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**THE FLORA OF
THE MALAY PENINSULA**

THE FLORA OF THE MALAY PENINSULA

BY
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STRAITS SETTLEMENTS

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INTRODUCTION

Area.—The Malay Peninsula as understood in this work comprises the whole area of mainland south of Lat. 7° N. to the island of Singapore, and the small islands within twelve miles of it in Lat. 1° N. Included in it are also the islands of Penang, Lankawi, Terutau and the Pulau Adang group on the west coast and the numerous small islands adjacent to the coasts both east and west. The whole area is approximately 52,820 square miles.

Climate.—Lying so near the equator, the climate is hot and very wet. The average maximum temperature throughout the peninsula is 90° Fahr., the average minimum (just before sunrise) is 70° Fahr. The variation in temperature in Singapore is between minimum 71° and maximum 87° . At each rise of 1000 feet elevation there is roughly a decrease of 3° , and at 7000 feet the maximum is about 70° , the minimum 50° . However, as much as 93° has been recorded at a height of 6335 feet.

Rainfall.—Taking the rainfall for nine years, the highest average at Thaiping was 163.53 inches per annum, the lowest average 70.22. In Singapore the rainfall varies from 82 inches to 123 inches in the year, and in the low country in the Federated Malay Straits it is about 90 inches. The North-East Monsoon commences about November, the South-East in the end of April or May. Rain falls on most days of the year, and in the south of the Malay Peninsula south of 6° N. there is no dry season, the only variation being that the heaviest rainfalls take place in December to the first fortnight of February, and in May there is often a short dry spell.

The air in the very dense and lofty forests which cover the centre of the Malay Peninsula is very humid at all times, the sun hardly penetrating the thick foliage.

North of Lat. 6° there is a considerable change of climate and a marked dry period occurs. I have seen the herbaceous plants in the rice-fields of Alor Sta quite dried up in February, but at present there have been no records kept of temperature or rainfall in this part of the peninsula.

Geology.—The Geology of the Malay Peninsula is as yet very incompletely known, but some valuable papers on it have been

published by Mr. Scrivenor, notably one in the *Quarterly Journal of the Geological Society*, vol. lxix, p. 343, June 1913, from which I condense the following brief account.

The oldest rocks *in situ* are the limestone rocks of the Raub series associated in Pahang with volcanoes. These, together with some calcareous shales, are apparently of Carboniferous age. The limestone rocks of the Malay Peninsula form detached masses on both sides of the main masses of granite from the north as far south as the Batu caves in Selangor on the west side and to Gunong Senyum in Pahang on the east side; north of the Batu caves we find these masses at Goping, Kwalá Dipang, Ipoh, Lenggong in Perak and Gunong Geriang in Kedah, and in the northern part of our area a great part of the Lankawi islands and Terutau and many rock masses in Perlis near Kanga are of the same formation; on the east side we have also Gunong Senyum and Kota Glanggi in Pahang, and Biserat in Jalor. Beyond our area we find great masses of limestone running through Trang and southern Siam to Tenasserim, Mergui, and up to Burma, the Shan States, Tonkin, and Laos, and limestones of the same age are known to occur in Sumatra, Borneo, Timor, and Rotti islands.

From north of Alor Sta in Kedah commences the main granite range which occupies the centre of the peninsula with outlying branches to Penang, the Dindings, Gunong Keledang, and as far south as Jelevu. Another granite ridge, the Benom Range, runs parallel to this on the east side from south of Kelantan into Negri Sembilan, and between these runs a range of foothills of quartzite; smaller granite ranges lie south of the end of the main range. Quartzite hills occur from the Kinta Valley to the Klang river mouth, and from the middle of Tringganu, including Gunong Tahan, lies an outcrop of quartzite running to the south of Rumpin. The quartzite forms also the main rocks of Pulau Tioman and Singapore. The hills of Bukit Timah and Bukit Mandai, however, are of granite.

These quartzite masses are called by Scrivenor the Gondwana rocks, while the granite is Mesozoic, dating sometime after the Trias and before the Eocene period. The weathering of the main Gondwana outcrop of quartzite and shales in Pahang accounts for the large area of sandy country on this coast.

Some Tertiary coal-deposits occur in Selangor, the flora of which, so far as I have seen it, much resembles that of the present-day Malay flora.

The great alluvial flat on the west coast of Selangor and Perak appears to be of very modern geological date. It extends westwards from the main chain for about thirty-six miles to the sea and consists mainly of stiff clays, generally yellow and ferruginous, containing masses of ironstone, formed by the iron-depositing bacterium, *Crenothrix*. The soil of the west coast-line, being thus argillaceous with but few sandy spots, accounts for the large area of mangrove

swamp and the absence of the sandhill flora so well represented on the east coast, where mangroves are nearly absent. The western alluvial flat is covered with a dense low-lying forest, while on the eastern coast the flat country forest is more open, and sandy plains covered with scattered bushes and patches of wood cover considerable areas. These sandy patches occur from Kelantan southwards to the east corner of Singapore, and bear a very different flora from that of the west coast.

Botanical Areas.—The whole area of the Malay Peninsula as included in this work falls botanically into two divisions, differing largely in climate, soil, and flora. The northern portion from the above-mentioned boundary line southwards to the mouth of the Kedah River, including the islands of Lankawi and Terutau, possesses a very distinct flora, having close relations with that of the Siamese territory south of Tenasserim and Mergui, upwards of forty genera being represented in this area which are unknown south of this line, while more than sixty genera well represented in the south part of the peninsula are missing. A few of these northern plants have crept down the coast as far as Province Wellesley and Pahang, probably (speaking geologically) in recent years, while some of the southern types have travelled as far north as Burma, where they are scantily represented. "One can gather from the flora that at no great distance of time the Malay Peninsula (the Golden Chersonese) was cut off from Burma south of Kedah by the sea" (Ridley, "Account of a Botanical Expedition to Lower Siam," *Journ. Roy. As. Soc. S. Br.* 57, p. 59). This is confirmed by the geology of the country so far as is known, and by early tradition. The soil of this area is sandy, with scattered masses of limestone rocks, and there appears to be a regular dry season which is absent from the south of the peninsula. The Pulau Adang group of islands, lying west of Terutau, however, contains more features of the southern flora and but little of the northern. The northern portion of our area is much smaller than the southern, and has only been botanically explored on the west side.

South of this line the whole flora and climate is altered. The greater part of this area is or was one continuous dense forest of large trees, many of which are 150 feet tall, making a thick canopy of foliage through which the sun's rays penetrate only here and there. On the highest boughs are many epiphytes, orchids, ferns, and other plants, while below is a dense mass of shrubs, seedling trees, palms, both erect and climbing, and a certain number of herbaceous plants. The proportion of trees and shrubs to herbaceous plants is very large, whereas in the northern part the plants are largely herbs and low shrubs, with very few trees over 80 feet high, while ferns, abundant in the south, are scarce. The climate is very wet, rain falling nearly every day, in fact this region is a typical example of the *Tropical Rain Forest region*, such as occurs also in Western

Africa and South America, but the Malayan forests are much denser than in either of these countries. This forest continues approximately uniform from the alluvial plains to about 3000 feet altitude, where the trees usually become smaller and do not attain the loftiness and bulk of those of the lower hills and plains, and many orders, such as *Anonaceæ*, *Dipterocarpaceæ*, *Myristicaceæ*, and *Aroideæ*, disappear.

The highest mountains that have been botanically explored, and which are believed to be the highest in the peninsula, are Gunong Tahan in Pahang, 7188 feet, and Gunong Kerbau in Perak, 7160 feet. The upper part of the former is a large sandstone plateau bearing a very distinctive flora, having the closest affinities with that of Mt. Kinabalu in Borneo. The flora of Gunong Kerbau is typically Malay peninsular. There is no trace in either of these mountains of the Himalayan palæarctic plants so characteristic of the lofty hills of Java and Sumatra, but this flora appears in the Telom valley in the Batang Padang district at 4000 feet altitude, where occur *Viola*, *Sanicula*, *Ophiopogon*, *Disporum*, and several other plants of this flora. Such evidence as there is goes to show in this a former connection with Sumatra rather than directly with the Himalayas.

Along the coast-line on the west are often extensive patches of mangrove swamp, the flora consisting of *Rhizophoras* two species, *Bruguieras* four, *Carapa*, and *Avicennia*, behind which is usually a patch of sand with *Lumnitzera*, *Podocarpus*, *Cynometra*, etc. On the east coast the country is more sandy and mangroves are scarce, only occurring in patches in the river-mouths. The characteristic trees here are *Casuarina* and *Thespesia*, bushes of *Scaevola*, and the porcupine grass *Spinifex*, with *Ipomœa biloba* creeping over the sand.

Distribution, etc.—Some attempt has been made in this work to indicate the comparative abundance of the different species and their distribution, but it is impossible, without a much more complete census of the flora than is or will be practicable for many years, to get a real idea of the abundance or rarity of most species. Many trees especially, by no means rare, have been seldom collected on account of the rarity of their flowering or of some difficulty (such as their immense height) of procuring specimens. Where a plant is recorded from all or nearly all the States it may be considered common.

It must be remembered that the parts of the peninsula which have been explored by any botanist are but a very small proportion of the whole area, and though Singapore, Malacca, Penang, and a good part of Selangor and Perak have been fairly well examined, most of the rest of the peninsula has been either explored on short expeditions or not visited at all. Where a species is known definitely to occur outside the Malay Peninsula its distribution is given, where no such data are given it is to be understood that so far as is known

the plant is endemic, *i. e.* confined to the Malay Peninsula. The number of these endemics is exceptionally large, being upwards of 3000 species, or about half the species recorded. But the adjacent lands, especially Sumatra, west and south Borneo and the southern Siamese regions, have as yet been very scantily explored, and further investigations will probably reduce the number of endemics considerably.

Owing to the very extensive clearing of the forests, especially in Singapore and Malacca and parts of Selangor and Johor, since the evolution of the cultivated rubber industry, a certain number of species have been either rendered very rare or probably entirely exterminated. Considerable areas which in 1890 were covered with a continuous almost impenetrable forest, probably now would not be found to bear a single indigenous plant.

All flowering plants known certainly to occur or to have occurred in the peninsula in a wild state are recorded and described, as well as all aliens which have established themselves sufficiently to propagate themselves naturally, but plants only known to occur in gardens are excluded, though the more conspicuous and well-known garden plants are mentioned where necessary.

Names of Places.—The names of localities given are in most cases readily found on the map of the Malay Peninsula as published by the Straits Branch of the Royal Asiatic Society, but I have failed to trace a few given by Kunstler and Scortechini. The latter collector seldom gave any specific locality on his collecting tickets, and his spelling and script where he did so make it difficult to identify his localities, *e. g.* one locality often given by him is quoted in books as Horum; I have reason to believe this means Arang Para near Gunong Bubu, in Perak. In a few cases I have given the English name instead of the Malay name where it is better known, *e. g.* Kedah Peak for Gunong Jerai, and Mt. Ophir for Gunong Ledang. The latter mountain is all through referred to Malacca territory, as it always was formerly included in Malacca; politically, however, it is now in the State of Johor.

The following Malay words for localities, etc., are constantly used :—

Bukit	.	.	.	.	.	Hill
Gunong	.	.	.	.	.	Mountain
Sungei	.	.	.	.	.	River
Kwala	.	.	.	.	.	Mouth of river
Ulu	.	.	.	.	.	Source of river
Tanjong	.	.	.	.	.	Cape
Pulau	.	.	.	.	.	Island
Ginting	.	.	.	.	.	Pass
Tasek	.	.	.	.	.	Lake
Teluk	.	.	.	.	.	Bend in a river
Dusun	.	.	.	.	.	Orchard

Kampong, campong	.	.	.	Village
Padang	.	.	.	Field, flat place
Rimbah	.	.	.	Forest
Hutan	.	.	.	Woods
Belukar	.	.	.	Secondary jungle

Native Names and Uses.—Where they have been obtained, the Malay names of plants as used in the peninsula have been given, as these are often useful to local botanists, for many of them are thoroughly well known to all Malays and strictly used for definite plants. To every name as given here the affix *Poko* (tree or shrub) or *Akar* (climber) is to be added, according to the habit of the plants. Grasses and small herbaceous plants are usually known as *Rumput*.

Pakis signifies a fern, and is supposed to be a variant of *Paku*, also used for ferns, which literally means a nail, and refers to the circinate vernation of a fern, and as a cycad has a similar vernation it is also called *Pakis*. *Lumut* (moss) is sometimes applied to moss-like plants, as the aquatic *Utricularias*. *Sakat* signifies an epiphyte, but the Javanese word *Angrek* is now generally used for epiphytic orchids. *Buah* (fruit), *Dauu* (leaf), *Bunga* (flower), *Akar* (root as well as climber), are commonly used when referring to these parts of a plant. The special *uses* of the plants described are added when of interest, but fuller accounts will be found in papers on the timbers, the fruits, poisons and materia medica of the Malays, published in the *Straits Agricultural Bulletin* and other local works.

Botanists and Plant Collectors in the Malay Peninsula.—I have given the names of the collectors of various species, partly on account of the interest that attaches to the older ones, and partly because the types of species are so frequently based on specimens collected in this country by certain collectors. Where no collector's name is given, it is to be understood that the plant was collected by the author.

The earliest voyagers to mention the plants of Malacca are Linschoten ("Voyages to the East Indies," 1583) and Garcia da Orta ("Historia Aromatum," 1593), who mention in these works a number of useful plants, chiefly fruits and spices that they met with in their travels.

The first regular collector of herbarium specimens was WILLIAM ROXBURGH, jun., son of the well-known W. Roxburgh; he collected plants in Penang in 1802.

NATHANIEL WALLICH, Superintendent of the Calcutta Botanic Gardens, visited Singapore and Penang in 1822, and made extensive collections there which were largely distributed and the study-set was incorporated in the Indian collections belonging to the Hon. East India Company. A lithographed catalogue (quoted *Wall. Cat.*) of these plants was published, and the study-set is now in the Kew Herbarium. He was assisted in this collection by several botanists, including W. Jack and G. Porter.

WILLIAM JACK, who collected in Singapore and Penang in 1819, described a number of species in the *Malayan Miscellanies*, published at Bencoolen, Sumatra, which rare work has been reprinted in the papers relating to Indo-China, vol. ii. p. 209, with notes by Hooker and Mr. D. F. Hervey, published by the Straits Branch of the Royal Asiatic Society.

GEORGE PORTER, a schoolmaster in Penang, who was later in charge of the Botanic Gardens of Ayer Hitam in Penang, also sent plants to Wallich, which were incorporated in the Wallichian collections, and GEORGE FINLAYSON, a surgeon to the East India Company, during his travels on an Embassy to Siam, 1821-22, took the opportunity of collecting plants in the forests of Penang, the Dindings, and Singapore, which collections were also sent to Wallich.

Mention, however, must be made of an earlier botanist :—

DR. WILLIAM HUNTER, who published an account of pepper cultivation in Penang in the *Asiatic Researches* in 1803. He published also an account of Gambir cultivation in *Trans. Linn. Soc.* in 1807. He wrote, too, a manuscript account of the plants of Prince of Wales Island (Penang) in 1802 or 1803. This paper, preserved in the British Museum, was published by the author of this work in the *Journal of the Straits Branch of the Asiatic Society*, No. 53, in 1909.

MR. W. E. PHILLIPS, who was Governor of Penang from 1820 to 1826, was interested in botany, and sent a number of plants to Sir William Hooker. These are now in the Kew Herbarium.

LADY DALHOUSIE, during her residence in Penang between 1829 and 1832, sent a small collection* also to Sir W. J. Hooker, which included the rare *Pteris Dalhousiæ* and *Lycopodium Dalhousiæ*.

COL. GEORGE WARREN WALKER collected plants in Singapore and Penang about 1837. His collections are at Kew and in the Natural History Museum.

HUGH CUMING (1791-1865) visited Singapore somewhere between 1835 and 1839, and was apparently the first botanist to ascend Mt. Ophir. He made very extensive collections, but at that time chiefly in the Philippines, and apparently only made flying visits to the Malay Peninsula. His collections are at Kew and the British Museum.

WILLIAM GRIFFITH, born 1810, was assistant surgeon to the East India Company in 1832, and collected plants extensively in Assam, Burma, Bhutan, and Afghanistan. He came to Malacca in 1841 and collected largely there, ascending Mt. Ophir, but returned to Calcutta after a year to take temporary charge of the Botanic Gardens there during Wallich's absence. He returned to Malacca in December, 1844, but, attacked by hepatitis, died in February, 1845. Considering the short time—little over two years—that he spent in Malacca, the extent of his collections and

writings on the flora is surprising. His collections are mainly at Kew.

THOMAS LOBB was a plant collector for Veitch about 1847. He visited the Himalayas, Borneo, and Java, and came to Singapore and Penang in 1848. He collected a good number of herbarium specimens besides living plants, and these were distributed later labelled Singapore, Lobb, and Java, Lobb, regardless of their original localities. Some labelled Singapore were undoubtedly obtained in the Himalayas, but most are Penang plants.

SIR WILLIAM NORRIS, Recorder of Penang, was a friend and fellow-traveller of Griffith. He collected plants in Penang and Malacca and sent a collection to Gardner of Ceylon, who named the genus *Norrisia* after him, and he also sent specimens to Sir William Hooker in 1849.

DR. THOMAS OXLEY resided in Singapore in 1843 and left in 1857, dying in England in 1886. He wrote papers on Botany published in *Logan's Journal*, and his name is associated with several plants—*Durio oxleyanus*, etc.

SURGEON-GENERAL ALEXANDER CARROLL MAINGAY. Born 1836. Arrived in Malacca in 1862, and was magistrate in charge of the jail till 1869, when he left for Rangoon, where he was also in charge of the jail, when he was killed in a mutiny the same year. He was in Singapore and also in Penang some part of his time, and made most important collections in all these places. His Herbarium with four volumes of botanical notes and drawings is preserved at Kew. It comprises the largest series of plants collected in the Malay Peninsula (only approached by Griffith's collections) up to that date. Many plants he obtained in Malacca have not been re-discovered and are perhaps extinct, owing to the extension of cultivation. His name is commemorated by the genus *Maingaya*, and also associated with many other species.

HERMANN KUNSTLER, a German, was employed by Dr. King in collecting plants, first in Singapore and then in Perak, from 1881 to 1886. His collections, with excellent descriptive tickets, were invaluable, and were distributed to several herbaria. He collected chiefly in the Thaiping Hills, near Goping, on Gunong Bubu and other localities in south Perak. He left the Malay Peninsula about 1886 and died in Australia.

FATHER BERTHOLD SCORTECHINI was a Roman Catholic missionary priest who came from Australia (where he had formerly collected plants) to Perak before 1884. He resided at the Perak Residency and collected extensively. His collections went to Calcutta and, like Kunstler's, were distributed thence. The distribution-tickets seldom bear any notes or localities, and I have had some difficulty in identifying his localities when he does give them. He obtained many plants which have never been re-collected. He died in 1886.

LEONARD WRAY, I.S.O., was appointed Superintendent of the Government Hill Garden in 1881, and Curator of the State Museum, Thaiping, 1883. He collected plants in the Thaiping Hills and made expeditions to the Batang Padang district, to Gunong Tahan with H. C. Robinson, and to other localities. His collections were distributed from Calcutta. He retired in 1908.

HENRY JAMES MURTON arrived in Singapore in 1875 and remained in charge of the Gardens till 1880. He collected a number of plants, visiting Kedah, Gunong Pulai in Johor, and Gunong Bubu in Perak. A few specimens remain in the Kew Herbarium, but the greater number and his manuscript flora of Singapore have disappeared. He died in Bangkok in 1881.

NATHANIEL CANTLEY succeeded Henry J. Murton in charge of the Gardens in 1880 and started the Herbarium there. He employed native collectors in Singapore, Malacca, and Negri Sembilan, and also collected in Singapore and other parts. His herbarium is still at Singapore Botanic Gardens. Many of the specimens were unfortunately unlocalised, but the collection was a very valuable one. He died in Tasmania in 1888. The genus *Cantleya* is named after him.

RICHMOND WILLIAM HULLETT, born 1843, headmaster of the Raffles School, was a good amateur collector at about this period, 1880. He collected in Singapore, Mt. Ophir, and Johor, and also in Java and Borneo, and made important additions to our knowledge of the flora. The genus *Hullettia* was named after him. He ceased collecting plants about 1888 and made over his herbarium to the Botanic Gardens, Singapore. He died in England in 1914.

After the death of Cantley, the author took charge of the Botanic Gardens in Singapore in 1888 and commenced collecting plants on as large a scale as possible. Having charge of the Colonial forests from 1888 to 1902, I had large opportunities of collecting in Singapore, Malacca, the Dindings, and Penang during the forest work, and also made expeditions to Johor, Negri Sembilan, Selangor, Perak, Province Wellesley, Kedah, and as far north as Setul, on the west coast, and to Pahang and Kelantan on the east coast. I retired in 1912, but later spent several winters in the Malay Peninsula continuing my researches. During my residence in Singapore I was materially assisted by a number of persons interested in botany, as well as officials on the staff of the Gardens and Forest Departments.

CHARLES CURTIS was in charge of the Penang Botanic Gardens from 1884 to 1903 when he retired. He collected the flora of Penang and published a list of the plants of Penang in the *Journal of the Straits Branch of the Asiatic Society*, vol. xxv, p. 67. He also made large collections in the Lankawi islands and Terutau and the Trang district, and also collected on the Hermitage Hill and Sungkai River in Perak. Many species of plants are named after him, as well as the genus *Curtisina*.

WALTER FOX, assistant in the Singapore Gardens, collected a small number of plants in Muar, and ROBERT DERRY, while in charge of the Gardens and Forest Department in Malacca, obtained a large collection of Malacca plants. Two Eurasian assistants in the Forest Department, S. GOODENOUGH and HOLMBERG, added many specimens obtained during their forest work in Singapore and Malacca.

LIEUT. H. J. KELSALL (now Lieut.-Col., D.S.O.) made an important collection in an expedition from the east to the west coast of Johor in company with HARRY LAKE in 1897, and also collected on Bukit Hitam in Selangor.

ALFRED DENT MACHADO, miner and planter, sent plants from Legoh, Kwala Lipis, and Kamuning, in Perak. He died in 1910. *Borassus Machadonis* is named after him.

E. ROSTADO sent the only plants known from Tringganu.

SIR WALTER NAPIER, Attorney-General, obtained specimens from Negri Sembilan, including *Webera Napieri*.

WARREN D. BARNES made a collection on K'luang Terbang in Pahang in 1900. He died in Hongkong in 1911.

DR. JOHN D. GIMLETTE sent a number of plants from Kota Bharu and Kwala Lebir in Kelantan, and published a useful book on Malay poisons and charm-cures, 1915, besides other works on local diseases and materia medica.

ALFRED M. BURN-MURDOCH, born 1868, was Conservator of Forests in the Malay Peninsula from 1904 till his death in Selangor in March, 1914. He collected a certain number of plants and published two numbers of "Trees and Timbers of the Malay Peninsula," 1911-1912. His name is associated with *Alpinia Murdochii*.

MOHAMMED HANIFF, overseer in the Penang Gardens from 1892 and in complete charge of them from 1912. He collected plants in Penang and also in Lankawi, Kedah, and on Gunong Kerbau in Perak, and has made many valuable additions to our knowledge of the flora.

HERBERT C. ROBINSON, director of the Federated Malay States Museums from 1903, and MR. CHARLES BODEN KLOSS did invaluable work in their explorations of the mountains of the peninsula. Mr. Robinson was the first man to ascend Gunong Tahan in Pahang, the highest mountain in the peninsula, bringing down with him the first collection of plants made above the altitude of 6000 feet. He and Mr. Kloss also collected plants on the mountains of Perak, Selangor, and Kedah, and in Lankawi islands and other places. Without these two collectors we should have known but little of the highland flora of the peninsula. I had the pleasure of accompanying them on several of their explorations, notably to Telom and Temengoh, Gunong Tahan, and Pulau Adang. Accounts of their botanical collections are published in the Journals of the

Linnean Society and of the Federated States Museums. The genus *Klossia* and very many species are associated by name with these energetic collectors. Other plants have been contributed by MR. J. H. BURKILL, Director of the Botanic Gardens, from Pulau Tiuman and elsewhere, and MR. J. C. EVANS, of the Forest Department of the Federated Malay States, sent plants from Pahang, and MR. F. W. FOXWORTHY, of the Forest Department, sent a large series from the Malay States.

Literature, etc.—To save space, references are only given to certain works, viz. the references to the original description of the species, references to King's "Materials for a Flora of the Malay Peninsula," and the "Annals of the Botanic Gardens, Calcutta," and to Hooker's "Flora of British India," which work contained all the species known in the Malay Peninsula at the date it was written. References are also given to good figures of the plants described.

The works mentioned give a full series of references from other works, as well as the synonyms which, unless necessary, are also excluded. King's "Materials" were published in the *Journal of the Asiatic Society of Bengal*, in different volumes, between the years 1889 and 1908, when he died, and Mr. J. S. Gamble continued the work, he previously having assisted Dr. King in some of the orders of *Gamopetalæ*.

The *Leguminosæ*, *Convolvulaceæ*, *Labiataæ*, and a few other orders were described by Sir David Prain, *Sonerila* by Dr. Stapf, *Acanthaceæ* and *Gentianaceæ* by Mr. C. B. Clarke, and the *Gesneraceæ* by the author of this work, all of these were published in the *Journal of the Asiatic Society of Bengal*. The *Apetalæ* and *Gymnosperms*, exclusive of the *Euphorbiaceæ* and the *Urticaceæ*, were described by Mr. Gamble in the *Journal of the Asiatic Society of Bengal*. The *Monocotyledons* were described by the author in three volumes independently under the title of "Materials for a Flora of the Malay Peninsula. *Monocotyledons* by H. N. Ridley, Singapore, 1907 to 1908."

The separate copies of King's and Gamble's "Materials" were paginated twice: on the top of the page is the pagination of the original article in the *Journal*, at the bottom of the page is the pagination of the "Materials" as a separate work. As the separate issue is rare and out of print, I have quoted the original pagination of the *Journal*. This is quoted as *King, Journ. As. Soc. Beng.*, the volume being given at the commencement of an Order or series of Orders.

Hooker's "Flora of British India" is quoted as *Hook. fl. F.B.I.*

The letters *l.c.* after a reference signify the last quotation of the work (*locus citatus*) referred to, thus: *Clarke, F.B.I. l.c. 27* signifies C. B. Clarke in Hooker's "Flora of British India," volume (last quoted), page 27.

<i>Roxb. Fl. Ind.</i>	.	.	.	.	Roxburgh's "Flora Indica."
<i>Bot. Mag.</i>	.	.	.	.	Curtis's <i>Botanical Magazine</i> .
<i> Ic. Pl.</i>	.	.	.	.	Hooker's "Icones Plantarum."
<i>Wight Ic.</i>	.	.	.	.	Wight's "Icones Plantarum."
<i>Journ. Roy. As. Soc. S. Br.</i>	.	.	.	.	<i>Journal of the Straits Branch</i> <i>of the Royal Asiatic Society.</i>
<i>Journ. F.M.S. Mus.</i>	.	.	.	.	<i>Journal of the Federated Malay</i> <i>States Museum.</i>
<i>Journ. Linn. Soc.</i>	.	.	.	.	<i>Journal of the Linnean Society.</i>

I have received advice and assistance in many points from Mr. J. S. Gamble and from the various members of the Kew Herbarium Staff.

H. N. RIDLEY.

May, 1922.

PLAN OF THE WORK

(*Provisional—May, 1922.*)

ANGIOSPERMÆ

DICOTYLEDONES

POLYPETALÆ VOL. I

GAMOPETALÆ VOL. II

APETALÆ VOL. III

MONOCOTYLEDONES

GYMNOSPERMÆ

INDICES

VOLS. IV
AND V

SYNOPSIS OF ORDERS

(*As in May, 1922.*)

Division: ANGIOSPERMÆ.

Flowering plants with the ovules enclosed in an ovary with a stigma.

Group: DICOTYLEDONES.

Plants with reticulate-nerved leaves. Petals, sepals, stamens and carpels in twos, fives, or multiples of these (except ANONACEÆ VI, perianth segments usually in threes.) Seeds with 2 cotyledons.

Section (A.) POLYPETALÆ.

Perianth of 2 whorls, sepals and petals (petals occasionally absent by abortion). Petals free not connate in a tube.

Sub-section (i). THALAMIFLORÆ

Calyx free from the ovary. Petals in one or more series, inferior. Stamens usually indefinite on a torus (receptacle). Ovary free, superior. (Orders I—XXVI.)

- I. RANUNCULACEÆ. Sepals 5. Petals in one series. Stamens many. Achenes (or follicles) apocarpous. Only climbers in this region.
- II. DILLENIACEÆ. Trees or climbers, one herb. Sepals persistent. Stamens numerous. Flowers showy, white or yellow. Follicles apocarpous.
- III. MAGNOLIACEÆ. Trees or shrubs. Stipules large covering buds. Flowers large, white or yellow. Stamens numerous; anthers narrow. Carpels numerous, separate spirally on an elongate axis.
- IV. WINTERACEÆ. Trees or shrubs, aromatic. Stipules none. Flowers small, axillary. Sepals 1 or 2 series. Petals many series. Stamens many to 15; anthers sub-globose. Carpels in one whorl.
- V. SCHIZANDRACEÆ. Lianes. Stipules none. Flowers unisexual. Sepals and petals 9 to 15. Stamens numerous, connate. Fruit a fleshy mass of carpels.

- VI. ANONACEÆ. Trees or lianes. Sepals and petals in threes; petals in 2 rows. Stamens indefinite, very short. Pistils several. Carpels usually stalked, drupes on a torus (in one genus follicular). Seed ruminant.
- VII. MENISPERMACEÆ. Climbers. Flowers very small unisexual. Sepals 6. Petals 6 or fewer. Stamens 6. Carpels 3 to 6, one-ovuled. Drupe, seed ruminant, often reniform.
- VIII. NYMPHÆACEÆ. Aquatic herbs. Sepals, petals and stamens indefinite. Carpels few or many in an obconic torus. Leaves peltate (Water lilies).
- IX. CRUCIFERÆ. Herbs. Sepals 4. Petals 4. Stamens 6 or 4. Ovary dimerous. Fruit a 2-valved pod.
- X. CAPPARIDÆ. Herbs, shrubs, trees. Sepals 4. Petals 4. Stamens many. Ovary 2- to 6-celled on a stalk (Gynophore). Leaves usually digitate. Fruit a berry or capsule.
- XI. VIOLACEÆ. Herbs or shrubs. Sepals 5. Petals 5. Stamens 5; anthers connivent round ovary and appendaged. Ovary 1-celled. Fruit a capsule. Flowers usually irregular.
- XII. PITTOSPOREÆ. Trees (or shrubs). Sepals 5. Petals 5. Stamens 5, not connivent. Flowers regular. Fruit capsule.
- XIII. POLYGALACEÆ. Shrubs, herbs or trees. Flowers irregular. Sepals 5. Petals 5 or 3. Stamens 8 or fewer. Ovary 2-celled. Fruit drupe, berry, capsule or samara.
- XIV. CARYOPHYLLACEÆ. Herbs. Leaves opposite. Sepals free or connate. Petals as many or absent. Stamens as many or twice as many. Placenta central. Fruit capsule.
- XV. PORTULACACEÆ. Succulent herbs. Sepals 2 to 5. Petals 4 or 5. Stamens 8 or many. Ovary half inferior; style 3- to 8-fid; capsule many-seeded.
- XVI. HYPERICINEÆ. Herbs, shrubs or trees. Leaves opposite. Sepals 5. Petals 5. Stamens many in bundles. Ovary of 3 to 4 carpels; styles 2 to 4. Fruit capsular.
- XVII. FLACOURTIACEÆ. Trees, shrubs or climbers. Flowers small usually unisexual. Petals often suppressed. Stamens 5 to many. Ovary 1-celled; styles 1 to 6. Fruit baccate or capsular.
- XVIII. GUTTIFERÆ. Trees exuding gum. Leaves opposite coriaceous. Flowers often unisexual. Sepals 4. Petals 4. Stamens many, often connate in bundles. Fruit, drupe or berry.
- XIX. TERNSTROEMIACEÆ. Trees or shrubs not gummy. Leaves alternate. Flowers bisexual. Sepals 3 to 5. Petals 5. Stamens many, free. Styles 3 to 5. Fruit, berry or capsule.
- XX. DIPTEROCARPACEÆ. Gigantic resinous trees. Leaves alternate, coriaceous. Flowers paniced. Sepals 5, free or connate. Petals 5, contort. Stamens 10 to 36. Ovary 3-celled; ovules 2 in a cell. Fruit, drupe, usually winged by the enlarged sepals.
- XXI. ANCISTROCLADACEÆ. Hooked climbers. Leaves coriaceous. Flowers small, paniced. Calyx tubular adnate to fruit, accrescent. Petals 5, imbricate. Stamens 5 to 10. Ovary 1 cell, 1 ovule; style globose or oblong. Fruit winged by enlarged sepals.

- XXII. BIXACEÆ. Shrubs. Leaves alternate, often lobed. Sepals 5. Petals large 5. Stamens numerous on a torus; anthers with 2 pores or valves. Style 1. Capsule 2- to 5-valved. Seeds numerous, small arillate or woolly.
- XXIII. MALVACEÆ. Herbs, shrubs or trees. Leaves alternate often lobed. Petals 5, large. Stamens numerous joined in a tube; anthers 1-celled. Fruit capsular.
- XXIV. STERCULIACEÆ. Herbs, shrubs, trees. Flowers often unisexual and petals suppressed. Stamens connate; anthers bilocular. Fruit a capsule.
- XXV. TILIACEÆ. Trees, shrubs, herbs. Leaves entire. Sepals 3 to 5. Petals as many. Stamens numerous free on a torus, 2-celled. Ovary 2- to 10-celled. Fruit, drupe, berry or capsule.
- XXVI. GONYSTYLACEÆ. Tree. Leaves coriaceous alternate. Sepals valvate 5, connate hairy. Petals numerous linear simple, bifid or trifid shorter than the calyx. Stamens many from calyx base. Ovary 5- or 4-celled; ovule 1 in a cell. Stigma clubbed. Fruit woody dehiscent. Seeds 1 or 2, large.

Sub-section (ii). DISCIFLOREÆ.

Calyx free from ovary. Petals in one row. Stamens definite in or round a fleshy disc often lobed or of glands. (Orders XXVII—XLV.)

- XXVII. LINEÆ. Climbing shrubs, trees, or herbs. Leaves alternate. Sepals 5. Petals 5. Stamens 5, 10, or 20, connate at base with 5 glands outside. Ovary 3- to 5-celled; ovules 1 to 2 in a cell; styles 3 to 5 more or less connate. Fruit capsular or drupe.
- XXVIII. MALPIGHIACEÆ. Climbers, small trees, or shrubs. Leaves opposite. Sepals 5. Petals 5, clawed often toothed. Disc inconspicuous. Stamens 10, connate at base. Carpels 3 (2 or 4); ovules 1 in each; styles 3. Fruit of 3-winged carpels or drupe.
- XXIX. OXALIDACEÆ. Trees, shrubs, or herbs. Leaves pinnate rarely simple. Flowers regular. Sepals imbricate, 5. Petals 5. Stamens 10. Ovary 5-lobed; ovules 1, 2, or many in a cell; styles 5, distinct. Fruit capsule or berry.
- XXX. BALSAMINACEÆ. Herbs. Leaves simple, usually opposite. Flowers irregular. Sepals petaloid, 3 to 5, one spurred. Petals 3, 2 side ones bilobed. Stamens 5; filaments very short. Ovary 5-celled; ovules many. Capsule explosively dehiscent.
- XXXI. RUTACEÆ. Trees or shrubs. Leaves opposite, often compound, glandular. Sepals 4 or 5. Petals 4 or 5 imbricate. Stamens as many or twice as many. Disc between stamens and ovary. Carpels 4 to 5 free or connate. Styles free or connate. Fruit, berry or of 2 or more dehiscent cocci.
- XXXII. SIMARUBACEÆ. Trees or shrubs, bark bitter. Leaves pinnate or simple. Flowers regular. Calyx 3- to 5-lobed. Petals 3 to 5. Disc annular or cup-shaped. Stamens as many or twice as many as petals. Ovary 2- to 5-lobed or carpels free 3 to 5; ovules usually solitary; styles 2 to 3. Fruit, drupe, capsule, or samara.

- XXXIII. **OCHNACEÆ.** Shrubs, trees, or trees. Leaves alternate, simple, coriaceous often serrulate. Flowers usually showy. Sepals 4 or 5, imbricate. Petals 5 (or 4 or 10). Torus large. Stamens 4 to many. Ovary 2- to 10-lobed, 1- to 10-celled; style 1. Fruit 3 to 10 drupes on enlarged torus, or berry.
- XXXIV. **BURSERACEÆ.** Trees or shrubs. Resinous. Leaves pinnate. Flowers small racemed or paniced. Calyx 3- to 5-lobed. Petals 3 to 5. Disc annular or cup-shaped. Stamens usually twice the petals on edge or base of disc. Ovary 2- to 5-locular; ovules 2 in a cell; style short. Fruit drupe or capsular.
- XXXV. **MELIACEÆ.** Trees. Leaves pinnate. Calyx 4- to 5-lobed. Petals 4 or 5 (3 to 7). Stamens 8 to 10 in a tube on base of disc. Anthers sessile in tube mouth. Disc ringed or tubular. Ovary 3- to 5-celled; ovules usually 2 in cell; style 1. Stigma simple. Fruit capsular. Seeds few, large, round, usually arillate or (*Cedrela*) winged.
- XXXVI. **CHAILETIACEÆ.** Shrubs or trees, often climbing. Leaves simple alternate, stipulate. Flowers small in cymes axillary. Sepals 5. Petals 5, bilobed. Stamens 5. Disc 5 glands or 5-lobed. Ovary 2- to 3-celled. Drupe.
- XXXVII. **OLACINEÆ.** Trees or shrubs, rarely climbing. Leaves simple, alternate, rarely opposite. Cymes or racemes axillary. Flowers small, green or white. Calyx 4- to 5-toothed. Petals 4 to 5 (rarely 6) free or connate. Stamens equal or twice as many opposite petals. Ovary 3- to 5-celled; ovules 2 to 3. Fruit a drupe, 1-celled. Seed 1.
- XXXVIII. **ILICINEÆ.** Trees or shrubs. Leaves alternate, simple. Inflorescence axillary cymose. Flowers very small, white or pink. Calyx 4- to 5-lobed. Petals 4 (to 6) connate at base. Stamens as many attached to corolla. Anthers oblong. Disc o. Ovary ovoid 4- to 6-celled; ovules 1 or 2 in cell; style short or o. Berry small of 4 to 8 pyrenes.
- XXXIX. **CELASTRINEÆ.** Trees or shrubs. Leaves simple opposite or alternate. Inflorescence cymose. Flowers small, green or white. Calyx 4- to 5-lobed imbricate. Petals 4 to 5 imbricate. Stamens 3 to 5 (rarely 2 to 10) on disc. Disc large, flat. Ovary sessile on disc, 3- to 5-celled; ovules usually 2 in a cell; style simple. Stigma entire or lobed. Fruit various.
- XL. **RHAMNACEÆ.** Shrubs erect or climbing, often spiny. Leaves simple alternate or opposite. Flowers small in axillary cymes, green or yellow. Calyx-tube obconic with 4 to 5 small lobes. Petals 4 to 5. Stamens 4 to 5, opposite petals. Disc thick or lining calyx. Ovary 3- (or 2- to 4-) celled, free or immersed in disc; ovule 1 in cell; style simple. Stigma simple or 3-lobed. Fruit drupe, capsule, or samara.
- XLI. **AMPELIDEÆ.** Shrubs or climbers. Leaves alternate, pinnate, or simple. Cymes paniced or raceme, opposite leaves. Flowers small, green or red. Calyx 4- to 5-toothed. Petals 4 to 5 free or cohering. Stamens 4 to 5 opposite petals. Disc between stamens and ovary. Ovary 5- to 6-celled immersed in disc; ovules 1 to 2 in cell; style short or o. Stigma round. Fruit a berry.

- XLII. SAPINDACEÆ. Trees or shrubs, rarely climbing. Leaves alternate compound. Flowers small white, green, pink. Sepals 4 to 5 free or connate imbricate. Petals 0 to 5, often unequal. Disc often unilateral. Stamens usually 8 within disc. Ovary entire or lobed 3- (or 1- to 4-)celled; style 1 (rarely 2 to 3), terminal or from between lobes; ovules 1 to 2 in cell. Fruit, drupe or capsule.
- XLIII. STAPHYLEACEÆ. Trees (or shrubs). Leaves opposite, compound. Flowers small, white, paniced. Sepals and petals 5 each. Stamens 5. Disc flat or ring-like. Ovary 2- to 3-lobed; styles 3, free or connate. Fruit, a berry, 3-celled. Seeds few or many albuminous.
- XLIV. SABIACEÆ. Shrubs or trees, rarely climbing. Leaves alternate simple or pinnate. Flowers small or minute. Calyx 4- to 5-lobed. Petals 4 or 5 imbricate. Disc annular. Stamens 4 or 5 opposite petals, often only 2 fertile; filaments clubbed. Anther connective wide; cells dehisce transversely. Ovary 2- to 3-celled or lobed; ovules 1 to 2 in a cell; styles free or connate. Carpels in fruit 1 or 2 drupaceous.
- XLV. ANACARDIACEÆ. Trees with caustic resin. Leaves alternate, rarely opposite, simple or compound. Flowers small, green, white or pink, often unisexual. Calyx 3- to 7-lobed. Petals 3 to 7 (or 10). Disc annular. Stamens twice the number of petals from base of disc, often some sterile. Ovary 1-celled (rarely 2- to 5-celled); styles 1 to 3. Fruit, drupe or indehiscent nut, sometimes winged with calyx-lobes.

Sub-section (iii). CALYCIFLORÆ.

(a) *Calyx-tube enclosing or adnate to ovary. Petals, one row insert on calyx-tube. (Orders XLVI—LII.)*

- XLVI. CONNARACEÆ. Lianes or small trees. Leaves alternate pinnate. Flowers racemed or paniced, small. Calyx 4- to 5-lobed. Petals 5, linear-oblong imbricate. Stamens 5 to 10. Disc 0 or surrounding stamens. Carpels 5 (rarely 1 to 3), 1-celled. Styles slender. Capsule a follicle. Seed 1, arillate.
- XLVII. LEGUMINOSÆ. Trees, shrubs, climbers, herbs. Leaves alternate compound stipulate. Flowers large or small, irregular (*Mimoseæ* regular). Sepals 4 to 5, free or connate. Petals 5 (or fewer). Stamens as many or numerous free or connate. Ovary 1-celled carpel; style 1. Fruit a pod (rarely drupaceous), 2-valved. Seeds 1 to many, hard.
- XLVIII. ROSACEÆ. Trees or shrubs (or herbs). Leaves simple or compound alternate. Stipules 2. Calyx tubular, 5-lobed lined by disc. Petals on edge of disc 5. Stamens many. Ovary of one or more carpels connate and adnate to calyx-tube; ovules 2 in capel; styles 1 or more. Fruit a drupe, apple, or many drupelets on a torus.
- XLIX. SAXIFRAGACEÆ. Shrubs, trees, or herbs. Calyx 5- to 12-lobed, free or adnate to ovary. Petals 4 to 5. Stamens as many or twice. Disc between stamens and ovary. Ovary of 2 to 5 carpels more or less separate; styles as many, more or less connate. Fruit, capsule or berry. Seeds usually minute.

- L. DROSERACEÆ. Insectivorous herbs. Leaves rosulate or scattered, covered with sticky hairs. Flowers small racemed. Calyx tubular 4- to 8-lobed. Petals 4 to 8, spatulate. Stamens as many. Ovary globose or ovoid, 1-celled; styles 3 to 5. Capsule many-seeded.
 - LI. CRASSULACEÆ. Herbs fleshy. Leaves opposite or alternate. Flowers cymose. Calyx 3- to 5-lobed or tubular. Petals as many. Stamens perigynous as many or double. Carpels as many as petals, free, 1-celled. Ovules very many; follicles membranous.
 - LII. HAMAMELIDÆ. Trees or shrubs. Leaves alternate. Flowers capitate. Sepals and petals various or 0. Ovary inferior or half inferior of 2 carpels connate at base, tips free; ovules 1 or many.
- (b) *Ovary quite inferior included and adnate to calyx-tube. Style one, rarely more. Leaves simple. (Orders LIII-LX.)*
- LIII. HALORAGÆ. (Occurrence doubtful.) Herbs or shrublets. Flowers minute, often unisexual and incomplete. Carpels 1-seeded.
 - LIV. RHIZOPHORACEÆ. Mangrove trees. Leaves opposite, coriaceous. Stipulate. Seed germinating in calyx, emitting a long root.
 - LV. LEGNOTIDÆ. Trees. Leaves opposite, stipulate. Flowers small. Stamens 8 to 12. Ovary many-ovuled (half inferior in *Gynotroches*). Fruit baccate or drupe.
 - LVI. ANISOPHYLLÆ. Shrubs and trees. Leaves alternate. Flowers very small. Ovary quite inferior; styles 3 to 4. Fruit drupe.
 - LVII. COMBRETACEÆ. Climbers or trees. Flowers small. Petals 5 or quite suppressed. Stamens 5 to 10. Ovary 1-celled; ovules 2 to 6. Fruit drupe or 4- to 6-winged samara. Seed 1.
 - LVIII. MYRTACEÆ. Trees or shrubs. Leaves opposite. Stamens indefinite. Ovary 1- to 2-celled; ovules 2 to many. Fruit, drupe or capsule.
 - LIX. MELASTOMACEÆ. Herbs, shrubs, trees. Leaves opposite, usually 3-nerved. Sepals imbricate. Stamens definite; anthers opening by terminal pores. Berry, capsule or drupe.
 - LX. LYTHRACEÆ. Herbs, shrubs, trees. Leaves opposite, entire. Sepals valvate. Stamens definite. Ovary usually free from sepals, 2- to many-celled; ovules and seeds many.
 - LXI. ONAGRACEÆ. Herbs (shrubs or trees). Leaves often toothed. Sepals valvate. Stamens definite. Ovary 2- or 1-celled, quite inferior. Capsule.

(c) *Ovary inferior, unilocular, placentas parietal. Styles more or less divided (except Samydaceæ). Leaves often lobed. Flowers unisexual.*

- LXII. SAMYDACEÆ. Shrubs or trees. Flowers small. Leaves alternate. Stamens 4 to 15 with alternating staminodes or glands. Petals 0 to 15.
- LXIII. TURNERACEÆ. Herbs, bisexual. Petals showy. Stamens 5. Ovary free from calyx; styles 3. Stigmas fan-shaped.

- LXIV. PASSIFLORACEÆ. Climbers, bisexual (one a tree). Leaves alternate, often lobed. Petals usually large, a corona in the mouth of the tube. Stamens 3 to 5. Ovary free on a stalk; style trifid. Fruit berry or capsule, many-seeded. (*Modecca unisexual*.)
- LXV. CUCURBITACEÆ. Herbs, climbing. Leaves alternate, lobed. Flowers unisexual, yellow or white. Stamens 3; anthers connate. Style divided (or simple). Ovary quite inferior.
- LXVI. BEGONIACEÆ. Herbs unisexual. Leaves alternate. Flowers white or pink. Sepals 2. Petals 2, all petaloid. Stamens numerous, connate. Ovary 3- to 5-celled; styles 3 to 5. Fruit angled or winged, usually capsular.
- LXVII. DATISCEACEÆ. Trees (or herbs). Leaves alternate. Flowers unisexual, small. Petals 0 (or 8). Ovary 1-locular; ovules many; styles 2 to 8. Fruit capsular.
- LXVIII. CACTACEÆ. Fleshy shrubs, spiny, no leaves. Petals and stamens indefinite. Fruit berry. (Introduced only.)
- LXIX. FICOIDEÆ. Herbs, some fleshy, not spiny. Leaves simple. Petals 5 or 0 (in *Sesuvium* sepals coloured). Stamens 5. Ovary inferior. Fruit capsule.
- (d) *Ovary inferior, 2-celled, 2-ovuled. Styles free.*
Flowers in umbels.
- LXX. UMBELLIFERÆ. Herbs. Leaves often dissect. Fruit in 2 dry indehiscent carpels.
- LXXI. ARALIACEÆ. Shrubs or trees. Leaves usually alternate, palmate. Fruit fleshy with 2 seeds.
- LXXII. CORNACEÆ. Trees or shrubs. Leaves opposite, entire. Flowers in panicles. Fruit a drupe, 1- to 2-seeded.

Section (B.) GAMOPETALÆ.

Petals connate in a tube.

Ovary inferior, 2- or more-celled.

- LXXIII. CAPRIFOLIACEÆ. Shrubs, usually exstipulate. Flowers in corymbs. Leaves opposite.
- LXXIV. RUBIACEÆ. Herbs, shrubs, trees. Stipules conspicuous. Flowers often axillary in cymes. Leaves opposite, entire.
- LXXV. COMPOSITÆ. Herbs, shrubs, trees. Flowers small in involucre heads. Ovary 1-celled, 1-ovuled. Calyx-limb reduced to a pappus or 0. Leaves alternate, often dissect.
- LXXVI. STYLIDÆ. Herbs. Flowers irregular. Stamens 2 connate with the style. Leaves radical or scattered on stem, alternate.
- LXXVII. GOODENOVIÆ. Herbs and shrubs. Leaves alternate. Flowers irregular. Stamens 5, free.
- LXXVIII. LOBELIACEÆ. Herbs. Flowers irregular. Stamens connate round the style. Fruit berry.

- LXXIX. CAMPANULACEÆ. Herbs. Flowers regular. Stamens 5. Seeds numerous.
- LXXX. VACCINIACEÆ. Shrubs. Leaves often serrate. Anthers opening by pores or tubular. Resemble *Ericaceæ* except inferior ovary. Fruit berry.
- Ovary superior. Corolla regular.*
- LXXXI. ERICACEÆ. Shrubs or trees. Flowers showy. Anthers opening by pores. Fruit capsular (rarely baccate).
- LXXXII. MONOTROPEÆ. Leafless parasites. Sepals 3 to 4. Petals 3, free. Stamens 6.
- LXXXIII. EPACRIDÆ. Heath-like shrubs. Flowers small. Anther splitting longitudinally. Fruit in our species a small drupe.
- LXXXIV. PLUMBAGINÆ. Herbs. Calyx sticky. Ovary 1-celled, 1-ovuled. Placenta central.
- LXXXV. PLANTAGINÆ. Herbs. Leaves basal. Flowers small, scarious in a spike or head. Stamens long, slender. Ovary 2-celled, many ovuled. Capsule circumsciss. Seeds several.
- LXXXVI. MYRSINÆ. Trees and shrubs. Leaves simple. Flowers rather small, pink or white, glandular. Fruit a drupe. Ovary with central placenta.
- LXXXVII. SAPOTACEÆ. Big trees, laticiferous. Corolla-tube short. Stamens as many as lobes or double, attached to corolla. Fruit a berry or drupe.
- LXXXVIII. EBENACEÆ. Trees. Flowers unisexual, sexes different in shape. Stamens free from corolla. Berry.
- LXXXIX. STYRACEÆ. Trees and shrubs. Corolla-tube usually short. Stamens twice as many, or more. Ovary 1, few-seeded. Drupe.
- XC. OLEACEÆ. Shrubs, erect or climbing, or trees. Stamens 2. Fruit, drupe.
- XCI. APOCYNACEÆ. Trees or climbers, rarely herbs, laticiferous. Corolla-tube usually long, lobes contort. Stamens and lobes 5. Fruit, drupe or capsule with seeds plumed.
- XCII. ASCLEPIADEÆ. Climbing or epiphytic herbs, laticiferous. Flowers small, tube short. Stamens connate into a column with style. Fruit capsular. Seeds plumed.
- XCIII. LOGANIACEÆ. Herbs, climbers, or trees. Stamens and corolla-lobes 4 to 5. Ovary bilocular. Resemble *Rubiaceæ*, except that the ovary is superior or half superior.
- XCIV. GENTIANACEÆ. Herbs (some floating aquatic). Leaves in terrestrials opposite. Stipules 0. Corolla-lobes contort. Capsule bivalved or irregularly dehiscent.
- XCV. HYDROPHYLLACEÆ. Herb. Leaves alternate. Corolla-lobes imbricate (or contort). Stamens 5. Ovary 2-celled; styles 2. Capsule 2-valved or irregularly dehiscent.
- XCVI. BORAGINÆ. Shrubs, trees, or herbs. Flowers panicled or in scorpioid cymes. Stamens as many as petals. Styles 2 or 1, two cleft. Ovary 2-celled. Fruit of 2 pyrenes, 1- to 2-seeded or 4-seeded.

- XCVII. CONVOLVULACEÆ. Climbers. Corolla plicate. Stamens 5, on corolla-tube. Fruit capsular, globose or baccate. Seeds few, large.
- XCVIII. CARDIOPTERIDÆ. Herbaceous climber or tree. Flowers small. Sepals and petals imbricate. Fruit a winged samara.
- XCIX. SOLANACEÆ. Herbs or shrubs. Corolla plicate. Carpels many-seeded. Fruit berry or capsule. Seed small.

Corolla irregular. Upper stamens smaller or reduced to a staminode.

- C. SCROPHULARINEÆ. Herbs, rarely shrubs, leafy. Ovary 2-locular. Capsule many-seeded.
- CI. OROBANCHACEÆ. Leafless parasites. Ovary 1-celled, placenta parietal.
- CII. LENTIBULARIÆ. Aquatic or marsh herbs with minute bladders on branches at base. Ovary 1-celled; placenta basal, central.
- CIII. GESNERACEÆ. Herbs, terrestrial or epiphyte. Leaves alternate or rosulate. Flowers showy. Capsule usually slender. Seed small, numerous, sometimes plumed. Fruit a dry berry in *Cyrtandra*.
- CIV. BIGNONIACEÆ. Trees or climbers. Leaves compound. Seeds winged. Fruit a long bivalved capsule.
- CV. PEDALINEÆ. Herbs. Leaves entire. Capsule many-seeded, oblong. Seeds small.
- CVI. ACANTHACEÆ. Herbs or shrubs or climbers. Ovary 2-celled; ovules 2 to 4. Capsule bivalved. Seeds discoid on elastic retinacula.
- CVII. VERBENACEÆ. Shrubs, trees, or herbs. Ovary entire. Fruit of 2 to 4 pyrenes in pulp.
- CVIII. LABIATÆ. Herbs often aromatic; stems 4-angled. Ovary 4-lobed. Fruit of 4 nutlets.

Section (C.) APETALÆ.

Perianth simple of one whorl of leaves or absent.

Flowers bisexual.

- CIX. NYCTAGINEÆ. Shrubs or herbs, rarely trees. Perianth tubular; base persistent in fruit. Carpel 1. Style 1.
- CX. AMARANTACEÆ. Herbs. Perianth scarious. Ovary 1-celled; style often 3-fid. Fruit a utricle.
- CXI. POLYGONACEÆ. Herbs. Leaves sheathing at base. Perianth pink or white. Ovary 1-celled, 1-seeded; style 2- to 3-fid.
- CXII. ARISTOLOCHIACEÆ. Shrublets or climbers. Perianth tubular. Ovary inferior. Fruit capsular.
- CXIII. CYTINACEÆ. Leafless parasites. Ovary inferior or half inferior.

Flowers unisexual.

- CXIV. NEPENTHACEÆ. Scandent shrubs. Leaves ending in pitchers. Flowers in racemes. Fruit capsular. Seeds winged.
- CXV. PIPERACEÆ. Herbs. Leaves entire. Flowers minute usually bisexual, no perianth. Ovary superior, 1-celled, 1-seeded. Fruit drupe.
- CXVI. CHLORANTHACEÆ. Herbs. Leaves toothed. Flowers minute, unisexual. Perianth 0. Stamens 1 to 2. Ovary inferior; ovule 1.
- CXVII. MYRISTICACEÆ. Trees. Flowers small, unisexual. Perianth 2- to 4-lobed. Stamens connate from perianth base. Ovary 1, in perianth base, 1-celled, 1-ovuled. Fruit, drupe splitting. Seed large, covered with red aril.
- CXVIII. MONIMIACEÆ. Trees or shrubs. Flowers unisexual. Perianth cup-shaped, 2- or more-lobed. Stamens embedded in a disc lining it, very many. Ovaries many, 1-seeded. Fruit, berry or drupe.
- CXIX. LAURINEÆ. Trees (one leafless parasitic climber), unisexual. Perianth 4- to 6-lobed in 2 series. Stamens as many or more; anthers opening by valves. Drupe.
- CXX. HERNANDIACEÆ. Trees or climbers. Leaves alternate. Flowers small, unisexual or bisexual. Perianth superior 4- to 8-lobed. Stamens 3 to 5, opening by valves or introrse. Ovary 1-celled, 1-ovuled. Fruit winged or calyx an enlarged cup.

Flowers bisexual to CXXVII.

- CXXI. PROTEACEÆ. Trees or shrubs. Leaves opposite. Perianth tubular; lobes 4 to 5. Stamens as many. Style very long. Drupe.
- CXXII. THYMELEACEÆ. Trees and shrubs. Leaves opposite. Perianth tubular; lobes 4 or 5. Drupe.
- CXXIII. ELEAGNACEÆ. Scandent shrub. Leaves silvery scaly beneath, alternate. Perianth small, constrict above ovary; lobes 4. Stamens 8. Drupe.
- CXXIV. LORANTHACEÆ. Shrubby parasites. Perianth often coloured, tubular splitting on one side, 5-lobed. Ovary inferior, Drupe.
- CXXV. SANTALACEÆ. Shrubs or trees. Flowers very small. Ovary inferior. Drupe or capsule.
- CXXVI. OPILIACEÆ. Shrubs. Flowers very small, bisexual. Stamens as many as the petals and opposite them. Petals gamosepalous or free. Ovary 1-celled, 1-seeded. Fruit drupe.
- CXXVII. BALANOPHORACEÆ. Fleshy parasites, leafless, red or yellow. Flowers unisexual.
- CXXVIII. EUPHORBIACEÆ. Herbs, shrubs, or trees. Flowers unisexual. Perianth single, double or 0. Stamens numerous, connate. Ovary 3-celled. Styles 3. Fruit splitting into bivalved cocci, 3-seeded or fleshy with 3 seeds. Often laticiferous.

- CXXIX. URTICACEÆ. Herbs, shrubs, or trees. Trees laticiferous. Flowers very small in unisexual heads or spikes or cymes, or mixed in a cupped receptacle (Figs). Perianth 2- to 4-lobed. Ovary 1-celled, 1-ovuled. Styles 2.
- CXXX. JUGLANDACEÆ. Trees. Leaves pinnate. Unisexual. Inflorescence of catkins. Perianth 0. Stamens many. Ovary 1-celled, 1-seeded. Fruit (in our species) winged.
- CXXXI. MYRICACEÆ. Shrubs and trees. Inflorescence a catkin, unisexual. No perianth. Stamens 2 to many. Ovary 1-celled, 1-seeded. Drupe.
- CXXXII. CASUARINEÆ. Trees. Branches slender, jointed, no leaves. Inflorescence spiked. Perianth 1- to 2-lobed, minute. Stamens 1. Head of fruit cone-like, separate fruits capsular. Seed winged.
- CXXXIII. CUPULIFERÆ. Trees. Inflorescence spicate. Perianth minute or 0. Stamens many. Ovary inferior, 3- to 5-celled, 2 ovules in cell. Nut in or on an involucre, ringed or spiny (Oaks and chestnuts).
- CXXXIV. SALICINEÆ. Shrubs or trees. Catkins unisexual. Perianth of scales. Stamens 2 to many. Ovary 1-celled. Capsule 2- to 4-valved. Seed very small, plumed (Willows).

Group: MONOCOTYLEDONES.

Embryo with a single cotyledon. Perianth trimerous. Leaves parallel-veined; vascular bundles irregularly scattered in the stem.

Ovary inferior. Perianth petaloid.

- CXXXV. HYDROCHARIDEÆ. Aquatic herbs. Flowers regular, usually unisexual. Stamens 3 to 12.
- CXXXVI. ORCHIDEÆ. Herbs often epiphytic. Flowers irregular. Stamens and pistil united in a column; anther 1. Capsule, seeds very many, minute.
- CXXXVII. ZINGIBERACEÆ. Herbs, rarely epiphytic. Flowers irregular. Stamen 1. Style 1, free. Capsule, seeds few.
- CXXXVIII. MARANTACEÆ. Herbs. Flowers irregular. Stamens 1-celled on a petaloid lobe. Staminodes petaloid, one hooded, one lip-like. Capsule, seeds few.
- CXXXIX. CANNACEÆ. Herbs. Sepals 3. Petals 3 in a tube at base. Staminodes petaloid; anther 1-celled, on one side of a petaloid lobe.
- CXL. LOWIACEÆ. Herbs. Flowers irregular, lip large. Stamens 5.
- CXLI. MUSACEÆ. Gigantic herbs. Flowers tubular. Calyx 3- to 5-lobed split on one side. Petal 1. Stamens 5. Fruit in our species baccate.
- CXLII. APOSTASIACEÆ. Herbs. Flowers regular. Stamens connate at base; anthers 2 or 3. Style free except at base. Capsule or berry.
- CXLIII. AMARYLLIDACEÆ. Herbs, tuberous or bulbous. Flowers regular. Sepals and petals similar 6. Stamens 6. Ovary 3-celled; style simple, long, free to base. Capsule.

- CXLIV. TACCACEÆ. Herbs, tuberous or rhizomed. Flowers regular. Sepals and petals similar. Stamens enclosed, hooded, 6. Ovary 1-celled. Berry.
- CXLV. DIOSCOREACEÆ. Usually tuberous, unisexual climbers. Sepals and petals small, green. Stamens 6 or 3. Fruit trigonous or 3-winged (one genus erect, flowers larger, bisexual).
- Ovary superior. Flowers petaloid.*
- CXLVI. ROXBURGHIIACEÆ. Herbs, often scandent. Sepals 2. Petals 2. Stamens 4. Ovary 1-celled. Capsule bivalved.
- CXLVII. LILIACEÆ. Herbs or shrubs. Sepals 3. Petals 3, similar. Ovary 3-celled. Fruit, capsule drupe or berry.
- CXLVIII. PONTEDERIACEÆ. Aquatic herbs. Flowers regular. Sepals and petals 6 similar, blue or pink. Stamens 6. Fruit capsular.
- CXLIX. PHILYDRACEÆ. Herbs. Leaves sword-shaped. Flowers irregular. Sepals larger than petals, 4. Stamen 1.

Ovary superior. Sepals herbaceous. Carpels connate.

- CL. XYRIDEÆ. Herbs. Leaves radical grassy. Flowers in a head of brown bracts. Sepals glumaceous, 3, 2 or 0. Petals 3, yellow, connate below in a tube.
- CLI. COMMELINACEÆ. Herbs. Sepals herbaceous 3. Petals very thin 3. Stamens 6 (or less). Capsule containing 1 to few seeds.
- Carpels free.*
- CLII. ALISMACEÆ. Aquatic herbs. Flowers regular. Sepals 3. Petals 3. Carpels several, separate.
- CLIII. TRIURIDEÆ. Minute leafless epiphytes. Flowers unisexual. Sepals and petals 3 to 8, connate at base. Stamens in male 2 to 6. Pistils in female numerous, free.
- CLIV. NAIADACEÆ. Submerged herbs. Flowers axillary, unisexual. Perianth transparent, tubular. Stamen 1. Carpel 1. Oblong seed 1.

Ovary superior. Perianth small, rigid or fleshy, not petaloid.

- CLV. FLAGELLARIACEÆ. Herbs or woody climbers. Leaves entire. Stamens 6.
- CLVI. PALMACEÆ. Trees or shrubs. Leaves rigid, pinnate or fan-shaped, lobed. Sepals and petals coriaceous or fleshy, 6. Stamens 6 or more. Ovary 1- to many-celled, usually 3-celled. Fruit a drupe or berry.

Ovary superior. Sepals and petals none or reduced to scales.

- CLVII. PANDANACEÆ. Shrubs. Leaves stiff, thorny, linear. Flowers unisexual in spadices (elongate or compact spikes), no perianth. Carpels solitary or connate, numerous in heads, woody.
- CLVIII. AROIDEÆ. Herbs or shrubby erect or climbing. Leaves not stiff or armed. Spadices solitary in a convolute spathe. Flowers unisexual on the same spike or bisexual. Perianth 0, or 3 to 9 scales.

- CLIX. LEMNACEÆ. Minute lenticular or sub-globose floating herbs, no stem. Flowers minute in a spathe. Stamens 1 to 2. Flowers sessile in heads or spikelets. Bracts glumaceous. Perianth lobes glumaceous or 0, very small.
- CLX. ERIOCAULACEÆ. Herbs. Flowers unisexual, crowded in globose white involucrate heads. Perianth segments 4 or 6 in 2 whorls, minute. Ovary 3- or 2-celled.
- CLXI. RESTIACEÆ. Stiff herbs. Flowers usually unisexual in spikelets. Perianth segments 6, glumaceous. Ovary 3-celled.
- CLXII. CYPERACEÆ. Herbs. Culms triangular or terete, pithy. Flowers uni- or bisexual in spikelets, numerous. Glumes (bracts) imbricate. Perianth usually 0 (occasionally 3 to 6 scales or bristles).
- CLXIII. GRAMINEÆ. Grasses, herbaceous except the bamboos, culms terete, hollow (except *Saccharum*, etc.). Flowers in spikelets usually bisexual. Glumes usually several in a spikelet. Perianth 0. Stamens 3 to 6, elongate. Ovary 1-celled, 1-seeded.

Division : GYMNOSPERMEÆ.

Trees, shrubs, climbers. Flowers unisexual in spikes or cones. Perianth 0, except *Gnetaceæ*. Ovary and style 0. Ovule nude.

- CLXIV. GNETACEÆ. Trees or lianes. Leaves broad, entire. Perianth in male bilobed, in female tubular. Stamens in a column. Drupes.
- CLXV. CONIFERÆ. Trees or shrubs. Leaves usually linear entire. Female flowers in a catkin or cone or solitary. Fruit a cone, seed winged or when flowers solitary, drupe.
- CLXVI. CYCADEÆ. Stem a thick trunk. Leaves pinnate, at top only. Inflorescence a large cone. Male scales covered with 1-celled anthers. Female scales usually woolly, toothed with ovules in the notches. Drupe large.

FLORA OF THE MALAY PENINSULA

VOLUME I

ORDER I. RANUNCULACEÆ.

Perennial herbs or climbing shrubs. Leaves (alternate) or opposite, simple or compound. Flowers regular, bisexual. Sepals 4, 5 or more, often petaloid. Petals 5 or more or absent. Stamens indefinite, free. Carpels numerous, distinct, each with a solitary pendulous or erect ovule. Seed with a minute embryo in abundant endosperm. Only section in our area *Clematideæ*, climbing shrubs with opposite leaves. Abundant in temperate and cold regions, rare in the tropics and usually at high altitudes. Genera 30. Species 300.

Petals none, climbing by the petiole	1. CLEMATIS
Petals many, narrow, linear, spreading	2. NARAVELIA

1. CLEMATIS, L.

Woody climbers. Leaves opposite, simple (or compound) climbing by the petiole. Sepals 4 to 8, valvate, petaloid. Petals 0. Stamens numerous. Carpels many with long feathery tails. Species about 100, chiefly in temperate climates.

(1) *C. smilacifolia* Wall. *Asiat. Research*, xiii. 414; *Bot. Mag. t.* 4259; *King, Journ. As. Soc. Beng.* lviii. (2), 363.

A slender climber with simple ovate leaves, rarely pinnate, blunt, base broad, sub-cordate, 5- to 9-nerved, coriaceous, entire or serrate, 3 to 10 in. long, 1.5 to 5 in. wide; petioles as long. Panicles axillary, few-flowered, 6 to 12 in. long. Flowers 1 to 1.5 in. wide. Sepals 4 or 5, oblong, pale brownish yellow, tomentose outside, deep purple within. Filaments linear, yellow. Achenes flat, pubescent with feathery tails, 2 in. long. *Hab.* Low country in open places, rare. Johor, Kota Tinggi; Pulau Tinggi. Penang; Road to Sungei Penang at 1000 ft. altitude (Curtis). *Distrib.* India, Siam, Malay islands.

2. NARAVELIA, DC.

Woody climbers, slender. Leaves opposite, tri-foliate, terminal leaflet forming a tendril. Sepals 4 or 5. Petals 6 to 12, narrow,

linear, longer. Achenes long, stipitate, with long bearded tail. Indo-Malaya, species 3.

Flowers in panicles; leaves 4 to 6 in. long (1) *N. laurifolia*
 Flowers solitary or in threes, axillary; leaves 2 in. long (2) *N. axillaris*

(1) *N. laurifolia* Wall. Cat. 4685; Hook. fil. F.B.I. i. 7; King, Journ. As. Soc. Beng. l.c. 360.

Long climber young parts only pubescent. Leaflets broadly ovate, acuminate entire, 4 to 6 in. long, 2 to 3 wide, deep green. Panicles lax many-flowered, 6 in. long, 8 in. across. Sepals lance-olate, .1 in. long, blunt glabrous. Petals linear narrow, .5 in. long,



FIG. 1.—*Naravelia laurifolia*.

apple green. Stamens numerous yellow. Achenes cylindric glabrous, tails silky. *Hab.* Not rare, from 400 ft. to 2000 ft. altitude, in thickets. From Selangor, Semangkok Pass north to Perak, Penang and Tomoh (Machado). *Distrib.* Whole Indo-Malayan regions.

A pretty climber, flowers scented like orange blossom.

(2) *N. axillaris* Ridl. Journ. Roy. As. Soc. S. Br. 59, p. 60.

Slender pubescent climber. Leaflets ovate, 2 in. long, $1\frac{1}{2}$ in. wide or solitary toothed, or trilobed larger; nerves pubescent. Flowers solitary axillary or in threes. Sepals .1 in. long, green.

Petals linear clubbed, green. Stamens numerous yellow. Pistils hairy. *Hab.* Hedges in rice-fields. Perlis at Kanga (Ridley).

ORDER II. DILLENIACEÆ.

Trees, shrubs or climbers, rarely herbs. Leaves alternate simple, toothed or entire exstipulate. Flowers in panicles or racemes, yellow or white, often large and showy. Sepals 5, imbricate persistent. Petals 5, rarely 3 or 4, deciduous. Stamens many, hypogynous, multiseriate, anthers introrse. Carpels 1 to 5 free, or cohering. Styles distinct, ovules solitary or many attached to the ventral suture. Fruit of coriaceous dehiscent or indehiscent follicles. Seeds 1 to many, usually arillate, albuminous. Tropics of both hemispheres. (*King, Journ. As. Soc. Beng.* lviii. (2), 4.)

Tribe 1. DELIMEÆ. Woody climbers; filaments dilated upwards.

Carpel 1	.	.	.	.	.	.	.	1. DELIMA
Carpels 2 to 5	.	.	.	.	.	.	.	2. TETRACERA

Tribe 2. DILLENIÆ. Herb, shrubs or trees; filaments not dilated.

Herb, stemless; leaves radical	3. ACROTREMA
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Trees or shrubs; follicles dehiscing expanding; seeds conspicuously arillate	4. WORMIA
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Trees; follicles not expanding nor dehiscing enclosed in the thickened pulpy sepals; seeds not arillate	5. DILLENNIA
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1. DELIMA, L.

Woody climbers. Leaves scabrid, obovate. Flowers small, white, paniced numerous. Sepals 5. Petals 2 to 5. Stamens numerous, filaments dilated upwards, anther-cells much diverging. Carpels solitary. Style subulate, ovules 2 to 3. Follicles ovoid 1-seeded. Seed arillate. Species 1, tropical Asia.

(1) *D. sarmentosa* L. *DC. Prodr.* i. 69; *Bot. Mag. t.* 3058; *Hook. fl. F.B.I.* i. 31; *King, l.c.* 362.

Leaves obovate, ovate or lanceolate-entire or serrate, pilose scabrid; nerves 11 to 9 pairs, 2.5 to 3.5 in. long, 1 to 2 in. wide; petioles .4 to .5 in. Flowers very numerous, fragrant, $\frac{1}{4}$ to $\frac{1}{3}$ in. across, in large spreading panicles. Sepals rounded, hairy on edge. Petals ovate-orbicular, white. Stamens and pistil white, the latter becoming red. Follicle .5 in. long, ovoid, beaked, hairy. *Hab.* River banks and forest edges. Common over the whole peninsula (except Singapore) from Johor, Sungei Tebrau, north to Siam. *Distrib.* India, Malaya, China. *Native names:* Ampelas putih; Ampelas hari betina; Ampelas Tikus. *Use:* Leaves used for smoothing wood.

Only the form *hebecarpa*, with hairy fruit occurs here. *D. lævis*, Maingay, *King, l.c.* is *Tetracera borneensis*, Miq.

2. TETRACERA, L.

Climbing shrubs with scabrid leaves. Flowers in terminal or lateral panicles, moderately large, white. Sepals 4 to 6. Petals as many. Stamens many, filaments dilate upwards, anther-cells distant. Carpels 3 to 5 rarely 1, developed only. Ovules many, in 2 series. Follicles coriaceous ovate or fusiform, seeds 1 to 5, aril fimbriate. Species about 30, all tropical regions.

Follicles ovoid 3 to 5 developed ; medium sized.

Leaves lower ones at least 3 to 6 in. wide.

Leaves glabrous; panicles short pubescent . . . (1) **T. macrophylla**

Leaves pubescent beneath; panicles long velvety . . . (2) **T. grandis**

Leaves small up to 2 in. wide.

Leaves obovate pubescent beneath; panicle short . . . (3) **T. lucida**

Leaves elliptic-lanceolate glabrous; follicles .5 in. long, shining.

Leaves toothed; panicles terminal 5- to 6-flowered . . . (4) **T. assa**

Leaves entire; panicles dense 1 to 2 in. axillary . . . (5) **T. sylvestris**

Follicles small 2; panicles lax, many-flowered, flowers smaller.

Leaves very stiff shining entire; panicle terminal 6 to 9 in. long.

Nerves beneath rather prominent, transverse nervules inconspicuous; panicles very lax 9 in. long . . . (6) **T. sumatrana**

Nerves beneath strongly elevate, nervules invisible; panicle lax 6 in. long . . . (7) **T. fagifolia**

Leaves thin toothed; panicles axillary and terminal 4 in. long or less . . . (8) **T. fragrans**

Leaves stiff coriaceous entire, transverse nerves conspicuous.

Follicles 1 or 2 long fusiform and beaked . . . (9) T. borneensis

(1) **T. macrophylla** Wall. Cat. 6628 (*T. macrocarpa* Wall. in sched.); Hook. fil. F.B.I. i. 32; King, l.c. 363.

A rough climber. Leaves broadly elliptic, lower ones very large, 5 to 7 in. long, tip rounded almost truncate, base cuneate 3.5 in. wide; nerves 13 pairs, strong, glabrous, stiffly coriaceous; petioles 1.6 in. long, stout. Panicle 9 in. long, rather dense, pubescent. Flowers numerous, nearly 1 in. across. Sepals obovate obtuse, ribbed, short pubescent, edges ciliate, inside silky. Follicles 2 to 3 ovoid beaked smooth, glabrous, hardly longer than the sepals. *Hab.* Edges of forests and dry woods, very common but rarely flowering. Singapore to Penang. *Distrib.* Sumatra. *Native names:* Ampelas (Mempelas) Rimbah; A. Lidah Kuching; A. Gajah; A. Rimau.

(2) **T. grandis** King, l.c. 362; *Ann. Bot. Gard. Calc.* v. (2), p. 115, pl. 129.

A large tree. Young branches and inflorescence velvety tomentose. Leaves large, coriaceous, elliptic to slightly obovate, tip truncate, edges crenate or undulate towards tip, base rounded glabrous above, tomentose beneath; nerves 14 pairs; 8 to 10 in.

long, 5·5 in. wide; petioles ·5 in. long. Panicle lateral or terminal, over 1 ft. long, velvety, flowers peduncled. Sepals 5, ovate, sub-acute, ribbed and tomentose, ·5 in. long. Petals as long, narrower. Follicles ovoid, glabrous, with a slender curved beak. *Hab.* Perak, no locality (Scortechini), very rare, only once collected.

If, as Scortechini says, this is a tree, it is the only one in the genus. The specimens somewhat resemble *T. macrophylla* Wall., but the whole inflorescence is velvety.

(3) **T. lucida** Wall. *Cat.* 6631. *T. euryandra* Hook. *fil.* *F.B.I.* i. 32 (not Vahl) King, *l.c.* 362.

Woody climber, young parts pubescent. Leaves stiff, obovate to oblong obtuse, entire, lower ones large, 6 in. long, 2·5 in. wide, upper ones crowded, 1 in. long and as wide, apex truncate or rounded, base broad; nerves 5 pairs; above glabrous, beneath strigose on midrib and nerves; petioles ·1 in. long, pubescent. Panicles terminal and axillary compact, few branched 1 to 3 in. long, pubescent. Sepals elliptic to oblong, ·2 in. long, hairy on both surfaces. Petals oblong, little longer, obtuse, white. Follicles 1 or 2, ovoid, ·2 in. long. *Hab.* Borders of woods. Singapore and Malacca. Common but seldom flowering.

var. *lanuginosa* Ridl. 20 to 30 ft. long, epiphytic, leaves narrowed at the base, obovate, margins sinuate; panicles and sepals thickly red woolly. *Hab.* Perak, Larut below 200 ft. altitude (Kunstler).

Apparently confined to the Malay Peninsula, *T. euryandra* Vahl., is a very different species from New Caledonia.

(4) **T. assa** DC. *Syst. Veg.* i. 402; Hook. *fil.* *F.B.I.* i. 63; King, *l.c.* 362. *T. trigyna* Roxb. *Fl. Ind.* ii. 645.

A rather slender woody climber never tall, often forming bushes in open country. Leaves ovate-lanceolate obscurely sinuate or toothed, glabrous except the nerves beneath, 2 to 5 in. long, 1 to 1·5 in. wide. Panicles axillary and terminal, 1 to 2 in. long, few-flowered. Sepals glabrous within, obovate, usually tipped red. Petals obovate, pure white or flushed pink, ·3 in. long. Stamens numerous long, tipped rose pink. Carpels usually 2, ovoid beaked glabrous, ·5 in. long. *Hab.* Common over the whole peninsula in open ground, orchards and in hedgerows. *Distrib.* Java, Siam, Cochinchina. *Native names*: Ampelas; P'las payah; Mempelas Minyak. *Use*: The stems are twisted into ropes.

T. trigyna Roxb., collected in Penang, was erroneously referred by Hooker to *T. laevis* Vahl., of India and Ceylon. Types in Herb. Kew show that it was *T. assa*.

(5) **T. sylvestris** Ridl. *Journ. Roy. As. Soc. S. Br.* 54, p. 8.

A tall woody forest climber 60 ft. long. Leaves oblong cuspidate not scabrid, entire narrowed to the blunt base, 3 to 6 in. long, 1·5 to 3 in. wide; petioles ·2 in. long. Panicles axillary and terminal,

1.5 to 2 in. long, few-flowered. Sepals 4, obovate pubescent, silky inside and on edges, green. Petals .4 in. long, spathulate white. Stamens very numerous, white, short. Carpels 4, green. Follicles .5 in. long, shining glabrous, 2 or 3. *Hab.* In forests low country, Singapore, Garden Jungle; Changi. Malacca (Maingay); Merlimau. Negri Sembilan, Tampin. Selangor near Batu Caves. Perak, Tapa (Wray). *Distrib.* Borneo.

(6) **T. sumatrana** Miq. *Fl. Ind. Bat. Supp.* i. 689.

A tall woody climber. Leaves coriaceous, smooth lanceolate, base cuneate, scabrid above; quite glabrous, 3 to 5 in. long, 2 in. wide; nerves 8 pairs; petioles .5 in. long, slender. Panicle lax, 6 to 8 in. long, tomentose, branches few distant. Sepals silky, hairy on the edge and in the middle on the inner side. Petals as long, orbicular. *Hab.* Rare in forests, Singapore, in the Garden Jungle and at Selitar. Penang on Government Hill (Curtis). *Distrib.* Sumatra.

(7) **T. fagifolia** Bl. *Bijdr.* 4; *Ridl. Journ. Roy. As. Soc. S. Br.* 54, p. 10.

Strong woody climber. Leaves ovate-lanceolate entire, base round, rigid, glabrous; nerves 8 pairs, prominent beneath; 3 to 5 in. long, 2 in. wide; petioles .4 in. long. Panicle terminal, lax, rather stout, 6 in. long, silky hairy. Flowers numerous, small. Sepals .1 in. long, silky on the edge and in the centre inside. Petals twice as long. Stamens short. *Hab.* Not common. In forests, Singapore, Garden Jungle and Selitar (Ridley). *Distrib.* Java.

(8) **T. fragrans** Ridl. *Journ. Roy. As. Soc. S. Br.* 59, p. 62.

A low sarmentose shrub. Leaves elliptic or oblanceolate, edges at the tip sinuate or dentate, 3 to 6 in. long, 2 to 2.75 in. wide; nerves 9 to 11 pairs. Panicle lax, 6 to 10 in. long, hairy. Flowers half an inch across, numerous, fragrant. Sepals ovate, glabrous except the ciliate margin. Petals oblong, white. Carpels 2, glabrous. *Hab.* North region, Perlis and Setul on open heaths. *Distrib.* Siam.

(9) **T. borneensis** Miq. *Ann. Mus. Bot. Lugd. Bat.* iv. 76. *Delima lævis*, Maingay MSS. King, l.c. 362.

Climber. Leaves oblong-lanceolate to narrowly elliptic acute, entire base cuneate or rounded, coriaceous, glabrous above, pubescent beneath, midrib strigose; nerves 8 to 9 pairs, prominent; 5 to 7.5 in. long, 2 to 2.5 in. wide; petioles .8 in. long, winged. Panicles longer than the leaves, dense, not spreading, many-flowered, 6 in. long, tomentose. Sepals rounded, silky within, edge ciliate. Petals short. Follicles 1 or 2, elongate, conic, acuminate with a long point .5 in. long, .12 in. through at the base, glabrous. *Hab.* Very rare, only collected by Maingay in Malacca, April 10, No. 1570. *Distrib.* Borneo.

A true *Tetracera* with only one or two follicles, which are peculiar in their unusual length and form.

3. ACROTREMA, Jack.

Herbs with woody rhizomes and large, rosulate, membranous leaves with sheathing stipules. Scape short axillary. Sepals 5, hairy. Petals 5, fugacious, yellow. Stamens numerous in three bundles alternating with the carpels; filaments filiform; anthers with porous dehiscence. Pistils 3. Styles subulate recurved. Ovules 2 or more. Follicles 3, irregularly dehiscent. Seed with membranous aril, testa crustaceous, pitted. S. India, Ceylon and Malay Peninsula, 10 species, 8 of which are Cinghalese.

(1) *A. costatum* Jack, *Mal. Misc.* i. No. 5, p. 36; *King, l.c.* 363.

Stem usually short to 6 in. long. Leaves obovate dentate ciliate, base narrowed sagittate, hairy, deep green often with a grey central line, or marked with red, 4.5 to 12 in. long, 2.3 to 4 in. wide, spreading flat. Scape 2.5 to 3.5 in. long, erect 8- to 10-flowered, setose reddish. Flowers opening singly, an inch across, bright yellow. Sepals ovate-lanceolate acute, hairy, setose. *Hab.* In dense wet forest on rotten leaves or on rocks. Common from Johor to Kedah, Lankawi islands and Kelantan. Absent from Singapore and Malacca.

4. WORMIA, Rottb.

Trees or shrubs. Leaves broad, coriaceous, ovate or obovate; nerves many, parallel; petioles winged or not. Flowers large, yellow, rarely white, in terminal racemes or few-branched panicles. Sepals 5, persistent closing over the fruit after fertilization, and expanding again with the dehiscence. Petals 5, obovate, thin. Stamens indefinite in several series, outer row usually longer than the inner; anthers linear, opening by 2 pores. Carpels 5 to 10. Ovules numerous. Follicles cartilaginous, dehiscent along the inner face and widely expanded, pink or more rarely white. Seeds black with a red aril. Species about 20, tropical Asia to Australia, one in Madagascar.

A. *Alatæ*. Petioles strongly winged enclosing bud.

- | | | |
|----------------------------------------------------|-----|------------------------|
| Flowers large, yellow, young parts nearly glabrous | (1) | <i>W. subsessilis</i> |
| Flowers large, yellow, young parts white floccose | (2) | <i>W. suffruticosa</i> |
| Flowers small, white | (3) | <i>W. albiflos</i> |

B. *Exalatæ*. Petioles terete, not winged; plant quite glabrous.

- | | | |
|----------------------------------|-----|----------------------|
| Flowers 3 to 4 in. across | (4) | <i>W. oblonga</i> |
| Flowers 2 in. across | (5) | <i>W. pulchella</i> |
| Midrib beneath and petiole hairy | (6) | <i>W. parviflora</i> |
| Leaves hairy beneath | (7) | <i>W. tomentella</i> |

(1) *W. subsessilis* Miq. *Fl. Ind. Bat. Supp.* i. 618; *Ann. Mus. Bot. Lugd. Bat.* i. 315, t. 9; *Ridl. Journ. Roy. As. Soc. S. Br.* 54, p. 4.

A very large shrub 20 ft. tall, rooting by its branches and forming large thickets. Shoots and leaves (except for a few hairs on the midrib) glabrous. Leaves ovate or oblong-ovate, obtuse mucronulate, distinctly serrate, base broad, 8 to 12 in. long, 6 to 7 in. wide; petioles $1\frac{1}{2}$ in. long, strongly winged. Raceme of 5 or 6 flowers. Bracts lanceolate, pink, .5 in. long. Flowers 5 in. across. Sepals 5, ovate-obtuse, ciliate, outer pair red. Petals 5, obovate,



FIG. 2.—*Wormia subsessilis*.

yellow. Stamens white, outer row shorter, yellow. Carpels 7. Follicles when expanded conspicuous, rose pink, sutures white, 1 in. long. Seeds $\frac{1}{5}$ in. long, black, aril scarlet. *Hab.* Common in swampy open country in the south, in Singapore and Johor and Pahang. *Distrib.* Banca and Borneo. *Native names:* Simpoh Gajah; Simpoh Ayer.

(2) *W. suffruticosa* Griff. *Notulæ* iv. 706; *Ic.* iv. t. 6496; *Ridl. l.c.* 5; *King, Journ. As. Soc. Beng. l.c.* 364 (*in part*).

A shrub, straggling up to 10 ft., not rooting by the branches,

usually 4 to 6 ft. tall. Young parts including inflorescence floccose with white hairs. Leaves obovate, more dentate, base broader than in *W. subsessilis*, sparsely hairy; petioles hairy. Racemes stouter and woolly. Sepals hairy on the edge. Petals larger, more obovate, bright yellow. Stamens white. *Hab.* Open wet country. Singapore at Stagmount and Jurong. Johor, Sedenah. Common in Malacca. Negri Sembilan, Seremban (Cantley). Selangor, Rawang (Goodenough). *Native names*: Champurna; Simpoh Ayer.

(3) **W. albiflos** Ridl. *Journ. Roy. As. Soc. S. Br.* 54, p. 6.

A large pubescent shrub. Leaves elliptic, oblong narrowed to the rounded base, tip acute, edges serrate; nerves 24 pairs; 7 to 10 in. long, 3 to 4 in. wide, pubescent above, densely tomentose beneath; petioles 1 to 1.5 in. long, sheathing softly pubescent. Panicles from upper axils; peduncles 3 in. long with 2 branches, pubescent. Sepals 5, obovate rounded, pubescent, .5 in. long. Petals obovate, glabrous, white, .5 in. long. Stamens numerous, subequal, glabrous. Carpels silky. *Hab.* Rare in wet woods at Tebing Tinggi, Johor (Ridley).

(4) **W. oblonga** Wall. *Cat.* 951; *Hook. fil. F.B.I.* i. 35.

A tree about 40 ft. tall, glabrous except the sparsely tomentose young branches. Leaves oblong or elliptic acute at both ends, deep green, entire to serrate; nerves 9 to 12 pairs; 6 to 8 in. long, 3 to 5 in. wide; petioles 1.5 in. long, channelled. Racemes terminal or axillary, few-flowered, tomentose. Flowers 3 to 4 in. across. Sepals ovate, tomentose. Petals obovate, clawed, light yellow. Carpels 8 to 10. *Hab.* Open lowland country and edges of woods. A very handsome floriferous tree. Pahang, Malacca (very common), Selangor, Perak, Prov. Wellesley and Kedah. *Distrib.* Sumatra. *Native names*: Simpoh Ayer; Kambai hutan; Simpoh Padi.

(5) **W. pulchella** Jack, *Mal. Misc.* ii. 70; *Hook. fil. F.B.I.* i. 36; *King, l.c.* 865.

A much-branched spreading tree about 40 ft. tall. Leaves obovate to obovate-oblong obtuse entire coriaceous, dark green shining, retuse, glabrous; nerves 5 to 7 pairs; 2.5 to 4 in. long, 1.5 to 2.5 in. wide; petioles channelled, .75 in. long. Pedicels slender, 2 in. long. Flowers 2 in. across, solitary axillary, pale yellow. Sepals broadly ovate, glabrous. Petals ovate. Stamens short, oblong, blunt, .4 in. long, rose pink. Seeds with red aril. *Hab.* Damp places in open country, Singapore, Malacca, Pahang, Perak. *Distrib.* Sumatra and Borneo.

(6) **W. parviflora** Ridl. *Journ. Roy. As. Soc. S. Br.* 54, p. 6.

A small tree. Branches pubescent. Leaves broadly lanceolate or ovate-lanceolate, membranous, base narrowed, tip acute, edge nearly entire; nerves 18 pairs, reticulations conspicuous, glabrous above except midrib, beneath hairy; petioles slender, .5 to 1 in. long, pubescent. Flowers few, small on short peduncles, .5 in.

long, pedicels 1 in. long. Bracts linear, densely hairy. Sepals obovate, $\frac{1}{2}$ in., densely hairy. Petals obovate crisped, little longer. Stamens, inner series longer, glabrous. *Hab.* Rare and only known from Malacca, at Merlimau and Ayer Panas, collected by Derry and Curtis. *Native name*: Simpoh Bukit.

(7) *W. tomentella* Mart. *Malesia*, iii. 159; *Ridl. Journ. Roy. As. Soc. S. Br.* 54, p. 5.

A tree 40 ft. tall, stem 2 to 3 feet through, with a large crown; branches pubescent. Leaves elliptic, obtuse at both ends, entire; nerves 13 pairs; glabrous above, hairy beneath; 6 to 10 in. long, 5 in. wide; petioles 1 to 2 in. long, pubescent, channelled. Racemes axillary, 6 in. long, pubescent. Sepals oblong obtuse, dull red, glabrous, 1 in. long. Petals broad spatulate, rounded, 1.5 in. long, .75 in. wide, light yellow. Stamens yellow, inner series longer, reddish, with 2 pores. Carpels 7, glabrous, red. Follicles widely expanding, white. *Hab.* Borders of jungle, Singapore, Bukit Timah; Garden Jungle. Johor, Tebrau Road. *Distrib.* Borneo.

5. DILLENIA, L.

Trees or large shrubs, resembling *Wormia*, but the flowers are more often solitary, and the carpels more numerous. The sepals after fertilization close over the carpels, and do not spread again, becoming often pulpy. The follicles do not expand and are indehiscent, cohering, the seeds exarillate. Species about 10, tropical Asia, Australia.

Flowering with the leaves, flowers large.

Flowers 6 to 9 in. across, white; fruit very large . . . (1) *D. indica*

Flowers 2 to 5 in. wide, yellow, flowering before leaves.

Leaves 4 in. long, oblong, blunt, velvety beneath . . . (2) *D. ovata*

Leaves 8 in. long, elliptic rounded, sparsely pubescent . . . (3) *D. aurea*

Leaves 18 in. long, lanceolate denticulate, many
nerved . . . (4) *D. grandifolia*

Leaves 10 to 18 in. long, obovate-elliptic, many
nerved . . . (5) *D. reticulata*

Flowers small, 1 in. across, appearing with leaves.

Leaves hairy; petals yellow; small tree . . . (6) *D. meliosmæfolia*

Leaves glabrous; petals 0; big tree . . . (7) *D. Scortechinii*

(1) *D. indica* L. *Sp. Pl.* 535; *Hook. fil. F.B.I.* i. 36; *King, l.c.* 366.

A tree 20 to 40 ft. tall with red bark; branches tomentose. Leaves coriaceous, lanceolate to ovate-lanceolate, serrate, glabrous above and strongly ribbed, bright green, beneath pubescent; nerves 30 to 40 pairs, conspicuous, 8 to 12 in. long, 3 to 4 in. wide; petioles 1 to 1.5 in. long, sheathing at the base. Flowers solitary, axillary, 6 to 9 in. across, on tomentose pedicels 2 to 3 in. long. Sepals orbicular, concave, green, fleshy. Petals white, obovate-oblong,

very caducous. Inner stamens longer. Carpels 20. Stigmas lanceolate, recurved. Fruit 6 in. in diameter. Sepals much thickened. Carpels follicular mucilaginous, seeds many, small reniform, hairy. *Hab.* River banks, wild; often planted elsewhere. Singapore. Malacca. Pahang, river bank, Pulau Tawar. Perak, Temengoh. Kelantan, Lebir river. The wild form here has smaller flowers than the Indian form. *Native name*: Simpoh or Chimpuh. *Use*: The pulp of the fruit used as a hair-wash.

(2) **D. ovata** Wall. *Cat.* 945; *Hook. fil. F.B.I.* i. 36; *King, l.c.* 366.

A rather straggling laxly branched tree, about 15 ft. tall; branchlets tomentose. Leaves coriaceous ovate or obovate rounded, tip rounded or emarginate, minutely toothed or entire; nerves 16 to 20 pairs, pubescent above, otherwise glabrous, beneath tomentose, 3.7 to 7 in. long, 2.75 to 3.5 in. wide; petioles 1 in. long, tomentose. Flowers solitary, 6 to 8 in. across, very showy, on tomentose peduncles 2.5 in. long. Sepals ovate, tomentose outside. Petals obovate, brilliant yellow, caducous. *Hab.* Rare on sandy or rather dry spots. Pahang, Tahan river. Selangor, Kwala Kubu. Perak, Temengoh. Penang (Wallich).

(3) **D. aurea** Sm. *Ex. Bot.* 93 t. 92; *Hook. fil. F.B.I.* i. 37; *King, l.c.* 367. *D. ornata*, Wall. *Pl. As. Rar.* i. 21. t. 33.

A low wide-branched tree, young parts silky. Leaves obovate blunt or acute crenate dentate, glabrous above except the nerves, 20 pairs, pubescent puberulous beneath, 5 to 8 in. long, 3 to 4.5 wide; petioles 1.25 to 2 in. long, sheathing at base. Flowers solitary on shortened branches, 4 to 5 in. across, bright yellow on 1 in. peduncle. Sepals oblong-obtuse, pubescent when young, later glaucous. Petals obovate. Stigmas 10. *Hab.* North of the peninsula on open rocky spots. Setul and Pulau Adang (Ridley). *Distrib.* Siam, India.

(4) **D. grandifolia** Wall. *Cat.* 946; *Hook. fil. F.B.I.* i. 38; *King, l.c.* 368.

A low straggling tree (or fide Keith, 45 ft. tall), shoots densely silky. Leaves oblong-lanceolate-acute, serrate glabrous above except the pubescent midrib, densely softly tomentose beneath, nerves 50 pairs; 14 in. long, 6 in. wide; petioles 3 in. long, pubescent. Flowers produced before the leaves, showy, axillary solitary. Sepals oval rounded, hairy. Petals oblong, spatulate, 2.5 in. long, 1 in. wide at tip, bright yellow. Carpels 12, greenish yellow. *Hab.* Rare, north of the peninsula on dry hillsides. Kedah, near Alor Sta. "Mons convult. dula" Penang (Wallich); Malacca (Griffith). *Distrib.* Siam.

Griffith's specimens are leaves only, and therefore doubtful. Wallich's locality may mean Former Convalescent Hill.

(5) **D. reticulata** King, *l.c.* 367.

A medium-sized or large tree. Leaves very coriaceous, obovate-

elliptic, base truncate cordate, above glabrous except nerves, beneath pubescent midribs and nerves very prominent, reticulations conspicuous; nerves 32 to 36 pairs; 10 to 18 in. long, 7 to 12 in. wide; petioles 2 to 3 in. long. Panicles axillary and terminal, 10- to 12-flowered, pubescent outside. Petals oblong, 1.5 in. long. Carpels 9, puberulous. *Hab.* Rare. Province Wellesley. Perak (Scortechinii). *Distrib.* Tongka.

(6) **D. meliosmæfolia** Hook. fil. *F.B.I.* i. 36; *Ridl. Journ. Roy. As. Soc. S. Br.* 54, p. 7.

A tall slender tree. Leaves soft bright green, glabrous above, pubescent beneath, obovate-lanceolate to elliptic-acute, entire or minutely serrate base acute; nerves 14 to 18 pairs, 5 to 8 in. long, 3 to 4 in. wide; petioles 1 in. long. Flowers axillary, solitary, 3 in. across, on peduncles 2 in. long, tomentose. Sepals 5, ovate silky. Petals 5, oblong obtuse narrowed at base 1.5 in. long, .5 in. wide, lemon yellow. Stamens outer 2 or 3 rows shorter, yellow, inner longer, white. Carpels 10, white. Fruit, sepals swollen pulpy acid yellow, not spreading. Carpels soft sweet, with 6 seeds, exarillate. *Hab.* Thick forests, not rare. Malacca to Pahang and Perak. *Native names:* Simpoh Bukit; Simpoh hutan; Simpoh jantan. *Uses:* The acid sepals and sweet carpels eaten by Sakai.

(7) **D. Scortechinii** Ridl. *l.c.* 7. *Wormia Scortechinii* King, *l.c.* 366. *W. Kunstleri* King, *l.c.* 366.

A tall tree 60 ft. high with red bark, emitting stilt-roots at the base. Leaves coriaceous obovate-oblong, undulate crenate, base narrowed, shining glabrous above except nerves, 26 to 30 pairs, pubescent minutely pubescent beneath; 4 to 6.5 in. long, 2 to 3 in. wide; petioles .5 to 2 in. long. Panicles pubescent 4 in. long, of which the peduncle is 2.5 in.; pedicels .2 in. long. Flowers 1 in. across apetalous. Sepals 5, green ovate coriaceous silky puberulous. Stamens short and broad subequal. Carpels 3 to 5, usually 4. Fruit as in *meliosmæfolia* but green, glabrous and less pulpy, 1 in. long. *Hab.* Dense forest, Singapore, Garden Jungle. Perak (Scortechinii); Goping (Kunstler).

This plant has apparently no petals.

ORDER III. MAGNOLIACEÆ.

Trees or shrubs. Leaves alternate. Stipules large, deciduous, protecting the buds. Flowers large solitary white or yellow (rarely purple). Sepals and petals in whorls of 3 or more. Stamens indefinite, free; anthers introrse, long, narrow. Carpels indefinite, spirally arranged on an elongated axis, free. Ovules solitary. Fruits follicular woody rarely connate in a fleshy mass, axis much elongated. Seed, 1 in a carpel, often pendulous on a long funicle,

endosperm oily, embryo minute. Chiefly in temperate regions, and in the mountains in the tropics.

Carpels persistent on the axis, dehiscing dorsally, woody.

Carpels contiguous with stamens.

Flowers terminal.

Fruit cylindric, ovules 2 1. MAGNOLIA

Fruit ovoid, ovules 6 or more 2. MANGLIETIA

Carpels separate from stamens by an internode.

Flowers axillary 3. MICHELIA

Carpels separating from the axis, dehiscing ventrally.

Flowers terminal 4. TALAUMA

Fruit pulpy, indehiscent carpels not separate. 5. AROMADENDRON

1. MAGNOLIA, L.

Trees or shrubs. Buds enclosed in convolute stipules connate in pairs. Flowers large, terminal white or pink. Sepals 3. Petals 6 to 12 in. long, 2 to 4 whorls. Stamens numerous in many rows, filaments flat, anthers introrse. Carpophore sessile. Carpels many on a long axis, 2-ovuled. Fruit an elongate axis with persistent adnate dorsally dehiscing follicles. Seeds pendulous with a long funicle, testa fleshy, albumen oily. Temperate and tropical E. Asia, temperate N. America, about 16 species.

(1) **M. Maingayi** King, *l.c.* 369; *Ann. Bot. Gard. Calc.* iii. (2), 208, *pl.* 45B.

A shrub about 6 ft. tall, occasionally a tree up to 20 ft. Young branches and inflorescence hairy. Leaves membranous oblanceolate-oblong to obovate, acuminate, base narrowed, rounded above light green glabrous, beneath glaucous; midrib villous; nerves 16 to 20 pairs, 6 to 8 in. long, 2.5 to 3 in. wide; petioles .3 in. long. Flowers solitary terminal shortly peduncled. Bud ovoid, stipules villous. Sepals 3, oblong blunt, 1.5 in. long. Petals 6, oblong, white, 2 in. long, .5 in. wide. Ovaries villous. Fruit cylindric, 1.5 in. long, .6 in. through. Follicles ovoid, .35 in. long, villous. *Hab.* Dense forest, usually at high altitudes, but occurring at little above sea level, up to 4500 ft. Not common. Singapore: Garden Jungle, one plant, perhaps introduced. Perak: Thaiping Hills and Gunong Batu Putih at 4500 ft. altitude (Kunstler). Penang Hill at 3000 ft. altitude.

2. MANGLIETIA, Bl.

Trees or shrubs of the habit of *Magnolia* but with ovoid fruits and carpels 6-ovuled. Sepals 3. Petals 6 or more, 2 or more seriate. Stamens very numerous; anthers linear adnate introrse. Carpophore sessile. Ovaries many in an ovoid head. Carpels persistent, dehiscing dorsally. Tropical Asia, species about 5.

Leaves 7 in. wide; nerves deep, sunk above strongly, elevate beneath

(1) **M. Sebassa**

Leaves obovate 3 in. wide; nerves fine hardly prominent

Leaves 3 in. or less long, 1 in. wide.

(2) **M. glauca**

Flowers .5 in. long

(3) **M. Scortechinii**

(1) **M. Sebassa** *Miq. Ann. Mus. Bot. Lugd. Bat.* iv. 71; *King, l.c.* 370; *Ann. Bot. Gard. Calc.* iii. (2), 211, *pl.* 54.

A shrub. Young branches, petioles and hood of calyx villous. Leaves coriaceous oblong or oblanceolate-acute, narrowed at base, glabrous, bullate; nerves 14 to 20 pairs; 11 to 14 in. long, 4.5 to 7 in. wide; petioles 1 in. long, thickened at base. Flowers solitary, terminal on villous peduncles 2 to 3 in. long. Sepals and petals about 9, fleshy obovate to oblong clawed, nearly 2 in. long, pale yellow. Filaments very stout. Pistils about 20. Carpels oblong. *Hab.* Rare. Once collected at Ulu Kal in Perak by Kunstler at 1500 ft. altitude. *Distrib.* Sumatra.

(2) **M. glauca** *Bl. in Verh. Bat. Gen.* ix. 149; *Bl. Fl. Jav. Magnoliaceæ*, 22 t. 6; *King, l.c.* 370; *Ann. Bot. Gard. Calc.* iii. (2), 213, *pl.* 56.

A tall glabrous tree. Leaves coriaceous oval to obovate-oblong glaucous beneath; nerves 12 to 14 pairs; 5 to 7 in. long, 2.5 to 3 in. wide; petioles .75 to 1.5 in. long. Flowers terminal solitary, 1.5 in. long on pedicels 1 to 1.5 in. long. Sepals and petals 9, greenish yellow, oblong, sub-acute. Filaments short. Pistils numerous. Fruit ovoid as big as a hen's egg, glabrous. Seeds with a red fleshy aril. *Hab.* Rocky Hills, from 200 to 3000 ft. altitude. Perak: Thaiping Hills, at 3000 ft. altitude (Kunstler), Kedah Peak at 500 ft. at Geroon (Bell and Haniff). Penang, The Spout (Haniff). *Distrib.* Java, Sumatra, Celebes and Cochin-China.

(3) **M. Scortechinii** *King, l.c.* 370; *Ann. Bot. Gard. Calc.* iii. (2), 213, *pl.* 56.

A tree. Young branches, stipules under surface of leaves pubescent. Leaves thinly coriaceous lanceolate narrowed to both ends, shining, reticulations distinct minute; nerves 12 pairs, 3.5 in. to 4 in. long, 1.25 in. wide; petioles .3 to .4 in. long. Flowers solitary, axillary on ringed peduncles, short, hood rufous, silky. Sepals and petals about 12 similar, .5 in. long, linear-lanceolate. Stamens linear. Fruit ovoid on a short carpophore, pubescent, carpels 6 to 8. Ovules solitary. *Hab.* Perak. No locality (Scortechinii).

Noticeable for its very small leaves and flowers.

3. MICHELIA, L.

Trees. Leaves as in *Magnolia*. Flowers axillary, solitary and terminal small. Sepals and petals narrow linear acute, all similar 9 to 15 in 3 or more rows. Stamens numerous. Carpophore stalked, carpels usually many. Ovules 2 or more. Follicles woody, 1 to many in a lax or dense spike dehiscing dorsally. Seeds 6 or

fewer, Indo-Malaya. Two species are common in gardens, *M. champaca* L., the Chempaka with narrow lanceolate leaves and yellow fragrant flowers, a native of India, and *M. longifolia* Bl., the white Chempaka, Chempaka putih, with larger and broader leaves and longer white flowers, a native of Java.

(1) **M. montana** *Bl. in Verh. Bat. Gen. ix. 153; Bl. Fl. Jav. Magnoliaceæ, 15, t. 5; King, l.c. 371; Ann. Bot. Gard. Calc. iii. (2), 218, pl. 68.*

A glabrous tree 20 to 30 ft. tall. Leaves thinly coriaceous obovate narrowed at both ends dark green; nerves 12 pairs, 6 to 7.5 in. long, 4 in. broad petioles .75 in. long. Flowers white, fragrant, 1.5 in. across, solitary axillary or terminal peduncle .5 in. long. Sepals and petals 8, oblanceolate or lanceolate-acute. Stamens 18 to 24. Pistils 3 to 4. Follicles usually 1, subglobular pyriform, woody 3 in. long, walls .5 in. thick. Seeds 4 or 5. *Hab.* Mountains. Rare. Perak at Goping (Kunstler). Kedah Peak at Geroon (Bell and Haniff). *Distrib.* Himalaya and Java.

4. TALAUMA, Juss.

Trees or shrubs. Leaves and inflorescence as in *Magnolia*. Flowers usually large, white. Sepals 3. Petals 6 or more in 2 or more whorls. Stamens numerous in many whorls; anthers linear introrse. Carpophore sessile; ovaries indefinite 2-ovuled, spicate. Stigmas decurrent. Carpels woody separating from the axis at the ventral suture and dehiscing, so that the seeds remain attached to the axis by a cord. Species about 20, tropical Asia and S. America and West Indies.

Carpels pubescent or woolly.

Leaves over 4 in. wide, obovate or elliptic.

Flowers 2 in. long; peduncle woolly (1) **T. lanigera**

Leaves 3 in. wide, elliptic.

Flowers 1 in. long; peduncle glabrous (2) **T. mutabilis**

Leaves oblong-lanceolate; peduncle glabrous (3) **T. Kunstleri**

Carpels glabrous.

Leaves very large, stiff coriaceous.

Petals 3 in. long (4) **T. Singaporensis**

Leaves narrow lanceolate, thin.

Petals .75 in. long (5) **T. longifolia**

(1) **T. lanigera** *Hook. fil. F.B.I. i. 40; King, l.c. 372; Ann. Bot. Gard. Calc. iii. (2), 202, pl. 42.*

A tree about 20 ft. tall, with erect branches. Young leaves, branches and petioles, peduncles, stipule covering the bud and ovaries brown villous. Leaves coriaceous oblong-oblanceolate abruptly cuspidate base narrowed, deep green shining glabrous except midrib beneath, 9 to 12 in. long, 2.5 to 4 in. wide; petioles 1 to 1.5 in. long. Sepals and petals white. Sepals 2 in. long, acuminate obtuse. Petals smaller. Pistil woolly. Fruit 3 to 4 in. long, 2 in.

through. Carpels woolly on the back. *Hab.* In mountain districts, Malacca, Mt. Ophir (Maingay, Griffith). Perak, Thaiping Hills (Kunstler). Penang Hill, Moniot's Road, etc. (Maingay, Curtis).

(2) ***T. mutabilis*** *Bl. Fl. Jav. Magnoliaceæ*, 35, t. 10-11, 12, fig. B.; *King, l.c.* 373; *Ann. Bot. Gard. Cal.* iii. (2), 203, pl. 44.

A shrub about 6 ft. tall, glabrous. Leaves oblong-lanceolate-acute at each end sub-coriaceous shining light green; nerves 12 pairs, 5 to 8 in. long, 2.25 to 2.75 in. wide; petioles .75 to 1 in. long minutely muriculate. Flowers solitary, terminal; on a glabrous peduncle 1.5 in. long. Stipular bracts fuscous villous. Sepals 3, broadly ovate. Petals 6 in 2 whorls broader, obovate, concave, 1.25 in. long, .5 in. wide. Fruit ovoid 1.5 to 2 in. long, pubescent at first, then glabrous, follicles rhomboid lenticelled with recurved beaks. *Hab.* In hill woods. Perak, Penang on West Hill (Curtis 1022). Kedah Peak (Bell and Haniff) at 2500 ft. altitude. *Distrib.* Malay Archipelago. Cultivated in Gardens, Singapore.

(3) ***T. Kunstleri*** *King, l.c.* 373; *Ann. Bot. Gard. Cal.* iii. (2), 204, pl. 41B.

A tree 25 to 30 ft. tall, glabrous except the peduncle and pistils. Leaves oblong-lanceolate; acuminate at both ends, shining; nerves 10 to 14 pairs; 6 to 9 in. long, 1.75 to 2.5 in. across; petioles .5 to 1.25 in. long, slender, base thickened. Flower terminal, ovoid, on peduncles, pubescent, .85 in. long. Sepals 3, and petals 6, broadly elliptic, waxy white, fleshy. Anthers sessile .5 in. long. Carpels 6 to 8 linear, pubescent. Fruit ovoid, acute, 1.25 in. long, .75 in. through, green, follicles .75 to 1 in. long, beaks short, stout, sub-terminal. *Hab.* Mountains at from 3000 to 4000 ft. altitude. Perak, Larut Hills. Kedah, on Kedah Peak (Kunstler).

(4) ***T. Singapurensis*** *Ridl. Kew Bulletin*, 1914, p. 323.

A big shrub about 20 ft. tall. Leaves large, stiffly coriaceous, young ones and midrib of adults hairy, oblanceolate-acuminate; nerves 14 to 15 pairs sub-horizontal, reticulations conspicuous on both sides, 15 to 16 in. long, 4.5 in. wide; petioles 1 to 1.5 in. long. Pedicel stout, 3 to 4 in. long, brown silky hairy. Sepals broad ovate-lanceolate silky. Petals lanceolate-acuminate, fleshy, 3 in. long, .75 in. wide at base, white. Stamens 1.5 in. long, acuminate. Ovaries glabrous. Fruit 3.2 in. long. Carpels 1.5 in. long, base broad, pustular, woody. Style convolute at tip. Seeds 2, irregularly elliptic or flat, smooth, pale brown. *Hab.* In low-lying forest swamps. Singapore, Selitar district (Ridley).

This has the habit of *T. gigantifolia* Miq., of Sumatra and Borneo, but has longer petioles and the pistils are quite glabrous.

(5) ***T. longifolia*** *Ridl. Journ. F.M.S. Mus.* vii. 38. *T. mutabilis*, var. *longifolia* *Bl. Fl. Jav. Magnoliaceæ*, 37.

Shrub 10 to 12 ft. tall. Leaves thin coriaceous glabrous lanceolate long acuminate narrowed to base; nerves 7 pairs, fine,

reticulations fine conspicuous, 6 to 8 in. long, 1·7 to 2·5 in. wide; petioles ·5 in. long. Bud ellipsoid beaked appressed, silky. Petals oblong, blunt, cream or pale yellow, ·7 in. long, ·3 in. wide. Fruit glabrous, pustular 1·5 in. long. Carpels about 6, beaked. *Hab.* Mountains. Kedah Peak, about 3900 ft. altitude (Robinson, Haniff). *Distrib.* Moulmein, Pungah, Java.

5. AROMADENDRUM, Bl.

A tall tree. Leaves lanceolate, coriaceous, small. Flower solitary, large, terminal, white. Sepals lanceolate, narrow. Petals



FIG. 3.—*Aromadendrum elegans*.

numerous, narrow, linear. Stamens numerous, slender, half as long as the petals. Carpels connate in a short cone. Fruit obovoid, fleshy, indehiscent, carpels connate.

Referred by Miquel and Benthams to *Talauma*, but very distinct in the numerous, narrow petals, resembling those of *Michelia*, and the pulpy indehiscent fruit, and connate carpels. One species, native of the Malay Peninsula and Java.

(1) *A. elegans* Bl. *Bijdr.* 8. *Talauma elegans* Miq. *Ann. Mus. Bot. Lugd. Bat.* iv. 70.

A lofty straight-stemmed tree about 60 to 80 ft. tall. Leaves finely reticulated dark green elliptic acuminate at each end, thinly

coriaceous, 3 to 4 in. long, 1 to 1.5 in. wide. Flowers 2 in. long, fragrant. Sepals lanceolate glabrous narrow acuminate. Petals linear acuminate white. Fruit 3 in. long, obovoid, apex rounded, base narrowed, fleshy smooth green outside, white inside; seeds pink. *Hab.* Dense forest. Probably not rare, though seldom collected. Singapore, Garden Jungle. Malacca, Selandor road (Derry). Penang on Government Hill (Curtis). *Distrib.* Java. *Native name*: Chempaka hutan.

ORDER IV. WINTERACEÆ.

Trees or shrubs. Leaves alternate, often aromatic, gland-dotted exstipulate. Flowers small, pink or white in axillary fascicles. Sepals 1 (or 2) series. Petals in several series. Stamens several, anthers small, sub-globose. Carpels in 1 whorl, few. Fruits capsular. Seeds shiny, endosperm copious, embryo minute. Species about 35, Australia, Malay Isles, S. America to Florida.

ILLICIUM, L.

Shrubs or treelets. Leaves usually small coriaceous or membranous entire. Flowers bi- or uni-sexual, solitary or fascicled in the axils, or on the stem, yellow, white or rose-pink, small. Sepals 3 to 6. Petals 9, 3 or many seriate. Stamens indefinite; filaments thick; anthers introrse. Pistils indefinite in 1 whorl, 1-ovuled. Fruit of radiating leathery green follicles. Seeds compressed with hard shining testa. North America, China, Cambodia.

Leaves thin coriaceous distinctly nerved.

Stamens 9 to 13 (1) **I. cambodianum**

Leaves thick coriaceous nerveless.

Stamens 30 to 50 (2) **I. evenium**

(1) **I. cambodianum** Hance, *Journ. Bot.* 1876, p. 240; *Pierre, Fl. For. Cochinchine*, i. pl. 4; *King, Journ. As. Soc. Beng. l.c.* 374; *Ann. Bot. Gard. Calc.* iii. (2), 200, pl. 38B.

A large shrub, very variable. Leaves opposite or in whorls of 3 or 4, dark green oblanceolate to obovate-lanceolate-acuminate, 3 to 4.5 in. long, 1 to 2 in. wide; petioles under .5 in. long. Flowers axillary or in old plants fascicled on the stem, rose colour or white, 1 in. across or less; pedicels stout or slender. Sepals 3 or 4, ovate round edge ciliate or not. Petals 9, ovate-oblong blunt. Stamens 9 to 13 in a single row. Follicles 8 to 12, radiate beaked, .4 to .5 in. long. Seeds flat ovoid, base truncate, polished brown. *Hab.* In woods on mountains, especially near streams from 3000 to 5000 ft. altitude. Common and variable.

var. *tenuifolia* Ridl. Leaves lanceolate or oblanceolate thin almost membranous; pedicels very slender. Flowers small .5 in.

across. Sepals 3 small ones at the base, 3 to 4 upper much larger, edges ciliate. *Hab.* Shady spots. Pahang, Telom cascade; Gunong Tahan; Selangor, Menuang Gasing (Kloss). Perak, Thaiping Hills (Kunstler). Kedah Peak (Bell and Haniff), form with white flowers in fascicles on trunk.

var. *crassifolia* Ridl. Leaves lanceolate to obovate, thick, coriaceous. Pedicels short, fleshy, thick. Flowers larger up to 1 in. wide. Lowest sepals broad, as big as the upper ones, often glabrous. *Hab.* On more exposed spots. Malacca, Mt. Ophir; Pahang, K'luang Terbang (Barnes); Gunong Berembun, near Telom; Gunong Tahan. Selangor, Bukit Kutu (flowers fascicled on stem);



FIG. 4.—*Illicium cambodianum*.

Gunong Menkuang (Robinson); Sempang mines, Semangkok Pass. Perak, Gunong Kerbau (Haniff); Gunong Batu Putih (Wray).

This is the typical form from Cambodia.

(2) *I. evenium* King, *l.c.* 374.

A small glabrous tree. Leaves very coriaceous smooth; nerves invisible opposite in whorls of three, oblanceolate to obovate-oblong, tip shortly acuminate, base elongate cuneate to a short thick petiole; 3.5 to 5 in. long, 1.25 to 2 in. wide; petioles .3 in. long. Flowers unisexual globular, 2 in. across on pedicels 1 in. long, solitary or in few-flowered racemes. Sepals 8 or 9, round fleshy similar. Stamens 30 to 50 in several rows; filaments shorter than anthers. *Hab.* Perak (Scortechini). Very rare, only once collected, in male flower only.

ORDER V. SCHIZANDRACEÆ.

Climbers shrubby. Leaves alternate, exstipulate. Flowers axillary solitary unisexual small pink. Sepals and petals 9 to 15, outer sepaloid. Stamens numerous, more or less connate into a fleshy mass. Anthers short. Carpels numerous, few ovuled, in fruit crowded into a fleshy mass. Species about 27 in 2 genera, Indo-Malaya, China, Japan, Southern United States.

KADSURA, Kaempfer.

Glabrous leaves, with entire leaves. Flowers unisexual, rose pink, white or yellow, small, axillary or from the stem on short bracteolate peduncles. Sepals and petals 9 to 12 imbricate in 3 rows. Male flower. Stamens 5 to 15 or more in a spiral; filaments very short, free, or sub-connate; anthers free or connate. Female flower, ovaries many, densely imbricate. Stigma sessile, ovules 2 to 4. Fruit a globose fleshy head of 1-seeded carpels. Seeds 1 to 2. Temperate and tropical Asia, species about 7.

Stems stout smooth; leaves ovate, base cuneate.

Flowers pink

(1) **K. scandens**

Stems stout corky; leaves ovate, base rounded.

Flowers pink

(2) **K. cauliflora**

Stems slender; leaves smaller lanceolate.

Flowers cream colour

(3) **K. lanceolata**

(1) **K. scandens** *Bl. Fl. Jav. Schizandreæ*, 9, t. 1; *King, l.c.* 375; *Ann. Bot. Gard. Calc.* iii. (2), 221, pl. 71.

A big liane 30 to 40 ft. or more long, bark dark striate. Leaves coriaceous broadly ovate to ovate-oblong-acuminate, base rounded sub-decurrent; nerves 5 pairs, dark green, 4 to 6 in. long, 2 to 4 in. wide; petioles 1 in. long. Flowers axillary and from the trunk on bracteolate peduncles, rose pink, .5 in. wide. Sepals 3, triangular connate at base. Petals ovate-oblong blunt, fleshy. Stamens in males numerous short cuneate equal on an ovoid fleshy receptacle. Ovaries in females numerous. Stigmas sessile elongate. Fruit 2 to 2.5 in. through, sub-globose. Carpels sessile globose beaked less than .5 in. in diameter. *Hab.* Common in forests at low elevations. Singapore; Malacca (Griffith). Negri Sembilan, Tampin Hill (Burkill). Perak, Larut Hills (Kunstler). Penang Hill (Curtis). *Distrib.* Malay Islands. *Native names*: Akar Kapala Patong; Akar Dama Daura. *Use*: A decoction of the roots is used for rheumatism.

(2) **K. cauliflora** *Bl. Fl. Jav. Schizandreæ*, ii. t. 2; *King, l.c.* 375; *Ann. Bot. Gard. Calc.* iii. (2), 222, pl. 72.

A big liane with pale corky bark, 80 ft. or more long and about 3 in. through. Leaves ovate rounded, tip shortly acuminate, base rounded; nerves 3 to 7 pairs; 6 to 7 in. long, 3.4 to 4.5 in. wide; petioles 1 to 1.5 in. long. Flowers from the trunk. Sepals and

petals larger and more ovate than in *K. scandens*, .3 in. long, obtuse. Carpels on pedicels .5 in. long. *Hab.* Dense forest at low altitudes. Singapore, Garden Jungle, etc., common; Perak (Scortechini). Penang Hill at 2000 ft. altitude (Curtis). *Distrib.* Java, Sumatra.

The flowers look like very small pink roses.

(3) *K. lanceolata* King, *l.c.* 376.

Slender woody climber. Leaves thin coriaceous ovate to ovate-lanceolate-acuminate; nerves 12 pairs, faint; 3 to 4 in. long, 1.5 in. wide; petioles .35 in. long. Flowers solitary, axillary globose, .25 in. through. Sepals 3, triangular. Petals 9, larger round or ovate,



FIG. 5.—*Kadsura scandens*.

cream colour. Ripe fruit .75 in. through. Carpels numerous ovoid. *Hab.* Perak, Thaiping Hills, 500 to 1000 ft. altitude (Kunstler, Scortechini).

ORDER VI. ANONACEÆ.

Trees rarely very large, shrubs or lianes. Leaves alternate, simple, entire. Flowers solitary or in fascicles, bisexual, rarely unisexual, seldom large, purple, green, white or yellow. Sepals 3, usually valvate, free or connate. Petals 6 hypogynous, in 2 whorls, often unequal, inner whorl occasionally absent (flowers dimerous in *Disepalum*). Stamens usually indefinite, crowded on the torus; filaments short or 0; anthers oblong, the connective produced into

an appendage. Pistils 1, or usually more, apocarpous; style very short or 0; ovules one or more. Fruit of 1, usually many, sessile or stalked carpels 1- or many-seeded, usually baccate, very rarely dehiscent (*Anaxagorea*, *Xylopia*). Seed large more or less flattened, testa crustaceous, usually shining. Albumen dense, ruminate, with several series of horizontal plates, embryo small. Tropics, chiefly of the Old World; genera 45, species 500 to 600, abundant in the lowland forests of the Malay region, becoming very scarce about 2000 ft. altitude. Commonly known by the Malays as Pisang-Pisang or variants of this (lit. bananas), on account of the bunch of carpels suggesting bananas. The uses of the plants of this order indigenous here are very limited. They have few medicinal properties, and the timber is usually too small to be of value, the only really big tree being *Mezzettia leptopoda*. *Drepananthus*, *Xylopia*, some *Polyalthias*, etc., are used in house-building, for rafters or poles. Cultivated here for their fruits are the *Anonas* of South America: *A. squamosa*, Nona Srikaya; *A. muricata*, Durian B'landa; Sri Kaya Blanda; Nona blanda; *A. reticulata*, Nona Kapri, and, as a roadside or village tree for its flowers, *Canarium odoratum*, the Kenanga, probably native of the Philippine Islands. Its soft timber is also used for tom-toms. *Artabotrys odoratissimus*, a climber cultivated for its fragrant flowers, is also to be found in Chinese gardens. The *Anonaceæ* of the peninsula were described in the "Materials" for a Flora of the Malay Peninsula, by Sir George King, in the *Journal of the Asiatic Society of Bengal*, lxi. (2), in 1892, and in the *Annals of the Botanic Gardens of Calcutta*, iv., quoted *Journ. As. Soc. Beng.* and *Ann. Bot. Gard. Calc.*, respectively.

i. UVARIÆ. Petals 2 in 2 rows, one or both rows imbricate in bud; stamens many, anther-cells concealed by a flat appendage; ovaries indefinite.

Sepals imbricate; trees or shrubs.

Flowers small globular, usually unisexual on
the older branches or trunk; ovules 6,
indefinite.

Ovules many; torus conic 1. STELECHOCARPUS

Ovules 6 to 8; torus flat 2. SAGERÆA

Flowers large, bisexual 3. GRIFFITHIA

Sepals valvate; climbers.

Flowers small, on trunk or branches; ovules
6 to 8. 4. CYATHOSTEMMA

Flowers usually large, expanding flat on
branches.

Ovules many 5. UVARIA

Ovules 1 to 2; flowers rather small 6. UVARIELLA

Flowers medium, petals not expanding; ovules
1 to 2 7. ELLIPEIA

ii. UNONÆ. Petals valvate in bud flat, or base only concave, inner petals similar to outer; stamens many, with overlapping appendages; ovaries indefinite, rarely few.

Flowers trimerous.

Petals connivent at concave base, covering stamens and ovaries.

Trees; ovaries 1 to 3, ovules many; flowers rather large

8. CYATHOCALYX

Trees; ovaries many; ovules 4 or more; flowers small

9. DREPANANTHUS

Climbers with hooked peduncles; flowers rather large

10. ARTABOTRYS

Petals flat; carpels indehiscent.

Trees; ovules many in 2 rows; stamen- appendages acute

11. CANANGIUM

Shrubs, half climbing; ovules 6 in 1 row; petals sometimes connate and reduced to 2

12. DESMOS

Trees; ovules 1 to 2

13. POLYALTHIA

Climbers; flowers solitary rather small

14. SPHÆROCORYNE

Shrubs; fruit follicular dehiscent

15. ANAXAGOREA

Flowers dimerous; sepals 2; petals very narrow

16. DISEPALUM

iii. MITREPHOREÆ. Petals valvate, outer spreading; inner concave connivent different, arching over stamens; stamens and pistils numerous and anther appendages overlapping except *Orophea*.

Trees.

Inner petals clawed.

Inner petals connivent, not vaulted; flowers rather large

17. GONIOTHALAMUS

Inner petals vaulted, longer than outer; stamens 6

18. OROPHEA

Inner petals vaulted, little longer than outer; stamens numerous

19. MITREPHORA

Inner petals not clawed.

Flowers small, globose; petals sub-equal

20. POPOWIA

Climbers; flowers long; petals narrow, inners much shorter

21. OXYMITRA

iv. XYLOPIÆ. Petals valvate thick connivent, outers long, narrow or broad, inners small but similar.

Climbers; outer petals triangular-ovate or long, yellow, pubescent

22. MELODORUM

Scandent; petals ovate, blunt; ovules many

23. RAUWENHOFFIA

Trees; outer petals narrow linear, sub-glabrous

24. XYLOPIA

v. MILIUSEÆ. Petals valvate, outers often very small; stamens definite loosely imbricate; ovules 1 or many; flowers usually solitary; trees or shrubs.

Ovaries indefinite.

Sepals and outer petals very small, inner petals large.

Ovules 1 to 2; stamens numerous with broad appendages; flowers solitary

25. PHEANTHUS

Ovules 1 to 4; stamens often few; appendage compressed, small; flowers usually solitary

26. MILIUSA

Petals all larger than sepals saccate at base

27. ALPHONSEA

Ovaries solitary or 2; fruit large; flowers very small, clustered on boughs.

Outer petals valvate, inner imbricate, petals ovate

28. KINGSTONIA

All petals valvate, linear; gigantic trees

29. MEZZETTIA

1. STELECHOCARPUS, Bl.

Trees with coriaceous leaves. Flowers unisexual, fascicled on the old wood. Sepals 3, small, elliptic to orbicular, imbricate. Petals very coriaceous, round, concave. Stamens in male indefinite ovoid. Ovaries 6 or more. Stigma sessile. Carpels globose berried, 4 to 6 seeds. Torus conical. 3 to 4 species, Malayan.

Leaves pellucid-punctate membranous (1) **S. punctatus**
 Leaves coriaceous not pellucid-punctate (2) **S. nitidus**

(1) **S. punctatus** King, *Journ. As. Soc. Beng.* lxi. (2), 4; *Ann. Bot. Gard. Calc.* iv. 4, *pl.* 1.

A tree 20 to 30 ft. tall, branchlets puberulous. Leaves membranous elliptic-ovate acuminate, base rounded, above glabrous except the pubescent midrib; beneath puberulous or glabrous, reticulations distinct; nerves 12 to 14 pairs, bold beneath; 7 to 10 in. long, 3 to 4 in. wide; petioles .15 to .2 in. long, pubescent stout. Male flowers in fascicles from trunk; buds turbinate, .5 in. across; peduncles 1 to 1.5 in. long, stout, puberulous. Sepals very coriaceous rounded concave pubescent outside. Petals very coriaceous rounded glabrous; outer 3 puberulous outside; inner smaller. Anthers sessile flat connective not produced. *Hab.* Perak (Kunstler), not seen.

S. Burahol Bl., a native of Java, is recorded from Singapore, Lobb. Lobb's localities are always unreliable, and he probably collected the plant in Java.

(2) **S. nitidus** King, *Journ. As. Soc. Beng. l.c.* 5; *Ann. Bot. Gard. Calc. l.c.* 4, *pl.* 2. *S. Schefferi* Boerl. *l.c. Bogor*, 89, *pl.* 71.

A tree 30 to 60 ft. tall; stem 6 to 8 in. through, glabrous. Leaves coriaceous dark green oblong-lanceolate shortly acuminate, base acute; nerves deeply impressed on upper surface, bold below, inarching within the margin; 6 to 9 in. long, .18 to 3.25 in. wide; petioles .35 in. long. Male flowers fascicled on the trunk, pale pink tinged with black; peduncles stout, 1 to 1.5 in. long, scurfy, puberulous. Sepals very coriaceous shortly oblong obtuse connate at base, puberulous. Petals larger, outer .5 in. long, ovate rounded, very thick and hard, inner smaller. Female flowers like the males, but no stamens, very numerous silky ovaries. Carpels broad ovoid obtuse, 2.5 in. long, 1.75 in. wide, puberulous, black. Seeds 8 in 2 rows, flat, 1.25 in. long, .5 in. thick. *Hab.* Limestone rocks in forests up to 800 ft. altitude; Perak, Gunong Pondok (Kunstler). *Distrib.* Sumatra.

2. SAGERÆA, Dalz.

Trees glabrous. Leaves coriaceous. Flowers uni- or bi-sexual, fascicled on tubercles on the old wood (or solitary axillary). Sepals orbicular to ovate, imbricate. Petals 6, in 2 series, imbricate,

sub-equal, concave-orbicular. Stamens 6 to 21 imbricate in 2 or more series, broad oblong fleshy; anther-cells dorsal, oblong; connective produced. Ovaries 3 to 6; style short; stigma capitate; ovules 6 to 8, on ventral suture. Carpels globose, stalked. Species 6, tropical Asia.

Leaves large, base round	.	:	:	:	:	(1) <i>S. elliptica</i>
Leaves 6 by 1·25, base narrow	.	:	:	:	:	(2) <i>S. lanceolata</i>

(1) *S. elliptica* Hook. fil. *F.B.I.* i. 93; *King, Journ. As. Soc. Beng. l.c.* 7; *Ann. Bot. Gard. Calc. l.c.* 6, *pl.* 34. *S. Hookeri* Pierre, *Fl. For. Cochinchine*, t. 15.

A big tree glabrous, branchlets angled. Leaves very coriaceous large narrow oblong acute or obtuse, base rounded; nerves 14 to 16 pairs, very faint; 8 to 12 in. long, 2·25 to 3·25 in. wide; petioles 1·5 in. long, very thick. Flowers unisexual, solitary, axillary or below several fasciated on the large branches or trunk, white or red, small; pedicels 25 in. long. Sepals small, semi-orbicular, glabrous, edges ciliate. Petals thick ovate-orbicular concave glabrous edges ciliate, 25 in. long, inner smaller. Stamens 12 to 18, appendages quadrate. Ovaries in female 3, glabrous, ovules 8. Carpels sub-sessile globose 1 in. through. Seeds several. *Hab.* Rare and little known. Penang (Wallich, Maingay). *Distrib.* Burma.

(2) *S. lanceolata* Miq. *Ann. Mus. Bot. Lugd. Bat.* ii. 10.

Tree. Leaves thin stiff coriaceous lanceolate blunt shortly narrowed to the base, shining; nerves faint, about 8 pairs, irregularly inarching; 6 in. long, 1·5 in. wide; petioles 25 in. long. Flowers small, in tufts below the leaves. Bracts numerous, hairy, ovate, 1 in. long. Pedicels 5 in. long. Sepals ovate connate at base small. Petals oblong with round tips, edge ciliate, imbricate, 15 in. long. Stamens 20 very short linear-oblong, glabrous. "Carpels 3, ovoid, ovules 10 in 2 rows. Fruit globose" (Miquel). *Hab.* Pahang, Baloh Residency, Kwantan (Coll. F. G. Yeop. Comm. Foxworthy). *Distrib.* Borneo. *Native name* : Melilen.

The texture of the leaves is as in *S. elliptica*, but they are much smaller, lanceolate and narrowed to base.

3. GRIFFITHIA, Maing.

Trees or shrubs. Flowers axillary solitary or in pairs, large. Sepals broad, short, imbricate. Petals 6, imbricate ovate, inner 3 smaller and much thicker than the outer, excavated at the base. Stamens numerous, elongate, connective truncate; anther-cells linear dorsal. Ovaries numerous; ovules 1 or 2 basal. Style filiform. Stigma broadly clavate. Species 3, Malay Peninsula only. Allied to *Polyalthia* (*macrantha* and its allies) in form of flowers and ovaries, but with imbricate petals and sepals. *Griffithia*, Wight and Arnott (*Rubiaceæ*), has long been reduced to *Randia*.

Leaves glabrous or glabrescent beneath.

- | | |
|-------------------------------------------|------------------------------|
| Flowers 2·5 to 3 in. long | (1) <i>G. magnoliæpetala</i> |
| Flowers 1 in. long | (2) <i>G. cupularis</i> |
| Leaves softly pubescent beneath | (3) <i>G. fusca</i> |

(1) *G. magnoliæpetala* Maing. MSS. in King's Ann. Bot. Gard. Calc. l.c. 9, pl. 218. *Polyalthia magnoliæflora* Hook. fil. F.B.I. i. 64; King, Journ. As. Soc. Beng. lxi. (2), 54.

A tree 30 to 40 ft. tall, 10 to 15 in. through; branchlets tomentose. Leaves thinly coriaceous obovate-oblong shortly acuminate, base rounded, above glabrous; nerves 15 to 20 pairs, sub-horizontal prominent beneath, pubescent on both sides, transverse nervules distinct, beneath glabrescent; 8 to 12 in. long, 2·5 to 3·5 in. wide; petioles ·25 in. long, tomentose, stout. Sepals coriaceous connate to middle broad ovate acute tomentose. Petals white coriaceous, oval or ovate-lanceolate acute, tomentose. Ovaries hirsute. Carpels 1·5 in. long, short-stalked, oblong acuminate at each end. *Hab.* Dense rocky jungle at 1500 to 2500 ft. altitude. Malacca (Maingay); Perak (Kunstler).

(2) *G. cupularis* King, Ann. Bot. Gard. Calc. l.c. 9, pl. 219.

A shrub 10 ft. to a tree 50 ft. tall; branchlets pubescent. Leaves membranous oblong acuminate slightly narrowed to the rounded base, above glabrous except pubescent midrib, beneath midrib and 12 to 14 pairs of nerves prominent puberulous; 6 to 9 in. long, 2 to 3 in. wide; petioles ·25 in. long. Flowers solitary or 2, silvery white or yellow on branches, about 1 in. long; pedicels tomentose with several large sheathing orbicular bracts. Sepals semi-orbicular quite obtuse tomentose outside greenish yellow, ·25 in. long. Petals thick coriaceous tomentose, outers ovate broad obtuse 1 in. long; inners short thicker, base excavate. Ovaries 12 villous; ovules 1 or 2. Carpels ovoid or sub-globose, blunt, ·8 in. long, tomentose, light brown to silvery; stalks ·35 in. long. Seed 1. *Hab.* Low hilly ground in dense jungle. Perak, Thaiping Hills, dense jungle at 300 to 1500 ft. altitude, and Gunong Bubu range (Kunstler).

(3) *G. fusca* King, Ann. Bot. Gard. Calc. l.c. 10, pl. 220.

Small tree 10 to 20 ft. tall; branchlets tomentose. Leaves thinly coriaceous oblong to oblanceolate-acute, base rounded above, glabrous beneath, pubescent; nerves 12 to 16 pairs, oblique prominent, 6 to 18 in. long, 1·75 to 2·75 in. wide; petioles ·2 to ·3 in. long, stout. Flowers solitary extra-axillary. Sepals slightly imbricate ovate sub-acute tomentose outside. Petals thick concave ovate-oblong cream-colour or deep yellow, outer 1 in. long, inner shorter and narrower, tomentose outside. Appendages flat. Ovaries few, villous, 1-ovuled. Carpels ovoid, densely minutely tomentose, dark mauve, 1 in. long, ·75 in. through. *Hab.* Dense mixed jungle 400 to 600 ft. altitude. Perak, Ulu Bubong (Kunstler).

4. CYATHOSTEMMA.

Big lianes. Flowers in di- or tri-chotomous cymes from the old wood, sub-globose, small. Sepals 3, connate, hirsute. Petals 6, in 2 whorls, sub-equal, bases fleshy, valvate, tips imbricate. Torus flat, edge convex. Stamens many short linear; anthers connec-tive oblique, incurved. Ovaries many; style cylindric glabrous; ovules many. Carpels oblong-ovoid, many-seeded. Species about 6, Malayan.

Flowers all hermaphrodite.

- | | |
|---------------------------------------------------------------------------------|----------------------------|
| Flowers in elongate cymes from trunk | (1) C. viridiflorum |
| Flowers fascicled 10 to 14, or in axillary pairs;
midrib pubescent | (2) C. Wrayi |
| Flowers 2 to 3 fascicled extra-axillary; midrib
glabrous | (3) C. Hookeri |
| Flowers dimorphous, some female | (4) C. acuminatum |

(1) **C. viridiflorum** Griff. *Notulæ* iv. 707, *Ic. Pl.* 4, t. 650; *Hook. fil. F.B.I.* i. 57; *King, Journ. As. Soc. Beng. l.c.* 8; *Ann. Bot. Gard. Calc. pl.* 37.

A big woody liane 80 ft. or more long with black bark. Leaves coriaceous obovate-elliptic or oblong, base rounded minutely cordate, dull green glabrous; nerves 8 to 11 pairs; 6 to 10 in. long, 2.5 to 4 in. wide; petioles .25 in. long. Cymes branched 2 to 4 in. long from the lower part of the liane, tomentose. Flowers .5 in. across, few. Sepals rounded connate for most of their length tomentose. Petals ovate sub-acute puberulous coriaceous, never expanding, base green, tips orange. Stamens cinnamon brown, appendages obliquely truncate. Ovaries numerous, pubescent. Carpels orange, oblong obtuse, 1.25 to 1.5 in. long, stalk as long or shorter. Seed 8 to 10, smooth, ovoid. *Hab.* Low country to 500 ft. altitude. Common in woods, Singapore, Garden Jungle; Bukit Timah. Johor; Malacca (Maingay).

var. *Scortechinii*. **C. Scortechinii** King, *Journ. As. Soc. Beng. l.c.* 9. Calyx a little less deeply cut. Fruit on shorter stalks. *Hab.* Perak, at Goping (Kunstler). *Native name*: Akar Mupisang.

(2) **C. Wrayi** King, *Journ. As. Soc. Beng. l.c.* 9; *Ann. Bot. Gard. Calc. l.c.* 12, *pl.* 39.

A liane 20 to 60 ft. long; young branches pubescent. Leaves membranous broadly oblanceolate shortly obtusely acuminate, narrowed towards base, glabrous on both sides except the midrib; nerves 8 to 10 pairs, inarching twice within the margin; 7 to 9 in. long, 2.5 to 3 in. wide; petioles .2 in. long. Flowers in fascicles of 10 to 14 on tubercles on the old wood, or in axillary pairs .5 in. across, waxy muddy yellow; pedicels .25 to .4 in. long, pubescent. Sepals broadly ovate spreading rufous-puberulous outside, .1 in. long. Petals concave, outer whorl ovate-orbicular acute; inner smaller, blunter and more imbricate. Stamens numerous, appendages truncate, 4- to 5-sided, covering the anthers. Ovaries

numerous, oblong, pubescent at base only. Carpels reddish ovoid glabrous, .4 to .6 in. long; pedicels slender as long. Seeds 1 or 2, ovoid or plano-convex. *Hab.* Hill forests, apparently locally common. Selangor, Weld's Hill (Foxworthy). Perak, Thaiping Hills; Goping (Kunstler, Scortechini, Wray).

(3) **C. Hookeri** King, *Journ. As. Soc. Beng. l.c.* 10; *Ann. Bot. Gard. Calc. l.c.* 13, *pl.* 40. *Uvaria parviflora* Hook. *fil. and Thom. Fl. Ind.* 103, *Hook. fil. F.B.I.* i. 51.

A liane 40 to 80 ft. long, glabrous except the inflorescence. Leaves membranous broadly oblanceolate to ovate-elliptic acute or bluntly acuminate, base rounded or sub-cuneate; nerves 9 to 10 pairs, inarching; 5.5 to 7 in. long, 2.25 to 2.75 in. wide; petioles .3 in. long. Flowers .25 in. across, in extra-axillary fascicles or cymes of 2 or 3, yellow, on puberulous pedicels .3 to .4 in. long. Sepals spreading broadly ovate sub-acute, .1 in. long. Petals concave; outer whorl little longer than sepals, narrower obovate contracted at base, puberulous outside; inner whorl narrower, thicker, oblique. Stamens numerous, appendages thick incurved. Ovaries numerous, puberulous. Carpels numerous, oblong or ovoid blunt glabrescent, .75 to 1.75 in. long, .6 to .9 in. diameter; pedicel 1.5 to 2 in., stout. Seeds 6 in one row, oblong. *Hab.* Local, in forest up to 1000 ft. altitude. Singapore, Garden Jungle. Perak, Thaiping Hills (Kunstler). Penang, Government Hill (Phillips, Curtis). *Distrib.* Borneo.

(4) **C. acuminatum** King, *Journ. As. Soc. Beng. l.c.* 10; *Ann. Bot. Gard. Calc. l.c.* 13, *pl.* 14.

A liane; young branches puberulous. Leaves membranous oblanceolate-oblong cordate-acuminate, base acute, glabrous except the puberulous midrib; nerves 10 to 11 pairs, curved; 8 to 9 in. long, 2.2 to 2.5 in. wide; petioles .15 in. long, tomentose. Hermaphrodite flowers in pubescent cymes, 4 to 6 in. long; pedicel as long as the branches. Bracts numerous distichous oblong. Flowers .4 to .5 in. across; pedicels short. Sepals triangular, obtuse. Petals as in *viridiflorum*. Stamens, appendages thick, incurved. Ovaries with conical stigmas. Female flowers, cymes shorter, few-flowered, 1.5 in. long, pubescent. Sepals broadly triangular cordate acute, pubescent. Petals, outer whorl ovate-triangular sub-acute; inner row smaller. Stamens 0. Ovaries as in hermaphrodite, but stigma larger, not conical. *Hab.* Very rare. Upper Perak (Wray).

5. UVARIA, L.

Scandent or sarmentose shrubs, often stellately pubescent. Flowers terminal or leaf-opposed, rarely axillary, cymose or solitary, crimson, purple or yellow. Sepals 3, valvate, often connate at the base. Petals 6, lanceolate-orbicular or ovate, imbricate in 2 whorls similar, sometimes connate at the base. Stamens indefinite, appendage ovoid-oblong or truncate. Torus flat or depressed, pubescent.

Ovaries indefinite, linear-oblong; styles short and thick. Ovules many in 2, rarely 1 row. Carpels many, cylindric, smooth, few- or many-seeded. Tropical Asia and Australia, a few African, about 110 species.

(a) *Flowers over .5 in. wide in short sub-terminal or lateral cymes.*

Anther appendage small, flat, oblique.

Flowers 1 in. across, yellow; leaves beneath glabrous except nerves

(1) **U. Larep**

Flowers over 1 in. long, cream; petals broad; leaves beneath tomentose

(2) **U. dulcis**

Flowers over 1 in. long, red, petals broad; leaves glabrous, coriaceous

(3) **U. Lobbiana**

Anther appendage half as long as anthers, flat, oblique truncate.

Flowers 1.5 in. across, red; leaves sub-glabrous beneath

(4) **U. macrophylla**

Flowers 3 in. across, purple red; leaves stellate tomentose beneath

(5) **U. purpurea**

Anther appendage slightly or not produced.

Whole plant stiffly hairy; flowers red

(6) **U. hirsuta**

Whole plant soft, tomentose

(7) **U. Curtisii**

Anther appendage broad quadrate, outer anthers staminodes; bush or climber, tomentose; flowers 1 in. long, purple

(8) **U. Ridleyi**

(b) *Flowers terminal racemes umbelled.*

Leaves rather small, glabrous

(9) **U. pauci-ovulata**

Leaves large, strong reticulate and tomentose beneath

(10) **U. Scortechinii**

(c) *Flowers small under .5 in. wide.*

Leaves small, lanceolate-acute, glabrous

(11) **U. micrantha**

Leaves large, oblong glabrous when adult

(12) **U. excelsa**

Leaves 4 in. long, pubescent beneath, minutely pustular above

(13) **U. astrostieta**

Dubious species. Flowers axillary, very small, resembling those of *Cyathostemma*

(14) **U. sub-repanda**

(1) **U. Larep** *Miq. Fl. Ind. Bat. Supp.* 370; *King, Journ. As. Soc. Beng. l.c.* 13; *Ann. Bot. Gard. Calc.* 16, *pl.* 14.

A liane 20 to 40 ft. long; young branches and petioles covered with scaly stellate hairs. Leaves membranous, elliptic or sub-ovate, short, acuminate, base rounded, glabrous except on the midrib on both faces and nerves beneath tomentose; nerves 10 to 12 pairs inarching, 5 to 8 in. long, 2 to 3 in. wide; petioles .2 to .3 in. long. Peduncles half-way between the leaves .1 in. long, 1- to 2-flowered. Pedicels .75 in. long. Bracts 1.2 in. long, reniform. Flowers 1.5 to 1.75 in. across. Sepals small, .2 in. long, reniform connate, pubescent, reflexed. Petals oblong-lanceolate, sub-acute, .75 in. long, puberulous, pale yellow. Anthers sessile in few rows, appendages short, oblique. Pistils numerous, angled, puberulous. Carpels numerous, cylindric-oblong, pubescent, 1.25 to 1.5 in. long, .5 in. through. Stalks 1.25 to 1.5 in. long, tomentose. Seeds 10,

in 2 rows. *Hab.* Rare. Perak, Thaiping Hills (Kunstler). *Distrib.* Sumatra.

(2) *U. dulcis* Dunal, *Anonaceæ* 90, t. 13; *King, Journ. As. Soc. Beng. l.c.* 14; *Ann. Bot. Gard. Calc. l.c.* 18, pl. 8.

A big liane 80 to 100 ft. long; young branches ashy-tomentose. Leaves coriaceous elliptic or oval-acute, base rounded, minutely cordate, above stellate-pubescent, 4.5 in. to 7 in. long, 2.5 to 3.5 in. wide; petioles .2 in. long, stout. Peduncles .5 in. long, lateral 1-flowered, 1 to 3 together. Bracts ovate, deciduous; buds ovoid-globose, woolly. Flowers 1.25 to 1.5 in. across, pale yellow. Sepals broadly triangular tomentose. Petals broadly ovate sub-acute, tomentose above, pubescent beneath. Stamens numerous, appendages large, oblique. Ovaries numerous, tomentose. Torus depressed-hemispheric, tomentose. Carpels numerous, oblong-ovoid, obtuse tuberculate and stellate-tomentose; stalks 1 in. long. *Hab.* Forests. Not very common. Malacca, Selangor, etc. Perak, Goping and Ulu Bubong (Kunstler). Dindings, Lumut. Penang, Moniot's road (about 1000 ft. altitude). *Distrib.* Java. *Native name*: Pisang-Pisang hitam.

(3) *U. Lobbiana* Hook. fil. and Thom. *Fl. Ind.* 100; *Hook. fil. F.B.I.* i. 49; *King, Journ. As. Soc. Beng. l.c.* 15; *Ann. Bot. Gard. Calc. l.c.* 19, pl. 9.

A big liane 100 to 150 ft. long, young parts pubescent. Leaves sub-coriaceous oblong or oblong-lanceolate acute or shortly acuminate, base rounded sub-cordate, glabrous except midrib on both sides; nerves 13 to 16 pairs, 4 to 7 in. long, 1.5 to 2.25 in. wide; petioles .25 in. long. Peduncles .25 in. long, 2- to 3-flowered, terminal or leaf opposed, tomentose, with a large round amplexicaul bract to each flower. Flowers 1 to 1.2 in. across, red. Sepals connate into a cup, tomentose. Petals coriaceous (often 7 or 8), nearly equal, oval-obovate blunt, minutely tomentose. Anthers .1 in. long, appendages obliquely truncate, outer row sterile. Pistils pubescent, 4-angled. Carpels numerous, globular to ovoid pubescent, 1 in. long, .5 to .75 in. wide; stalks slender, 1.5 to 2 in. long. Seeds 4 to 10 plano-convex. *Hab.* In forests, not rare. Singapore, Garden Jungle. Malacca, Pringit (Griffith, Maingay). Selangor; Perak, Goping (Kunstler), Penang Hill. *Distrib.* Sumatra.

(4) *U. macrophylla* Roxb. *Fl. Ind.* ii. 663; *Wall. Pl. As. Rar.* ii. t. 122; *King, Journ. As. Soc. Beng. l.c.* 16; *Ann. Bot. Gard. Calc. l.c.* 19, pl. 10. *U. cordata* Wall. *Cat.* 6486.

A woody liane from 10 to 60 ft. or more long, young branches and petioles tomentose. Leaves coriaceous elliptic-oblong or obovate blunt or shortly acuminate, base rounded sub-cordate, above glabrous, except midrib and nerves tomentose, beneath tomentose; nerves 11 to 18 pairs; 4.5 to 10 in. long, 2.5 to 4 in. wide; petioles .25 in. long. Peduncles tomentose, extra-axillary or terminal, 3- to 5-flowered; bracts oval, rounded. Flowers dark

red, 1·5 in. across. Sepals connate into a cup; edge wavy. Petals longer, sub-rotund blunt coriaceous, brown tomentose below, pubescent above. Anthers ·3 in. long, appendages nearly half as long, obliquely truncate. Ovaries tomentose. Torus woody, hemispheric 1 in. across, pubescent in fruit. Carpels oblong, blunt at both ends, glabrous orange, ·75 to 1·25 in. long; stalks ·5 to 1 in. long. Seeds numerous, oval. *Hab.* Common in woods and open country all over the peninsula. Singapore, Changi. Malacca, Ching (Griffith). Selangor, Kwala Lumpur. Perak, Ulu Bubong (Kunstler). Penang, Batu Feringhi (Curtis). *Distrib.* Burma, Ceylon and Java.

(5) **U. purpurea** *Bl. Bijdr.* 11; *Bl. Fl. Jav. Anonaceæ* 13, t. 1 and t. 13 A.; *Hook. fil. F.B.I.* i. 47; *King, Journ. As. Soc. Beng. l.c.* 17; *Ann. Bot. Gard. Calc. l.c.* 21, pl. 12. *U. grandiflora* *Roxb. Fl. Ind.* ii. 665; *Wall. Pl. As. Rar.* ii. t. 121.

A climbing or sarmentose liane, never very thick, bark black, young parts stellate pubescent or tomentose. Leaves thickly membranous glabrous above, stellate-tomentose beneath, deep green shining, oblong-lanceolate or elliptic acute or acuminate, base rounded or cordate; nerves 14 to 17 pairs, 4·5 in. to 11 in. long, 2·5 to 3·75 in. wide; petioles hairy, ·15 to ·25 in. long. Peduncles 1 to 1·5 extra-axillary, 1- to 2-flowered. Flowers showy, 3 to 3·5 in. across. Sepals ovate-obtuse, pale green, hairy. Petals spreading flat coriaceous lanceolate or oblong-acute, 1·75 in. long and ·7 in. wide, nearly equal, deep madder red. Anthers ·3 in. long brownish flesh colour, appendages conspicuous, oblong, irregular. Pistils numerous, tomentose. Stigmas covered with a waxy yellow gum. Torus depressed hemispheric, pubescent. Carpels numerous, oblong-cylindric obtuse minutely tomentose, orange colour, stalked, 1·5 to 2·5 in. long, ·5 in. through; stalks ·5 to 1 in. long. *Hab.* Borders of woods and roadsides, a sarmentose plant; in dense forest climbing high on the trees. Common often in open country. Singapore, Changi. Malacca, Ayer Panas and Ching (Griffith); Nyalas (Derry); Selangor; Pahang. Selangor, Kwala Lumpur. Perak, Kwala Rumpin (Wray). Ulu Bubong and Larut (Kunstler). Prov. Wellesley, Krian. Penang (Porter, Jack); Batu Feringhi. Singora (Annandale). *Distrib.* Malay Islands, S. China. *Native name* : Pisang-Pisang.

The most showy and conspicuous in the genus. King's variety *tuberculata* has rough tubercled fruit. It was collected at Goping by Kunstler.

(6) **U. hirsuta** *Jack, Mal. Misc.* i. (2), 46; *Bl. Fl. Jav. Anonaceæ*, 22, t. 5; *King, Journ. As. Soc. Beng. l.c.* 18, *Ann. Bot. Gard. Calc. l.c.* 22, pl. 14.

A tall slender liane twining by twisting its branches round supports to 80 ft., or more. Young branches, petioles and most of the other parts of the plant covered with stiff red hairs. Leaves

coriaceous elliptic to oblong-acute, base rounded or cordate, hairy on both sides; nerves 9 to 14 pairs; 4 to 7 in. long, 2.25 to 3.25 in. wide; petioles .2 in. long. Peduncles extra-axillary terminal, 1 to 2 in. long, 1- or 2-flowered. Bracts lanceolate. Sepals ovate-acute connate hairy reflexed. Petals crimson red, rather fugacious, ovate acute, .5 in. long, hairy below. Anthers .15 in. long, appendages short obtuse. Pistils tomentose. Carpels numerous, cylindric blunt, 2 to 3 in. long, brownish orange, hairy; stalks 1 to 1.25 in. Torus hemispheric, all hairy. *Hab.* In forests in the low country. Singapore, Garden Jungle, etc. Malacca. Selangor, Sungei Buluh. Dindings. Perak, Gunong Bubu 1500 to 2000 ft. altitude (Kunstler) and Ulu Bubong. Penang, The Nest (Curtis). Kelantan, Kota Bharu. *Distrib.* Malay Archipelago, Burma.

(7) **U. Curtisii** King, *Journ. As. Soc. Beng.* lxxvi. (2), 19; *Ann. Bot. Gard. Calc. l.c.* 23, *pl.* 24A.

A large liane; young branches tomentose. Leaves oblong-lanceolate-acuminate, base rounded, above glabrous except the tomentose midrib, beneath stellate-tomentose; nerves 7 to 12 pairs, 4 to 9 in. long, 1.7 to 3.25 in. wide; petioles .15 to .2 in. long. Flowers solitary or in pairs axillary white; pedicels 1 to 1.75 in. long, tomentose. Bract ovate. Sepals broadly ovate spreading, tomentose outside, puberulous inside, .35 in. long. Petals thinly coriaceous white, subequal ovate-oblong blunt, .5 in. long, puberulous. Stamens connective truncate; no appendages. Ovaries numerous, tomentose; ovules 12 in 2 rows. *Hab.* Rare in forests. Muar; Biawak (Curtis); Perak, on Ulu Bubong (Kunstler); Penang, Government Hill at 2000 ft. altitude (Curtis).

(8) **U. Ridleyi** King, *Journ. As. Soc. Beng. l.c.* 19; *Ann. Bot. Gard. Calc. l.c.* 23, *pl.* 24B.

A bush in open country, a rather slender climber about 15 to 20 ft. long, on edges of woods; young parts stellate-tomentose. Leaves sub-coriaceous elliptic-oblong-acuminate, base round, stellate hairy all over; nerves 10 to 15 pairs; 3 to 5 in. long, 1.3 to 2 in. wide; petioles .15 in. long; stellate-tomentose. Flowers usually dull purple, 2 or 3 in extra-axillary cymes, .75 to 1.2 in. across; pedicels .3 to .4 in. long. Bract large orbicular amplexicaul. Sepals orbicular connate into a 3-toothed cup stellate-tomentose outside. Petals sub-orbicular or oblong blunt sub-equal pubescent. Stamens, outer row sub-quadrate, sterile, appendages broad. Carpels ovoid or obovoid blunt pubescent pulpy and sweet, 1.2 to 1.5 in. long, stalks 1 in. long. Seeds numerous in 2 rows, oval. *Hab.* On heathy open country a bush, on edges of woods a climber. Singapore, Toas; Bukit Mandai. Johor, Sungei Tebrau. Pahang, Pekan (Ridley). Setul, Batu Bunga (form with deep red flowers).

The fruit is quite sweet and eatable.

(9) **U. pauci-ovulata** Hook. *fil. F.B.I.* i. 51; King, *Journ. As. Soc. Beng. l.c.* 20; *Ann. Bot. Gard. Calc. l.c.* 25, *pl.* 16.

A lofty climbing liane, forming a large mass on tree-tops; young branches densely stellate-tomentose. Leaves coriaceous, stiff, narrowly elliptic to oblong obtuse or bluntly acuminate, base round or cordate, above glabrous, below pubescent; nerves 10 to 14 pairs; 2·5 to 6 in. long, 1·25 to 3 in. wide. Racemes terminal, umbellate, few-flowered, 1·5 to 2·5 in. long, tomentose. Bracts numerous imbricate, round or ovate tomentose. Flower 1·5 in. across. Sepals small, 3 in. long, orbicular connate half-way, tomentose outside, puberulous within. Petals much larger connivent ovate rounded blunt, inner 3 narrower, tomentose outside, pubescent inside. Anthers cuneate, appendages short truncate. Pistils longer stellate hairy; ovules 1 to 3. Carpels numerous, sub-globose mucronate tomentose, 35 to 5 in. through, stalk 5 to 75 in. long, slender. Seeds 1 or 2. *Hab.* In dense forests probably common, but difficult to get. Johor; Gunong Pulai. Malacca (Maingay). Penang, highlands (Curtis).

(10) **U. Scortechinii** King, *Journ. As. Soc. Beng. l.c.* 20; *Ann. Bot. Gard. Calc. l.c.* 25, p. 17.

Sarmentose, flexuous shrub; young branches and petioles densely rusty-floccose. Leaves coriaceous elliptic to elliptic-round, blunt, base rounded, above glabrous except nerves, tomentose beneath; nerves and reticulations prominent, red-hairy; nerves 10 to 12 pairs, doubly inarching within the edge, 4 to 7 in. long, 2·5 to 4 in. wide; petioles 2 to 4 in. long. Flowers 1·5 in. across in terminal umbels of 2- to 3- or many-flowered panicles, 4 in. long; peduncles 5 to 75 in. long. Bracts numerous, ovate-orbicular, covered like the branches of inflorescence with flocculent tomentum. Sepals fleshy triangular sub-acute, lower third connate pubescent. Petals 1 in. long, connivent; outer 3 ovate-round, quite blunt, tomentose-pubescent on both sides, inner 3 obovate, clawed, pubescent outside, glabrous inside except a broad pubescent band. Anthers sessile, appendages truncate, almost peltate. Pistils several with a few stellate hairs. Ovules 2 to 3. *Hab.* Very rare. Perak (Scortechinii).

(11) **U. micrantha** Hook. *fil. and Thom. Fl. Ind.* 103; *Hook. fil. F.B.I.* i. 51; *King, Journ. As. Soc. Beng. l.c.* 21; *Ann. Bot. Gard. Calc. l.c.* 26, *pl.* 18.

Large liane; young branches tomentose, adult glabrous, dark with pale warts. Leaves thinly coriaceous oblong-lanceolate, base rounded or slightly cuneate, glabrous except pubescent midrib; nerves very inconspicuous 12 to 15 pairs; 2·5 to 5·5 in. long, 8 to 14 in. wide; petioles 15 in. long. Peduncles terminal or axillary, very short, 2- to 4-flowered, tomentose. Bracts orbicular. Flowers 4 in. across, greenish yellow. Sepals round pubescent outside. Petals broadly ovate sub-obtuse minutely tomentose outside, pubescent inside. Anthers very pale rose. Carpels numerous, ovoid globose, round at each end stalked, glabrous, 2- to

4-seeded. Seeds plano-convex. *Hab.* Forests up to about 2500 ft. altitude. Malacca (Maingay). Perak, Thaiping Hills at the Tea Gardens; Lankawi islands, Terutau (Haniff); Penang, Telok Bahang and Balik Pulau (Curtis).

(12) *U. excelsa* Wall. *Cat.* 6477; *King, Journ. As. Soc. Beng. l.c.* 22; *Ann. Bot. Gard Calc. l.c.* 30, *pl.* 26. *Mitrephora excelsa* Hook. *fil. F.B.I.* i. 79.

A liane 30 to 100 ft. long; young parts stellate-pubescent, soon glabrous. Leaves coriaceous oblanceolate obovate-oblong to elliptic acuminate, base minutely cordate, above glabrous except the puberulous midrib, beneath tomentose; nerves 10 pairs; 3.5 to 7.5 in. long, 1.5 to 4 in. wide; petioles .3 to .5 in. long, pubescent. Flowers white, .35 to .4 in. across, axillary or in contracted cymes, below the leaves; pedicels .2 in. long, tomentose. Bracts large close to flower. Sepals semi-orbicular acute valvate, tomentose outside. Petals imbricate only at tips thick concave pubescent on both faces, outer broadly ovate acute, little larger than the sepals, inner about as large as the sepals. Anthers numerous, appendages thick sub-quadrate pubescent. Carpels sub-globular obovoid blunt tomentose, 1.1 in. long, .9 in. wide. Seeds 14 in 2 rows, flat, half-oval. *Hab.* Forests. Perak; Gopong and Larut (Kunstler). Malacca; Selangor. Penang (Wallich, Curtis). *Distrib.* Cochinchina.

Aberrant in the petals being imbricate at the tips only.

(13) *U. astrosticta* Miq. *Fl. Ind. Bat. Supp.* 370; *Ann. Mus. Bot. Lugd. Bat.* ii. 8; *King, Journ. As. Soc. Beng. l.c.* 23; *Ann. Bot. Gard. Calc. l.c.* 3A.

Young branches deciduously stellate-tomentose with hairs intermixed. Leaves coriaceous oblong-lanceolate acuminate, base rounded above scaberulous, nerves sometimes pubescent, beneath tomentose, later stellate pubescent; nerves 12 to 16 pairs, 4 to 6 in. long, 1.5 to 1.8 in. wide; petioles .2 in. long. Peduncle extra-axillary, .3 in. long, 2- to 3-flowered, stellate-tomentose with 2 or 3 sub-rounded bracts. Flowers .6 in. across. Sepals reniform sub-acute united half-way. Petals nearly 3 times as long, broadly oval slightly obovate sub-acute pubescent. Anthers 3 outer ones barren, appendages flat, truncate. Torus hairy. *Hab.* Very rare. Perak (Scortechini). *Distrib.* Sumatra.

(14) *U. sub-repanda* Wall. *Cat.* 6483; *Hook. fil. F.B.I.* i. 50; *King, Journ. As. Soc. Beng.* 23; *Ann. Bot. Gard. Calc.* 32, *pl.* 117.

Tree. Young parts pubescent, branches very slender. Leaves thin obovate-oblong acute, base round cordate, midrib above pubescent, otherwise glabrous; nerves 10 to 14 pairs, fine elevate beneath; 5 to 7.5 in. long, 2 to 2.5 in. wide; petioles .15 to .25 in. long, scaly. Flowers axillary stellate-tomentose .5 in. across; pedicel .75 in. long. Bracts sub-orbicular. Sepals broad and short,

hairy. Petals ovate, small. Stamens narrow with erect oblong appendages. Pistils hairy slender; no style; ovules numerous in one row. *Hab.* Singapore (Wallich). Penang, Pulau Betong reserve (Curtis).

The habit and foliage are very like that of *Cyathostemma Hookeri*, but the flower is tomentose. Curtis describes this as a tree; I do not think it is an *Uvaria* at all, but I have seen no really adult flowers nor fruit. The stellate pubescence is peculiar.

6. UVARIELLA, Ridl.

Climbers with the habit and flowers of *Uvaria*. Flowers small extra-axillary solitary or few. Petals sub-similar. Stamens numerous with short broad appendages. Pistils hairy, 1-ovuled. Style 0. Carpels oblong or ovoid; stigma terminal. Seed 1. Species 4, India, Cambodia, Malay Peninsula.

(1) *Uvariella leptopoda* Ridl. *Ellipeia leptopoda* King, *Journ. As. Soc. Beng. l.c.* 25; *Ann. Bot. Gard. Calc. l.c.* 33, *pl.* 29.

A liane, 50 to 70 ft. long; young branches and petioles covered with ashy tomentum. Leaves coriaceous obovate-oblong blunt, or with a short blunt point, narrowed to the cordate base, above sparsely stellate-pubescent when young, glabrous except the midrib when adult, beneath softly densely tomentose; nerves 10 to 12 pairs; 3.5 to 5 in. long, 2.25 to 2.5 in. wide; petioles .2 to .25 in. long. Peduncles extra-axillary, .5 in. long. Flowers 3 to 4 on short pedicels. Bracts round hooded, all with the sepals stellate-tomentose. Flower .75 in. wide. Sepals often 4, semi-orbicular, blunt, connate below. Petals three times as long as the sepals, ovate-round obtuse pubescent on both sides, dark crimson. Anthers very small, appendages flattened oblique. Carpels numerous ovoid-rounded oblique, with a lateral beak, ashy pubescent, stalks slender, 1.5 to 2.5 in. long. Seed ovoid, flattened on one side. *Hab.* Rare. Johor at Pinerong (Cantley). Perak, Larut to 300 ft. altitude (Kunstler).

7. ELLIPEIA, Hook. and Thom.

Climber. Flowers yellow in terminal racemes. Petals connivent not spreading, outer 3 much larger than inner 3, all foveolate at base. Stamens numerous, appendages large. Pistil hairy; ovule 1 ventral. Style distinct and rather large. Carpels 1-seeded, stalked; style lateral. Species 1, Malayan.

The other species referred to this genus later by Hooker and by King are separated, *E. nervosa* Hook., and *E. pumila* King, being *Popowias*, *E. glabra* Hook., a *Polyalthia* and *E. leptopoda* an *Uvariella*.

(1) *E. cuneifolia* Hook. *fil. and Thom. Fl. Ind.* 104; *Hook. fil. Ic. Pl. t.* 1025; *F.B.I.* i. 52; *King, Journ. As. Soc. Beng. l.c.* 25; *Ann. Bot. Gard. Calc.* 32, *pl.* 29.

A very lofty liane, as long as 150 ft.; young branches tomentose,

at length glabrous. Leaves thinly coriaceous, oblong or obovate-oblong abruptly shortly acuminate, base rounded or sub-cordate, above glabrous light green shining, midrib and nerves tomentose, below puberulous or glabrescent; nerves 16 to 19 pairs, conspicuous beneath; 4 to 7 in. long, 1.5 to 3 in. tomentose. Flowers .75 to 1 in. across, yellow in short tomentose panicles. Bracts ovate, bracteoles round; pedicels .25 to .4 in. long. Sepals small, sub-orbicular connate below, yellow tomentose. Petals connivent in a cone-shaped mass; outer 3 much larger than sepals, round pubescent on both sides; inner 3 not much larger than sepals, round pubescent outside, glabrous inside. Anthers sessile, short, appendages broad round truncate. Carpels numerous, ovoid oblique blunt yellow tomentose, stalks long. Seed ovoid. *Hab.* Dense forest. Common. Singapore, Garden Jungle. Malacca (Maingay); Tabong (Griffith). Selangor, Semangkok Pass, 2000 to 3000 ft. altitude (Curtis). Perak, Goping (Kunstler).

8. CYATHOCALYX, Champ.

Trees. Leaves glabrous, rather thin. Flowers fascicled, medium size to rather large. Sepals united at base. Petals 6, biseriate, valvate, bases concave. Stamens indefinite, truncate. Ovaries 1 to 6; ovules many. Stigma large. Carpels large oblong, many-seeded, pericarp thick, woody. Species about 10, Indo-Malaya.

Flowers small; petals narrow lanceolate-acuminate (1) **C. virgatus**
Fruit oblong (2) **C. Maingayi**

(1) **C. virgatus** King, *Journ. As. Soc. Beng. l.c.* 28; *Ann. Bot. Gard. Calc. l.c.* 37, pl. 44. *Unona virgata* Bl. *Bijsdr.* 14; *Bl. Fl. Jav. Anonaceæ*, 43, t. 19 and 25B. *Meiogyne virgata* Miq. *Ann. Mus. Bot. Lugd. Bat.* ii. 12.

A tree 20 to about 60 ft. tall, nearly glabrous except the flowers. Leaves membranous, elliptic-oblong to oblong-lanceolate, light green, above glabrous shining, beneath pubescent on the 8 or 9 pairs of nerves, 4 to 6.5 in. long, 1.25 to 2.75 in. wide; petioles .25 to .35 in. long, pubescent. Flowers in axillary sub-sessile fascicles of 2 or 3. Sepals connate at base, ovate or ovate-lanceolate, tomentose, short. Petals tomentose-silky cream colour, tinted with purplish at base, eventually widely expanded, outer .75 in. long, lanceolate long-acuminate, inner base orbicular concave long-acuminate .5 in. long. Stamens purplish, appendages short, obliquely truncate. Pistils 4 to 6, hairy. Torus conic truncate pubescent. Carpels 1 or 2, divergent, oblong-ovoid blunt at both ends, tomentose black, 2 to 3 in. long, 1 to 1.5 in. through. Seeds 8 to 10, elongate, sub-reniform. *Hab.* In woods, often by streams, usually a small tree with slender twiggy branches. Singapore, Bukit Timah. Malacca (Maingay). Perak, Larut (Kunstler). Penang. *Distrib.* Java.

(2) **C. Maingayi** Hook. *fl. F.B.I.* i. 53; *King, Journ. As. Soc. Beng. l.c.* 29; *Ann. Bot. Gard. Calc. l.c.* 38.

Tree 50 to 60 ft. tall, branches puberulous, otherwise glabrous. Leaves elliptic to oblong, often caudate-acuminate, base round or cuneate; nerves 13 to 15 pairs; 5.8 in. to 8.8 in. long, 2.75 to 3.75 in. wide; petioles .3 in. long. Flowers 1 to 3, racemose axillary; pedicels .05 to .75 in. long. Sepals ovate sub-acute puberulous .4 in. long. Petals green, with a reddish yellow spot at base, obovate shortly clawed puberulous, inner row sub-concave. Stamens, appendages flat orbicular oblique. Ovaries 3, pubescent; style lateral. Carpels brown, 1 or 2 globular, 1.75 in. through, pubescent. Seeds 10. *Hab.* In low country forest. Malacca (Maingay); Ayer Panas (Derry and Griffith). Perak, Larut (Kunstler). Penang, Telok Bahang (Curtis). *Native name* : Medang Tanjong.

9. DREPANANTHUS, Maing.

Tall, slender, straight trees with straight projecting branches. Leaves large pubescent beneath. Flowers small yellowish white in crowded racemes on very short tubercles, on the old wood of the branches. Sepals 3. Petals 6, valvate in 2 series sub-equal, bases concave connivent, limb erect ovate or cylindric. Stamens many cuneate; anthers linear, cells lateral, appendages very small. Pistils 4 to 12. Stigma sub-sessile. Ovules 4 or more in 2 rows. Carpels globular. Seeds several. Species 3, Malay Peninsula and Sumatra.

Petals and sepals sub-equal; petals ovate-oblong broad	(1) D. pruniferus
Petals longer than sepals, sub-cylindric narrow	(2) D. ramuliflorus
Petals linear-oblong narrow keeled	(3) D. carinatus

(1) **D. pruniferus** Maing. *in Hook. fl. F.B.I.* i. 56; *King, Journ. As. Soc. Beng. l.c.* 38; *Ann. Bot. Gard. Calc. l.c.* 49, *pl.* 65.

A tree 40 to 50 ft. tall, with stout spreading branches, pubescent at first. Leaves coriaceous elliptic to oblong acute or obtuse, base rounded sub-cordate, above glabrous except the tomentose midrib and 14 to 16 pairs of nerves, pubescent beneath, finally glabrous, 7.5 to 14 in. long, 3 to 6.5 in. wide; petioles .5 to 1.5 in. long, stout. Racemes 6- to 8-flowered; pedicels .5 to .75 in. long, tomentose. Bracts oblanceolate. Flowers .75 in. long, yellowish white. Sepals and petals sub-equal, or petals little longer, tomentose. Sepals ovate-oblong. Petals outer ovate-oblong broad sub-acute, constricted above the claw; inner closely connivent, much constricted above the claw, tips broad. Pistils silky. Carpels 6 to 8, sessile globose pubescent, 1 to 1.25 in. through. Seeds oblong, numerous, flat. *Hab.* In lowland forest. Common. Singapore. Perak, Larut (Kunstler). Pahang, Kuantan (Foxworthy), Penang Hill (Curtis). *Native names* : Antoi hitam and Antoi kuning. *Use* : In house-building.

(2) **D. ramuliflorus** Maing. in *F.B.I. l.c.* 56; *King, Journ. As. Soc. Beng. l.c.* 39; *Ann. Bot. Gard. Calc. l.c.* 49, *pl.* 66.

A tree resembling *D. pruniferus*, but bigger. Flowers .4 to .5 in. long, white crowded in very short fascicles on tubercles on the branches below the leaves; pedicels .3 in. long. Sepals triangular acuminate tomentose. Petals, both rows similar, claw concave connivent tomentose, limbs fleshy, narrow sub-cylindric curved, connivent or spreading, pubescent. Pistils 5, oblong. Carpels globose tomentose or oblong, .75 in. through. Seeds about 7, ovoid, plano-convex, flattened, chestnut colour, .50 in. long, .3 in. wide. *Hab.* Singapore, Garden Jungle. Malacca, not rare here, about Ayer Panas and Sungei Hudang. *Native name*: Antoi putih.

(3) **D. carinatus** Ridl.

Tree, softly hairy. Leaves sub-coriaceous ovate or oblong acute, base round, above smooth, beneath glaucescent and glabrous, shortly thickly hairy; nerves 10 pairs, 6 in. long, 2.75 in. wide; petioles .3 in. long. Flowers solitary on branches; peduncle short thick hairy .25 in. long with a large round convolute bract. Sepals broad, almost reniform, .12 in. long, .25 in. wide, hairy. Petals oblong-linear blunt, keeled on back, pubescent constricted above the silky claw; .75 in. long, .12 in. wide. Stamens short oblong, appendages small. Ovaries 5, hairy; stigmas longer than stamens. Fruit very young, small, silky. *Hab.* Selangor, Sungei Buluh (Foxworthy). *Native name*: Malak.

10. ARTABOTRYS, R.Br.

Sarmentose or climbing shrubs, seldom very stout. Leaves coriaceous usually small, dark green shining. Flowers solitary or more often fascicled on flattened, woody, recurved peduncles by which the plant climbs. Sepals 3, valvate. Petals 6 in 2 series, white or yellowish rarely green or pink, bases concave, connivent; limb lanceolate or sub-terete, generally narrow. Stamens oblong or cuneate, appendages short or long; anther-cells dorsal. Pistils few or many; style oblong or columnar. Ovules 2, erect. Carpels baccate. Species 40, tropical Africa and East Asia. Easily recognized by the peculiar flattened hooked branches by which the plants climb.

i. PLATYPETALA. Petals broad, flat, lanceolate.

Flower under 1 in. long.

Petals very fleshy, elliptic, blunt; leaves thin,
8 to 14 in. long

(1) **A. grandifolius**

Petals coriaceous lanceolate-acuminate; leaves
thick, 2 in. long

(2) **A. Scortechinii**

Petals elliptic, blunt; leaves thin, lanceolate,
caudate

(3) **A. pleurocarpus**

Flowers 1 in. long.

Leaves elliptic, coriaceous, 3 to 6 in. long

(4) **A. venustus**

- Leaves elliptic hairy strong-nerved, 6 to 8 in. long (5) **A. Wrayi**
 Flowers over 1 in. long.
 Leaves oblong-elliptic coriaceous, blunt (6) **A. crassifolius**
 Leaves oblong-acuminate, thinly coriaceous (7) **A. oblongus**
 Flowers 2 in. long (8) **A. Lowianus**
 Flowers 1·75 in. long (9) **A. oxycarpus**
- ii. **ANGUSTIPETALÆ.** Petals narrow linear or cylindric dilate at base.
 Petals linear flat, thick blunt, not dilate at base . . . (10) **A. gracilis**
 Petals cylindric dilate at base.
 Leaves rather thin, 3 to 6 in. long, elliptic acuminate; flowers 1 to 1·25 in. long . . . (11) **A. Maingay**
 Leaves stiff oblong-lanceolate, 2 to 3 in. long; flowers ·4 in. long (12) **A. suaveolens**
Dubious species. Leaves rather thin, very strongly ribbed (13) **A. costatus**

(1) **A. grandifolius** King, *Journ. As. Soc. Beng. t. i. pl. 2*, 31; *Ann. Bot. Gard. Calc. l.c. 39, pl. 46*.

A big liane 60 to 80 ft. long, glabrous except the flowers. Leaves thinly coriaceous pellucid-punctate elliptic-oblong to obovate sub-acute; base cuneate; nerves 10 to 12, inarching ·25 in. from the edge; 8 to 14 in. long, 3 to 5 in. wide; petioles ·4 in. long, stout. Petals very fleshy tomentose, outer 3 broadly elliptic, sub-acute, ·75 in. long, ·4 in. broad, inner 3 obovoid, tips incurved, shorter light brown. Carpels on a hemispheric torus, 1 in. across, on a stout 3 in. long peduncle, numerous elliptic-ovoid mammillate 1·5 in. long, 1 in. through; stalk ·5 in. long, pericarp hard. Seed 1, ellipsoid blunt pale wrinkled. *Hab.* Low country forest, rare. Perak, Goping at 500 to 800 ft. altitude (Kunstler).

(2) **A. Scortechinii** King, *Journ. As. Soc. Beng. l.c. 32; Ann. Bot. Gard. Calc. l.c. 40, pl. 48*.

A glabrous liane. Leaves thinly coriaceous ovate-lanceolate shortly acuminate, base cuneate; nerves 9 to 11 pairs inarching ·1 in. from the edge, 2·25 in. long, ·9 to 1·3 in. wide; petioles 2 in. long. Peduncle 3- or 4-flowered; pedicels ·5 in. long, puberulous. Bracts at base small ovate. Flowers ·6 to ·8 in. long. Sepals very coriaceous triangular acuminate connate at base, pubescent, ·25 in. long. Petals coriaceous broadly lanceolate acuminate tomentose, inner 3 smaller. Appendages of anthers broad. Torus flat silky. Pistils glabrous. *Hab.* Very rare. Perak (Scortechini), Lankawi (Curtis).

(3) **A. pleurocarpus** Maingay in Hook. *fil. F.B.I. i. 54; King, Journ. As. Soc. Beng. l.c. 32; Ann. Bot. Gard. Calc. l.c. 41, pl. 49*.

A liane, glabrous except the flowers. Leaves coriaceous oblanceolate-oblong, tip abruptly shortly acuminate, base narrowed, shining and reticulate; nerves 10 pairs; 4 to 6·5 in. long, 1·5 to 2·25 in. wide; petioles ·15 in. long. Peduncles flat stout much hooked densely pubescent. Flowers 1·5 in. long. Sepals broad ovate

blunt. Petals sub-equal flat elliptic-oblong blunt pubescent, outer row 1 to 1.35 in. long; inner smaller. Pistils many. Carpels broadly elliptic, mammillate narrowed to a short, stout stalk, .75 in. long. Seeds 2. *Hab.* Forests. Rare. Malacca (Maingay). Perak (Scortechini).

(4) **A. venustus** King, *Journ. As. Soc. Beng. l.c.* 32; *Ann. Bot. Gard. Calc. l.c.* 41, *pl.* 50.

A big liane 30 to 80 ft. long; young parts at first puberulous. Leaves coriaceous glabrous shining elliptic to elliptic-oblong, shortly acuminate, base rounded; nerves 7 to 10 pairs inarching .1 to .2 in. from edge; 3.5 to 6 in. long, 2 to 3 in. wide; petioles .2 to .25 in. long. Peduncles extra-axillary, rather slender in flower, thicker in fruit, tomentose, with 3 or 4 flowers; .75 in. to 1 in. long; pedicels slender, .5 to .1 in. long. Sepals broadly triangular sub-acute green with red hair outside, glabrous inside, .15 in. long. Petals tomentose outside, outer 3 ovate-lanceolate, sub-acute, inner 3 shorter, narrower, all pale yellow. Anthers short, appendages orbicular flat green. Pistils 10, oblong green. Carpels about 6, obovoid narrow at the base sessile, 2 in. long, green ribbed. Seeds 2, plano-convex, flesh colour, about 1 in. long and .6 in. wide. *Hab.* In hill forests. Perak; Thaiping Hills at 1000 ft. to 1500 ft. altitude; Goping (Kunstler). *Distrib.* Siam.

(5) **A. Wrayi** King, *Journ. As. Soc. Beng. l.c.* 37; *Ann. Bot. Gard. Calc. l.c.* 48, *pl.* 64.

A big climber; young branches rufous-tomentose. Leaves thinly coriaceous large oblong-elliptic or elliptic shortly acuminate, base rounded, boldly reticulate, sub-bullate beneath, softly pubescent; nerves 10 to 12 pairs, inarching within the edges; 8 to 12 in., 2.75 to 5 in. wide; petioles .35 in. long, stout tomentose to glabrescent. Peduncles short, sometimes straight when young and curving in fruit, glabrous, pedicels 1 in. long, tomentose. Flowers 1 in. long. Sepals broadly ovate acuminate, .5 in. long, silky, tomentose outside, glabrous within. Petals sub-equal, ovate-oblong sub-acute contracted above the claw, silky except inside of the claw. Pistils numerous. Carpels obovoid tapering to base, tip mucronate, sessile densely tomentose, nearly 1 in. long. *Hab.* Low country; Singapore, Garden Jungle and roadsides near Tanglin. Perak, Waterfall, Thaiping.

Remarkable for its large leaves.

(6) **A. crassifolius** Hook. *fil. F.B.I.* i. 54; King, *Journ. As. Soc. Beng. l.c.* 33; *Ann. Bot. Gard. Calc.* 42, *pl.* 51.

A big climber; young branches rusty-tomentose. Leaves very coriaceous elliptic to oblong blunt or shortly mucronate, base acute or rounded, above glabrous, beneath pubescent, becoming glabrous; nerves 9 to 10 pairs, 6 to 6.5 in. long, 1.75 to 2.75 in. wide; petioles .3 to .4 in. long, stout. Peduncles stout flat much

hooked; pedicels .3 to .4 in. long, tomentose thick. Bracts ovate. Flowers 1.25 in. long, yellow. Sepals ovate-lanceolate blunt pubescent on both sides. Petals coriaceous oblong-lanceolate densely tomentose on both sides, outer three larger. Carpels 8 sessile on a sub-globose torus on a very stout peduncle, ovoid or obovoid glabrous 1.25 to 1.65 in. long, .75 to 1.15 in. through. Seeds 2 oblong compressed .9 in. long and 6 in. wide. *Hab.* Not very rare in dense forest. Singapore, Bukit Timah. Malacca (Maingay). Perak, Thaiping (Kunstler). *Distrib.* Burma.

(7) **A. oblongus** King, *Journ. As. Soc. Beng. l.c.* 33; *Ann. Bot. Gard. Calc. l.c.* 42.

A glabrous climber 50 to 70 ft. long, young branches and inflorescence only pubescent. Leaves coriaceous oblong acuminate, base acute; nerves 10 to 12 pairs, inarching twice or thrice within the edge; 6.5 to 9 in. long, 2.5 to 3 in. wide; petioles .4 in. long. Peduncles stout, pubescent with 3 or 4 pedicels, 1 in. long. Flowers 1.35 in. long, light yellow. Sepals triangular acute red-pilose on both sides, .25 in. long. Petals base saccate, blade lanceolate sub-acute, tomentose on both surfaces, claw partly glabrous, partly white-haired. Anther-appendages flattened, oblong. Ovaries few, glabrous. *Hab.* Lowland forest. Rare. Perak, Larut Hills at 500 to 800 ft. altitude (Kunstler).

(8) **A. Lowianus** King, *Journ. As. Soc. Beng. l.c.* 34; *Ann. Bot. Gard. Calc.* p. 43, *pl.* 54.

A stout climber, glabrous except the flower. Leaves thinly coriaceous, oblong-lanceolate, caudate-acuminate, base cuneate; nerves 8 to 10 pairs, inarching .2 in. within the margin; 3.5 to 6 in. long, 1.25 to 1.75 in. wide; petioles .25 in. long. Peduncles extra-axillary, 2- to 3-flowered; pedicels .5 to .75 in. long, all glabrous. Sepals triangular acute glabrous, .25 in. long. Petals puberulous elliptic-lanceolate obtuse, 3 outers 1.75 in. long, inners smaller. Appendages of anthers rounded. Pistils many, glabrous. Carpels sessile, ovoid. *Hab.* Perak (Scortechini). Very rare.

(9) **A. oxycarpus** King, *Journ. As. Soc. Beng. l.c.* 34; *Ann. Bot. Gard. Calc. l.c.* 44, *pl.* 56.

A stout climber 60 to 80 ft. long, glabrous except the flower. Leaves oblong-lanceolate, base cuneate; nerves 6 to 8 pairs; .3 to .5 in. long, 1.25 to 1.5 in. wide. Peduncles .75 in. long, glabrous; pedicels 2.75 in. long. Flowers green, turning yellow 1.5 to 1.75 in. long. Sepals small broadly ovate acute, .2 in. long. Petals much longer lanceolate obtuse pubescent, inner 3 smaller. Torus small silky. Pistils glabrous. Carpels numerous sessile glabrous narrowly elliptic tapering to both ends, tip caudate, 1 to 1.2 in. long, .4 in. through. Seeds 2, plano-convex, .25 in. long. *Hab.* Not common in forests. Perak, Larut Hills, 500 to 1000 ft. altitude (Kunstler). Kelantan, Chaning Woods (Ridley).

(10) **A. gracilis** King, *Journ. As. Soc. Beng. l.c.* 35; *Ann. Bot. Gard. Calc. l.c.* 46, *pl.* 60.

A slender climber 60 to 80 ft. long, glabrous except the petals. Leaves thinly coriaceous ovate-lanceolate acuminate, base cuneate; nerves 7 to 8 pairs inarching within the edge; 2·5 to 3 in. long, 1 to 1·75 in. wide; petioles 1·5 to 2 in. long. Peduncles much hooked, 4- to 6-flowered; pedicels 35 in. long. Flower 3 to 4 in. long. Sepals very coriaceous, semi-orbicular, concave. Petals subequal curved tomentose, outer 3 flattened linear thick, inners obtusely 3-angled base swollen, smaller. Appendages of anthers broad. Pistils 3 to 4, oblong; stigmas large. Torus villous. Carpels 3 to 4 sessile yellow obovoid glabrous, 8 in. long, 7 in. through. Seeds 2 compressed-ovoid. *Hab.* Lowland forests. Johor, Kota Tinggi. Selangor near Kwala Lumpur. Perak, Thaiping and Ulu Selama (Kunstler).

(11) **A. Maingayi** Hook. *fil. F.B.I.* i. 55; King, *Journ. As. Soc. Beng. l.c.* 35; *Ann. Bot. Gard. Calc. l.c.* 45, *pl.* 58.

A climber 40 to 80 ft. long, glabrous except the flowers. Leaves thinly coriaceous deep shining green elliptic acuminate at both ends; nerves 7 to 9 pairs; 3·5 to 6 in. long, 1·35 to 2 in. wide; petioles 25 to 5 in. long. Peduncles flat curved glabrous. Flowers yellowish white, 1 in. long fascicled; pedicels 5 to 1·5 in. long, pubescent. Sepals small, obtuse, 2 in. long. Petals, outer linear-oblong obtuse, the saccate base small, 1 to 1·25 in. long, 25 to 35 in. broad, inner smaller and narrower. Pistils 3 to 4 ovoid. Carpels sessile elliptic-globose mammillate glabrous yellow, 2·5 in. long, 1·5 in. through. Seeds 2, plano-convex, testa stony. *Hab.* Common in the south in woods, but seldom flowering. Singapore, Garden Jungle; Malacca (Maingay).

(12) **A. suaveolens** Blume, *Fl. Jav. Anonaceæ*, 62, *t.* 30, 31D; Hook. *fil. F.B.I.* i. 55; King, *Journ. As. Soc. Beng. l.c.* 36; *Ann. Bot. Gard. Calc. l.c.* 46, *pl.* 61.

A tall climber 50 ft. or more long; stem black, usually glabrous except the petals, occasionally puberulous on the underside of the leaves and peduncles. Leaves thinly coriaceous dark shining green oblong-lanceolate to ovate-lanceolate-acute shortly acuminate, base acute, 3·5 in. long; petioles short. Peduncles thin hooked at first, thickening strongly as they age, glabrous or puberulous, with 5 to 15 flowers on pedicels, 3 to 45 in. long. Flowers 4 in. long, white creamy, tomentose. Sepals ovate acute, 1 in. long. Petals dilate at base, limb cylindric or clubbed erect, tips incurved. Anthers brown, appendages broad oblique. Carpels few, ellipsoid, obtuse, base narrowed, glabrous, 4 to 5 in. long, 25 in. through. Seed 1, ellipsoid, testa granular. *Hab.* The commonest species, very floriferous in October in forests. Singapore (abundant) to Penang. *Distrib.* Chittagong, Mergui, Burma, Malay islands. *Native name:* Akar Chenana.

(13) **A. costatus** King, *Journ. As. Soc. Beng. l.c.* 37; *Ann. Bot. Gard. Calc. l.c.* 47, *pl.* 63.

A climber 15 to 80 ft. long; young branches pubescent. Leaves thinly coriaceous elliptic-oblong or oblanceolate shortly acuminate, base cuneate above, glabrous shining, midrib tomentose, beneath puberulous when young; nerves 12 to 14 pairs, boldly inarching .3 in. from the edge with an outer series of arches; 7 to 9 in. long, 2.5 to 3.25 in. wide; petioles .2 in. long. Peduncles rather small hooked. Carpels 2 to 5, sessile, ellipsoid, glabrous. Seeds 2. *Hab.* Forests in the lowlands. Singapore, Mandai. Negri Sembilan, Bukit Tampin. Perak, Goping; Gunong Keledang and Ulu Bubong (Kunstler).

11. CANANGIUM, Baill.

Tall trees with large membranous leaves. Flowers large or small, solitary or fascicled in short axillary cymes. Sepals 3, ovate-valvate. Petals 6, thin sub-equal green or yellow long flat, valvate. Stamens linear; anther-cells approximate extrorse; appendages lanceolate acute. Pistils many; stigmas sub-capitate; ovules numerous in 2 rows. Carpels many juicy stalked. Seeds many, testa black, crustaceous pitted, sending spinous processes into the albumen. Species 3, Burma to New Guinea and Philippines.

Leaves glabrous; flowers over 2 in. long	(1) C. odoratum
Leaves glabrescent; flowers 1 in. long	(2) C. Scortechinii
Leaves ovate to orbicular, woolly beneath deciduous; flowers large	(3) C. latifolium
Dubious, glabrous; flowers 1 in. long; petals blunt	(4) C. monosperma

(1) **C. odoratum** Baill. *Hist. des Planies*, i. 213.

The well-known Kenanga of the Malays, is not wild in the peninsula, only occurring in gardens and orchards, where planted. It is readily known by its large flaccid fragrant flowers, at first green, gradually becoming yellow, and its dark green, eventually black, pulpy fruit with the black-pitted seed.

Rumphius' genus *Cananga* was pre-Linnean and thus is not retained, as Aublet unfortunately transferred this suitable name to a South American plant of a different genus.

(2) **C. Scortechinii** King, *Journ. As. Soc. Beng. l.c.* 42; *Ann. Bot. Gard. Calc. l.c.* 51, *pl.* 68.

A tall tree 30 to 40 ft. high, with puberulous branchlets becoming soon glabrous and dark coloured. Leaves membranous ovate base broad rounded, apex acuminate, at first pubescent, later glabrescent, gland-dotted; midrib and nerves 6 to 7 pairs appressed-pubescent; 2.5 to 6 in. long, 1.5 to 3 in. wide. Cymes short, few-flowered. Flowers 1 to 1.25 in. long; pedicels under 1 in. long pubescent; bracteoles median ovate .25 in. long. Sepals ovate

sub-acute pubescent, .35 in. long. Petals sub-equal linear-obtuse, claw short thickened pubescent. Stamens with bulbous appendages tapering to a point. Pistils numerous, oblong, glabrous except the base. Ovules 6 to 8. *Hab.* Rare in forests. Malacca, at Sungei Hudang (Derry). Perak, Kwala Dipang (Scortechini). *Native name*: Kasidang.

(3) *C. latifolium* *Pierre, MS.*; *C. Brandesanum*, *Safford Bull. Torr. Club*, xxxix. 506. *Unona latifolia* *Hook. fil. F.B.I.* i. 60; *King, Ann. Bot. Gard. Calc. l.c.* 58, *pl.* 78. *U. Brandisianum* *Pierre, Fl. For. Cochinchine*, t. 19.

Tree 30 to 50 ft. tall; branchlets grey tomentose; leafless when in flower. Leaves membranous ovate to orbicular blunt, base round, glabrescent above, grey, tomentose beneath; nerves 7 to 9 pairs, 2 to 5 in. long, 1.65 to 3.5 in. wide; petioles .4 in. long. Flowers 1 to 2, extra-axillary; peduncle .5 to 1 in. long, with a lanceolate bract. Sepals oblong ovate acute connate at base. Petals oblong-lanceolate, inner row shorter, green tomentose. Stamens few; appendages ovate acute erect. Styles elongate. Carpels 20, oblong, .5 in. long; stalks thick, .4 in. long. Seeds 3. *Hab.* In dry places in the north in open country. Lankawi isles (Curtis). Perlis at Kanga. *Distrib.* Burma and Cambodia.

Pierre named this after Sir Dietrich Brandis. Safford, unfortunately, in putting it into the genus *Canangium*, altered *Brandisianum* into the meaningless *Brandesanum*.

(4) *Cananga ? monosperma* *Hook. fil. F.B.I.* i. 57.

Large tree with thick stem, half-way up the hill and about 5 ft. tall and as thick as the thumb at the top, glabrous, bark pale. Leaves thinly coriaceous broadly elliptic shortly bluntly acuminate, base cuneate oblique, glabrous; nerves 10 to 12 pairs, very slender and faint, midrib channelled and elevate beneath; 3.5 to 4.5 in. long, 1 to 3 in. wide; petioles .2 in. long, thick. Flowers solitary axillary on short .2 in. long peduncles. Sepals small ovate obtuse connate at base. Petals, outer valvate coriaceous broad ovate pubescent narrowed at base .4 in. long; inner rather narrower, more oblong. Anthers short broad cuneate, cells dorsal, appendages broad truncate. Style 0. Ovules numerous in 2 rows. Disc hairy. Fruit fusiform 1-seeded, .25 in. long, pedicel very short. *Hab.* Penang Hill (Maingay).

I have failed to find this plant on Penang Hill, nor has any other collector met with it. I hardly think it can be a *Cananga*, perhaps nearer *Cyathocalyx*.

12. DESMOS, Lour.

Unona *Hook. fil. and King*, not of Linné.

Shrubs, erect or scandent. Flowers solitary axillary or leaf-opposed, pedicelled. Sepals 3, valvate. Petals 6 or 3, sometimes 2, valvate. Stamens many cuneate; appendages globose or truncate,

ovaries many. Style ovoid or oblong, ovules 2 to 8 in 1 row. Carpels many, long and constrict between seeds. Seeds 2 to 6. Species 20, tropical Asia.

i. EUDESMOS. Petals 6 in 2 rows.

- Flower axillary; leaves glabrous (1) **D. Dunalii**
 Flower opposite leaf; leaves glabrous.
 Pedicel 4 to 6 in. long; leaves hardly glaucous
 beneath (2) **D. Cochinchinensis**
 Pedicel 1 to 2 in. long.
 Leaves quite glaucous beneath (3) **D. chinensis**
 Leaves hairy, tomentose (4) **D. dumosa**

ii. DASYMASCHALON. Petals 3 or 2, long and often connate.

- Flowers broad 3 in. long; carpels many-seeded;
 pedicels short (5) **D. dasymaschala**
 Flowers narrow, 6 in. long; pedicels very long;
 carpels 1-seeded (6) **D. filipes**

(1) **D. Dunalii** *Safford, Bull. Torr. Club*, xxxix. 506. *Unona Dunalii* *Wall. Cat.* 6425; *Hook. fil. F.B.I.* i. 58; *King, Journ. As. Soc. Beng.* lxi. (2), 43; *Ann. Bot. Gard. Calc. l.c.* 54, *pl.* 71.

A climber 60 to 100 ft. long. Leaves thickly membranous elliptic-oblong to oblong-lanceolate acute or acuminate, base rounded above, glabrous beneath and slightly glaucous, with occasionally a few hairs on the midrib; nerves 10 to 12 pairs; 3 to 4 in. long, 1.2 to 1.75 in. wide; petioles .2 in. long. Flowers axillary solitary, 1.25 to 1.4 in. long on pedicels .35 to .5 in. long, slender pubescent, a minute bract in the middle. Sepals broadly ovate acute puberulous, .25 to .3 in. long. Petals narrowly oblong-lanceolate, sub-acute puberulous or glabrous yellow, 1 to 1.25 in. long, inner ones smaller. Carpels numerous, glabrous, 1.25 to 1.75 in. long, constricted between the 3 to 5 ovoid joints, yellow turning black, on stalks 1 in. long. *Hab.* Dense jungle and tops of limestone hills. Malacca (Griffith). Penang (Wallich and Curtis), Muka Head. Perak, Trong; Goping and Kol, 500 to 1800 ft. altitude (Kunstler). *Distrib.* Chittagong.

(2) **D. Cochinchinensis** *Loureiro, Fl. Cochinchine*, i. 352. *Unona Desmos* *Dunal. Anonaceæ* 112, *Hook. fil. F.B.I.* i. 59; *King, Journ. As. Soc. Beng. l.c.* 44; *Ann. Bot. Gard. Calc.* 55, *pl.* 73.

A slender climber 20 to 30 ft. long, or an erect shrub. Leaves thinly coriaceous oblong-acute or acuminate, base rounded, glabrous beneath pale; nerves 12 to 14 pairs; 4.8 to 8.8 in. long, 1.65 to 3.25 in. wide; petioles .35 in. long. Flowers solitary extra-axillary 1.35 to 1.75 in. long, green to dark yellow on a slender peduncle .4 to .6 in. long. Sepals ovate acuminate pubescent, .3 in. long. Petals ovate-lanceolate pubescent; the outer ones 2 in. long, .85 in. wide, inner ones smaller. Carpels numerous, .5 to .75 in. long, glabrous constrict between 2 to 5 oval joints, stalked. *Hab.* Open places and thickets. Malacca, Brisu (Derry). Pahang, Kwala

Semantan. Selangor. Perak, Larut (Kunstler). Penang (Wallich); Telok Bahang (Curtis). Jalor (Gwynne Vaughan). Kedah, Alor Sta. Kelantan, Kampong Kota (Gimlette). *Distrib.* Assam, Assam, Cochin-China. *Native names*: Akar Sugi-Sugi; Larak Salai. *Use*: A decoction of roots for fever.

(3) **D. chinensis** Loureiro, *Fl. Cochinchine*, i. 352. *Unona* discolor Vahl, *Symb.* ii. 63, t. 36; *Hook. fil. F.B.I.* i. 59; *King, Journ. As. Soc. Beng. l.c.* 44; *Ann. Bot. Gard. Calc. l.c.* 56, pl. 74.

A shrub or climber 40 to 80 ft. long. Leaves membranous oblong to oblanceolate acute, base rounded, above glabrous, beneath glaucous glabrous or pubescent; nerves 8 to 10 pairs; 3 to 7.5 in. long, 1 to 2 in. wide; petioles .25 in. long. Flowers solitary extra-axillary, 2 to 2.5 in. long, at first green becoming yellow; peduncle 1 to 2 in. long, slender pubescent. Sepals ovate-lanceolate, nearly glabrous, .4 to .6 in. long. Petals narrow lanceolate, glabrous or silky. Pistils oblong, hairy. Carpels numerous, .75 to 1.5 in. long, glabrous or pubescent, constricted between the 2 to 5 oval joints; stalks .25 in. long. *Hab.* Open country and borders of woods and thickets. Common up to 1800 ft. altitude. Singapore, Reservoir woods; Garden Jungle. Malacca, Bukit China Road (Maingay); Ayer Panas (Goodenough). Pahang, Kwantan (Foxworthy). Perak, Waterloo (Curtis); Kwala Dipang (Curtis); Batang Padang (Kunstler). Kedah. Lankawi, Tasek Enak (Haniff). Jalor, Biserat (Gwynne Vaughan). *Distrib.* East Himalaya, Burma, Malay isles, China. *Native names*: Kenanga hutan; Akar Darah; A. Mariam; A. Singa; Poko Sikenchong. *Use*: A decoction used for dysentery.

(4) **D. dumosa** Safford *l.c.* 506. *Unona dumosa* Roxb. *Fl. Ind.* ii. 670; *Hook. fil. F.B.I.* i. 131.

A large climber; young branches tomentose. Leaves membranous broadly-ovate to oblong-ovate or oblanceolate-oblong blunt or sub-acute, base rounded, when young purplish tomentose on both sides, when adult glabrescent, except midrib; nerves 10 to 12 pairs; 2 to 5.25 in. long, 1.25 to 2.5 in. wide; petioles .15 to 3 in. long. Flowers solitary, leaf-opposed or extra-axillary, 2 to 2.5 in. long, greenish yellow, on pedicels .5 to .75 in. long, tomentose. Bracts near the base ovate. Sepals cordate or ovate acute tomentose .4 in. long. Petals obovate-spathulate to broadly ovate-lanceolate acuminate at both ends, densely pubescent at first. Carpels numerous glabrous, .75 to 1.4 in. long, constricted between the 2 to 3 ovoid joints, yellow turning dark purple. *Hab.* Not rare in open country and thickets. Singapore in Tanglin. Malacca; Perak at Thaiping and Relau Tujur (Wray); Goping (Kunstler); Dindings, Lumut; Kelantan, Channing Woods. *Distrib.* Assam. *Native names*: Akar Pisang-Pisang Padi; Akar Kinching Juhu.

(5) **D. dasymaschala** Safford *l.c.* 507. *Unona dasymaschala*

Bl. Fl. Jav. Anonaceæ 55, t. 27; *Hook. fil. F.B.I.* i. 61; *King, Journ. As. Soc. Beng. l.c.* 47; *Ann. Bot. Gard. Calc.* 59, pl. 81.

A shrub or treelet, about 12 ft. tall, glabrous or pubescent. Leaves thinly coriaceous oblong or elliptic-oblong acute or acuminate, base round or narrow, above glabrous dull green, beneath glaucous, midrib pubescent velvety; nerves, 10 to 12 pairs, 4.5 to 6 in. long, 1.5 to 3 in. wide; petioles .1 in. long, pubescent or brown velvety. Flowers axillary solitary pendent; pedicels .75 to 1.75 in. long. Sepals short broadly triangular, .15 in. long, pubescent. Petals 3, light orange cream colour ovate acute to lanceolate-acuminate, often twisted and usually connate for the greater part of their length, usually glabrous, 3 in. long, .4 to .5 in. wide. Anthers oblong, tips cuneate, white tipped with pink. Pistils densely villous. Carpels numerous, moniliform, joints 5 or 6 oval, .35 in. long, pubescent or glabrous. *Hab.* Woods and thickets; the commonest species, variable in amount of pubescence and size of flowers. Singapore, Garden Jungle; Bukit Timah; Jurong. Malacca (Maingay). Selangor, Sungei Buluh (Foxworthy). Perak, Thaiping (Wray); Goping (Kunstler). Dindings, Pangkor (Curtis). Province Wellesley, Bukit Juru (Curtis). Penang, Pulau Adang. Kedah. Kelantan.

var. *Wallichii* *Hook. fil.* Branches tomentose. Johor, Tanjong Bunga; Perak, Goping (Kunstler), B'landa Mabok (Wray); Province Wellesley, Bukit Juru (Curtis). *Distrib.* Burma, Siam, Java, Sumatra. *Native names:* Jari Ayam; Kenanga Paya; Chenang hutan; Larut Api; Chin Ching.

(6) *D. filipes* *Ridl. Journ. Roy. As. Soc. S. Br.* 75, p. 6. *Unona filipes* *Ridl. Journ. Linn. Soc.* xli. 287. *U. longiflora* *King, Ann. Bot. Gard. Calc.* pl. 80 (*flowering spray only*), *not of Roxburgh.*

A tree 10 to 20 ft. tall; bark black. Leaves elliptic acute, base round, thin coriaceous glaucous beneath, 9 to 10 in. long, 4 in. wide; nerves 15 pairs; petioles .5 in. long. Flowers solitary axillary brown or crimson on filiform pedicels 23 in. long. Sepals deltoid-ovate .1 in. long. Petals elongate linear-acuminate base wider, tips twisted, 6 in. long .5 in. wide at base. Stamens triangular ovate. Pistils flask-shaped, densely hairy. Carpels numerous, about 20, not moniliform, ellipsoid 1-seeded, .6 in. long, .4 in. through on stalks, .5 to 1.5 in. long. *Hab.* Forests; usually 2500 ft. to 3000 ft. altitude, but sometimes in the low country. Selangor, Menuang Gasing (Kloss). Perak, Thaiping Hills (Kunstler, Wray). Kelantan, Kota Bharu.

King confused this very distinct plant with the Indian *U. longiflora* Roxb., and took his descriptions in the Materials and Annals of Calcutta Gardens, mainly from Indian specimens.

13. POLYALTHIA, Blume.

Trees or occasionally shrubs. Leaves usually coriaceous. Sepals 3, valvate or sub-imbricate. Petals 6 in. 2 series, ovate to linear, flat, or the inner ones slightly vaulted. Torus convex. Stamens cuneate; anther-cells extrorse. Pistils indefinite; ovules 1 to 5, basal and erect, or sub-basal and ascending. Carpels 1-seeded, drupaceous. Species 50, tropical Asia, a few in Africa and Australasia.

(a) *Flowers on tubercles on the stem. Petals narrow lanceolate to linear.*

- Flowers solitary, 3 in. long, glabrous; fruit 1.5 in. long (1) *P. Wrayi*
 Flowers several, 2 in. long, pubescent; fruit 1 in. long (2) *P. desmantha*
 Flowers, petals very narrow, linear, crowded on trunk; fruit red, tomentose (3) *P. stenopetala*

(b) *Flowers mostly on branches (some also on stem-tubercles).*

- Petals narrow lanceolate about 2 in. long.
 Leaves thin not glaucous. Trees nearly glabrous.
 Flowers flesh colour or brown (4) *P. Beccarii*
 Flowers yellow or orange; pedicels 1.50 in. long (5) *P. cauliflora*
 Pedicels .5 in. long; flowers smaller (6) *P. pycnantha*
 Branches and fruit large, short pedicelled red, hairy (7) *P. cinnamomea*
 Leaves stiff, rigid glaucous beneath (8) *P. sumatrana*
 Dwarf shrub, leaves broad (9) *P. pumila*
 Petals very narrow, linear, about 2.50 in. long, not spreading (10) *P. angustissima*
 Petals very narrow, linear, about .5 in. long, spreading (11) *P. asteriella*
 Petals very small, under .5 in. long, lanceolate; leaves glaucous (12) *P. hypoleuca*
 Flowers very small, hardly .5 in. wide.
 Leaves narrow linear acuminate; fruit and flowers glabrous (13) *P. dumosa*
 Leaves lanceolate, narrow; fruit glabrous (14) *P. parviflora*
 Leaves lanceolate-acuminate; petals lanceolate, hairy (15) *P. hirta*
 Leaves lanceolate; petals oblong ovate.
 Petals hairy; fruit hairy (16) *P. montana*
 Leaves oblong-lanceolate, shortly narrowed at base (17) *P. Kunstleri*
 Leaves oblong, base minutely cordate (18) *P. obliqua*

(c) *Flowers 1 in. long in clusters on the branches; branches hairy.*

- Leaves bullate, 12 to 14 in. long; shrub (19) *P. bullata*
 Leaves lanceolate 6 in. long, not bullate, hairy beneath (20) *P. velutinosa*

(d) *Flowers rather or quite large, on the boughs.*

- Petals broad, thin-textured, on the boughs.
 Flowers 4 in. across (adult); leaves when young hairy (21) *P. Scortechinii*

- Flowers nearly 3 in. wide (adult); leaves all glabrous (22) **P. canangioides**
 Petals broad and blunt, oblong, coriaceous.
 Flowers solitary, terminal over 2 in. long. (23) **P. pulchra**
 Flowers solitary extra-axillary, 1 in. long, pubescent (24) **P. oblonga**
 Flowers solitary extra-axillary, golden hairy (25) **P. chrysotricha**
 Flowers solitary axillary, 2 in. long; sepals and petals very broad and thick (26) **P. macrantha**
- (e) *Flowers on boughs in fascicles.*
 Leaves thin coriaceous; midrib above velvety (27) **P. Hookeriana**
 Leaves stiff coriaceous, oblong-acuminate; nerves fine (28) **P. sclerophylla**
 Leaves stiff coriaceous, broad elliptic; nerves prominent (29) **P. pachyphylla**
- (f) *Flowers in short-branched cymes on the boughs.*
 Cymes 2 in. long; flowers 1 in. long (30) **P. Curtisii**
- (g) *Flowers fascicled on trunk about 1 in. long, pedicelled.*
 Leaves elliptic-lanceolate about 1 in. long (31) **P. glomerata**
 Leaves very large oblong 12 to 15 in. long, over 6 in. wide (32) **P. lateriflora**
- (h) *Flowers on short, stout branches on trunk.*
 Leaves elliptic to lanceolate, 4 to 6 in. long; fruit large, clavate (33) **P. macropoda**
 Leaves oblong sub-cordate, 12 × 6 in.; flowers very large (34) **P. congregata**
- (i) *Flowers on long subterranean shoots several feet long* (35) **P. hypogæa**

(1) **P. Wrayi** Ridl. *Unona Wrayi* Hemsl. *Hook. fil. Ic. Pl. t.* 1553, King, *Journ. As. Soc. Beng.* lxi. (2), 47; *Ann. Bot. Gard. Calc.* l.c. 60, pl. 82.

A tree 40 ft. tall, with slender tomentose branches. Leaves thickly membranous, elliptic-oblong acuminate or obtuse, base rounded, glabrous above except the pubescent midrib, beneath puberulous; nerves 8 to 10 pairs inarching in two arches; 5·5 to 7·5 in. long, 2 to 2·65 in. wide; petioles 2 in. long, tomentose. Flowers in fascicles from tubercles on the large branches, 3 to 3·5 in. long, on slender pedicels 75 to 9 in. long, white, becoming claret colour or brick red. Sepals ovate-lanceolate sub-acute 3 in. long, puberulous. Petals linear-lanceolate acuminate, 3 in. long, puberulous outside, 3 in. wide. Pistils numerous pubescent; ovules 3 or 4, superposed. Carpels red ovoid or oblong obtuse glabrous, 1 to 1·25 in. long, on stalks 5 to 75 in. long. Seeds 3, oval, rugulose, 6 in. long. *Hab.* Perak, Lenggong; Kinta (Kunstler); Ulu Kenering (Wray).

Very near *P. desmantha*, but flowers solitary, longer and nearly glabrous.

(2) **P. desmantha** Ridl. *Journ. Roy. As. Soc. S. Br.* 75, p. 6;

Unona desmantha Hook. *fil.* *F.B.I.* i. 61; *King, Journ. As. Soc. Beng. l.c.* 60, *pl.* 83.

A small tree; young branches pubescent. Leaves coriaceous elliptic-oblong to oblanceolate shortly acuminate, base acute above glabrous except the pubescent midrib, beneath paler puberulous, especially on nerves; nerves 8 to 11 pairs; 5 to 8 in. long, 2 to 3 in. wide; petioles 10 in. long. Flowers densely crowded on large tubercles on stem and larger branches; peduncles .75 in. long, puberulous. Sepals ovate acute, .3 in. long. Petals linear-oblong acuminate, base not dilate, 1 to 1.5 in. long, .2 in. wide, inner row narrower, orange colour. Ovules 3 to 5 superposed. Carpels globose, glabrous .5 in. through; stalks 1 in. long. *Hab.* Sandy woods. Singapore (Maingay); Changi; Chan Chu Kang. Johor, Sedenah. Malacca (Maingay); Selangor. Perak, Gunong Bubu and Selama (Kunstler); Dindings, Pangkor; Telok Sera (Curtis).

(3) *P. stenopetala* Ridl. *Journ. Roy. As. Soc. S. Br.* 75, p. 6. *P. crinita* Ridl. *l.c.* *Unona stenopetala* Hook. *fil. and Thom. Fl. Ind.* 136; *King, Journ. As. Soc. Beng. l.c.* 49; *Ann. Bot. Gard. Calc. l.c.* 61, *pl.* 85. *U. crinita* Hook. *fil. F.B.I.* i. 61; *King, Ann. Bot. Gard. Calc. l.c.* *pl.* 84.

A slender tree 20 to 35 ft. tall; branchlets tomentose. Leaves thinly coriaceous oblong-obovate or oblanceolate-acuminate, base narrowed cordate, glabrous except the pubescent midrib, 6 in. long, 2 in. wide; nerves 7 pairs, doubly inarching, slender; petioles very short. Flowers pedicelled in hairy tufts of 2 to 8 branchlets on tubercles on stem and branches, salmon colour or brick red. Sepals lanceolate acuminate connate at base, pubescent outside, .4 to .5 in. long. Petals narrow linear slightly wider at base pubescent, 1.25 to 3 in. long. Stamens numerous, connective broad flat. Ovaries 4 to 7 villous, ovules 4 or 5. Carpels sub-globular or ovate brown tomentose at first, .5 to .65 in. long, .5 in. through. Seeds 1 to 3, discoid rugulose. *Hab.* In dense forests, Malacca (Maingay). Selangor, Kwala Lumpur; Petaling; Ginting Sempah. Perak, Kenering (Wray); Lenggong; Ulu Temengoh. Dindings, Bruas. *Native name*: Jambol Chichit.

(4) *P. Beccarii* King, *Journ. As. Soc. Beng. l.c.* 65; *Ann. Bot. Gard. Calc. l.c.* 81, *pl.* 110B.

A small tree 10 to 30 ft. tall; branchlets tomentose. Leaves sub-coriaceous, narrow oblong to oblong-lanceolate, glabrous shining; midrib pubescent above, tomentose beneath; nerves 6 or 7 pairs inarching far from the edge; 3 to 4.5 in. long, .75 to 1.35 in. wide; petioles .1 in. long, tomentose. Flowers 1.50 in. long, pendent from branches or trunk in tufts; pedicels slender, pubescent, 1 in. long. Sepals ovate obtuse .15 in. long, pubescent. Petals cinnamon brown, with a pink blotch at the base inside, linear oblong acute, pubescent. Stamens flesh colour. Ovaries pubescent 2-ovuled. Carpels numerous oval .3 in. long, white becoming red

and finally claret colour, stalks .75 in. long. Seed oblong, transversely wrinkled and grooved longitudinally on each side. *Hab.* Lowland woods, Singapore. Johore. Negri Sembilan. Perak, Dindings. Pahang. Kelantan. *Native names:* Poko Ruseh; Buah Larat Meral. *Distrib.* Sumatra and Borneo.

(5) *P. cauliflora* Hook. *fil. and Thom. Fl. Ind.* 138; *Hook. fil. F.B.I.* i. 60. *P. Teysmanni* Boerl. *Ic. Bogor. i. t.* 107.

Small tree, 12 to 30 ft. tall, 3 in. through. Leaves resembling those of *P. Beccarii*, lanceolate acuminate acute, base cuneate, glabrous, 6 in. long, 1.75 in. wide; nerves prominent beneath, 7 pairs, inarching within the margin; petioles .1 in. long. Flowers solitary or several together, pendulous from branches, yellow or orange; pedicels very slender, 1.50 in. long. Sepals ovate-lanceolate, acute, .1 in. long, pubescent. Petals narrow linear acute, base slightly wider, pubescent outside. Stamens, appendages ovate. Carpels ellipsoid .4 in. long, pubescent; stalks .5 in. long. *Hab.* Woods in the lowlands. Not rare. Singapore (Wallich *Uvaria cauliflora*, No. 6476); Bukit Timah; Garden Jungle. Johor, Kwala Tebing Tinggi. Pahang, Tahan River. Selangor, Sepang. *Distrib.* Sumatra, Borneo and Billiton.

(6) *P. pycnantha* King, *Journ. As. Soc. Beng. lxi.* (2), p. 67. *Ann. Bot. Gard. Calc. l.c.* 116 bis. *Unona pycnantha* Hook. *fil. F.B.I.* i. 60.

Tree. Branchlets pubescent. Leaves coriaceous elliptic-oblong or oblong-lanceolate-acuminate, base blunt, glabrous above, beneath paler, and midrib puberulous, 6 to 9 in. long, 2.5 to 3.5 in. wide; petioles .2 in. long, pubescent. Flowers in tufts on old wood; pedicels .25 in. long, pubescent. Sepals ovate acute, .2 in. long. Petals linear blunt, bases of inner ones concave, .5 to .75 in. long, silky outside. Torus flat-topped, glabrous. Ovules 2, superposed. *Hab.* Malacca (Maingay).

The flowers are in a very young state, with very short pedicels. The foliage is exactly like that of *P. cauliflora*, and I suspect that it is merely a state of this.

(7) *P. cinnamomea* Hook. *fil. and Thom. Fl. Ind.* 138; *Hook. fil. F.B.I.* i. 65; *King, Journ. As. Soc. Beng. l.c.* 66; *Ann. Bot. Gard. Calc. l.c.* 81, *pl.* 114.

A tree 20 to 60 ft. tall; branchlets tomentose. Leaves thinly coriaceous narrowly oblong to oblanceolate tapering to each end, acute shining glabrous above, slightly pubescent beneath; midrib tomentose, nerves 12 to 14 pairs, inarching; 4.5 to 7.5 in. long, 1.25 to 2.25 in. wide; petioles .2 in. long, tomentose. Flowers sub-sessile solitary or in pairs on the old wood, 2 to 2.25 in. long, dull red; peduncles very short tomentose. Sepals sub-orbicular, .25 in. long, tomentose. Petals linear-oblong, sub-acute, pubescent outside, 2 to 3 in. long. Anthers numerous, appendages flat

truncate. Pistils oblong, pubescent. Torus tomentose. Carpels pyriform, .75 in. to 1 in. long, .5 to .75 in. through, densely tomentose; stalks very short. Seeds 2. *Hab.* Forests; not common. Singapore, Malacca (Maingay). Selangor, Weld's Hill (Foxworthy). Penang, Pulau Betong (Curtis). *Native names*: Sugao; Sigumpet Hutan. *Use*: Rafters and firewood.

(8) *P. sumatrana* King, *Journ. As. Soc. Beng. l.c.* 53; *Ann.*



FIG. 6.—*Polyalthia sumatrana*.

Bot. Gard. Calc. l.c. 66, pl. 69. *Guatteria sumatrana* Miq. *Fl. Ind. Bat. Supp.* 380.

A medium-sized tree 30 to 60 ft. tall, glabrous except the flowers. Leaves coriaceous oblong-lanceolate acuminate, base acute, glabrous beneath; nerves 15 to 20 pairs, very slender; 4.5 in. to 6.5 in. long, 1.25 to 1.75 in. wide; petioles .25 in. long. Flowers green or yellowish, 1.4 to 1.75 in. long, solitary or 2 or 3 in fascicles below the leaves or axillary; pedicels .6 to .9 in. long. Sepals very small semi-ovate. Petals narrow linear-oblong sub-acute or

obtuse puberulous, outer ones slightly longer than inner ones, .15 to .2 in. wide. Ovaries glabrous with 1 ovule. Stigma hairy. Carpels ovoid, 1 in. long, .6 in. through, pinkish red mottled darker; stalks .5 to .6 in. long. *Hab.* Singapore, Selitar. Selangor, Negri Sembilan and Perak to 2500 ft. altitude, Goping and Larut (Kunstler). *Distrib.* Borneo and Sumatra.

(9) **P. pumila** Ridl. *Journ. Roy. As. Soc. S. Br.* 54, p. 12.

A dwarf shrub 1 ft. tall; stem black hairy. Leaves nearly sessile, coriaceous, elliptic or oblanceolate, base broad, glabrous above, hairy beneath; nerves 12 pairs; 8 to 10 in. long, 3 in. wide; petioles hairy, .25 in. long. Flower solitary, axillary subsessile, orange colour. Sepals triangular lanceolate blunt hairy .1 in. long. Petals linear-lanceolate sub-acute, dilate at base silky, 1.25 in. long, .1 in. wide, inner ones longer (1.50 in. long) than outer ones, narrower glabrescent. Stamens minute, appendages rounded. Ovaries few. Stigmas silky. *Hab.* In woods Johor, Gunong Janeng (Kelsall). Dindings, Telok Sera (Ridley). *Native name*: Kenanga Merah.

The smallest species of any Anonaceous plant known to me.

(10) **P. angustissima** Ridl. *Journ. Roy. As. Soc. S. Br.* 54, p. 11.

Slender tree 20 ft. tall. Leaves glabrous, thinly coriaceous, 3 in. long, .1 in. across, young ones rose pink; nerves inconspicuous, 6 pairs; petioles .12 in. long, pubescent. Flowers pendulous on branches, on golden pubescent pedicels .1 in. long. Sepals .01 in. long, lanceolate-acuminate golden-hairy. Petals linear acuminate very narrow, base gibbous, hairy cherry pink tipped yellowish, 2.50 in. long, .01 in. wide. Stamens quadrate, few in 3 whorls, white. Ovaries 7 to 12, hairy. Carpels few, 2 or 3 globose, .3 in. long, glabrous red; pedicels .1 in. long. Seed 1 oblong brown. *Hab.* Sandy woods in the south. Singapore, Garden Jungle; Bukit Timah (Ridley). Johor, Kwala Sembrong (Kelsall). *Native name*: Sisik Managon.

(11) **P. asteriella** Ridl. *Journ. Roy. As. Soc. S. Br.* 82, p. 169.

Tree. Branchlets puberulous. Leaves thinly coriaceous lanceolate-acuminate base cuneate; nerves 10 pairs, elevate beneath, 6 in. long, 3 in. wide or less; petioles .2 in. long. Flowers few on a short pubescent hairy peduncle with small oblong bracts; pedicels hairy, .5 in. long. Sepals short ovate. Petals linear fleshy, very narrow from a broader base, .2 in. long. Stamens numerous, appendages flat. Pistils about 6, hairy; style very short. Stigma rather large. *Hab.* Perak: Thaiping Hills (Ridley).

The spreading short narrow blunt petals are unlike anything else.

(12) **P. hypoleuca** Hook. *fl. F.B.I.* i. 63; *King, Journ. As. Soc. Beng. l.c.* 52; *Ann. Bot. Gard. Calc. l.c.* 66, *pl.* 88.

A tree 50 to 80 ft. tall, glabrous except the flowers. Leaves

coriaceous oblong-ob lanceolate or elliptic-lanceolate acuminate, base acute; nerves many pairs usually invisible when dry; 2.5 to 5 in. long, .75 to 1.75 in. wide; petioles .2 to .3 in. long. Flowers .3 to .4 in. long, light green or yellow, solitary or fascicled from the axils of fallen leaves; pedicels .15 in. long, tomentose. Sepals very small triangular pubescent. Petals linear-oblong obtuse pubescent on both sides. Carpels few, or solitary elliptic-oblong obtuse black, .8 in. long; stalks .1 to .25 in. long. *Hab.* Forests, Singapore (Maingay). Malacca (Maingay). Negri Sembilan, Perhentian Tinggi. Selangor, Klang (Foxworthy). Perak, Gopong and Larut (Kunstler). Penang, Batu Feringi (Curtis). *Distrib.* Borneo. *Native name:* Melian.

(13) **P. dumosa** King, *Journ. As. Soc. Beng. l.c.* 52; *Ann. Bot. Gard. Calc. l.c.* 64, pl. 86A.

Shrub glabrous except the flowers. Leaves thinly coriaceous lanceolate or oblong-lanceolate acuminate, base rounded; nerves 8 to 9 pairs faint; 2.5 to 3.25 in. long, .5 to .9 in. wide; petioles less than .1 in. long. Flowers solitary, leaf-opposed, .3 to .35 in. long; pedicels .3 to .4 in. long. Sepals broad ovate acute or acuminate glabrescent. Petals sub-equal narrow oblong-acuminate, puberulous inside. Stamens numerous, appendages very broad rhomboid truncate. Ovaries very few pubescent. Stigma broad hairy. Carpels 1 or 2, ovoid-globose red, .25 to .3 in. long. *Hab.* Perak. No localities given, at 1200 ft. altitude (Wray, Scortechini).

Remarkable for its very narrow leaves.

(14) **P. parviflora** Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 49.

Small tree; young parts brown hairy. Leaves thinly coriaceous glabrous except midrib, scurfy on back, lanceolate-acuminate, base cuneate; nerves 6 pairs, inarching far from margin; 3 to 4 in. long, .75 to 1.50 in. wide; petioles .12 in. long, hairy. Flowers solitary axillary sub-sessile; pedicels short hairy. Sepals ovate-lanceolate, half as long as the petals, hairy. Petals white linear oblong obtuse, .12 in. long, hairy on both sides. Stamens very numerous, appendages rounded. Carpels oblong to globose sessile hairy at tip, .3 in. long. *Hab.* Selangor, Menuang Gasing (Kloss). Adang Islands, Pulau Tengah, and on Lankawi Island at Kwala Malacca (Ridley).

(15) **P. hirta** Ridl. *Journ. Roy. As. Soc. S. Br.* 82, p. 168.

Small tree. Branchlets hairy. Leaves lanceolate-acuminate, base round; nerves slender elevate inarching about 7 pairs; 4.5 in. long, 1 in. wide, midrib hairy, rest glabrous; petiole hairy .05 in. long. Flowers solitary sub-sessile, .5 in. wide. Sepals lanceolate acute hairy. Petals triangular lanceolate hairy outside. Stamens rather few, appendages broad. Pistils 6, hairy; style short but distinct; stigma broad sub-orbicular. Ovule 1. *Hab.* Penang, Pulau Betong (Curtis).

(16) **P. montana** *Ridl. Journ. Linn. Soc. xli. 288.*

Tree. Young parts hairy. Leaves lanceolate acuminate blunt, base narrowed, coriaceous glabrous, 5 to 9 in. long, 1·8 in. wide; nerves 8 pairs; petioles pubescent, ·2 in. long. Flowers solitary, ·5 in. across. Sepals ovate hairy. Petals purple oblong ovate, blunt hairy outside, glabrous inside, outer shorter than inner. Stamens oblong, appendages elliptic small. Ovaries few, hairy. Stigmas glabrous. Carpels ellipsoid hairy, or pustulate when the hairs are fallen, half an inch long, on stalks ·1 in. long. *Hab.* Selangor, Ulu Langat (Kloss).

The flower is often male only, with no pistils. It differs from *P. dumosa* King in the hairy petals and small oblong connectives.

(17) **P. Kunstleri** *King, Journ. As. Soc. Beng. l.c. 55; Ann. Bot. Gard. Calc. l.c. 69, pl. 87B.*

A shrub or tree 30 to 40 ft. tall. Leaves oblong-lanceolate shortly and bluntly acuminate, base narrowed, above glabrous, beneath puberulous on midrib and nerves; nerves 6 to 12 pairs inarching ·1 in. to ·2 in. from the margin, prominent beneath, 4·5 to 8 in. long, 1·5 to 2·35 in. wide; petioles ·2 in. long, pubescent. Flowers solitary or in pairs ·4 in. across, tomentose; pedicels ·25 in. long. Sepals ovate triangular obtuse broad, nearly as long as the petals. Petals broad oblong-ovate. Stamens numerous, appendages flat, truncate. Carpels numerous, ovoid-globular apiculate, ·3 in. long, waxy red; stalks slender, ·5 in. long, pubescent. *Hab.* Dense jungle on low hills. Pahang, Sungei Tahan. Perak, Batang Padang (Kunstler). Penang, Pulau Betong (Curtis).

(18) **P. obliqua** *Hook. fil. and Thom. Fl. Ind. 138; King, Journ. As. Soc. Beng. l.c. 63; Ann. Bot. Gard. Calc. l.c. 77, pl. 100B.*

Tree. Leaves sub-sessile, elliptic to oblong-lanceolate acuminate or acute, base unequally cordate, thinly coriaceous; nerves 7 to 8 pairs, inarching ·15 in. from the edge, 4 to 6·5 in. long, 1·5 to 2·2 in. wide; petioles less than ·1 in. long. Flowers small, ·4 in. across, solitary, extra-axillary, very shortly pedicellate. Sepals broadly triangular blunt pubescent, less than half as long as the petals. Petals lanceolate sub-equal obtuse silky outside. Stamens numerous, appendages large flat. Ovaries few. Carpels oblong, narrowed at the base, ·50 in. long. Seeds 2. *Hab.* Malacca (Griffith and Maingay).

(19) **P. bullata** *King, Journ. As. Soc. Beng. l.c. 64; Ann. Bot. Gard. Calc. l.c. 79, pl. 3.*

A shrub 6 to 8 ft. tall; branches golden hairy. Leaves thinly coriaceous bullate, narrow oblong-acuminate, base cordate auricled, above glabrous except midrib, beneath midrib and nerves 25 to 40 pairs sparsely golden-hairy, nerves twice inarching, prominent; 12 to 14 in. long, 2·75 to 3·35 in. wide; petioles ·25 in. long, pubescent. Flowers solitary, terminal or axillary, 1 in. long; pedicels as long,

pubescent. Sepals small lanceolate pubescent, .25 in. long. Petals narrow linear pubescent. Stamens numerous, appendages orbicular. Ovaries few, pubescent. Carpels globular-ovoid puberulous, .4 in. long; stalks .2 in. long. Seeds 2, plano-convex rugose. *Hab.* Woods. Rare. Pahang, Tahan River. Selangor, Dusun Tua; Ulu Selangor. Perak, Goping (Kunstler). *Native name*: Tonkat Ali.

The specimen given by King as "Singapore, Ridley," was collected by Cantley and the locality is doubtful.

(20) ***P. velutinosa*** Ridl. *Journ. Roy. As. Soc. S. Br.* 59, p. 64.

Tree 20 to 30 ft. tall; branchlets red-hairy. Leaves lanceolate-oblong acute, base rounded, thinly coriaceous, above glabrous, beneath sparingly on the midrib and 12 pairs of nerves red-hairy, 6 in. long, 1.5 in. wide; petioles .1 in. long, densely hairy. Flowers solitary, sessile on the branches. Sepals broad, triangular-ovate hairy, .12 in. long. Petals linear oblong, sub-acute velvety outside, 1.25 in. long. Ovaries 1-ovuled. Carpels 12 to 15, ovoid sessile brown velvety. Torus hairy. *Hab.* Lankawi on Gunong Raya (Haniff).

Allied to *P. bullata*, but the flowers and leaves smaller and the petals narrower.

(21) ***P. Scortechinii*** King, *Journ. As. Soc. Beng. l.c.* 56; *Ann. Bot. Gard. Calc. l.c.* 69, *pl.* 95.

Small tree 20 to 30 ft. tall. Leaves thinly coriaceous oblong or oblong-elliptic acute, base rounded or sub-acute, glabrous except midrib and nerves pubescent; nerves 8 to 11 pairs prominent beneath, inarching near the edge; 4 to 8 in. long, 1.15 to 2.25 in. wide; petioles .25 in. long, pubescent. Flowers solitary or in pairs, axillary; pedicels .5 to .75 in. long, tomentose. Bracts in middle of pedicels rather large. Sepals small triangular pubescent. Petals flaccid, sub-equal oblong-lanceolate acute, margins wavy, minutely pubescent on both sides, 1.5 to 2 in. long, green, becoming at length yellow. Ovaries pubescent; stigma large glabrous. Carpels numerous ovoid pubescent, .3 in. long; pedicels pubescent, .75 in. long. *Hab.* In forest. Singapore, Garden Jungle. Johor. Malacca, Ayer Panas (Goodenough). Perak, Bera; Goping and Larut (Kunstler). *Native names*: Jangkang Hutan; Kenanga Hutan.

(22) ***P. canangioides*** Boerl. *l.c. Bogor.* i. 105. *P. Jenkinsii* King, *Journ. As. Soc. Beng. l.c.* 56; *Ann. Bot. Gard. Calc. l.c.* 70, *pl.* 96, *not of Hooker*. Monoon *canangioides* Miq. *Ann. Mus. Bot. Lugd. Bat.* ii. 18.

Tree 20 to 30 ft. tall, 12 in. through. Leaves membranous, glabrous oblong-lanceolate acuminate, base rounded; nerves 7 pairs, inarching some way from the edge; 4 to 7 in. long, 1.35 to 3 in. wide; petioles .2 to .3 in. long. Flowers large pale green becoming cream colour, solitary axillary, 1.75 to 3 in. across;

pedicels .6 in. long. Sepals sub-orbicular, puberulous. Petals rather thin, broad lanceolate or oblanceolate to 3 in. long, 1.25 in. wide, narrowed at the base, puberulous or glabrous. Ovaries pubescent; ovule 1. Carpels oblong, numerous, apiculate, .4 in. long; stalks slender, .4 in. long. *Hab.* Malacca (Maingay). Perak, Larut (Kunstler). *Distrib.* Malay Archipelago.

This differs from *P. Scortechinii* in the smaller flowers (apparently adult) and always glabrous leaves. I am not sure that it is anything but a state of *Scortechinii*.

(23) **P. pulchra** King, *Journ. As. Soc. Beng. l.c.* 55; *Ann. Bot. Gard. Calc. l.c.* 68, *pl.* 94.

A medium-sized or small tree about 30 ft. tall, glabrous except the flowers. Leaves thinly coriaceous, elliptic to oblong-lanceolate acute or acuminate, base acute, minutely muriculate, 4.5 to 6 in. long, 2.5 in. wide; petioles .25 in. long. Flowers large solitary terminal, 2 in. or more across, dirty white with a purple spot at the bases of the petals, very fragrant. Sepals ovate acute glabrous, .6 to .75 in. long. Petals sub-equal ovate-elliptic sub-acute. Stamens numerous; appendages broad sub-orbicular, pubescent. Ovaries oblong, pubescent; style short, cylindric. Carpels numerous, elliptic-ovoid glabrescent purple, stalks 1.5 in. long, crimson. Seed 1, elliptic. *Hab.* Mountain woods to 5000 ft. altitude or more. Pahang, Gunong Tahan. Selangor, Menkuang Lebah (Robinson). Perak, Welds Rest, Gunong Kerbau (Robinson).

var. *angustifolia* King, *l.c.* Leaves narrower, 1.75 in. wide; petals narrow lanceolate, 1.75 in. long. *Hab.* Perak, Gunong Bubu at 5000 ft. altitude (Wray).

One of the very few mountain *Anonaceæ*.

(24) **P. oblonga** King, *Journ. As. Soc. Beng. l.c.* 65; *Ann. Bot. Gard. Calc. l.c.* 80, *pl.* 113.

A small tree 10 to 15 ft. tall; young branches tomentose. Leaves thinly coriaceous sub-sessile oblong to oblong-lanceolate shortly acuminate, base minutely cordate unequal, glabrous above, puberulous beneath; midrib pubescent, nerves 14 to 20 pairs; 9 to 14 in. long, 3.5 to 5 in. wide; petioles .15 in. long, tomentose. Flowers solitary from small tubercles, 1.25 to 1.75 in. across. Sepals semi-orbicular acute connate pubescent. Petals waxy light yellow, oblong tapering to the sub-acute tip, pubescent on both sides. Carpels 10 to 20, ovoid or orbicular pubescent or sub-glabrous, .3 to .35 in. long; .6 to .75 in. wide. Seed 1, ovoid or 2 plano-convex. *Hab.* Mountain forests. Perak, Larut Hill ranges and Gunong Pondok at 1000 to 2000 ft. altitude (Kunstler); Hermitage Hill (Curtis). Penang Hill (Curtis).

(25) **P. chrysotricha** Ridl. *n.sp.*

Branches golden-hairy. Leaves oblong-obovate acute, base

shortly cordate, glabrous, 13 in. long, 5 in. wide; petioles and extreme bases of midrib above hairy, 15 in. long. Flowers solitary extra-axillary with several lanceolate golden-hairy bracts. Pedicels 5 in. long, golden-hairy. Sepals ovate blunt, 5 in. long, golden-hairy outside. Petals and stamens not seen. Pistils very numerous, densely silky golden-hairy; no style, stigma small. *Hab.* Selangor, Menuang Gasing (Kloss).

I have only seen a single incomplete flower, peculiar from the large sepals and very numerous ovaries. I am not sure it is a *Polyalthia*, but, if so, it is near *P. oblonga*.

(26) **P. macrantha** King, *Journ. As. Soc. Beng. l.c.* 54; *Ann. Bot. Gard. Calc. l.c.* 68, *pl.* 93.

Tree 60 to 70 ft. tall. Leaves coriaceous oblong or elliptic-oblong acute, base cordate, glabrous; nerves 20 to 24 pairs; 12 to 18 in. long, 4.5 to 7.5 in. wide; petioles 4 in. long, thick. Flowers solitary, axillary waxy, cream colour, 2.5 to 4.5 in. across; pedicels 1.5 to 2 in. long. Sepals ovate-orbicular obtuse connate at base puberulous corrugate. Petals oblong-elliptic large blunt fleshy puberulous, 1.3 to 2.9 in. long; inner ones smaller. Stamens numerous, appendages truncate. Ovaries few, puberulous. Carpels elliptic-ovoid, blunt, 1 to 1.25 in. long, .75 in. through. *Hab.* Forests. Perak, Larut Hills at 300 ft. altitude (Kunstler).

(27) **P. Hookeriana** King, *Journ. As. Soc. Beng. l.c.* 57; *Ann. Bot. Gard. Calc. l.c.* 71, *pl.* 97.

A tree 20 to 70 ft. tall; young parts pubescent. Leaves membranous obovate-elliptic or oblanceolate shortly acuminate, base cuneate, glabrous except the nerves, 10 to 11 pairs, and midrib pubescent on both surfaces; 5 to 7 in. long, 2.25 to 3.25 in. wide, petioles 1.5 to 2 in. long, tomentose. Flowers yellowish red in pairs from peduncles with abortive flowers at the base, extra-axillary; pedicels .5 to .75 in. long, pubescent. Bracts 1 to 2, ovate. Sepals broad ovate concave, free or nearly so to the base, pubescent outside, 2 in. long. Petals yellowish sub-equal ovate or obovate-oblong sub-acute puberulous, nearly 1 in. long. Stamens very short, appendages thick truncate-orbicular. Ovaries oblong, puberulous, 1-ovuled; stigma sessile large lobed. Carpels numerous, ovoid, apiculate, base narrow, red, .65 in. long, stalks 1.2 in. long. *Hab.* Hilly forests, Perak, Larut and Batang Padang district (Kunstler). Pahang, Bukit Goh (Foxworthy).

(28) **P. sclerophylla** Hook. *fil. F.B.I.* i. 65; King, *Journ. As. Soc. Beng. l.c.* 59; *Ann. Bot. Gard. Calc. l.c.* 74, *pl.* 103.

A small glabrous tree. Leaves stiff coriaceous oblong acute, base cuneate; nerves 10 to 12 pairs, slender, reticulations distinct; 6 to 18 in. long, 1.5 to 2.6 in. wide; petioles .5 in. long. Flowers fascicled on trunk, 2 in. across, green; peduncles 1 to 1.5 in. long, pubescent; bracts small, orbicular. Sepals ovate obtuse, short. Petals, linear oblong obtuse puberulous, 1.6 in. long. Ovaries pilose.

Carpels elliptic-oblong, 1 to 1·5 in. long; stalks 1 to 1·5 in. long. *Hab.* Malacca (only collected by Maingay).

(29) **P. pachyphylla** King, *Journ. As. Soc. Beng. l.c.* 66; *Ann. Bot. Gard. Calc. l.c.* 82, *pl.* 115.

A tree 50 to 100 ft. tall; branchlets pubescent. Leaves stiffly coriaceous elliptic-oblong sub-acute, base rounded, glabrous except midrib tomentose beneath at the base; nerves 11 or 12 pairs; 4·5 to 7·5 in. long, 1·75 to 3·5 in. wide; petioles ·35 to ·5 in. long, tomentose. Flowers few in tufts from old wood; pedicels 2 in. long, tomentose. Sepals semi-orbicular short tomentose. Petals pale green nerved, oblanceolate sub-acute or obtuse, pubescent outside, tomentose inside, outers shorter and narrower, ·9 to 1·5 in. long, ·3 to ·5 in. wide. Stamen-appendages truncate. Ovaries numerous glabrous; stigma sessile, puberulous. Carpels numerous obovoid blunt, 1·75 in. long, 1 in. through with a short stalk. Seeds 2. *Hab.* Perak, Larut Hills below 500 ft. altitude (Kunstler).

(30) **P. Curtisii** Ridl. *Journ. Roy. As. Soc. S. Br.* 54, p. 11. *Ellipeia glabra* Hook. *fil. F.B.I.* i. 52; King, *Journ. As. Soc. Beng. l.c.* 26; *Ann. Bot. Gard. Calc. l.c.* 34, *pl.* 27B.

A tree; young branches and inflorescence brown, pubescent. Leaves coriaceous oblong or elliptic, base round or acute, glabrous; nerves 9 pairs, 4 to 5·5 in. long, 1·5 to 2 in. wide; petioles ·25 in. long. Cymes shortly peduncled, axillary 3- to 4-flowered, 1 to 1·5 in. long, golden-hairy. Flowers 1·5 in. across. Bracts oblong, sub-amplexicaul. Sepals ovate-lanceolate acute, ·25 in. long. Petals, outer linear-oblong hairy outside, sub-acute 1 to 1·5 in. long; inner shorter obtuse spatulate obovate. Pistils strigose above, 1-ovuled. Carpels sub-globose, ·65 in. long; stalk ·75 to 1·25 in. long. Seed oblong with a deep longitudinal furrow. *Hab.* Malacca (Maingay). Penang, Telok Bahang (Curtis).

(31) **P. glomerata** King, *Journ. As. Soc. Beng. l.c.* 61; *Ann. Bot. Gard. Calc. l.c.* 75, *pl.* 106.

Tree 40 to 50 ft. tall. Leaves membranous, elliptic or oblong acute, base slightly cuneate, reticulate, glabrous except puberulous midrib; nerves 7 to 8 pairs, not inarching, slender; 4 to 6 in. long, 1·8 to 2·6 in. wide; petioles ·25 to ·35 in. long. Flowers 2·5 in. long, 20 to 30 together on a stem tubercle; pedicels 1·5 to 2·5 in. long, slender, puberulous. Bracts ovate-lanceolate. Sepals lanceolate acuminate, bases broad connate. Petals linear-oblong, base slightly concave, minutely tomentose; inners slightly smaller. Stamens, appendages orbicular sub-convex. Ovaries few, oblong, hairy. *Hab.* Perak, Thaiping Hills 2800 to 3000 ft. altitude (Kunstler); Sira Rimau (Yapp). *Distrib.* Sumatra and S. Siam at Trang.

(32) **P. lateriflora** King, *Journ. As. Soc. Beng. l.c.* 58, *Ann. Bot. Gard. Calc. l.c.* 73, *pl.* 102. *Guatteria lateriflora* Bl. *Bijdr.* 20; *Fl. Jav. Anonaceæ*, p. 100, *t.* 50 and 52D.

Tree 50 to 70 ft. tall, glabrous except flowers. Leaves coriaceous elliptic-oblong or oblong abruptly acute, base rounded sub-cordate unequal; nerves 12 to 16 pairs, prominent; 8 to 15 in. long, 2·5 to 7 in. wide; petioles stout, ½ in. long. Flowers fascicled on stem and branch tubercles 1·25 in. to 2 in. long, greenish yellow; pedicels pubescent, bi-bracteate, 1·25 to 1·75 in. long. Sepals ovate-orbicular short densely tomentose outside. Petals greenish yellow, dull crimson at base, oblong-lanceolate tapering to a sub-acute tip; outer ones shorter than inner, minutely pubescent. Carpels ovoid-elliptic, blunt, base narrowed, 1·25 in. long, ½ in. through; stalks stout, 1·25 to 2 in. long. *Hab.* Singapore (Maingay). Perak: Ulu Bubong and Larut Hills (Kunstler). *Distrib.* Java.

(33) **P. macropoda** King, *Journ. As. Soc. Beng. l.c.* 60; *Ann. Bot. Gard. Calc. l.c.* 74, *pl.* 104. *P. clavigera*, King, *l.c.*; *Ann. Bot. Gard. Calc. l.c.* 75, *pl.* 105.

A tree 30 to 60 ft. tall. Leaves rather thin oblong-lanceolate acuminate, base acute, midrib pubescent, otherwise glabrous; nerves 8 to 9 pairs, prominent; 3·5 to 5·5 in. long, 1·4 to 2·1 in. wide; petioles ½ in. long. Flowers fascicled on tubercles near the stem-base, pink and white, 1 in. long; pedicels 1 in. long. Sepals ovate acute corrugated. Petals elliptic blunt, coriaceous puberulous. Stamens numerous, appendages transversely elongate. Carpels on a large rounded woody torus, oblong fusiform, tapering at each end, bright orange colour, narrowed into the stalk, 2·5 to 3·5 in. long including the stalk. Seed 1, elongate-ovoid, grooved. *Hab.* Dense forests, usually in rocky places. Singapore: Bukit Timah; Selitar. Perak, Goping and Ulu Kal (Kunstler); Penang, Richmond Pool.

I cannot separate King's two species, and believe that Beccari's *Polyalthia anomala* from Matang, Sarawak, is the same plant.

(34) **P. congregata** King, *Journ. As. Soc. Beng. l.c.* 61; *Ann. Bot. Gard. Calc. l.c.* 76, *pl.* 107.

A tree 40 to 60 ft. tall. Leaves thinly coriaceous, oblong-elliptic acute narrowed to the rounded base, glabrous except the puberulous midrib; nerves 13 to 19 pairs, prominent beneath; 6 to 16 in. long, 3·75 to 7 in. wide; petioles ½ to ¾ in. long, stout. Flowers large, white, in woody cymes from the trunk; pedicels 1·25 to 1·75 in. long. Bract orbicular. Sepals broadly ovate-triangular concave corrugate, puberulous outside, ½ in. long. Petals thick ovate-elliptic sub-acute, puberulous except at base; outers 1·5 to 3 in. long, ⅔ to 1 in. wide, inners narrower. Stamens numerous; appendages truncate oblique. Ovaries 20 to 30, strigose; stigma oblong pubescent. Carpels elliptic beaked pubescent, narrowed into the short stalk. *Hab.* Wet woods, usually on limestone, Selangor, Batu Caves; Ulu Gombak. Perak, Goping and Larut (Kunstler).

(35) *P. hypogæa* King, *Journ. As. Soc. Beng. l.c.* 62; *Ann. Bot. Gard. Calc. l.c.* 76, *pl.* 107.

Tree 25 to 30 ft.; young parts densely tomentose. Leaves thinly coriaceous oblong or elliptic-oblong or obovate, base narrowed round, glabrous; nerves 18 to 22 pairs, prominent beneath; 10 to 20 in. long, 3 to 7 in. wide; petioles .4 in. long, stout, tomentose. Flowers on pubescent branches 1 to 8 ft. long from the trunk-base, cream colour, .75 to 1 in. long; pedicels .75 to 1.5 in. long. Bracts tomentose, one lanceolate median, one sub-orbicular near the flower. Sepals broad triangular-ovate acute tomentose, .25 in. long. Petals narrow oblong sub-acute pubescent outside, inners smaller. Stamens numerous, appendages broad convex oblique. Ovaries few villous; stigma large, ovoid. Carpels ovoid dark velvety greenish brown. *Hab.* Hill woods in Perak, 500 to 3400 ft. altitude. Thaiping Hills and Gunong Batu Putih (Kunstler).

Easily distinguished by its long subterranean flower branches.

EXCLUDED SPECIES

P. NITIDA Hook. *fil. F.B.I.* i. 64, was based on a fruiting specimen from Tavoy (*Wall. Cat.* 6439) and a flowering specimen which may not be the same species labelled "Singapore Lobb."

P. SIMIARUM var. *ANGUSTIFOLIA* King, *Journ. As. Soc. Beng. l.c.* 58. The plants so labelled by King in *Herb. Kew* bear no resemblance to the Indian *P. simiarum* either in flowers or leaves; one sheet is undoubtedly *P. Hookeriana* King. The other consists of leaves of some species unknown to me, and detached carpels identical with those of *P. lateriflora*.

P. ABERRANS Maing. Hook. *fil. F.B.I.* i. 67 is *Sphærocoryne aberrans* Ridl.

P. SUB-CORDATA Bl. See *Miliusa amplexicaulis* Ridl.

14. SPHÆROCORYNE, Scheff.

Scandent shrubs or small trees. Leaves coriaceous or membranous. Flowers solitary axillary rather small. Sepals ovate valvate. Petals, outer ones much larger ovate; inner ones ovate much smaller, base flat, not excavate. Stamens numerous oblong, appendages flat truncate. Pistils longer, projecting. Ovaries hairy; styles cylindric, glabrous. Stigma bi-lobed. Ovules 1 or 2. Carpels sub-globose on long stalks. Seed 1, oblong. Species 3, Siam, Cambodia, Sumatra.

(1) *S. aberrans* Ridl. *Journ. Roy. As. Soc. S. Br.* 75, p. 7. *Polyalthia aberrans* Hook. *fil. F.B.I.* i. 67; King, *Journ. As. Soc. Beng. l.c.* 63; *Ann. Bot. Gard. Calc.* 78, *pl.* 109A. *Unona* Mesnyi *Pierre Fl. For. Cochinchine*, t. 17.

A slender climber 30 to 100 ft. tall. Leaves membranous glaucous beneath, lanceolate acuminate glabrous; nerves 14 to 18 pairs

fine; 3·5 to 5 in. long, 1·4 to 1·8 in. wide; petioles ·2 to ·25 in. long. Flowers ·5 to ·75 in. across, on peduncles 1 in. long. Sepals connate into a three-angled cup. Petals ovate-orbicular acute, outer ones ·35 in. long, pubescent, inner ones half as large. Carpels on a peduncle 2 in. long and with pedicels over 1 in. long, oblong or ovoid, ·5 in. long. Seeds 1 or 2, ovoid. Torus globose. *Hab.* Forests. Malacca (Maingay); Kemander (Burkill). Selangor, Ulu Selangor (Kunstler). Perak, Goping (Kunstler).

15. ANAXAGOREA, St. Hil.

Shrubs or treelets. Leaves thin, dotted. Flowers small, green, leaf-opposed solitary. Sepals 3, valvate connate at base. Petals 3 or 6, sub-equal (inner row sometimes wanting). Stamens indefinite. Ovaries few; ovules 2, collateral sub-basal. Carpels follicular curved club-shaped, with a long stalk. Seeds 1 or 2, hard, shining, black, plano-convex. Species about 8, Tropical Asia and America.

Petals 6	.	.	.	.	.	.	.	.	(1) A. luzonensis
Petals 3	.	.	.	.	.	.	.	.	(2) A. Scortechinii

(1) **A. luzonensis** *A. Gray, Bot. U.S. Expl. Exped. 27; Hook. fil. F.B.I. i. 68; King, Journ. As. Soc. Beng. l.c. 68; Ann. Bot. Gard. Calc. l.c. 84, pl. 118A.* *Rhopalocarpus fruticosus* *Teysm. and Binn, Miq. Ann. Mus. Bot. Lugd. Bat. 22, t. 2, fig. B.*

Glabrous shrub. Leaves membranous oblong-elliptic-oblong acuminate, base cuneate; nerves 7 to 8 pairs; 5 to 7 in. long, 1·75 to 2·5 in. wide; petioles ·25 to ·35 in. long. Flowers ·5 in. long; pedicels ·25 in. long. Bracts 1 to 2, amplexicaul. Sepals round obtuse. Petals 6, elliptic-obtuse white. Carpels 1 to 10, cuneate clavate apiculate, ·9 in. long, follicular portion ·4 in. long. *Hab.* Rare. Penang Hill at 300 ft. altitude. Malacca (Maingay). *Distrib.* Burma, Ceylon to Malay Archipelago.

(2) **A. Scortechinii** *King, Journ. As. Soc. Beng. l.c. 68; Ann. Bot. Gard. Calc. l.c. 85, pl. 119.*

A bush or shrubby tree 30 to 40 ft. tall, glabrous. Leaves thinly coriaceous elliptic-oblong, abruptly acuminate, slightly narrowed to the base; nerves 7 to 9 pairs; 6 to 8 in. long, 2·5 to 3·5 in. wide; petioles ·3 to ·4 in. long. Flowers ·75 in. long, green, pedicels ·3 in. long. Sepals ovate acute pubescent. Petals 3, much larger, oblong-lanceolate sub-acute, pubescent outside, fleshy. Ovaries numerous pubescent. Carpels 5 or 6, stalks 1 in. long, sulcate; follicles 1·5 in. long, ovoid curved apiculate. Seeds pear-shaped plano-convex ·5 in. long, polished black. *Hab.* Woods, Pahang, Tahan woods. Malacca (Maingay). Selangor, Kanching Camphor forest; Dusun Tua. Perak, Larut Hills; Goping (Kunstler); Batu Kurau (Scortechini); Gapis Pass (Curtis). Lankawi. *Native names* : Pali

Monyet; Bunga Lerak. *Use*: The natives put the seeds among clothes (Burkill).

This has much larger fruit and flowers than *A. luzonensis* Gray.

16. DISEPALUM, Hook. fil.

Shrubs or treelets. Leaves oblong. Flowers few terminal. Sepals 2, large concave valvate. Petals 4, spatulate narrow, incurved, on the margin of the torus. Stamens numerous, appendage broadly orbicular. Ovaries 10 to 15, ovoid; style short terete; stigma small. Ovule 1. Species 4, Malay Peninsula and islands.

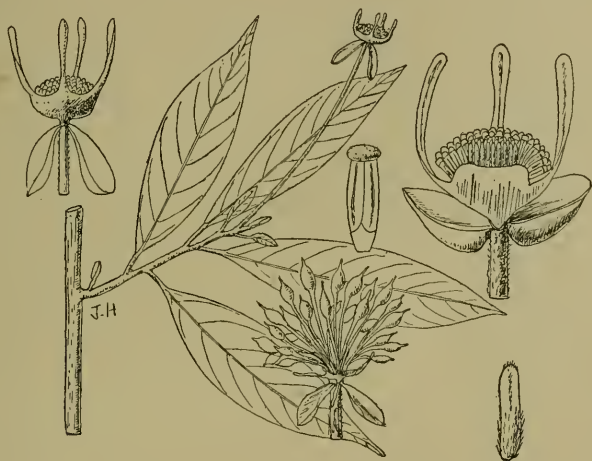


FIG. 7.—*Disepalum anomalum*.

(1) *D. anomalum* Hook. fil. *Trans. Linn. Soc.* xxiii. 156, t. 20A. *D. longipes* King, *Journ. As. Soc. Beng. l.c.* 69; *Ann. Bot. Gard. Calc. l.c.* 86, pl. 118B.

A small tree 30 to 40 ft. tall. Leaves membranous oblong acuminate, base cuneate; nerves 7 to 10 pairs; 4 to 7 in. long, 1.5 to 2.25 in. wide; petioles .25 in. long. Flowers long-pedicelled, solitary or in pairs. Sepals ovate blunt. Petals linear-spathulate, all green. Stamens dark red. Ovaries hairy. Carpels ovoid, .4 in. long, obtuse, narrowed at base on pedicels 2 in. long. *Hab.* Borders of woods and thickets. Johor, on Gunong Pantai (Kunstler), not rare. Dindings at Bruas. *Distrib.* Borneo.

17. GONIOTHALAMUS, Blume.

Small trees or shrubs. Leaves usually coriaceous. Flowers solitary or fascicled often on old wood; peduncles with scaly,

distichous bracts. Sepals 3, valvate, outer thick flat; inner smaller shortly clawed, cohering in a vaulted cap over the stamens and ovaries. Stamens many, linear-oblong; anther-cells dorsal; appendages oblong or truncate. Ovaries many; style cylindric; stigma simple or bifid. Ovules 1 or 2 superposed (rarely 4). Carpels 1-seeded. Species about 50, East Asia.

Slender shrubs; flowers axillary, small, green; leaves membranous; ovules 1 or 2.

Leaves oblong narrow, base short narrowed; nerves inconspicuous; style slender . . .

(1) *G. subevenius*

Leaves long-caudate, base narrow; style very short . . .

(2) *G. tenuifolius*

Leaves elliptic, abruptly caudate . . .

(3) *G. caudifolius*

Leaves sub-coriaceous, lanceolate narrowed both ends . . .

(4) *G. Wrayi*

Tall, erect shrubs; flowers large; leaves coriaceous.

Flowers very large yellow; petals 2·5 in. long . . .

(5) *G. giganteus*

Flowers about 1 in. long.

Leaves oblanceolate, 12 in. long, strong-nerved

(6) *G. macrophyllus*

Leaves elliptic, very coriaceous, 6 to 8 in. long; nerves very inconspicuous . . .

(7) *G. malayanus*

Leaves oblong cuspidate, very coriaceous, 6 to 8 in. long; nerves very inconspicuous . . .

(8) *G. Tapis*

Leaves rather oblong-oblanceolate; conspicuously nerved.

Flowers ½ in. long . . .

(9) *G. Kunstleri*

Flowers 1·5 in. long; sepals large . . .

(10) *G. Scortechinii*

Flowers 1·5 in. long; sepals small; petals acuminate . . .

(11) *G. fulvus*

Tree. Leaves over 12 in. long, pubescent beneath; flowers large . . .

(12) *G. Curtisii*

Big tree. Flowers large, fleshy in masses at base of trunk . . .

(13) *G. Ridleyi*

Shrub. Ovules and seeds 4. . . .

(14) *G. uvarioides*

(1) *G. subevenius* King, *Journ. As. Soc. Beng. l.c.* 71; *Ann. Bot. Gard. Calc. l.c.* 89, *pl.* 121B.

Shrub or treelet, to 30 ft. tall, branchlets puberulous. Leaves membranous, narrow, oblong, acuminate at each end; nerves 10 to 12 pairs, invisible or very faint; 3·5 to 6·5 in. long, 1·25 to 1·75 in. wide; petioles ½ in. long. Flowers solitary, axillary, ½ to ¾ in. long, pale green; pedicels ¼ to ½ in. long. Bracts 6. Sepals broadly ovate-acuminate pubescent, ¾ in. long. Petals thinly coriaceous puberulous, lanceolate acute, inner ones half as large as outer ones, shortly clawed. Stamen-appendages broad orbicular. Ovaries narrow oblong; stigma entire. Carpels ovoid to oblong glabrous, ½ to ¾ in. long; stalks ⅓ to ½ in. long. *Hab.* Thick forest, Perak, Goping (Kunstler). Kedah Peak (Haniff). Kelantan, Chaning Woods.

(2) *G. tenuifolius* King, *Journ. As. Soc. Beng. l.c.* 71; *Ann. Bot. Gard. Calc. l.c.* 89, *pl.* 122A.

A bush or treelet 6 to 8 ft. tall glabrous. Leaves membranous

lanceolate acuminate, base acute; nerves 8 to 11 pairs inarching within the margin, faint; 4·5 to 7 in. long, 1 to 1·75 in. wide; petioles 2 in. long. Flowers axillary solitary; pedicels slender 35 to 45 in. long. Bracts 2. Sepals free membranous green nerved ovate-acute, 75 to 111 in. long. Petals green, thinly coriaceous broad lanceolate acuminate, narrowed at base, outer ones 1 to 1·2 in. long, inner ones less than half as long ovate-acuminate clawed pubescent. Stamens, appendages broad, pubescent. Ovaries few, 1- or 2-ovuled; style long; stigma funnel-shaped toothed. Carpels ovoid enveloped in calyx, 4 to 5 in. long; stalks 2 in. long. Seeds 1 or 2. *Hab.* In forests, Selangor, Sungei Buluh. Perak, Thaiping Hills 2000 to 3000 ft. altitude; Sungkai River (Kunstler). Dindings, Lumut.

var. *arborescens* King, *l.c.* A tree 15 to 25 ft. tall. Petals coriaceous pubescent small. *Hab.* Perak, Larut Hills at 2000 to 3000 ft. altitude (Kunstler).

(3) *G. caudifolius* Ridl. *Kew Bulletin*, 1914, p. 324.

Shrub? Branches slender velvety pubescent. Leaves elliptic acute or caudate, apex obtuse, base shortly cuneate or rounded, membranous glabrous, 4·5 in. long, 1·5 in. wide; nerves 7 to 10 pairs, depressed above, elevate beneath; petioles 1 in. long. Flowers solitary extra-axillary on branches, pedicels thick, 2 in. long, glabrous. Sepals ovate acute, hairy on edges, bases broad 3 in. long, 2 in. wide, veined and reticulate. Petals, outer ones lanceolate, 6 in. long pubescent, inner ones ovate, 3 in. long obtuse pubescent. Stamens numerous, narrow linear, appendages broadly conic, blunt. Ovaries numerous, glabrous. *Hab.* Perak, Pondok Tanjong (Burn-Murdoch).

(4) *G. Wrayi* King, *Journ. As. Soc. Beng. l.c.* 78; *Ann. Bot. Gard. Calc. l.c.* 99, *pl.* 142.

Small tree or shrub 3 to 12 ft. tall, glabrous. Leaves membranous lanceolate or oblanceolate acuminate at each end; nerves 14 to 18 pairs, slender, very inconspicuous; 4·5 to 9 in. long, 1·25 to 2 in. wide; petioles 2 to 2·5 in. long. Flowers solitary on branches or pedicels 35 in. long. Sepals membranous reticulate, ovate acuminate, puberulous outside, 2 in. long. Petals subcoriaceous puberulous greenish yellow, outer ones narrow lanceolate acuminate, bases thickened, 65 to 75 in. long, inner ones half as long, ovate acuminate. Anthers shorter than ovaries, appendages long acuminate. Ovaries 20, hairy; 1- or 2-ovuled; style stout; stigma truncate. Carpels obovoid-oblong, apiculate, 6 in. long. Seed 1, rarely 2. *Hab.* Perak; very common in the hill woods, Gunung Batu Putih (Wray).

(5) *G. giganteus* Hook. *fil. and Thom. Fl. Ind.* 109; *Hook. fil. F.B.I.* i. 75; *King, Journ. As. Soc. Beng. l.c.* 73; *Ann. Bot. Gard. Calc. l.c.* 93, *pl.* 130.

A tall, slender tree 30 to 70 ft. high. Leaves coriaceous, glabrous

above, puberulous beneath, oblong acuminate, base cuneate; nerves 10 to 14 pairs, very slender, 6 to 10 in. long, 2·25 to 2·75 in. wide; petioles 25 in. long, deeply channelled. Flowers very large 3 to 5 in. long, golden yellow, from the axils of leaves pendulous; pedicels 1 in. long pubescent. Sepals ovate acute pubescent, 5 in. long. Petals coriaceous pubescent ovate-oblong, inner ones 6 in. long, ovate acute, golden silky. Stamens very numerous. Ovaries hairy, 2-ovuled; style long, slender; stigma 2-lobed. Carpels about 20, oblong tapering to the stalk, 1·25 to 1·5 in. long, 6 in. through; stalk stout 75 in. long. Seeds 1 or 2. *Hab.* In thin woods; common; a very handsome species. Singapore, Johor, Malacca, Pahang, Perak, Penang, Lankawi. *Native names*: Penawar hitam (lit. black drug); Galang hitam.

(6) *G. macrophyllus* Hook. fil. *F.B.I.* i. 74; *King, Journ. As. Soc. Beng. l.c.* 76; *Ann. Bot. Gard. Calc. l.c.* 96, *pl.* 132. *Polyalthia macrophylla* Bl. *Fl. Jav. Anonaceæ*, 79, *t.* 39.

Leaves coriaceous large oblong-lanceolate acute or acuminate, base sub-acute or rounded; nerves 16 to 20 pairs, slightly prominent beneath; 10 to 18 in. long, 2·5 to 4·5 in. wide; petioles 6 to 1 in. long, stout. Flowers slightly supra-axillary or pendulous from branches below the leaves, 1 or 2, green; pedicels 35 in. long. Sepals broadly ovate acute connate at base, 65 in. long, puberulous. Petals coriaceous, outer ones oblong-lanceolate acute, 1 to 1·5 in. long, inner ones half as long, ovate acuminate, edges ciliate. Stamens numerous. Ovaries 12 to 18, glabrous, 1-ovuled. Stigma bilobed. Carpels globular obovoid glabrous 4 in. long. *Hab.* Common in woods all over the peninsula. Malacca, Ayer Panas (Griffith). Selangor, Sempang, Semangkok. Perak, Goping and Larut (Kunstler). Penang: West Hill (Curtis). Pulau Adang. *Distrib.* Sumatra, Java. *Native names*: Penawar hitam; Bongsol. *Use*: In native medicine; the wood is aromatic.

(7) *G. malayanus* Hook. fil. and Thom. *Fl. Ind.* 107; *F.B.I.* i. 75; *King, Journ. As. Soc. Beng. l.c.* 74; *Ann. Bot. Gard. Calc. l.c.* 94, *pl.* 128B.

A small glabrous tree, 15 to 20 ft. tall. Leaves coriaceous oblong-elliptic to oblong abruptly acuminate, base cuneate; nerves faint, 12 to 15 pairs; 5·5 to 9 in. long, 1·5 to 2·75 in. wide; petioles 25 in. long, channelled. Flowers solitary pink or green from below the leaves; pedicels 35 to 5 in. long, pubescent. Sepals ovate-triangular acuminate, connate at base, pubescent, 25 in. long. Petals coriaceous, outer ones broad ovate acuminate, minutely tomentose, keeled outside, 1 to 1·25 in. long; the inner ones one-third as long. Stamens numerous. Ovaries 15, hairy; ovules 3 to 4; style long, slender; stigma sub-capitate, bilobed. Carpels narrow, oblong apiculate narrowed to each end glabrous, 1·5 in. long, 5 in. across; stalks thick 1 in. long. Seeds 2 to 3, flat ovoid black. *Hab.* Common in woods. Singapore, Bukit Timah; Pulau Damar.

Muar. Malacca (Maingay). Selangor, Rantau Panjang (Kloss); Gunong Mengkuang (Kloss). Perak, Goping, and Gunong Malacca (Kunstler). Dindings. Kelantan. *Distrib.* Banca and Borneo to the Philippines. *Native names*: Kenanga hutan; Mupisang.

(8) **G. Tapis** *Miq. Fl. Ind. Bat. Supp.* 371; *King, Journ. As. Soc. Beng. l.c.* 77; *Ann. Bot. Gard. Calc. l.c.* 99, *pl.* 140.

A shrub or tree 15 to 40 ft. tall, glabrous. Leaves coriaceous oblong abruptly acuminate, base rounded or cuneate; nerves 10 to 12 pairs, thin very indistinct, 5·5 to 9 in. long, 2·5 to 3·25 in. wide; petioles ·3 in. long. Flowers yellow, solitary or fascicled on the branches, pedicels ·4 in. long. Sepals free ovate acute pubescent, ·4 in. long. Petals coriaceous puberulous; outer ones ovate-lanceolate, thickened and contracted at the base, 1·75 in. long, inner ones ·65 in. long. Appendages conic. Ovaries hairy; stigma sub-discoïd, 2- to 3-lobed. Carpels obovoid sub-sessile, ·4 to ·5 in. long. *Hab.* Woods, Singapore, Selitar; Jurong. Muar, Biawak (Curtis). Negri Sembilan, Tampin Hill. Perak, Larut (Kunstler). Dindings, Pangkor (Curtis). Penang: West Hill (Curtis). *Distrib.* Borneo, Sumatra. *Native name*: Galai.

(9) **G. Kunstleri** *King, Journ. As. Soc. Beng. l.c.* 73; *Ann. Bot. Gard. Calc. l.c.* 90, *pl.* 124.

A shrub 4 to 10 ft. tall; branchlets puberulous. Leaves thinly membranous oblanceolate abruptly acuminate, base cuneate, glabrous; midrib puberulous, nerves 11 to 13 pairs, inarching within the margin; 6 to 9 in. long, 2 to 3·25 in. wide; petioles ·35 in. long, puberulous. Flowers solitary super-axillary, pedicels ·15 in. long. Sepals broadly ovate acute nerved and reticulate thinly membranous green, ·3 to ·4 in. long. Petals sub-coriaceous yellow or orange, outer ones lanceolate acuminate, puberulous ·8 to 1·25 in. long, inner ones one-third as long, ovate acute pubescent. Stamens many, appendages flat broad pubescent. Carpels crowded ovoid, ·4 in. long. *Hab.* Woods, 500 to 2000 ft. altitude. Perak at Goping (Kunstler). Province Wellesley. Penang: Waterfall (Curtis).

(10) **G. Scortechinii** *King, Journ. As. Soc. Beng. l.c.* 77; *Ann. Bot. Gard. Calc. l.c.* 99, *pl.* 141.

Shrub or small tree glabrous except the flowers. Leaves membranous oblanceolate blunt or very shortly acuminate, narrowed to the rounded (rarely cuneate) base; nerves 18 to 24 pairs, inarching close to the edge; 10 to 15 in. long, 2·75 to 4 in. wide; petioles ·3 in. long. Flowers solitary on the lower part of the stem, pale greenish white, on pedicels ·5 in. long. Sepals membranous large orbicular-ovate obtuse or sub-acute connate, ·65 to 1 in. long, waxy cream colour. Petals coriaceous puberulous, very little longer than the sepals, inner ones ovate acute, ·5 in. long. Anthers numerous, appendages conic. Ovaries puberulous 1-ovuled; stigma 2- or 3-lobed. Carpels oblong, glabrous, narrowed to the short stalks, ·45 in. long; stalks ·2 to ·25 in. long. *Hab.* Woods below

500 ft. altitude. Pahang, Bentong (Foxworthy). Perak, Gunong Pondok and Thaiping (Kunstler). Penang Hill (Curtis). *Native name*: Bunga Chenang.

(11) *G. fulvus* Hook. *fl. F.B.I.* i. 75; *King, Journ. As. Soc. Beng. l.c.* 74.

Shrub. Branchlets rufous-pubescent. Leaves membranous oblong-lanceolate obtuse, above glabrous, beneath puberulous or glabrous; nerves 14 to 16 pairs, 7 to 10 in. long, 2.5 to 3.25 in. wide; petioles thick, .5 in. long. Flowers solitary axillary; pedicels .25 in. long, puberulous. Sepals broad ovate obtuse pubescent, connate at base, .15 in. long. Petals coriaceous, densely silky, outer ones oblong-lanceolate to lanceolate long-acuminate, 1 to 1.5 in. long, inner ones .3 in. long, ovate acute, golden-silky. Stamens numerous, appendages convex, puberulous. Ovaries pubescent; style cylindric, glabrous. Stigma bifid. *Hab.* Malacca (Griffith). Pahang, Rumpin (Foxworthy).

(12) *G. Curtisii* King, *Journ. As. Soc. Beng. l.c.* 75; *Ann. Bot. Gard. Calc. l.c.* 96, *pl.* 135.

A shrub or small, slender tree. Branchlets tomentose. Leaves thickly membranous narrow oblong to obovate-oblong abruptly acuminate, base rounded, glabrous above except the puberulous midrib, beneath puberulous; midrib and nerves (28 to 30 pairs) tomentose, nerves very prominent inarching; 9 to 15 in. long, 3 to 5.5 in. wide; petioles .35 in. long, pubescent, channelled. Flowers solitary extra-axillary; pedicels decurved hairy stout, .6 in. long. Sepals stiffly membranous pink nerved reticulate-pubescent, .75 to 1 in. long, connate into a cup with 3 ovate acute teeth. Petals coriaceous velvety green to yellow, tinged red, outer ones broad lanceolate acuminate, 1.25 to 1.75 in. long, inner ones more than one-third as long, ovate acuminate. Stamens, appendages acute conical. Ovaries numerous pubescent, 1-ovuled. Carpels ovoid acute hooked, points pubescent, .75 in. long, stalks .1 in. long, stout. *Hab.* Dense forests. Selangor. Batu Caves; Menuang Gasing (Kloss); Kwala Lumpur. Perak, Ulu Kerling, Waterloo, etc. (Kunstler, Curtis).

Very distinct in its large leaves, often widest near the tip, with very numerous parallel nerves.

(13) *G. Ridleyi* King, *Journ. As. Soc. Beng. l.c.* 76; *Ann. Bot. Gard. Calc. l.c.* 98, *pl.* 138. *G. Prainianus* King, *l.c.* 72; *Ann. Bot. Gard. Calc. l.c.* 90, *pl.* 123.

A tree about 20 ft. tall, 6 in. through. Leaves membranous broad elliptic abruptly acuminate, base sub-acute, glabrous except the midrib, puberulous on both sides; nerves puberulous, 6 pairs; 8 to 12 in. long, 3.5 in. wide; petioles .25 in. long, puberulous. Flowers very abundant on tubercles at the base of the stem, forming a pile, on pedicels 2.5 to 3.5 in. long, coriaceous dull red brown to

bright rose pink. Sepals ovate-elliptic obtuse, '6 in. long, puberulous. Petals, outer ones elliptic-oblong or ovate obtuse or subacute with a broad thick claw, 1·65 to 2 in. long, inner ones connate, '6 in. long, obovate, claw narrow. Stamens yellow, numerous, appendages conic. Ovaries narrow; style cylindric, puberulous; stigma bilobed, white. Carpels globular green, an inch through; stalks 2 to 3 in. long, forming a head of fruit as big as a cricket ball. *Hab.* Rocky Woods, Singapore, Bukit Timah. Malacca. Dindings. Perak, Chanderiang; Gunong Bubu (Kunstler); Batu Kurau (Curtis). *Native name*: Banitan.

The mass of flowers at the base of the tree is often very large and is usually covered with earth by the ants, which abound in and on the flowers, and probably pollinate them. I am quite unable to separate *G. Prainianus* King, which seems to be based on the young flowers only.

(14) *G. uvarioides* King, *Journ. As. Soc. Beng. l.c.* 78; *Ann. Bot. Gard. Calc. l.c.* 100, *pl.* 143.

A shrub 6 to 15 ft. tall, glabrous except flower and fruit. Leaves thinly coriaceous, oblong slightly obovate, narrowed towards the rounded base; nerves 22 to 25, rather horizontal, inarching near the margin; 10 to 15 in. long, 3 to 6 in. wide; petioles '4 in. long. Flowers near the base of the stem, on stout pedicels '35 in. long. Sepals small coriaceous pubescent semi-orbicular, '2 in. long. Petals very coriaceous, yellow, outer ones lanceolate pubescent, 1·5 in. long, inner ones similar, 1 to 1·2 in. long. Appendages conic. Ovaries hairy. Carpels oblong acute at each end puberulous, 1·5 in. long, '65 in. through; stalks '7 in. long. Seeds 4, compressed, rugose, '5 in. long. *Hab.* Very little known, based on fruiting specimens from the Ulu Slim and Ulu Bubong in Perak and a Borneo specimen in flower. A fruiting plant I found in Chaning Woods, Kelantan, appears to be this species.

18. OROPHEA, Bl.

Trees of medium size or shrubs. Flowers usually small, axillary fascicled or cymose, white or pink. Sepals 3, valvate. Petals 6, valvate, outer three ovate, inner three clawed and spatulate and cohering at their edges into a conic cap, occasionally oblong approximate in the middle and diverging at the tips. Stamens definite, 6 to 12, ovoid, fleshy; anther-cells dorsal, large, appendages conic. Staminodes 0 or 3 to 6. Ovaries 3 to 15; style short or 0. Ovules 4. Carpels 1- or more-seeded, globular, oblong or elongate, jointed. Species about 25, tropical Asia.

Inner petals vaulted.

Stamens 12; stem hairy; carpels globose . . . (1) *O. setosa*
Stamens 6.

Stem hairy; carpels globose (2) *O. hirsuta*

Stem glabrous; carpels elongate, jointed . . . (3) *O. enterocarpa*

Stem red-velvety; flowers large; carpels elongate, jointed (4) *O. maculata*

- Inner petals slightly vaulted; flowers very small,
 carpels globose (5) ***O. gracilis***
 Inner petals spreading, not vaulted.
 Stamens 10 to 12.
 Inner petals hastate; fruit globular (6) ***O. hastata***
 Inner petals linear-oblong; fruit ovoid (7) ***O. dodecandra***
 Stamens 6.
 Inner petals cuneiform; fruit cylindric (8) ***O. cuneiformis***

(1) ***O. setosa*** King, *Journ. As. Soc. Beng. l.c.* 80; *Ann. Bot. Gard. Calc. l.c.* 102, *pl.* 131B.

A shrub 4 to 6 ft. tall. Branchlets pubescent and covered with long brown bristles. Leaves membranous oblong to oblong-lanceolate-acuminate, base rounded, sparingly bristly on both sides, especially on the midrib and nerves; lower surface also pubescent; nerves 8 to 10 pairs inarching near the edge; 5·5 to 7·5 in. long, 2 to 2·75 in. wide; petioles ·05 in. long, bristly. Flowers solitary extra-axillary ·2 in. across; pedicels slender, ·75 in. long, pubescent. Sepals sub-orbicular blunt. Petals, outer ones broadly ovate sub-acute, pubescent outside; inner ones longer vaulted, claw narrow shorter than the trapezoid-sagittate limb, pubescent on back and edges. Male flower. Stamens numerous, appendages broadly truncate. Carpels 4 or 5, sessile globose or oblong-globose, ·3 in. through, pubescent and bristly. Seed 1, rarely 2. *Hab.* Woods from 500 or 1200 ft. altitude, Negri Sembilan, Bukit Danau (Cantley). Perak, Gunong Pondok (Kunstler). *Native name*: Pialu. *Use*: A decoction of the roots used in malaria.

(2) ***O. hirsuta*** King, *Journ. As. Soc. Beng. l.c.* 81; *Ann. Bot. Gard. Calc. l.c.* 104, *pl.* 146A.

A shrub 3 to 12 ft. tall. Branchlets red-hairy. Leaves elliptic or elliptic-oblong or slightly obovate acuminate, base minutely cordate; above glabrous, beneath hairy, midrib bristly; nerves 8 to 9 pairs, very faint; 3·5 to 4·5 in. long, 1·24 to 1·75 in. wide; petioles ·05 in. long, bristly. Peduncles extra-axillary, ·5 in. long, 1- to 3-flowered, hairy; pedicels ·75 in. long, hairy. Bracts minute, several. Flowers ·5 in. across, dark red, base white. Sepals broad ovate acute hairy outside. Petals, outer ones larger broad obovate blunt hairy outside, ·15 in. long; inner ones ·25 in. long, claw narrow longer than limb, glabrous, limb trapeziform vaulted thick glabrous outside, pubescent within. Stamens 6, in one row. Ovaries 6, ovoid glabrous; ovules 1 to 2. Carpels 4 to 5, globular yellow hairy, ·4 in. long; stalks ·1 in. long. *Hab.* Perak, Goping (Kunstler). Rare. *Native name*: Supucha Pelandok. *Use*: The plant is chewed with betel-nut in cases of cough.

(3) ***O. enterocarpa*** Maing. in Hook. *fil. F.B.I.* i. 92; *Ann. Bot. Gard. Calc. l.c.* 106, *pl.* 148A.

Tree 10 to 30 ft. tall, glabrous. Leaves membranous elliptic-acuminate base rounded; nerves 6 to 7 pairs, slender, 3·5 to 5 in. long, 1·2 to 1·5 in. wide; petioles ·1 in. long. Flowers extra-

axillary; pedicels very slender .75 to 1.25 in. long, pubescent except at base. Bracts several ovate lanceolate. Sepals small ovate acuminate pubescent. Petals, outer ones .5 in. long, ovate acuminate puberulous cream colour; inner ones larger, .6 to .75 in. long; claw narrow, yellowish with a reddish band, or dark claret colour, limb elongate trapezoid. Stamens 6. Ovaries 6, ovules 2 to 7. Carpels 4 to 6, elongate-cylindric moniliform red, 3 to 5 in. long, .3 in. through. Seeds 2 to 7, linear-oblong. *Hab.* Malacca (Maingay). Perak, Thaiping (Kunstler).

(4) *O. maculata* Scort. in *King, Journ. As. Soc. Beng. l.c.* 84; *Ann. Bot. Gard. Calc. l.c.* 106, *pl.* 148B.

Shrub 5 to 20 ft. tall. Branchlets red tomentose. Leaves membranous elliptic to oblanceolate, caudate acuminate, base rounded above, glabrous beneath, sub-glabrous, midrib and nerves pubescent; nerves 10 to 12 pairs, faint; 3.25 to 7 in. long, 1.5 to 2.25 in. wide; petioles .1 in. long, tomentose. Peduncles 1- to 3-flowered, very slender, .5 to 1 in. long, pubescent. Bracts numerous, linear-oblong. Sepals narrow lanceolate acuminate. Petals, outer ones larger .5 in. long, ovate acuminate hairy, mottled red and yellow, or white spotted with pink; inner ones .1 in. long, claw long, narrow, pubescent, limb lanceolate acuminate hairy. Stamens 3, orbicular. Stamens 6, bases hairy. Ovaries 3 to 6, very hairy, 6- to 7-ovuled. Carpels 4 to 6, elongate cylindric puberulous moniliform, red. Seeds 4 to 7, linear-oblong. *Hab.* In thick woods, usually on limestone rocks. Perak, Goping. Gunong Pondok (Kunstler); Tapah. Pahang, Kota Glanggi and Pulau Chengai, Pahang river.

(5) *O. gracilis* King, *Journ. As. Soc. Beng. l.c.* 83; *Ann. Bot. Gard. Calc. l.c.* 107, *pl.* 149A.

Tree 20 to 30 ft. tall. Stem 4 to 6 in. through. Leaves membranous to thinly coriaceous, lanceolate acuminate obtuse, base cuneate or rounded narrowed, glabrous; nerves 5 to 6 pairs, slender inarching far from the edge, indistinct; 2.5 to 3.5 in. long, .9 to 1.2 in. wide; petioles .05 in. long. Flowers solitary extra-axillary on slender jointed pedicels .75 to 1 in. long. Bracts several, minute, subulate. Sepals broad ovate sub-acute, base connate. Petals, outer ones larger, ovate acute, .15 in. long, white glabrous except edges pubescent; inner ones .25 in. long; limb thick trapezoid, edges pubescent, claw shorter glabrous. Stamens 6 in one row, appendages long. Ovaries 4 to 10, ovoid glabrous, 2-ovuled. Carpels 6 to 10 globose, .45 in. long, glabrous brown; stalks .25 in. long. *Hab.* Open jungle on limestone hills, Perak, Goping (Kunstler).

(6) *O. hastata* King, *Journ. As. Soc. Beng. l.c.* 83; *Ann. Bot. Gard. Calc. l.c.* 107, *pl.* 149B.

Tree, 20 to 40 ft. tall, 5 to 7 in. through, glabrous. Leaves coriaceous, elliptic caudate-acuminate, base shortly cuneate; nerves

6 to 8 pairs, inarching within the edges; 3·5 in. to 5·5 in. long, 1·6 to 2·4 in. wide; petioles 1 in. to 2 in. long. Peduncles solitary, axillary or extra-axillary, 4 in. long, with several bracts and 3 to 4 flowers on pubescent pedicels. Flowers 4 in. long, dark red, petals tipped yellow. Sepals ovate acute, pubescent outside. Petals, outer ones twice as large, ovate acute, pubescent outside; inner ones 35 in. long, limb hastate triquetrous, edges ciliate; claw long, narrowed to base, glabrous. Staminodes 0. Stamens 10 in 2 rows, apiculate. Ovaries 10, oblong, pubescent, 2-ovuled. Carpels 5 to 6, globular, glabrous, 4 in. long, green, mottled dark red; stalks 25 in. long. Seeds solitary. *Hab.* Dense rocky jungle up to 1000 ft. altitude, Singapore, Bukit Timah forest. Perak; Ulu Slim and Larut (Kunstler). Dindings, Lumut.

(7) *O. dodecandra* Miq. *Ann. Mus. Bot. Lugd. Bat.* i. 25; *King, Journ. As. Soc. Beng. l.c.* 84; *Ann. Bot. Gard. Calc. l.c.* 108, *pl.* 150A.

Tree 30 to 50 ft. tall. Stem 15 to 20 in. through. Branchlets pubescent. Leaves sub-coriaceous, elliptic caudate acuminate, base cuneate, glabrous; nerves 5 to 6 pairs elevated beneath, inarching 25 in. from edge; 3·5 to 5·5 in. long; 1·75 to 2·3 in. wide; petioles 2 in. long, stout, channelled. Peduncles several together, axillary, 4 in. long with 3 to 7 flowers; pedicels as long or longer. Flowers small, dark red. Sepals ovate connate at base. Petals, outer ones broad ovate acuminate, base rounded, 15 in. long; inner ones thick, linear-oblong blunt puberulous, apices recurved. Staminodes 0. Stamens 12, in 2 rows; appendages prolonged. Ovaries 6 to 8, oblique curved glabrous, 2-ovuled. Carpels ovoid blunt glabrous, 85 in. long, white spotted red. Seed 1, oblong or rounded. *Hab.* Sea level to 800 ft. altitude in dense forests. Singapore, Garden Jungle. Selangor, Petaling. Perak at Thaiping and Gunong Bubu (Kunstler); Kwala Dipang.

(8) *O. cuneiformis* King, *Journ. As. Soc. Beng. l.c.* 84; *Ann. Bot. Gard. Calc. l.c.* 108, *pl.* 150B.

A tree 15 to 30 ft. tall. Stem 3 to 4 in. through. Leaves dark green thinly coriaceous oblong or elliptic acuminate; base shortly narrowed rounded cordate, at first sparsely hairy, later glabrous above, pubescent beneath; nerves 8 to 12 pairs with the midrib tomentose, 3·5 to 6 in. long, 1·1 to 2·2 in. wide; petioles 05 in. long, tomentose. Peduncles supra-axillary, slender rufous-tomentose, 1 in. long. Bracts numerous linear-lanceolate. Flowers 4 or 5; pedicels 3·5 in. long, red-tomentose. Sepals ovate long acuminate. Petals, outer ones ovate acute, white and pink; inner ones cuneiform, sometimes retuse, claw short narrow. Staminodes 3, sub-orbicular. Stamens 6, appendages broad, flat. Ovaries 6, oblong villous, 2- to 3-ovuled. Carpels 2 to 4, sessile cylindric not moniliform, 1·5 to 1·75 in. long, 35 in. through. Seeds 2, oblong. *Hab.* Woods, on limestone hills under 1000 ft. altitude.

Perak, Goping district (Kunstler). Setul, Bukit Rajah Wang.
Distrib. Siam, Tongka.

19. MITREPHORA, Bl.

Trees or shrubs. Leaves sub-coriaceous or coriaceous. Flowers solitary or in racemes usually axillary or leaf-opposed, small, often unisexual. Sepals 3, orbicular or ovate. Petals 6, in 2 series, valvate; outer ones ovate, thin; inner ones clawed, limb ovate or lanceolate, vaulted and cohering. Stamens oblong; anther-cells dorsal, remote; appendages broad, truncate. Ovaries oblong; style oblong or clavate; ovules 4 or more, 2-seriate. Carpels globose or ovoid, stalked or nearly sessile. Species 10, East Asiatic.

Flower hermaphrodite 1 in. or more across, yellow
or red (1) *M. Maingayi*

Flowers unisexual.

Flowers on branches.

Carpels ovoid not rugulose; nerves 12 to 14 pairs (2) *M. reticulata*

Carpels sub-globular rugulose; nerves 14 to 20
pairs (3) *M. macrophylla*

Flowers on trunk, fleshy (4) *M. crassipetala*

(1) *M. Maingayi* Hook. *fil. F.B.I.* i. 77; King, *Journ. As. Soc. Beng. l.c.* 86; *Ann. Bot. Gard. Calc. l.c.* 112, *pl.* 154.

A tree 20 to 50 ft. tall, 6 to 24 in. through; branchlets tomentose. Leaves coriaceous ovate or oblong-acuminate, base rounded, glabrous; nerves 6 to 10 pairs; 3 to 5.5 in. long, 1.5 to 2.2 in. wide; petioles .3 to .4 in. long. Flowers large and showy, 1 in. across or more, yellow with red spots, several on a leaf-opposed red-velvety peduncle, with many bracts. Sepals connate ovate acute, tomentose. Petals, outer ones orbicular or obovate, edges undulate, pubescent inside, inner ones shorter cordate with a long linear claw. Stamens numerous, appendages flat. Ovaries narrowed into the styles; ovules 4. Carpels ovoid densely tomentose pale green, 1 in. long, .75 in. through; stalks stout, .75 in. long. Seeds 4. *Hab.* Borders of woods in open country. Malacca (Maingay). Selangor. Dindings, Bruas; Telok Sera (Curtis). Perak, Thaiping; Goping (Kunstler); Penang, Telok Bahang (Curtis, Porter). *Distrib.* Borneo, Cochinchina. *Native name:* Maribut Daun Besar.

(2) *M. reticulata* Hook. *fil. F.B.I.* i. 77; King, *Journ. As. Soc. Beng. l.c.* 87; *Ann. Bot. Gard. Calc. l.c.* 113, *pl.* 156A. *Orophia reticulata* Miq. *Ann. Mus. Bot. Lugd. Bat.* ii. 23. *Uvaria reticulata* Bl. *Fl. Jav. Anonaceæ*, 50, *t.* 24.

Tree 20 to 30 ft. tall, stem 4 to 6 in. through; branchlets tomentose. Leaves membranous narrow oblong acuminate, base cuneate or rounded, reticulate glabrous; midrib pubescent above, setose beneath; nerves 12 to 14 pairs, prominent; 5 to 14 in. long, 2

to 4·5 in. wide; petioles 25 in. long, swollen. Flowers small, 2 in. across, lavender colour or brownish pink, unisexual in few-flowered axillary cymes. Pedicels slender, 1 in. long. Bracts many, small. Sepals ovate acute pubescent. Petals, outer ones twice as large as inner ones ovate obtuse, pubescent; inner ones spoon-shaped, limb ovate acute, claw linear. Stamens numerous in male, appendages rounded broad. Ovaries 3, hairy. In female, staminodes in 2 rows. Ovaries 12, hairy ovoid-cylindric; ovules 4. Stigma large, fleshy. Carpels ovoid wrinkled hoary, 8 in. long, 65 in. through; stalk stout, 2 in. long. Seeds 2. *Hab.* Forests, common. Johor, Pulau Tioman (Burkill). Malacca. Selangor, Batu caves. Perak, Bujong Malacca; Temengoh hill-woods; Sungkai (Burn-Murdoch). Kelantan, Chaning. *Distrib.* Burma, S. Siam (Trang). *Native names*: Ringei Jerenang; Kiru; Pisang Pisang Bukit. *Use*: Timber used for house-building; bark used as soap in Malacca.

(3) ***M. macrophylla*** Oliv. *Ic. Pl. t.* 1562; *King, Journ. As. Soc. Beng. l.c.* 87; *Ann. Bot. Gard. Calc. l.c.* 114, *pl.* 157.

Small tree 20 to 30 ft. tall; trunk 6 to 8 in. through; branches puberulous. Leaves thinly coriaceous, elliptic-obovate or oblong-lanceolate acute or acuminate; base rounded, puberulous when young, minutely reticulate; nerves 14 to 20 pairs, inarching, 15 in. from margin, prominent beneath; 7 to 13 in. long, 1·75 to 4 in. wide. Flowers 25 to 3 in. wide axillary in pairs or cymes, dull purple to dark pink, 1 to 2 in. long, pubescent, similar to those of *M. reticulata*. Fruit globose, minutely tomentose, rusty brown, 4 to 5 in. through; stalk 2 in. long. Seeds several. *Hab.* Johor. Pahang, Tahan River. Dindings. Selangor, Weld's Hill (native collector); Perak, Thaiping Hills; Sungkai; Goping, common (Kunstler); Penang, West Hill from about 1500 ft. altitude upwards (Curtis). *Native name*: Prusat.

(4) ***M. crassipetala*** Ridl. *Journ. Roy. As. Soc. S. Br.* 54, p. 13.

A tree, glabrous. Leaves oblong or oblong-lanceolate acuminate acute, base rounded; nerves elevate beneath, 9 pairs, inarching, 6 to 8 in. long, 2·5 to 2·75 in. wide; petioles 25 in. long. Flowers in racemes 5 in. long in clusters on trunk; white. Bracts 05 in. long, ovate. Sepals ovate obtuse, edges ciliate, 1 in. long. Petals, outer ones ovate, 3 in. long; tip very thick, coriaceous; inner ones connivent spatulate, limb triangular thick. Male flowers, stamens numerous oblong; appendages triangular-ovate. Pistils abortive. *Hab.* Forests, Pahang on the Tahan River. Rare (Ridley).

20. POPOWIA, Endl.

Trees or shrubs. Flowers small sub-globular, usually bisexual, occasionally unisexual, hardly opening, extra-axillary or leaf-opposed nearly sessile, tomentose. Sepals 3, ovate valvate.

Petals 6, valvate in 2 series, ovate or orbicular, outer ones little longer than the sepals, spreading; inner ones thick, concave connivent acute, tip sometimes inflexed, a little longer than the outer ones. Stamens indefinite or definite, short cuneate; anther-cells dorsal, remote, appendages usually broad and flat. Ovaries about 6, ovoid; style large, oblong, straight or curved. Ovules 1 or 2 on ventral suture, rarely 1, basal. Carpels berry-like, globose or ovoid, stalked. Seeds 1 to 3. Species about 20 in Africa, 12 Australia and 1 African.

Flowers hermaphrodite.

Leaves glabrous except nerves; flowers very small.

Leaves ovate; nerves 6 to 8 pairs (1) *P. ramosissima*

Leaves lanceolate; nerves 9 to 10 pairs (2) *P. pauciflora*

Leaves yellow, tomentose beneath; fruit very large (3) *P. foetida*

Leaves glabrous above except nerves below, pubescent; fruit small (4) *P. perakensis*

Leaves puberulous above, pubescent beneath blunt (5) *P. fusca*

Leaves glabrous except midrib, sparse hairy beneath (6) *P. velutina*

Leaves soft, tomentose all over (7) *P. tomentosa*

Flowers unisexual. Leaves large, glabrous strongly nerved.

Flowers .5 in. across, dense, hairy.

Petals short, ovate, inner much smaller; fruit .25 in. (8) *P. nervifolia*

Petals subequal, oblong; fruit .75 in. (9) *P. nervosa*

Flowers .3 in. wide, glabrous; fruit oblong, .5 in. (10) *P. pumila*

(1) *P. ramosissima* Hook. *fil.* and Thom. *Fl. Ind.* 105; Hook. *fil. F.B.I.* i. 68; King, *Journ. As. Soc. Beng. l.c.* 92; *Ann. Bot. Gard. Calc. l.c.* 117, *pl.* 159B.

A small spreading tree 10 to 12 ft. tall, 3 to 4 in. through; young branches rufous-pubescent. Leaves membranous coriaceous nearly sessile elliptic to nearly ovate shortly acuminate, base round, glabrous except midrib and nerves 6 to 8 pairs ascending pubescent; 2.75 in. to .4 in. long, 1 to 1.75 in. wide; petioles hairy, .05 in. long. Flowers leaf-opposed, 1 to 3 together, .2 in. across, white or yellow. Sepals broad, triangular, ovate acute tomentose outside. Petals sub-equal, coriaceous sub-rotund concave, little larger than the sepals, tomentose outside; inner ones little larger than outer ones, tips incurved. Stamens short, appendages broad concave. Ovaries 5 to 6, villous, ovules 1 to 2. Carpels globose, .25 to .35 in. long, pubescent, green; stalks .05 in. long. *Hab.* Forests, sea level to 2000 ft. altitude. Common. Singapore, Bukit Timah. Johor. Pahang, Kota Glanggi. Malacca. Selangor, Petaling. Perak, Thaiping Hills; Ulu Bubong (Kunstler). Dindings, Pangkor. Penang (Wallich); Pulau Betong (Curtis). *Distrib.* Sumatra, Borneo, South. Siam at Trang. *Native name:* Kayu San Tuche.

(2) *P. pauciflora* Maing. in Hook. *fil. F.B.I.* i. 69; King, *Journ. As. Soc. Beng. l.c.* 92; *Ann. Bot. Gard. Calc. l.c.* 117, *pl.* 159A.

Tree?, branchlets strigose. Leaves membranous elliptic-lanceolate acuminate, base acute or obtuse, glabrous above except midrib and nerves, pilose beneath, 9 to 10 pairs, ascending, 5 to 6 in. long, 1·5 to 2 in. wide; petioles ·2 in. long, pubescent. Flowers extra-axillary or axillary solitary, ·25 in. across; pedicels ·15 to ·25 in. long, red, strigose. Sepals minute ovate. Petals, outer ones small ovate, inner ones twice as large, sub-orbicular concave, tips inflexed. Stamens many. Ovaries 6, strigose; ovules solitary. Carpels globose sub-sessile glabrous, ·3 in. long. *Hab.* Malacca (Maingay). Very rare, only known from Maingay's specimens.

(3) *P. fœtida* Maing. in Hook. fil. *F.B.I.* i. 69; *King, Journ. As. Soc. Beng. l.c.* 93; *Ann. Bot. Gard. Calc. l.c.* 119, *pl.* 161A.

A large tree 30 to 40 ft. tall; branches pale, branchlets tomentose. Leaves sub-coriaceous, elliptic-lanceolate caudate-acuminate, above glabrous except the puberulous midrib, beneath densely yellowish-tomentose; nerves 11 to 18 pairs, prominent beneath inarching close to margin, ascending 4·5 to 6·5 in. long, 1·6 to 2 in. across; petioles tomentose, ·2 in. long. Flowers solitary ·35 in. long, yellow, pedicels very short. Sepals ·1 in. long lanceolate ovate. Petals, outer ones ovate-elliptic, obtuse; inner ones larger concave, edges thickened, all tomentose. Stamens about 30. Ovaries strigose, about 6, 2-ovuled. Carpels 1 to 3, very large, oblong-ovoid rounded, sessile, densely shortly yellow-tomentose, 2·25 in. long, 1·5 in. through. Seed 1, oblong, 1·6 in. long, ·75 in. through. *Hab.* Forests. Malacca, Sungei Hudang (Derry). Penang, Pulau Betong (Curtis). *Native name*: Pisang Pisang Besar.

(4) *P. perakensis* King, *Journ. As. Soc. Beng. l.c.* 94; *Ann. Bot. Gard. Calc. l.c.* 120, *pl.* 161B.

A small tree 6 to 15 ft. tall; branchlets tomentose. Leaves large elliptic or oblong shortly acuminate, base narrowed obtuse, above glabrous, except the midrib and nerves 8 to 10 pairs, prominent beneath, tomentose on both sides, beneath pubescent sub-granular; 5 to 6 in. long, 2·5 to 3 in. wide; petioles ·1 in. long, tomentose. Flowers extra-axillary, in pairs, ·3 in. across, silvery grey; pedicels ·4 in. long, red-tomentose. Sepals semi-orbicular acute tomentose outside. Petals thick ovoid-orbicular acute sub-concave, white silky; inner ones slightly larger than outer ones. Stamens numerous, appendages truncate corrugate. Ovaries 10, nearly glabrous, 2-ovuled. Carpels 8 or more, oblong-ovoid glabrescent, with horizontal constrictions when dry, ·5 in. long, ·25 in. through; stalks ·25 in. to ·5 in. long. Seeds 2. *Hab.* Dense forest. Perak, Thaiping Hills from the waterfall to 2000 ft. altitude (Kunstler).

(5) *P. fusca* King, *Journ. As. Soc. Beng. l.c.* 94; *Ann. Bot. Gard. Calc. l.c.* 120, *pl.* 162A.

Tree 40 to 50 ft. tall; stem 6 to 10 in. through; branchlets purplish brown, tomentose. Leaves coriaceous, oval-oblong obtuse

or sub-acute, base rounded, above puberulous, beneath pubescent, midrib and nerves 8 to 11 pairs, prominent brown tomentose both sides; 2·5 in. to 3·5 in. long, 1·4 to 1·8 in. wide; petioles thick, 2 in. long, tomentose. Flowers fascicled extra-axillary, 25 in. across, on pedicels 15 to 25 in. long, tomentose. Sepals ovate-obtuse tomentose outside. Petals rounded thick and fleshy, both series equal, tomentose outside, puberulous inside. Carpels 3 to 4, globose green with a brown gloss, 25 in. through on stalks 1 to 2 in. long, tomentose. Seed 1. *Hab.* Dense bamboo forests and lowland mixed forest. Singapore, Garden Jungle. Perak at Ulu Kerling at 500 ft. altitude (Kunstler).

(6) ***P. velutina*** King, *Journ. As. Soc. Beng. l.c.* 94; *Ann. Bot. Gard. Calc. l.c.* 120, *pl.* 162B.

Tree 30 to 40 ft. tall, 6 to 8 in. through. Leaves glossy dark green velvety, elliptic-oblong acute or acuminate, slightly narrowed to rounded base, above granular sparsely hairy, beneath softly pubescent, midrib and nerves 6 to 7 pairs, indistinct, tomentose on both surfaces; 3 to 5 in. long, 1·4 to 1·8 in. wide; petioles 1 in. long. Flowers 1 to 2, extra-axillary, 25 in. across; pedicels densely tomentose. Sepals broad, ovate sub-acute, tomentose outside, persistent. Petals sub-equal, thick sub-orbicular, tomentose outside. Carpels few, 1 to 3, ovoid blunt, slightly narrowed at base, velvety-pubescent, 5 in. long, 35 in. through; stalks 2 in. long, tomentose. Seed 1, rugose. *Hab.* Dense jungle, limestone districts at 500 to 800 ft. altitude. Perak, Goping (Kunstler).

(7) ***P. tomentosa*** Maing. in Hook. *fil. F.B.I.* i. 70; King, *Journ. As. Soc. Beng. l.c.* 95.

Shrub 6 to 15 ft. tall; stem 2 to 3 in. through or less; branchlets tomentose. Leaves elliptic-oblong obtuse or sub-acute, base rounded, sub-coriaceous, 3·5 to 5 in. long, 1·5 to 1·9 in. across, softly pubescent-tomentose on both sides, much so beneath; nerves 9 to 10 pairs, slender; petioles 1 in. long. Flowers extra-axillary sub-sessile or shortly stalked, 25 in. across, white. Sepals ovate connate. Petals villous outside, outer ones ovate thick, inner ones larger, thick and concave. Stamens 25. Ovaries 7 to 9, oblong pubescent; ovules 2. Carpels globose, pubescent, 5 to 75 in. long; stalks 35 in. long on peduncle enlarged to 5 in. long, tomentose. Seeds 2. *Hab.* Forests lowland. Singapore, Garden Jungle. Malacca (Maingay). Brissu; Ayer Panas. Selangor, Batu caves. Perak, Ulu Kerling, open bamboo forests (Kunstler). Dindings, Gunong Tungul. Penang Moniot's Road. *Native name* : Chingau.

(8) ***P. nervifolia*** Maing. in Hook. *fil. F.B.I.* i. 60; King, *Journ. As. Soc. Beng. l.c.* 95; *Ann. Bot. Gard. Calc. l.c.* 121, *pl.* 164.

Small tree 15 to 20 ft. tall; stem 2 to 3 in. through; branchlets pubescent. Leaves coriaceous oblong-lanceolate to elliptic-oblong shortly acuminate, base cuneate, glabrous above, nearly so beneath,

midrib and nerves pubescent; nerves 10 to 12 pairs, prominent, as are reticulations; 5·5 to 8·5 in. long, 2 to 3·5 in. wide; petioles ·35 to ·5 in. long, glabrous or pubescent. Flowers 1 to 2, extra-axillary, ·5 to ·75 in. across; white or pink; pedicels tomentose, ·15 to ·25 long, bracts 2, nearly as large as sepals. Sepals ovate-orbicular acute thick villous, tomentose outside. Petals, outer ones larger tomentose outside, inner ones longer, tips inflexed, tomentose. Stamens numerous, appendages rhomboid. Ovaries numerous, hairy. Carpels numerous, cylindric-ovoid apiculate, narrowed at base, strigose, ·5 in. long, ·25 in. through; stalks ·2 to ·3 in. long on a globular torus. *Hab.* Forests, to 1000 ft. altitude. Johor, Gunong Janeng (Kelsall). Negri Sembilan, Bukit Sulu (Cantley). Malacca (Maingay). Perak, Thaiping Hills. Selangor, Ginting Bidai. Penang, Pulau Butong at 300 ft. altitude (Curtis). *Native names*: Pasa Achong; Mumpisang Batu. *Use*: In house-building.

(9) **P. nervosa** Ridl. *Ellipeia nervosa* Hook. *fl. F.B.I.* i. 52; *King, Journ. As. Soc. Beng. l.c.* 27; *Ann. Bot. Gard. Calc. l.c.* 35, *pl.* 33.

A tree up to 20 ft. tall; branchlets glabrous. Leaves coriaceous with pellucid dots, elliptic to lanceolate-oblong acute at both ends, tip sometimes acuminate, above glabrous, beneath sparsely strigose with distinct reticulations; nerves 10 to 12 pairs; 8 to 12 in. long, 2 to 3·5 in. wide; petioles ·35 to ·5 in. long, glabrous. Flowers unisexual, solitary or in pairs, extra-axillary, ·75 in. across, globose; pedicels ·1 to ·2 in. long, pilose, stout. Sepals ovate acute pubescent. Petals white, pubescent, spreading imbricate, much longer, outer ones broad ovate-oblong, blunt; inner ones shorter and narrower, oblong. Stamens in male flowers numerous. Pistils in females many. Carpels numerous, ovoid apiculate, narrowed into stalk, orange (rose red according to Wray), 1 in. long, ·5 in. through, glabrous on ·75 to 1 in. stalks. *Hab.* In lowland forest to 3000 ft. altitude. Common. Johor. Malacca. Pahang. Selangor. Perak and Penang. *Native names*: Poko Girah; Kenchong; Larak. *Use*: In house-building.

The leaves of this tree very closely resemble those of *P. nervifolia*.

(10) **P. pumila** Ridl. *Ellipeia pumila* King, *Journ. As. Soc. Beng. l.c.* 27; *Ann. Bot. Gard. Calc. l.c.* 34, *pl.* 32.

A shrub 2 to 8 ft. tall; young branches tomentose. Leaves coriaceous oblong to elliptic-lanceolate, apex acuminate, base acute, above glabrous, beneath sparsely pubescent; nerves 9 pairs, faint, 4·5 to 7 in. long, 1·5 to 2·25 in. wide; petioles ·25 to ·35 in. long, pubescent. Flowers 1 or 2, extra-axillary sub-sessile, ·75 in. across; pedicels ·1 in. long, coarsely hairy. Sepals much shorter than the petals, ovate sub-acute, strigose-pubescent outside. Petals imbricate, white, lanceolate hairy-strigose outside, glabrous inside,

outer ones at first much shorter, later sub-equal to the inner ones. Male flowers; stamens numerous, appendages truncate, pistils 0. Female, stamens fewer; pistils 10, pubescent, 1-ovuled. Carpels 4 to 5, sub-cylindric tapering to both ends, .75 in. long, .25 in. through, granular-strigose; stalks .15 in. long, tomentose; torus very small. Seed solitary. *Hab.* In forests, not common. Selangor, near Klang Gates. Negri Sembilan, Bukit Tampin (Robinson). Perak, Ulu Bubong and Chanderiang (Kunstler).

21. OXYMITRA, Bl.

Climbers woody, usually slender, red-tomentose. Leaves oblong obovate large, glaucous beneath. Flowers, leaf-opposed or extra-axillary, moderately large; buds conic. Sepals 3, valvate, connate at base. Petals 6, valvate in 2 series, outer ones long, flat or triquetrous narrow, connivent, coriaceous, usually yellow, inner ones much smaller, ovate-lanceolate or oblong or narrow, connivent. Stamens many, linear-oblong, truncate; anther-cells dorsal, remote. Ovaries oblong, strigose; style oblong. Ovules 1 or 2, sub-basal. Carpels stalked, 1-seeded. Species 30, Asia and Africa.

Outer petals flat.

- | | |
|---------------------------------------|-------------------------|
| Leaves broad, elliptic | (1) <i>O. affinis</i> |
| Leaves narrow, sub-glabrous | (2) <i>O. fornicata</i> |

Outer petals concave.

- | | |
|----------------------------------|-----------------------|
| Pedicels long, slender | (3) <i>O. filipes</i> |
|----------------------------------|-----------------------|

Pedicels very short.

Leaves large, obovate.

- | | |
|----------------------------------------------------------|------------------------|
| Sepals elliptic, nearly half as long as petals | (4) <i>O. calycina</i> |
|----------------------------------------------------------|------------------------|

- | | |
|--------------------------------------------|-------------------------|
| Sepals very small, sub-orbicular | (5) <i>O. latifolia</i> |
|--------------------------------------------|-------------------------|

Leaves oblong-elliptic not obovate.

- | | |
|------------------------------|----------------------------|
| Outer petals broad | (6) <i>O. biglandulosa</i> |
|------------------------------|----------------------------|

- | | |
|--------------------------------------------------|----------------------|
| Outer petals narrow, linear-lanceolate | (7) <i>O. glauca</i> |
|--------------------------------------------------|----------------------|

(1) *O. affinis* Hook. fil. *F.B.I.* i. 70; King, *Journ. As. Soc. Beng. l.c.* 98; *Ann. Bot. Gard. Calc. l.c.*, pl. 168A.

Climber; branchlets rusty-tomentose. Leaves sub-coriaceous, oblong-elliptic or slightly obovate acute or shortly acuminate, base round, above glabrous except the midrib pubescent on both sides, beneath glaucous pubescent especially on midrib and prominent nerves 8 to 14 pairs, 3.5 to 10 in. long, 1.25 to 4.5 in. wide; petioles .3 in. long, tomentose. Flowers solitary on pedicels .25 to .45 in. long, yellow. Sepals slightly connate at base, broad ovate, sub-acute, pubescent, .5 in. long. Petals flat, very unequal; outer ones thinly coriaceous, oblong-lanceolate sub-acute, pubescent on both sides, 1.5 to 1.75 in. long, .4 to .6 in. wide; inner ones thickly coriaceous, ovate sub-acute, .5 in. long, pubescent outside. Carpels cylindrical blunt pubescent, .5 to .8 in. long, .3 in. through; stalks pubescent, .2 in long, Seeds 1. *Hab.* Lowland forests. Singapore, Bukit Timah. Malacca, Selangor, etc. (Maingay,

Cantley). Perak, Larut Hills (Kunstler). *Distrib.* Southern Siam. *Native name*: Akar Larak.

(2) *O. fornicata* Hook. *fil.* *F.B.I.* i. 71; var. *glabra*.

Branches slender, nearly glabrous. Leaves oblong; base narrow, blunt, tip cuspidate, glabrous; nerves 13 pairs, slender; 6 in. long, 1.75 to 2 in. wide; petioles .2 in. long. Flowers very short pedicelled, extra-axillary. Sepals ovate ribbed hairy. Petals, outer ones flat lanceolate golden-silky, inner triangular-ovate. Fruit oblong, .5 in. long. *Hab.* In forests, not common. Penang:



FIG. 8.—*Oxymitra filipes*.

in Herb. Kew (probably Phillips). Pulau Adang (Ridley). *Distrib.* Silhet, Assam, Cambodia.

This plant is remarkable in the genus for its narrow leaves. I have only seen two specimens of the Penang plant, one in fruit, the other in young flower. King refers the former to *O. affinis*, which it is not. I believe it to be a form of *O. fornicata*, a native of Assam, Mergui and Cambodia.

(3) *O. filipes* Hook. *fil.* *F.B.I.* i. 171; King, *Journ. As. Soc. Beng.* l.c. 99.

Branchlets velvety-tomentose. Leaves membranous oblong-lanceolate slightly obovate acute (or acuminate), base sub-cordate, above glabrous or pubescent, beneath sub-glaucous pubescent;

midrib and nerves 12 to 14 pairs, above pubescent, beneath tomentose, secondary nerves prominent also; 4·5 to 7·5 in. long, 1·4 to 2·5 in. wide; petioles ·2 to ·25 in. long, tomentose. Flowers very long and narrow yellow, 1·75 to 2·5 in. long, solitary on extra-axillary peduncles, 3 to 4 in. long, pubescent. Sepals ·25 in. long, ovate acute pubescent. Petals, outer ones fleshy narrow triquetrous, base concave; inner ones glabrous, one-fifth length of the outer ones, lanceolate caudate-acuminate. Stamens numerous. Ovaries 1-ovuled. Carpels numerous, brownish green, ovate-cylindric, pubescent, ·5 in. long, ·25 in. wide; stalks ·3 in. long. *Hab.* Forests. Malacca (Maingay). Perak, Goping and Ulu Bubong (Kunstler).

(4) *O. calycina* King, *Journ. As. Soc. Beng. l.c.* 99; *Ann. Bot. Gard. Calc. l.c.* 125, *pl.* 168.

Branchlets tomentose. Leaves large, much resembling those of *O. latifolia* Hook. fil., but more pubescent beneath and more distinctly obovate retuse. Flowers solitary, short pedicelled, very tomentose. Sepals green, ovate-elliptic acute, ·6 in. long, ·5 in. wide at the base. Petals, outer ones thick lanceolate caudate-acuminate, concave at base, 1 to 1·25 in. long, tomentose outside; inner ones about 5 in. shorter, connate into an acute cone, puberulous outside. Stamens with smaller appendages than in *O. latifolia*. Carpels elliptic pubescent, ·35 in. long; stalks ·2 in. long, pubescent. *Hab.* Forests in mountains. Perak, Thaiping Hills and Ulu Bubong (Kunstler). Penang, near the Experimental Nursery, at 2000 ft. altitude (Curtis).

(5) *O. latifolia* Hook. fil. and Thom. Fl. Ind. 145, Hook. fil. F.B.I. i. 70; King, *Ann. Bot. Gard. Calc. l.c.* 126, *pl.* 166B.

Climber 20 to 60 ft. long. Leaves thickly membranous oblong ovate, often slightly obovate obtuse, truncate or retuse, base retuse or cordate, above glabrous except tomentose midrib, beneath glaucous (young leaves plum-colour) softly puberulous; midrib and nerves pubescent, nerves 10 to 12 pairs, elevate beneath; 7 to 12 in. long, 3 to 6 in. wide; petioles ·25 to ·45 in. long, red tomentose. Flowers solitary, on pedicels ·25 in. long. Sepals rounded gibbous small, green with short red hairs. Petals outer ones creamy white, fleshy triangular blunt, red-hairy at base, 1 in. long, ·5 in. wide at base; inner ones shorter, ·9 in. long, cream colour, excavate at base, tip fleshy. Stamens white in 5 rows, anthers oblong, appendages recurved. Ovaries 5 rows, brown hairy; stigma thick, recurved. Carpels cylindric-ovoid, narrowed at base, puberulous or not, yellow orange, ·5 to ·75 in. long, ·3 to ·4 in. through; stalk as long. Seed 1. *Hab.* Borders of forests. Singapore, Garden Jungle; Selitar, etc. Malacca, Selangor, Perak, Goping (Kunstler); Tapah; Relau Tujur (Wray). Penang (Phillips). Kedah, Yan. Lankawi (Curtis).

(6) *O. biglandulosa* Scheff. in *Nat. Tijdschr. Ned. Ind.* xxxi.

341; *King, Journ. As. Soc. Beng. l.c.* 100; *Ann. Bot. Gard. Calc. l.c. pl.* 170. *Guatteria biglandulosa* *Bl. Fl. Jav. Anonaceæ* 102, *t.* 51.

Branchlets red-silky. Leaves coriaceous elliptic to oblong acute or shortly acuminate, base rounded, above glabrous, midrib puberulous, beneath sub-glaucous puberulous; nerves 7 to 9 pairs, prominent beneath; 3·5 to 7·5 in. long, 2 to 3·5 in. wide; petioles 2 to 4 in. long. Flowers solitary extra-axillary, 1 to 1·5 in. long on slender pedicels, 4 in. long. Sepals fleshy ovate long acuminate puberulous. Petals yellow, outer ones lanceolate oblong blunt, base concave, midrib prominent; inner ones 3 in. long, bases broad, tips long-acuminate. Carpels oblong-ovoid blunt, yellow, 75 in. long, puberulous or not; stalks 5 in. long. *Hab.* Forests, lowland. Malacca, Merlimau (Cantley); (Griffith, Maingay). Selangor, Kwala Lumpur (Curtis). Perak, Ulu Kerling; Waterfall Hill, Thaiping; Goping (Kunstler). *Native name:* Akar Mupisang hitam. *Distrib.* Java, Borneo and Sumatra.

(7) *O. glauca* *Hook. fil. and Thom. Fl. Ind.* 146; *Hook. fil. F.B.I.* i. 71; *King, Journ. As. Soc. Beng. l.c.* 101; *Ann. Bot. Gard. Calc. l.c. pl.* 171A.

Branchlets tomentose. Leaves thinly coriaceous elliptic to lanceolate, blunt or acute, base rounded, above glabrous, except the midrib and nerves pubescent, beneath glaucous glabrous or nearly so; midrib pubescent; nerves 8 to 12 pairs, prominent beneath pubescent, 4 to 6 in. long, 1·5 to 2 in. wide. Flowers solitary extra-axillary on slender pedicels 5 in. long. Sepals connate at base, broad ovate acuminate pubescent, 25 in. long. Petals, outer ones coriaceous narrow linear-lanceolate sub-acute, base concave, outside pubescent; inner ones, bases sub-orbicular, tips long-acuminate, one-fifth of the length of the flower. Ovaries hairy, 1-ovuled. Carpels many ovoid, 4 in. long and 25 in. through, tomentose; stalks slender, 75 in. long. *Hab.* Forests. Malacca (Maingay). Perak at Simpang; Ulu Kerling; Goping and Ulu Bubong (Kunstler). *Distrib.* Sumatra.

22. MELODORUM, Dunal.

Climbing shrubs. Stem rarely stout. Leaves more or less coriaceous, red-pubescent or silky or glabrescent. Flowers terminal, solitary axillary or paniced; buds conic, triquetrous, usually covered with red silky tomentum. Sepals 3, valvate connate, small. Petals 6, in 2 rows, outer ones fleshy or coriaceous, lanceolate or ovate, trigonous; inner ones fleshy, glabrescent, tips triquetrous, base excavate on the inner face. Stamens many; anther-cells contiguous; appendages more or less flattened, triangular to orbicular. Pistils many; style oblong; ovules 2 or more. Carpels berried with several seeds. Species about 35, tropical Asia, Africa and Australia.

- i. EU-MELEDORUM. Petals oblong-ovate, under 1 in. long, seeds smooth.
 Flowers .4 in. to nearly .5 in. long; buds broad pyramidal.
 Flowers .25 in. long, lax, axillary racemes . (1) *M. litseæfolium*
 Flowers .4 to .5 in. long; solitary, or in short cymes . (2) *M. fulgens*
 Flowers .5 in. long or more; buds pyramidal, broad.
 Flowers racemose; leaves glabrous above; fruit globose . (3) *M. manubriatum*
 Flowers solitary axillary; fruit cylindric . . (4) *M. cylindricum*
 Flowers racemose.
 Leaves pubescent above (young), base narrow . . . (5) *M. latifolium*
 Leaves glabrous, smooth above, base broad round . . . (6) *M. Kingii*
 Flowers narrow, pyramidal; fruit tubercled . . (7) *M. hypoglaucom*
 ii. PYRAMIDANTHE. Outer petals linear-lanceolate, 1.2 to 2 in. long; leaves tomentose beneath.
 Outer petals densely woolly outside; fruit globose . . . (8) *M. lanuginosum*
 Outer petals minutely red-tomentose; fruit oblong . . . (9) *M. Maingayi*
 Outer petals minutely red-tomentose 2 in. long; fruit ovoid, tubercled; leaves sub-glabrous . . (10) *M. prismaticum*
 Outer petals minute, red-tomentose .75 in. long; oblong . . . (11) *M. rubiginosum*
 iii. KENTIA. Outer petals as broad as long, ovate, edges thick; flowers axillary; seeds pitted.
 Leaves oblong-lanceolate; fruit ovoid; ovules 8 . . (12) *M. elegans*
 Leaves elliptic or obovate; fruit globose; ovules 2 . (13) *M. pisocarpum*

(1) *M. litseæfolium* King, *Journ. As. Soc. Beng. l.c.* 103; *Ann. Bot. Gard. Calc. l.c.* 132, *pl.* 173.

A strong climber; branchlets rusty-tomentose. Leaves coriaceous, oblong-ovate to oblong-acute, base rounded, glabrous above, midrib pubescent; beneath hairy pubescent, midrib and nerves 8 to 10 pairs, red-tomentose, slender, prominent beneath; 2.75 to 4.25 in. long, 1.25 to 1.6 in. wide; petioles .1 to .2 in. long. Flowers in lax few-flowered racemes or panicles, 3 to 4 in. long; pedicels .25 to .35 in. long. Sepals broad ovate acute concave, connate at base, .1 in. long. Petals broadly ovate acute coriaceous, outer ones .2 to .3 in. long, rufous-tomentose outside; inner ones smaller, puberulous outside. Stamens numerous, appendages broadly and bluntly triangular. Ovaries few, red, pubescent 4-ovuled. *Hab.* Open forest. Rare. Perak, Thaiping Hills at 300 to 500 ft. altitude (Kunstler).

Distinct in its small flowers in panicles, very near the Chinese *M. glaucescens*. Kunstler described it on one ticket as a shrubby tree 10 to 15 ft. tall, 3 to 4 in. through.

(2) *M. fulgens* Hook. *fil. F.B.I.* i. 120, King, *Journ. As. Soc. Beng. l.c.* 104; *Ann. Bot. Gard. Calc. l.c.* 133, *pl.* 174.

A moderate climber; branchlets pubescent. Leaves lanceolate-acuminate or elliptic-lanceolate, base rounded or sub-acute, above glabrous, beneath glabrous or sparsely strigose; nerves 13 to 18 pairs, slender curving; 3 to 4 in. long, 1·2 to 1·5 in. wide; petioles ·25 in. long, pubescent. Flowers 1 to many in a terminal or leaf-opposed cyme; pedicels ·3 to ·4 in. long, pubescent. Sepals broad ovate sub-acute, connate at base, ·1 in. long, pubescent outside. Petals thick, outer ones flat ovate-oblong sub-acute, red pubescent outside, ·5 in. long; inner ones similar but smaller, glabrous and concave at the base, ·3 in. long. Stamens numerous, appendages of outer ones lanceolate and as long as the anthers. Ovaries pubescent, 4-ovuled in 2 rows. Carpels ovoid, globose, densely silky tomentose, 1 to 1·5 in. long, ·9 in. through; stalks ·85 to 1·5 in. long, stout. Seeds oblong. *Hab.* Open forest-edges. Common. Singapore, Reservoir Woods; Bukit Mandai; Chanchu Kang. Johor. Malacca, Sungei Hudang (Derry). Selangor, Bukit Kutu; Kwala Lumpur; Gunong Semangok at 2500 ft. altitude (Curtis). Perak, Tapah (Wray); Larut (Kunstler). *Distrib.* Malay Isles. *Native names*: Akar Kep; Akar Singuloh; Akar Larat, Larit or Lerek.

(3) ***M. manubriatum*** Hook. *fil.* and Thom. *Fl. Ind.* 118; Hook. *fil.* *F.B.I.* i. 79; King, *Journ. As. Soc. Beng. l.c.* 104; *Ann. Bot. Gard. Calc. l.c.* 134, *pl.* 176. *M. bancanum* Scheff. *Nat. Tijdr.* xxxi. 343. *Uvaria manubriata* Wall. *Cat.* 6456.

A large climber; branchlets red-tomentose. Leaves thinly coriaceous, oblong-lanceolate acuminate, base rounded, above glabrous except the rufous-hairy midrib, beneath densely red-tomentose; nerves 12 to 18 pairs, slender curved, rather prominent beneath; 2 to 4·5 in. long, ·75 to 1·5 in. wide; petioles ·3 in. long, tomentose. Flowers 1 or 2 or more in short racemes, on pedicels ·25 to ·75 in. long, densely red-tomentose, extra-axillary. Sepals ovate broad obtuse, connate at the base, silky outside, ·2 in. long. Petals coriaceous, lanceolate to ovate lanceolate obtuse, outer ones densely red-tomentose outside, puberulous in the upper half; inner ones smaller, pubescent at the tip, base concave. Stamens, appendages bluntly triangular. Ovaries numerous oblong, densely silky; ovules 8 in 2 rows. Carpels numerous, ovoid-globose, about 1·25 in. long, densely red-woolly; stalks 2 to 3 in. long. Torus globose, all red-woolly. Seeds 8. *Hab.* Dense forest. Common. Singapore, Changi; Bedoh. Malacca, Merlimau (Derry); Alor Gajah and Rim Jungle (Griffith). Negri Sembilan. Perak, Tapah (Wray); Gunong Bubu 2000 ft. altitude and Goping (Kunstler). Penang. *Distrib.* Mergui, Banca. *Native names*: Akar Jangkang; Akar Larak; Akar Kenchang.

(4) ***M. cylindricum*** Maing. in Hook. *fil.* *F.B.I.* i. 80; King, *Journ. As. Soc. Beng. l.c.* 106; *Ann. Bot. Gard. Calc. l.c.* 136, *pl.* 177B.

A moderate climber; branchlets rusty-pubescent. Leaves coriaceous elliptic-oblong acute, base rounded, above glabrous, bright green, beneath golden-silky; nerves 8 to 10 pairs, faint; 2·5 to 4 in. long, 1·6 to 1·8 in. wide; petioles ·5 in. long. Flowers solitary axillary orange yellow, fragrant. Sepals ovate triangular pubescent, connate. Petals, outer ones triangular-lanceolate, ·5 in. long, ·3 in. wide, flat with thickened edges; inner ones nearly as long, orange lanceolate acuminate. Stamens numerous, dark rose pink; appendages ovate. Pistils honey-coloured, 4 to 6, silky. Carpels cylindrical, blunt at both ends, brown-silky, 1 to 1·75 in. long and ·35 to ·75 in. wide; stalk ·5 in. long, thick. Seeds many, horizontal. *Hab.* Common on edges of woods in low country in the south. Singapore. Bukit Timah; Garden Jungle, etc. Johor, Mt. Austin. Selangor, Bukit Kutu and Semangkok Pass (Ridley).

(5) *M. latifolium* Hook. *fil. and Thom. Fl. Ind.* 116; Hook. *fil. F.B.I.* i. 79; King, *Journ. As. Soc. Beng. l.c.* 105; *Ann. Bot. Gard. Calc. l.c.* 135, *pl.* 178. *Uvaria latifolia* Bl. *Fl. Jav. Anonaceæ t.* 15. *M. sphærocarpa* Miq. King, *Journ. As. Soc. Beng. l.c.* 108.

A stout climber; branchlets red-velvety. Leaves coriaceous, oblong blunt, base round, above minutely pubescent or nearly glabrous except the tomentose midrib, beneath densely red-tomentose; nerves 16 to 20 pairs, spreading elevate; 3 to 7·5 in. long, 1·75 to 2·5 in. wide; petioles ·4 to ·7 in. long, tomentose thick. Flower-buds conic, in lax axillary racemes or panicles; pedicels ·35 to ·5 in. long, red-tomentose. Sepals broad ovate obtuse, connate in a flat cup, ·25 in. across, tomentose. Petals fleshy ovate blunt, outer ones ·4 to ·7 in. long, tomentose outside, inner ones smaller, glabrous. Stamens, appendages triangular acute. Ovaries about 6, short oblong densely hairy; ovules 6 to 8. Carpels globose to ovoid, brown-tomentose, 1 to 2·25 in. long, 1 to 1·2 in. wide; stalks velvety brown, ·75 to 1·25 in. long. Seeds about 10, flattened, deep brown; var. *typica*, with rather larger flowers and oblong or globular fruit. Rare. In hill woods. Perak, Thaipang Hills. *Distrib.* Java.

var. *ovoidea* with smaller flowers and obovoid fruit. *Hab.* Common in lowland forest. Singapore, Garden Jungle, Selitar, etc. Malacca, Ayer Panas. Perak, common; Penang. *Distrib.* Sumatra, Borneo, Java, Philippines. *Native name*: Akar Pisang-Pisang Bukit or Buldo.

I think King's *M. sphærocarpa* is merely a form of this and probably *M. Kingii* is also a variety.

(6) *M. Kingii* Boerl. *l.c. Bogor.* ii. (2), 134. *M. parviflorum* King, *Journ. As. Soc. Beng. l.c.* 107, not of Scheffer.

A very large climber 150 ft. long, 4 to 6 in. through. Leaves elliptic sub-acute or obtuse, base rounded, coriaceous, above glabrous, beneath brownish scaly-pubescent; nerves 11 to 15 pairs,

elevate transverse, nervules conspicuous; 3·5 to 6·5 in. long, 2 to 3 in. across; petioles ·5 in. long, thick glabrous. Cymes few-flowered axillary or terminal, dark tomentose; pedicels ·5 in. long. Sepals connate with short sub-acute points, small. Petals white tinged with pink; outer ones lanceolate, fleshy, obtuse, ·6 in. long, ·1 in. wide at base, outside brown tomentose. Carpels globose, ·75 in. to 1 in. long, velvety brown; pedicels long. *Hab.* Forests. Not common; Malacca (Cantley). Perak: Ulu Bulong, 400 to 600 ft. altitude and Thaiping Hills (Kunstler). *Native name*: Poko Achar. *Use*: A decoction of the flowers used for dyspepsia.

Possibly only a form of *M. latifolium*.

(7) **M. hypoglaucum** Miq. *Ann. Mus. Bot. Lugd. Bat.* ii. 37; *King, Journ. As. Soc. Beng. l.c.* 106; *Ann. Bot. Gard. Calc. l.c. pl.* 160A.

A strong climber; branchlets minutely red-pubescent. Leaves thinly coriaceous oblong-lanceolate to elliptic-acute or shortly acuminate, base rounded, above glabrous except the red-pubescent midrib, beneath hoary-puberulous; nerves 10 to 12 pairs, bold ultimately glabrous and dark; 3 to 5·5 in. long, 1·35 to 2·2 in. wide; petioles ·25 in. long. Flowers in axillary racemes of 2 to 3 flowers, or in 10- to 12-flowered terminal panicles on pedicels ·5 to ·8 in. long slender, greenish yellow. Sepals ovate acute concave, connate at base, red-pubescent outside, puberulous inside. Petals coriaceous linear-lanceolate, base dilate concave, outer ones red-tomentose outside, pubescent inside, concave for the whole length, ·5 to ·8 in. long; inner ones one-third shorter, excavate at base only, above triquetrous. Stamens, appendages broad sub-globular. Ovaries 12, oblong golden-silky; ovules 4 to 6 in. long, 2 rows. Carpels globose tubercled, puberulous or not, 1 in. long. Seeds globose tubercled, puberulous or not, 1 in. long; stalks as long. Seeds 4 or 5, oval. *Hab.* Hill forests. Perak, Gopong and Ulu Bubong and Batang Padang (Kunstler). *Native name*: Akar Larak Merah.

(8) **M. lanuginosum** Hook. *fil. and Thom. Fl. Ind.* 117; Hook. *fil. F.B.I.* i. 79; *King, Journ. As. Soc. Beng. l.c.* 108; *Ann. Bot. Gard. Calc. l.c. pl.* 182.

A strong climber; branchlets red-tomentose. Leaves coriaceous, oblong or sub-ovate oblong acute or shortly acuminate, base rounded; above glabrous except the red-tomentose midrib, beneath densely red-woolly; nerves 12 to 20 pairs inarching close to the edge, prominent beneath; 3·5 to 9 in. long, 1·9 to 3·5 in. across; petioles ·4 to ·6 in. long, tomentose. Flowers axillary or leaf-opposed solitary, or in racemes of 2 to 4; pedicels stout woolly, ·5 in. long. Sepals ovate, red-woolly outside. Petals thick oblong-lanceolate sub-acute, outer ones 1·25 to 2·1 in. long, densely red-woolly; inner ones smaller glabrous, base concave. Stamens

glaucous, above dark shining green; nerves 10 to 12 pairs, very numerous, appendages triangular. Ovaries obovoid, densely red-tomentose, .7 to 1 in. long, .75 in. through. Seeds about 4. *Hab.* Open country and forest edges. Common; a very handsome species easily known by its large flowers. Singapore, Bukit Timah; Jurong; Sembawang. Malacca (Maingay); Perak, Thaiping; Blanda Mabok (Wray). Dindings. Pangkor (Curtis). Penang. Lankawi.

(9) **M. Maingayi** Hook. *fil. F.B.I.* i. 80; *King, Journ. As. Soc. Beng. l.c.* 109; *Ann. Bot. Gard. Calc. l.c.* 139, *pl.* 184A.

Climber; branchlets pubescent. Leaves rather stiffly coriaceous broadly elliptic or oblong shortly acuminate at tip, base rounded, above glabrous, beneath glaucous; nerves 14 to 16 pairs, slender and slightly prominent; 3 to 6 in. long, 1.5 to 2.35 in. wide; petioles .6 in. long. Flowers solitary axillary, yellow on short .25 in. thick tomentose pedicels. Sepals orbicular subacute, quite connate into a saucer .25 in. across. Petals coriaceous, outer ones oblong-lanceolate, base broad, .75 to 1.25 in. long, flat keeled down the middle inside, red-tomentose outside, inner ones very small triangular-ovate, glabrous. Stamens numerous, appendages rounded. Ovaries 6, silky. Carpels oblong, slightly tapering to each end, red-puberulous, 1.5 to 2 in. long, .75 in. through; stalks .5 in. long. Seeds many. *Hab.* Forests. Rare. Perak, Gunong Batu Putih (Wray at 3600 ft. altitude). Penang (Maingay); Bukit Padi at 1500 ft. altitude (Curtis).

(10) **M. prismaticum** Hook. *fil. and Thom. Fl. Ind.* 121; Hook. *fil. F.B.I.* i. 81; *King, Journ. As. Soc. Beng. l.c.* 110; *Pyramidanthe rufa* Miq. *Ann. Mus. Bot. Lugd. Bat.* ii. 39. *Oxymitra bassiæfolia* Teysm. and Binn. in *Tijdschr. Ned. Ind.* xxv. 419.

A large climber; branchlets glabrous. Leaves coriaceous oblong abruptly shortly acuminate; base broad rounded, above glabrous except the puberulous midrib, beneath glaucous, finely pubescent or glabrous; nerves 12 to 18 pairs faint, secondary nerves prominent; 4.5 to 8.5 in. long, 2.3 to 3.3 in. wide; petioles .5 to .7 in. long. Flowers 1.5 to 2 in. long, orange outside, white inside, hardly opening, axillary solitary; pedicels .3 to .6 in. long, red-tomentose. Sepals quite connate into a 3-angled disc, .3 in. across, pubescent outside. Petals, outer ones fleshy orange covered with ochreous scurf, inside greenish cream, linear-lanceolate triquetrous, inner ones .3 in. long, triangular ovate acute yellow glabrous. Stamens numerous, white, appendages triangular. Ovaries oblong pubescent; ovules 14 in 2 rows. Carpels ovoid blunt tubercled, 1.4 in. long, .8 in. wide; stalks .8 to 1 in. long, stout. Seeds oval black. *Hab.* Common in forests, Singapore, Garden Jungle; Selitar. Johor. Malacca. Perak, Thaiping; Gop-
ing (Kunstler). Penang Hill. *Distrib.* Banka, Borneo. *Native name*: Akar Pisang-Pisang Bukit.

(11) **M. rubiginosum** Hook. *fil. and Thom. Fl. Ind. l.c.* 116; Hook. *fil. F.B.I.* i. 79; King, *Ann. Bot. Gard. Calc. l.c.* 139, *pl.* 183.

Large climber; branches rusty-tomentose. Leaves thinly coriaceous oblong to elliptic blunt or rarely minutely cuspidate, base rounded or sub-cordate often unequal, above puberulous thin, glabrous except the tomentose midrib, beneath pubescent; nerves 13 to 22 pairs, prominent beneath; 3 to 9 in. long, 1·25 to 4 in. wide; petioles 35 to 6 in. long, stout tomentose. Flowers solitary or in terminal cymes of 4 to 5 flowers, on stout pedicels 6 to 8 in. long, red-tomentose. Sepals semi-orbicular, 1 in. long, connate at base. Petals, outer ones thick elongate lanceolate, thinly brown-tomentose outside, slightly concave glabrous inside, inner ones shorter and narrower sub-triquetrous. Stamens very numerous, appendages large, sub-acute. Ovaries several, silky; ovules silky in 2 rows. Carpels oblong, tapering to base, 1 to 1·25 in. long, thinly tomentose; stalks about as long. *Hab.* Rare. Lowland woods, Perak, road to Batu Kurau (Curtis); Goping (Kunstler). Penang, Waterfall (Curtis). *Distrib.* Silhet to Tenasserim.

King makes the Malay plant a variety *oblonga*, but the Goping plant is exactly Hooker's Indian plant. Curtis' Penang plant has smaller stiffer leaves, not oblique at the base.

(12) **M. elegans** Hook. *fil. and Thom. Fl. Ind. l.c.* 122; Hook. *fil. F.B.I.* i. 82; King, *Journ. As. Soc. Beng. l.c.* iii.; *Ann. Bot. Gard. Calc. l.c.* 141, *pl.* 184B. *Uvaria elegans* Wall. *Cat.* 6474A.

A large but slender climber. Leaves thinly coriaceous, oblong-lanceolate acuminate, narrowed slightly to rounded base; nerves 12 to 13 pairs, faint; 2·5 to 3·5 in. long, 1 to 1·25 in. wide; petioles 25 to 35 in. long. Flower-buds obtusely ovate, axillary solitary or 2 to 3 together, 35 to 65 in. long, on slender pedicels, 35 to 6 in. long. Sepals ovate acute connate at base only, outside pubescent, 1 in. long. Petals, outer ones broadly ovate obtuse red-tomentose outside, yellow hoary-puberulous within, inner ones 25 in. long, very thick, triquetrous above. Stamens numerous, appendages thick triangular. Ovaries glabrous; ovules in 2 rows. Carpels ovoid to globose, glabrous, 35 to 5 in. long; stalks slender, 5 in. long. *Hab.* Forests, widely spread in the peninsula, Singapore, Chan Chu Kang (Ridley). Johor, Sedenak. Malacca, Bukit Rejang (Derry). Perak, Thaiping Hills; Chankat Serdang (Wray). Penang at Telok Bahang (Curtis, Wallich).

(13) **M. pisocarpum** Hook. *fil. and Thom. Fl. Ind.* 123; Hook. *fil. F.B.I.* i. 82; King, *Journ. As. Soc. Beng. l.c.* 112; *Ann. Bot. Gard. Calc. l.c.* 142, *pl.* 187A. *Uvaria mabiformis* Griff. *Notula*, iv. 709.

A glabrous climber. Leaves small, coriaceous elliptic to obovate-elliptic shortly abruptly acuminate, base rounded, underneath indistinct; 2·5 to 4 in. long, 1·25 to 1·8 in. wide; petioles 35 in.

long. Flowers axillary solitary or in pairs; pedicels rather stout deflexed puberulous, '25 to '35 in. long. Sepals broadly ovate acute, connate into a triangular cup, puberulous outside. Petals, outer ones thick flat ovate blunt red-tomentose outside, pubescent inside, '3 to '4 in. long, inner ones less than half as long, base concave, apex triquetrous. Stamens numerous. Carpels globular, glabrous, '25 in. through; stalks as long. Seeds 2, plano-convex, dark brown pitted. *Hab.* Common in forests. Singapore, Bukit Timah; Bukit Mandai. Malacca, Merlimau; Selandor (Cantley). Negri Sembilan. Perak, Ulu Bubong; Larut (Kunstler); Penang Hill (Curtis). *Distrib.* Sumatra. *Native names:* Akar Gintek; Akar Tentawan; Akar Tawan hitam.

23. RAUWENHOFFIA, Scheff.

Scandent shrubs; inflorescence opposite leaves. Leaves coriaceous. Flowers medium. Sepals 3, valvate, connate. Petals ovate, outer ones larger than inner ones, velvety. Stamens indefinite, widely dilate above anther. Torus convex. Pistils fairly numerous, no style. Stigma rather small. Ovules numerous. Carpels ripe, shortly stipitate, oblong or globose, 1- to 3-seeded. Species 2, Siamese and Malay Islands.

(1) *R. siamensis* Scheff. *Ann. Jard. Buitenz.* ii. 23. Uvaria Godefroyana Finet, *Bull. Soc. Bot. Fr. Mem.* 4, p. 71.

Scandent or dwarf shrub. Leaves oblong acute, base round; nerves 10 pairs, obscure beneath, above smooth, shining, 6·6 in. long, 2 in. wide; petioles '2 in. long. Flowers solitary or 2 to 3 together, scurfy, tomentose. Sepals connate, forming a bluntly 3-lobed cup. Petals olive colour, blunt ovate, outer ones little larger than inner, densely appressed, silky hairy '3 in. long. Carpels about 6, oblong to globose, 3-seeded, wrinkled, velvety, '25 in. long. *Hab.* Sandy heaths, half scandent or bushy. Pahang Pasir Aur, Rumpin (Foxworthy). Kelantan, Kota Bharu (Ridley). *Distrib.* Siam, Cochin-China. *Native name:* Pisang-Pisang Ayer.

24. XYLOPIA, Linn.

Shrubs or tall trees with coriaceous leaves. Flowers axillary, solitary or cymose, buds triquetrous conic, often slender. Sepals 3, valvate connate, small. Petals 6, valvate elongate, outer ones flat or concave, inner ones nearly as long, triquetrous, base concave. Torus flat or hollow. Stamens numerous, oblong truncate or appendages prolonged; anther-cells often septate. Ovaries 1 or more. Style long, clavate. Ovules 2 to 6, in 1 or 2 rows. Carpels long, cylindric or moniliform or short oblong. Seeds several. Species 70 to 80, tropical Asia and Africa.

Leaves quite glabrous.

- Leaves 12 in. long, strongly nerved beneath . . . (1) **X. Curtisii**
 Leaves 6 to 7 in. long (2) **X. oxyantha**
 Leaves 3 to 5 in. long.

- Ripe fruit tubercled; leaves lanceolate . . . (3) **X. dicarpa**
 Fruit smooth; leaves elliptic cuspidate . . . (4) **X. malayana**

- Leaves 2 to 3 in. long, shining (5) **X. pustulata**

- Leaves 3 in. long, midrib beneath obscurely hairy; petals very narrow and long . . . (6) **X. stenopetala**

Leaves pubescent beneath, coriaceous; nerves inconspicuous.

- Leaves oblong-lanceolate 3 in. long acute . . . (7) **X. elliptica**

- Leaves oblong blunt, 3 in. long (8) **X. fusca**

- Leaves lanceolate caudate, 2 in. long; silky beneath (9) **X. caudata**

- Leaves elliptic sub-acute, 6 in. long; petals long . . . (10) **X. magna**

- Leaves oblong acute, 6 in. long, red-hairy beneath, branches hairy; fruit long, cylindric . . . (11) **X. ferruginea**

Leaves large, thin, obovate or oblanceolate with prominent nerves; petals narrow.

- Leaves glabrous, oblanceolate (12) **X. olivacea**

- Nerves pubescent, strongly elevate, obovate . . . (13) **X. Scortechinii**

- Leaves obovate, hairy all over beneath; very subulate (14) **X. Ridleyi**

(1) **X. Curtisii** King, *Journ. As. Soc. Beng. l.c.* 116; *Ann. Bot. Gard. Calc. l.c.* 147.

Tree 30 to 40 ft. tall glabrous. Leaves large, very coriaceous, oblong shortly bluntly acuminate; base cuneate oblique, margin undulate, glabrous except midrib, puberulous beneath; nerves sunk above, prominent beneath, 12 to 20 pairs, inarching near the edge, transverse nervules horizontal; 5·5 to 10 in. long, 2 to 3 in. wide; petioles 35 in. long, stout. Flowers 1 to 2, on stout woody peduncles, 4 in. long; pedicels red-tomentose, 2 in. long. Sepals thick ovate acuminate blunt woolly, free nearly to base, 2 in. long. Petals linear-lorate obtuse, sub-equal, 7 in. long to 1 in. wide, tomentose, outer ones wider than inner ones, keeled, base dilated concave. Stamens numerous, appendages oblique truncate. Ovary 1, cylindric fluted, glabrous; ovules many. Carpel globose compressed grey woody, 3 in. long, 2·5 in. wide. Seeds flat large, 4 to 6. *Hab.* Penang, Waterfall (Curtis). Rare.

Very peculiar in the large stiff leaves, with very distinct nervation and the large round woody fruit.

(2) **X. oxyantha** Hook. *fil. F.B.I.* i. 85; King, *Journ. As. Soc. Beng. l.c.* 114; *Ann. Bot. Gard. Calc. l.c.* 144, *pl.* 188.

A tree. Leaves very coriaceous, elliptic ovate or oblong shining, shortly abruptly acuminate, glaucous beneath; nerves 12 to 15 pairs, slender; 6 to 7 in. long, 2·5 to 3 in. wide; petioles 35 in. long. Peduncles axillary fascicled, 35 to 5 in. long, adpressed-pubescent. Flowers pale green, pubescent. Sepals ovate broad. Petals narrow linear, tapering to the point, 1·25 to 1·5 in. long.

Carpels cylindric like those of *X. ferruginea* 4 in. long. *Hab.* Lowland forests. Rare. Singapore (Wallich 6478, *Uvaria oxyantha*) Sungei Morai. *Distrib.* Borneo.

(3) *X. dicarpa* Hook. fil. *F.B.I.* i. 85; *King, Journ. As. Soc. Beng. l.c.* 114; *Ann. Bot. Gard. Calc. l.c.* 144, *pl.* 189A.

A tree 20 to 25 ft. tall or more, glabrous. Leaves lanceolate acute or acuminate, base acute; nerves 10 pairs very faint, secondaries nearly as distinct; 3 to 4.5 in. long, 1.5 to 1.75 in. wide; petioles .25 in. long. Flowers solitary or in pairs pendent, 1.5 in. long; pedicels very short. Bracts orbicular, amplexicaul. Sepals ovate obtuse, connate to middle. Petals linear-oblong expanded at base, slightly hoary-pubescent; inner ones narrower and shorter than outer ones, sub-trigonous. Stamens many, inner rudimentary; anthers linear septate, appendages rounded. Ovaries 2 to 4 pilose; ovules many. Carpels cylindric blunt at both ends, tubercled, 1.5 to 2 in. long, .75 in. through. Seeds 7 or 8, compressed. *Hab.* Forests. Rare. Singapore (Maingay); Bukit Timah. Perak, Gunong Malacca at 1000 to 1500 ft. altitude, top of limestone hills (Kunstler).

(4) *X. malayana* Hook. fil. and Thom. *Fl. Ind.* 125; Hook. fil. *F.B.I.* i. 85; *King, Journ. As. Soc. Beng. l.c.* 115; *Ann. Bot. Gard. Calc. l.c.* 145, *pl.* 187B. *X. Maingayi* Hook. fil. and Thom. *l.c.* 125; *King, Journ. As. Soc. Beng. l.c.* 115; *Ann. Bot. Gard. Calc. l.c.* 146, *pl.* 191A.

A tall tree; glabrous. Leaves thinly coriaceous, ovate to elliptic, shortly bluntly acuminate, base cuneate; nerves 8 pairs, faint; 3.5 to 5 in. long, 1.5 to 2 in. wide; petioles .2 in. long. Flowers .6 to .9 in. long, 1 to 3 axillary; pedicels red-pubescent, .1 in. long. Sepals broad ovate acute puberulous outside, .15 in. long. Petals linear, base concave, tip shortly narrowed, pubescent; inner ones slightly smaller and more concave. Stamens numerous, appendages rhomboid, papillose; anthers septate. Pistils 6, hairy, 2-ovuled; styles longer than stamens, glabrous. Carpels red-hairy 3 to 4, oblong blunt narrowed to the stalk, nearly 1 in. long and .4 in. through; stalk thick, .1 in. long. Seeds about 6. *Hab.* Common in the south of the peninsula, in thin woods. Singapore, Jurong. Muar (Curtis); Malacca, Bukit Bruang. Negri Sembilan. Perak, Ulu Kal (Kunstler). *Distrib.* Sumatra and Borneo. *Native names:* Banit Kijang; Kayu B'linchi. *Use:* In house-building.

X. Maingayi, Hook. fil., based on a single specimen of Maingay's, who considered it the same as *X. malayana*, seems identical to me.

(5) *X. pustulata* Hook. fil. *F.B.I.* i. 85; *King, Journ. As. Soc. Beng. l.c.* 116; *Ann. Bot. Gard. Calc. l.c.* 146, *pl.* 191B.

A tree with pustulate brown bark, glabrous. Leaves small coriaceous, elliptic bluntly acuminate, narrowed and acute at base; nerves invisible above, beneath fine, secondaries equally distinct as

are reticulations; 2 to 2·75 in. long, ·75 to 1·3 in. wide; petioles ·1 in. long. Flowers 1 to 2 axillary pendent, ·6 in. long; pedicels very short, tomentose. Bracts orbicular. Sepals short ovate sub-acute pubescent, half connate. Petals narrow linear sub-acute pubescent, dilate at base; inner ones shorter, much narrower, concave base larger. Stamens linear, apiculate, cells septate. Ovaries 5 to 8, hairy. Stigma clavate. *Hab.* Very rare. Malacca (Maingay).

(6) **X. stenopetala** Hook. *fil. and Thom. Fl. Ind.* 125; Hook. *fil. F.B.I.* i. 85; *King, Journ. As. Soc. Beng. l.c.* 117; *Ann. Bot. Gard. Calc. l.c.* 148, *pl.* 193B.

Tree 50 to 60 ft. tall, glabrescent. Leaves thinly coriaceous, elliptic-oblong, shortly bluntly acuminate, base sub-cuneate, above glabrous, beneath glauco-pubescent, finely reticulate; nerves fine, 10 to 12 pairs inarching near the edge; 2·5 to 4·5 in. long, 1·1 to 1·6 in. wide; petioles ·1 in. long. Flowers 2 to 5, axillary; pedicels slender decurved, ·3 to ·5 in. long. Sepals very small ovate rounded, connate towards base. Petals narrow linear acuminate pubescent yellowish; inner ones sub-equal but narrower, 1·2 in. long, ·5 in. broad. Stamens numerous, appendage conic. Ovaries numerous elongate, 6-ovuled; style filiform. Carpels cylindric blunt, narrowed to a thick, short stalk, 2·6 in. long, ·4 in. through. Seeds 1 to 4. *Hab.* Hill woods at 600 ft. altitude. Rare; very fragrant. Penang, Government Hill (Curtis).

(7) **X. elliptica** Maing. *in Hook. fil. F.B.I.* i. 86; *King, Journ. As. Soc. Beng. l.c.* 117; *Ann. Bot. Gard. Calc. l.c.* 147, *pl.* 193A.

A tree 25 to 30 ft. tall. Leaves thinly coriaceous, small elliptic or ovate or lanceolate, base cuneate, apex acute or sub-acute, above glabrous, beneath grey pubescent; nerves 6 to 7 pairs, very faint; 1·5 in. to 3 in. long, 1 to 1·25 in. wide; petioles ·2 in. long. Flowers 1 to 3 together axillary, yellowish green, ·6 in. to ·75 in. long; pedicels ·1 in. long, pubescent. Sepals ovate sub-acute, united to the middle. Petals tomentose, outer ones linear subulate, base broader, concave, inner ones trigonous, shorter and narrower. Stamens numerous; anthers linear. Ovaries 1 to 3 densely hairy, 4- to 6-ovuled. *Hab.* Malacca (Maingay). Upper Perak (Wray). Penang, Sungei Pinang (Curtis). *Native name*: Lilan.

(8) **X. fusca** Maing. *Hook. fil. F.B.I.* i. 85; *King, Journ. As. Soc. Beng. l.c.* 116; *Ann. Bot. Gard. Calc. l.c.* 190B. **X. obtusifolia** Hook. *fil. l.c.*; *King, Journ. As. Soc. Beng. l.c.* 119; *Ann. Bot. Gard. Calc.* 150, *pl.* 197A.

A tree 60 to 80 ft. tall with dark coloured branches and silky buds. Leaves stiffly coriaceous glossy green, brown beneath, coppery pubescent when young, oblong obtuse, base cuneate, glabrous; nerves 8 to 9 pairs, very faint, inarching within the margin; 2 to 3 in. long, ·75 to 1 in. wide; petioles ·2 in. long, stout. Flowers ·75 in. long, extra-axillary solitary or racemed; peduncle ·25 to ·75 in. long with several bracts. Pedicels ·25 in. long,

puberulous. Sepals ovate acute, connate about half their length; teeth acute, puberulous outside, .1 in. long. Petals linear-oblong, tapering at the tip, white silky, base little dilate; inner ones smaller. Stamens linear not septate, appendages short erect. Ovaries 4 or 5, silky. Carpels oblong-cylindric blunt, reddish brown, 1.25 in. long, .7 in. wide. Seed 3 to 4 globular. *Hab.* Forests. Malacca (Griffith and Maingay); Perak, Larut (Kunstler).

(9) *X. caudata* Hook. *fil. and Thom. Fl. Ind.* 125; *Hook. fil. F.B.I.* i. 85; *King, Journ. As. Soc. Beng. l.c.* 117; *Ann. Bot. Gard. Calc. l.c.* 148, *pl.* 193B.

Shrub or small tree, with very slender pubescent branchlets. Leaves small, lanceolate acuminate obtuse, base cuneate, above glabrous, beneath adpressed silky or glabrous, coriaceous; nerves 10 pairs, faint; 1.25 to 2.25 in. long, .6 to .8 in. wide; petioles .1 in. long, slender. Peduncles axillary, very short. Flowers small white, 2 to .3 in. long. Sepals ovate sub-acute, connate at base, pubescent outside. Petals linear-oblong blunt, silky pubescent, dilate at base; inner ones slightly narrower. Stamens numerous. Ovaries 2, silky; ovules 2. Carpels 1 to 3, sub-globose or oblong pubescent, .3 in. long. *Hab.* Singapore (Wallich 6452). Malacca (Maingay and Griffith). Pahang, Temerloh (Foxworthy). *Native name*: Memponai.

(10) *X. magna* Maing. *in. Hook. fil. F.B.I.* i. 84; *King, Journ. As. Soc. Beng. l.c.* 120; *Ann. Bot. Gard. Calc. l.c.* 151, *pl.* 197B.

A tree 40 to 60 ft. tall; stem 6 to 10 in. through; branchlets tomentose. Leaves coriaceous, ovate-lanceolate to elliptic sub-acute, base rounded, above shining light green, glabrous except the pubescent midrib, beneath hairy; nerves 10 pairs inarching near the edge, very faint, reticulations as conspicuous; 3 to 4.5 in. long, 1.25 to 2 in. wide; petioles .25 in. long, pubescent. Flowers 2 to 2.5 in. long, solitary or in pairs on red-pubescent pedicels .3 in. long. Sepals ovate acute, connate into a cup, pubescent outside. Petals sub-equal, oblong-linear acuminate, .1 in. across, dilate and concave at base, coppery-pubescent. Stamens numerous; anthers linear septate, appendages oblong. Ovaries 15, densely hairy outside, 4-ovuled. Carpels obovoid-oblong blunt, tomentose, green, marked with red and white, 1.4 in. long, .65 in. wide; stalks thick, .15 in. long. *Hab.* Thick lowland forest. Malacca (Maingay); Perak, Larut 500 to 800 ft. altitude and Ulu Kal (Kunstler). *Native name*: Kudaga hutan.

(11) *X. ferruginea* Hook. *fil. F.B.I.* i. 85; *King, Journ. As. Soc. Beng. l.c.* 120; *Ann. Bot. Gard. Calc. l.c.* 151, *pl.* 198. *Habzelia ferruginea* Hook. *fil. and Thom. Fl. Ind.* 123.

A tree 50 to 80 ft. tall, 10 to 24 in. through; branchlets pubescent. Leaves coriaceous, narrow oblong acute, base slightly narrowed rounded sub-cordate, above glabrous dark green, beneath glaucous, pubescent; nerves 10 to 12 pairs inarching near the edge, prominent

beneath; 3·5 to 5·5 in. long, 1·1 to 2 in. wide; petioles 2 in. long, channelled. Flowers solitary or in pairs axillary or extra-axillary, yellow; pedicels red-velvety, 5 to 75 in. long. Bracts small, lanceolate. Sepals ovate acuminate, connate at base, pubescent outside, 2 in. long. Petals linear fleshy, acute at tip elongate yellow, outer ones red-pubescent outside, puberulous inside, concave at base, 1·25 to 2 in. long; inner ones narrower and thinner, little shorter, puberulous. Stamens 24; anthers linear, appendages broadly oblong. Ovaries numerous, hairy. Carpels red, elongate cylindric, 4 to 5 in. long. Seeds oblong. *Hab.* Common in forests at low altitudes. Singapore, Bukit Timah; Selitar; Changi. Malacca (Maingay, Griffith). Pahang. Selangor, Rawang (Kloss). Perak, Ulu Bubong and Batang Padang (Kunstler). *Distrib.* Borneo. *Native names:* Jangkang Merah or Jangkang Paya; Pisang-Pisang Jari. *Use:* The bark is used for walls and partitions in houses, and the timber for rafters.

(12) *X. olivacea* King, *Journ. As. Soc. Beng. l.c.* 119; *Ann. Bot. Gard. Calc. l.c.* 150, *pl.* 196.

A tree 15 to 70 ft. tall; stem 4 to 15 in. through. Leaves coriaceous, elliptic-oblong, more or less obovate sometimes abruptly short acuminate, base cuneate dark green, glabrous; nerves 6 to 8 pairs, curved, interarching 2 in. from edge, prominent beneath; 3·5 to 8 in. long, 1·75 to 2·5 in. wide; petioles 25 in. long, thick wrinkled. Flowers solitary or in pairs extra-axillary, cream colour to light yellow, green when young; pedicels stout, 5 in. long, tomentose. Sepals thick ovate, connate at base, acute puberulous, 1 in. long. Petals sub-equal linear, 1·5 in. long, 1 in. wide, base much expanded, hemispheric, densely tomentose, inner a little shorter. Stamens cuneate, appendages broad. Ovaries few oblong, densely silky, 6- to 8-ovuled. Carpels few globose, minutely tomentose, 6 in. through. Seeds 4 or 5, discoid. *Hab.* Perak, Thaiping Hills up to 500 ft. altitude. Common (Kunstler); Sungkai (Burn-Murdoch). Negri Sembilan, Selaru (Foxworthy).

The tree has a spicy smell (Kunstler).

(13) *X. Scortechinii* King, *Journ. As. Soc. Beng. l.c.* 118; *Ann. Bot. Gard. Calc. l.c.* 149, *pl.* 195.

Tree 50 to 60 ft. tall, 10 to 15 in. through; branchlets tomentose. Leaves coriaceous large, obovate-elliptic to elliptic-oblong shortly abruptly acuminate, base sub-cuneate rounded, above glabrous, beneath sparsely pubescent, especially on midrib; nerves 10 to 14 pairs, straight elevate; 4 to 7 in. long, 1·75 to 4 in. wide; petioles 35 in. long, pubescent. Flowers 1 to 5, fascicled on axillary tubercles pale yellow; pedicels 2 to 25 in. long, thick tomentose. Sepals free, broad ovate obtuse, brown, pubescent outside. Petals thick, linear obtuse, base concave dilated, pubescent. Stamens numerous, appendages truncate angled. Ovaries few, short,

pubescent, ovules 4 to 5. Carpels broad ovoid blunt, pubescent eventually glabrous. Seeds 4, discoid, brown. *Hab.* Dense jungle near limestone, 200 to 300 ft. altitude, Perak at Kwala Dipang (Scortechini and Kunstler).

(14) **X. Ridleyi** King, *Journ. As. Soc. Beng. l.c.* 121; *Ann. Bot. Gard. Calc. l.c.* 152, *pl.* 199.

A tree 20 ft. tall; branches tomentose. Leaves thinly coriaceous large, obovate-elliptic, abruptly shortly acuminate, base slightly cuneate, above glabrous, beneath softly tomentose; nerves 12 to 14 pairs, inarching, .1 to .2 in. from edge, prominent beneath; 6.5 to 8.5 in. long, 2.75 to 3.5 in. wide; petioles .5 to 1 in. long, thick, tomentose. Flowers extra-axillary on stout branches, 2 to 5 together, green fragrant; pedicels tomentose .2 in. long. Sepals ovate, long acuminate, .35 in. long, tomentose. Petals filiform, 1.2 in. long, very narrow, bases widely concave, tomentose. Stamens numerous, appendages 4- to 5-angled. Ovaries ovoid, silky, 4- to 6-ovuled. *Hab.* Dense forests at low altitudes. Rather rare. Singapore, Bukit Timah and Changi (Ridley). *Distrib.* Borneo.

The flowers are scented like *Cananga* flowers.

25. PHÆANTHUS, Hook. fil.

Bushes or small trees, with thin membranous leaves. Flowers small, solitary or 2 or 3 together, extra-axillary, pendulous. Sepals 3, small, valvate. Petals 6, valvate, outer ones small like the sepals; inner ones large flat, coriaceous. Stamens numerous, oblong-quadrate truncate; anther-cells dorsal, distant. Ovaries numerous, 1- to 2-ovuled, ascending, basal. Style cylindric or clavate, grooved ventrally. Carpels stalked, 1-seeded. Species 6, one in Burma, one in the Andamans, the rest Malayan.

Leaves softly pubescent; flowers over an inch long. . . . (1) **P. nutans**

Leaves glabrous; flowers 1 in. or less long (2) **P. lucidus**

(1) **P. nutans** Hook. fil. and Thom. Fl. Ind. 147; Hook. fil. F.B.I. i. 72; King, *Journ. As. Soc. Beng. l.c.* 122; *Ann. Bot. Gard. Calc. l.c.* 152, *pl.* 200A.

A bush or small tree; branchlets tomentose. Leaves membranous, oblong-lanceolate to obovate-elliptic, caudate-acuminate, base narrowed sometimes acute, above glabrous except midrib and nerves tomentose, beneath softly pubescent, midrib tomentose; nerves 10 to 14 pairs, prominent beneath, inarching near the edge; 5 to 9 in. long, 1.3 to 4.5 in. across; petioles .3 in. long, tomentose. Flowers on pedicels, .5 to 1.5 in. long, pubescent. Sepals linear lanceolate, .2 in. long. Petals, outer ones sepaloid, green; inner ones ovate-oblong acute pubescent, cream colour, .75 to 1 in. long. Stamens pale green outside; anther-cells white. Carpels ovoid, pubescent, .6 in. long, orange or dark red. *Hab.* Common in

thick woods at no great elevation. Singapore, Garden Jungle; Kranji. Malacca, Bukit Sadanen; Ayer Panas. Sungei Ujong (Cantley). Pahang, Pahang River. Selangor, Batu caves; Sungei Buluh. Dindings. Perak, Thaiping Hills; Slim; Ipoh (Kunstler). Penang Hill 2000 ft. altitude (Curtis). *Distrib.* Sumatra. *Native names*: Poko Pisang-Pisang Paya or Kechil; Poko Chingkring.

(2) **P. lucidus** *Oliv. Hook. fil. Ic. Pl. t.* 1561; *King, Journ. As. Soc. Beng. l.c.* 122; *Ann. Bot. Gard. Calc. l.c.* 153, *pl.* 200B.

Usually a bush with straight, black stems and tough bark; branchlets brown-furry. Leaves papery-membranous, dark green above, shiny beneath, oblong-elliptic or lanceolate acuminate, base cuneate, glabrous except midrib pubescent beneath; nerves 8 pairs, rather prominent beneath; 4·5 to 6·5 in. long, 1·25 to 2·25 in. wide; petioles ·2 in. long. Flowers ·6 to 1 in. across on pedicels 1 to 1·25 in. long, puberulous. Sepals ovate acute almost triangular, edged with red fur. Petals, outer ones more lanceolate, otherwise similar to sepals; inner ones thick, oblong-ovate acute green ·5 in. long, pubescent both sides. Stamens, appendages square truncate. Ovaries numerous, green, 1-ovuled. Carpels oblong fleshy, ·6 in. long, ·3 in. through, red, smooth and shining dotted all over with shining hairs; stalks ·5 to ·6 in. long. *Hab.* Thick forests. Common; flowers September. Singapore, Garden Jungle; Tanglin. Johor; Serom. Pahang at Pulau Tawar. Malacca, Bukit Besar; Mt. Ophir. Selangor, Batu caves. Perak, Thaiping Hills; Ulu Bubong (Kunstler). Penang Hill at 500 ft. altitude (Curtis).

26. MILIUSA, Lesch.

Trees or shrubs. Flowers often unisexual, green or purple, axillary or extra-axillary solitary (fascicled or cymose). Sepals 3, small, valvate. Petals 6, valvate in two series, outer small like the sepals; inner larger, when young cohering by the margins, at length free. Torus elongate, cylindric. Stamens definite or indefinite; anther-cells contiguous, ovoid, extrorse; appendages broad. Ovaries indefinite, linear-oblong; ovules 1 to 2, rarely 3 to 4. Species about 12.

Leaves narrowed to base.

Flowers nearly 1 in. across (1) **M. longipes**

Flowers ·25 in. wide (2) **M. parviflora**

Leaves sub-sessile, unequally bilobed at base . . . (3) **M. amplexicaulis**

(1) **M. longipes** *King, Journ. As. Soc. Beng. l.c.* 124; *Ann. Bot. Gard. Calc. l.c.* 157, *pl.* 204.

A small bushy tree or shrub 15 to 30 ft. tall, glabrous. Leaves membranous shining, oblong-oblancoelate acuminate, base cuneate; nerves 12 pairs, faint, 5·5 to 7 in. long, 1·75 to 2·75 in. wide; petioles 1 to 1·5 in. long. Flowers axillary solitary on slender pedicels,

·5 to ·75 in. long with 3 to 4 lanceolate bracts at base. Sepals and outer petals similar small ovate acute, edges ciliate, green; inner petals much larger, ·5 to ·6 in. long, ovate oblong sub-acute, greenish yellow, inside purple. Stamens 18; appendages broad. Ovaries numerous, glabrous. Stigma capitate sessile. Carpels numerous, globular-ovoid, blunt, glabrous, ·25 to ·3 in. long; stalks ·75 to 1 in. long. *Hab.* Dense forest. Singapore on Bukit Timah. Malacca. Woods at the base of Mt. Ophir. Perak, Chanderiang and Kinta (Kunstler). Kedah at Yan.

(2) *M. parviflora* Ridl. *Journ. Roy. As. Soc. S. Br.* 59, p. 65.

A small tree with grey bark. Leaves membranous lanceolate-acuminate, glabrous when adult except the midrib, 2 to 2·5 in. long, ·75 to 1·5 in. wide; nerves fine, inconspicuous, 12 pairs. Flowers solitary extra-axillary, green; pedicels pubescent ·5 in. long. Sepals very small ovate acute, pubescent. Petals, outer ones similar to sepals; inner ones ovate-triangular blunt, pubescent outside, ·12 in. long. Stamens few; anther-cells separate; appendages triangular short erect. Ovaries 8, silky. Carpels ·5 in. long, oblong blunt, ·25 in. through. Seeds 1 to 3, elliptic. *Hab.* Limestone rocks. Perlis, at Bukit Lagi and Tebing Tinggi (Ridley).

(3) *M. amplexicaulis* Ridl. *Journ. Roy. As. Soc. S. Br.* 54, p. 13. *Polyalthia sub-cordata* Bl. *Fl. Jav. Anonaceæ* t. 33, 36B; King, *Journ. As. Soc. Beng. l.c.* 64.

Tree; branches brown-tomentose. Leaves nearly sessile, elliptic-ovate acuminate, base broad, unequally bilobed amplexicaul, 7 in. long, 3·5 in. wide; nerves 12 pairs, elevated beneath, above glabrous, beneath sparsely hairy, midrib and nerves hairy; petioles 1 in. long. Flowers axillary in twos or threes; peduncles ·25 in. long; pedicels as long, hairy. Bracts small ovate. Sepals ovate acute, edges hairy. Petals, outer ones similar, little longer; inner ones ovate-triangular fleshy glabrous, edges hairy, ·1 in. long. Stamens in 3 whorls, bases hairy; appendages broad ovate. Pistils several. *Hab.* Limestone rocks. Perak at Lenggong; Larut (Kunstler). Lankawi at Kwah (Curtis).

27. ALPHONSEA, Hook. fil.

Shrubs, medium-sized trees or climbers. Leaves more or less coriaceous, glabrous. Flowers middle-sized or small in leaf-opposed fascicles on the branches, solitary or two or three together silky white or yellowish, buds conic. Sepals 3 valvate, very small. Petals 6 in 2 series, much larger, saccate at the base, sub-triangular valvate sub-equal or the inner ones a little smaller. Torus cylindric or hemispheric. Stamens few, or many whorls; anther-cells dorsal, contiguous; appendages very small or o. Ovaries 1 or more; ovules 4 to 8 in 2 rows; style cylindric; stigma rather large. Carpels usually cylindric, several seeded, stalked or sessile. Species 9 to 10, Indo-Malayan.

Leaves pubescent beneath; tree (1) **A. Maingayi**

Leaves glabrous.

Trees or shrubs.

Buds conic; fruit globose or ovoid (2) **A. lucida**

Buds globose; fruit cylindric; leaves 6 in. long (3) **A. sub-dehiscens**

Buds conic; fruit cylindric; leaves 3 in. long (4) **A. cylindrica**

Climber; buds conic; leaves stiff, 6 in. long,
lanceolate (5) **A. Curtisii**

(1) **A. Maingayi** Hook. *fil. F.B.I.* i. 90; *King, Journ. As. Soc. Beng. l.c.* 125; *Ann. Bot. Gard. Calc. l.c.* 161, *pl.* 205B.

A medium-sized tree; branches spreading, bark black. Leaves coriaceous glabrous, dark shining green, elliptic-oblong to lanceolate, obtusely acuminate, base rounded; nerves 8 to 9 pairs, inarching far from the margin, reticulations conspicuous beneath, edges and midrib hairy; 5 to 7 in. long, 1.5 to 2.7 in. wide; petioles .25 in. long. Flowers extra-axillary solitary or shortly racemed, peduncles tomentose. Sepals very small sub-orbicular, brown-hairy. Petals silky, pale flesh-colour, outer ones base gibbous, above lanceolate sub-acute, tips recurved, inner ones erect tips shortly recurved, a little smaller, fleshy with a central groove, .75 in. long. Stamens in 3 rows, filaments connate in three bundles; anthers elliptic; appendages 0. Ovaries 7; styles brown-hairy cylindric; stigma orbicular white. Ovules 20. Carpels ovoid, short-stalked, 2 in. long, 1 in. through, tomentose. Seeds many. *Hab.* Lowland forest in the South. Singapore, Garden Jungle. Malacca, Selandor (Cantley, Maingay). Pahang, Kwantan, and Negri Sembilan, Senawang (Foxworthy). *Native names*: Papisang Bukit; Terbak.

var. elliptica Ridl. *M. elliptica* Hook. *fil. F.B.I.* i. 90; *King, Journ. As. Soc. Beng. l.c.* 123; leaves quite glabrous; nerves not so conspicuous and reticulations finer. Flowers less silky. Fruit 2.5 in. long. *Hab.* Malacca (Maingay).

(2) **A. lucida** King, *Journ. As. Soc. Beng. l.c.* 126; *Ann. Bot. Gard. Calc. l.c.* 163, *pl.* 212.

A shrub 6 to 8 ft. tall, glabrous. Leaves thinly coriaceous, broadly elliptic abruptly acuminate, base cuneate; nerves 6 to 8 pairs, inarching some way from edge, depressed above, prominent beneath, transverse nervules conspicuous beneath; 4.5 to 5.5 in. long, 1.75 to 2.5 in. wide; petioles .3 in. long. Flowers solitary or in racemes of 3; peduncles very short, puberulous .3 to .4 in. long. Sepals triangular-ovate, connate at base, puberulous outside. Petals yellowish, inner ones slightly smaller than outer ones. Stamens in three rows, shortly apiculate. Ovaries 4 to 5, oblong, pubescent; ovules many in 2 rows; stigma sessile, sub-capitate. *Hab.* Dense jungle 300 to 500 ft. altitude. Larut (Kunstler).

(3) **A. sub-dehiscens** King, *Journ. As. Soc. Beng. l.c.* 126; *Ann. Bot. Gard. Calc. l.c.* 164, *pl.* 213.

Tree 30 to 40 ft. tall; stem 4 to 5 in. through; branchlets

puberulous. Leaves thinly coriaceous oblong-lanceolate or elliptic abruptly acuminate, base rounded or cuneate, glabrous on both sides; midrib channelled above; nerves about 10 pairs, very faint; 4 to 6 in. long, 1·75 to 2·3 in. wide; petioles grooved, 25 in. long. Flowers globular, scarcely opening, 25 in. across, solitary or in pairs axillary on short thick pedicels with several orbicular bracts. Sepals thick joined into a flat cup, 3 in. through; lobes obtuse, broad. Petals larger thick fleshy, silvery grey, orbicular acute concave, pubescent outside; outer ones 2 in. across, inner ones smaller. Stamens numerous; appendages large fleshy conical. Torus conic. Pistil 1, puberulous, many-seeded; stigma minute. Carpels elongate clubbed pubescent, 1 to 1·25 in. long, narrowed to stalk, 25 to 3 in. long. Seeds 10. *Hab.* Rare in dense jungle at 400 to 600 ft. altitude. Perak, Ulu Bera (Kunstler). Dindings, Lumut (Ridley).

(4) *A. cylindrica* King, *Journ. As. Soc. Beng. l.c.* 127; *Ann. Bot. Gard. Calc. l.c.* 164, *pl.* 211B.

A small tree 20 to 30 ft. tall; stem 3 to 4 in. through; branchlets with soft brown pubescence. Leaves thinly coriaceous ovate-lanceolate to oblong, shortly and rather abruptly acuminate, base rounded, slightly oblique, above glabrous, midrib brown-hairy, beneath sparingly hairy on nerves; nerves 7 to 9 pairs, faint; 2·5 to 3·5 in. long, 1·1 to 1·5 in. wide; petioles hairy, 15 in. long. Flowers 1 to 3 from extra-axillary pubescent peduncles 15 to 4 in. long. Bracts sub-orbicular, deciduous. Sepals semi-orbicular blunt, connate at base, tomentose outside, cream colour. Petals sub-equal oblong-ovate or sub-triangular obtuse, waxy white, tomentose, 35 in. long. Stamens in 3 rows; anthers ovate apiculate. Ovaries 3 oblong silky; many ovules in 2 rows. Carpels 1 to 2, elongate terete acuminate, pubescent, 1 in. long, 2 in. across; dark brown. *Hab.* Perak, Ulu Bubong in bamboo forest at 400 to 600 ft. altitude. Rare (Kunstler).

(5) *A. Curtisii* King, *Journ. As. Soc. Beng. l.c.* 127; *Ann. Bot. Gard. Calc. l.c.* 166, *pl.* 215B.

A shrub; scandent branchlets yellow pubescent. Leaves stiffly coriaceous, oblong-lanceolate, acute at both ends, glabrous except the scurfy midrib, finely reticulate, shining; nerves 12 to 15 pairs, faint, inarching some way from the edge; 4 to 5·5 in. long, 1·2 to 1·75 in. wide; petioles 2 in. long. Peduncles extra-axillary 1- to 2-flowered. Flowers 1 in. long, buds conic; pedicels 3 in. long, silky. Bracts 1 or 2, orbicular. Sepals connate in a cup, 25 in. across, tomentose outside, teeth ovate sub-acute. Petals much larger, oblong-ovate sub-acute, outer ones tomentose on both sides, inner ones narrower, glabrous inside. Stamens numerous; appendages small. Pistils 3, tomentose, many-ovuled. Stigma broad. *Hab.* Penang at Muka Head. Rare (Curtis).

Excluded is *A. ventricosa* Hook., given as Penang, Wall. Cat. 6458, but the specimens so numbered were from the Calcutta Gardens. It is Assamese.

28. KINGSTONIA, Hook. fil.

Tree. Leaves thinly coriaceous. Flowers fascicled on tubercles on branches, bisexual. Sepals 3 persistent ovate acute, connate at base. Petals 6, outer ones valvate, inner ones imbricate. Stamens 15, filaments half as long as the extrorse anther-cells; appendages obliquely truncate. Ovary 1; stigma sessile, peltate crenate; ovules 4 to 6. Carpels globose. Seeds several, 2-seriate. Species 1.

(1) **K. nervosa** Hook. fil. *F.B.I.* i. 93; *King, Journ. As. Soc. Beng. l.c.* 128; *Ann. Bot. Gard. Calc. l.c.* 167, *pl.* 216A.

Leaves oblong to elliptic, acuminate, base rounded, glabrous; nerves 12 to 14 pairs, prominent beneath, 4 to 8 in. long, 1·5 to 3·25 in. wide; petioles 4 in. long, puberulous. Flowers 2·5 in. long in fascicles of 8 to 10; pedicels slender, 3·5 to 5 in., pubescent. Bracts several orbicular, imbricate at base. Sepals pubescent outside. Petals, outer ones oblong-elliptic concave, tomentose outside, inner ones smaller thick concave, tomentose above. Stamens 15. Ovary oblong pubescent. Carpels ovoid blunt tomentose, 1·5 in. long, 1·1 in. through. Seeds 4 oblong. *Hab.* Malacca (Maingay); Ayer Panas (Goodenough). Perak, at 300 ft. altitude (Wray).

The imbrication of the inner petals suggests an affinity with *Stelechocarpus*, but there is only one pistil.

29. MEZZETTIA, Beccari.

Vast trees with small coriaceous leaves. Flowers small axillary or from axils of fallen leaves, fascicled or umbelled, green. Sepals 3, ovate valvate. Petals 6, valvate, flat linear, inner series smaller than the outer. Stamens 9 to 12 in 2 rows; anther-cells lateral introrse; appendages truncate. Torus small, concave, pubescent. Ovary 1, ovoid glabrous, contracted to a very short style; ovules 2. Carpels globose or elliptic, pulpy. Seeds 2, extremely hard, large, plano-convex. Species 5 or 6, Malay Peninsula and islands and Africa.

Leaves coriaceous; sepals broadly ovate.

Outer petals linear (1) **M. leptopoda**

Outer petals ovate lanceolate (2) **M. Herveyana**

Leaves thinly coriaceous; sepals semi-orbicular (3) **M. Curtisii**

(1) **M. leptopoda** Oliver, Hook. fil. *l.c. Pl. t.* 1560; *King, Journ. As. Soc. Beng. l.c.* 129; *Lonchomera leptopoda* Hook. fil. *F.B.I.* i. 94.

An immense tree over 100 ft. tall with smooth, grey bark. Leaves glabrous, coriaceous, oblong narrowly elliptic acute or obtusely acuminate, base rounded; nerves 8 to 9 pairs, inarching far from the margin faint; 2·5 to 4 in. long, 1 to 1·75 in. wide; petioles

·35 in. long. Flowers in fascicles of 2 to 6 on slender pubescent pedicels, ·5 to ·75 in. long. Sepals broad ovate, connate at base, tomentose. Petals green, tomentose on both sides, outer ones linear obtuse, ·2 in. long, inner shorter and broader. Ovary ovoid. Fruit globose, 2·5 in. long, light green, pulp firm. Seeds 2, 1·5 in. long, ·5 in. thick, brown, testa stony, back rounded, inner surface flat, ovoid oblong. *Hab.* In forests. Common all over the south of the peninsula from Singapore northwards. *Native name*: Poko Prah.

(2) **M. Herveyana** *Oliver, Hook. fil. Ic. Pl. t. 1560; King, Journ. As. Soc. Beng. l.c. 129; Ann. Bot. Gard. Calc. l.c. 168, pl. 217A.*

A tree; glabrous. Leaves coriaceous elliptic-oblong acuminate, base cuneate; nerves 10 pairs faint, inarching within margin; 2·5 to 3 in. long, 1 to 1·25 in. wide; petioles ·25 to ·35 in. long. Flowers crowded in sessile fascicles axillary or extra-axillary, 3 to 8; pedicels ·3 in. long, puberulous. Sepals broadly ovate obtuse, connate at base pubescent. Petals, outer ones ovate obtuse flat pubescent, inner ones smaller broad elliptic obtuse, tips incurved. Anthers 12, sessile, obovate-quadrate. Ovary oblong tapering to style. Ovules 2. *Hab.* Malacca (Hervey). *Native name*: Mengkudang.

(3) **M. Curtisii** *King, Journ. As. Soc. Beng. l.c. 129; Ann. Bot. Gard. Calc. l.c. 217B.*

Tree 30 to 40 ft. tall. Leaves thinly coriaceous oblong-lanceolate to oblong shortly acuminate, base cuneate, drying black, glabrous; nerves 10 pairs, faint; 2·5 to 5 in. long, ·5 to 1·5 in. wide; petioles ·25 in. long. Flowers umbelled fascicled, axillary or extra-axillary on branches below the leaves, 5 to 10 in a fascicle; pedicels slender, scurfy, pubescent, ·35 to ·6 in. long. Sepals semi-orbicular, connate into a spreading cup, densely tomentose. Petals, outer ones ligulate acute tomentose with a glabrous patch at the base, inner ones less acute and one-third shorter. Anthers sessile 12; appendages very broad truncate. Ovary 1, ovoid, 2-ovuled. Carpels sub-globose, 1·5 to 2 in. across, smooth, glaucous. *Hab.* Penang, Government Hill at 1200 ft. altitude (Curtis).

ORDER VII. MENISPERMACEÆ.

Climbing herbs or shrubs. Leaves alternate, entire or rarely lobed, usually palminerved. Stipules 0. Flowers small or minute white or green, in cymes or racemes, solitary or fascicled, unisexual. Sepals 6, or 3 to 4, or 8 to 12, usually free, imbricate in 2 to 4 series. Petals 6 or 0, or 1 to 5, free or connate. Male flowers, stamens hypogynous, filaments free or connate. Anthers free or connate, 2-celled. Pistillodes minute or 0. Female flowers, staminodes 6 or 0. Ovaries 3 (rarely 1 or 6 to 12). Style terminal, simple or

divided. Ovules 1 (except *Fibraurea*, 2) usually amphitropous. Fruit a drupe. Seed hooked or reniform or straight, often curved round an intrusion of the endocarp. Albumen even or ruminant or absent. Cotyledons flat or semiterete. About 32 genera. 100 species. Tropics generally. *King, Journ. As. Soc. Beng.* lviii. (2), 377.

(a) *Ovaries* 3.

Drupes with a terminal style-scar; stamens free.

- | | |
|-----------------------------------------------------------------------------------------|-----------------|
| Sepals 3 or 6; petals 6; slender climbers;
leaves thin, usually herbaceous | 1. TINOSPORA |
| Sepals 6, connate; petals 0; slender climber | 2. PERIPETASMA |
| Sepals 9; petals 6 | 3. TINOMISCIMUM |
| Sepals 6; petals 0; woody liane | 4. FIBRAUREA |

Drupes with sub-basal scar.

Woody climbers.

- | | |
|-----------------------------------------------------------------|------------------|
| Sepals 6; stamens free; flowers in heads | 5. COSCINIUM |
| Sepals 6; petals 6; stamens free; flowers
cymosed | 6. DIPLOCLISIA |
| Sepals 9; stamens 9, connate; flowers
panicked | 7. ARCANGELISIA |
| Sepals 8; petals 2; stamens 4 to 8 | 8. PYCNARRHENA |
| Slender climbing shrubs; leaves not coriaceous. | |
| Sepals 9; petals 3 to 6 | 9. LIMACIA |
| Sepals 6; petals 4 to 6; stamens 3 | 10. TILIACORA |
| Sepals 6; petals 6; ovaries 3 to 6; stamens
6 to 9 | 11. COCCULUS |
| Sepals 8 to 12; petals 4 to 6 | 12. HYPSEPERA |
| Sepals 6; petals 6; ovaries 3; styles forked | 13. PERICAMPYLUS |

(b) *Ovaries* usually 1. *Endocarp* muricate; leaves
peltate.

- | | |
|------------------------------------------------------------------|-----------------|
| Sepals 6 to 10; petals 3 to 5, free | 14. STEPHANIA |
| Sepals 4; petals of male 4, female 1 | 15. CISSAMPELOS |
| Sepals 4 to 8, connate; anthers on a central
column | 16. CYCLEA |

1. TINOSPORA, Miers.

Weak climbers with loose pale bark often warted. Leaves membranous, rarely sub-coriaceous, cordate or truncate at the base, 3- to 5-nerved. Racemes solitary slender rarely branched. Males several together. Females solitary. Flowers small, green. Sepals 3 to 6, outer series usually smaller than the inner one. Petals 5 or 6, widely cuneate-ovate, very small and involute round the stamens or larger and free. Stamens 6, free. Females, petals minute spathulate-oblong. Staminodes 6, shorter and with the petals adnate to the pistils. Carpels 3, ellipsoid. Style short thick. Stigma ligulate peltate. Drupes 3 or fewer, stalked ellipsoid. Seed flattened moon-shaped, hollowed on ventral side. Albumen ruminant. Species 24, tropical Asia, Australia.

Leaves herbaceous; fruit .25 in. long, red.

Leaves slightly cordate, base truncate (1) *T. crispa*

Leaves truncate at base; fruit 1.25 in. long, yellow. (2) *T. macrocarpa*

Leaves sub-coriaceous, base round (3) *T. Curtisii*

(1) **T. crispa** Miers, *Contrib. Bot.* iii. 34; *Hook. fil. F.B.I.* i. 96.

Climber with fawn colour papery warted bark. Leaves ovate to oblong-ovate acuminate, base truncate or very slightly cordate, thin light green, 3 to 3·5 in. long, 3 to 1·5 in. wide; petioles 3·5 in. long. Raceme slender lax. Flowers small green. Males, sepals 3 outer smaller, 3 inner elliptic much larger. Petals very small, involute oblong ovate. Stamens short 6. Females, pistils 3, sub-cylindric. Fruit oblong 3 in. long, yellow or red. Seed smooth. *Hab.* Cultivated ground, Singapore. Malacca, Pulau Jawa (Griffith); Penang, near Waterfall (Curtis); Perlis, Tebing Tinggi. *Distrib.* India. Introduced here and more or less cultivated; very rarely flowering.

(2) **T. macrocarpa** Diels, *Pflanzenreich, Menispermaceæ* 141.

Stem as in *T. crispa*. Leaves ovate-oblong, base truncate or cordate, acuminate, 3·5 in. long, 3·75 in. wide. Flowers unknown. Drupes oblong cylindric, 1·5 in. long, 7 in. wide; endocarp bony sub-ellipsoid, somewhat warty. *Hab.* Malacca (Maingay).

Possibly *T. uliginosa* Miers, of the Malay Islands, as King suggests, of which I have seen no plants.

(3) **T. Curtisii** Ridl. *Journ. Bot.* 1920, p. 148.

Climber; bark pale, warty. Leaves elliptic ovate, base round minutely cordate, sub-coriaceous; nerves 3 pairs with reticulations elevate beneath; 4 in. long, 3 in. wide; petioles 1 in. long. Inflorescence laxly paniced over 12 in. long; branches 3 to 5 in. long, minutely puberulous. Flowers 12 in. wide, solitary and a few in short racemes. Pedicels very short. Bracts minute acuminate. Male flowers, sepals 3, round and wide. Petals longer lanceolate acuminate. Stamens 6, filaments short broad linear. Female flowers and fruit unknown. *Hab.* Penang, Batu Feringhi, near the beach (Curtis).

2. PERIPETASMA, Ridl.

Slender woody climber. Leaves thin sub-herbaceous, elliptic oblong cuspidate, base round; nerves from base 3. Panicles axillary of long slender racemes, many-flowered. Flowers small. Sepals 6, connate in a campanulate tube, lobes long-acuminate, outer series narrower and thicker than inner ones. Petals 0. Stamens 6, base of filament thickened and winged, upper part slender incurved; anther-cells 2, discrete. Pistillode minute, triquetrous. Species 1.

(1) **P. polyanthum** Ridl. *Journ. Bot.* 1920, p. 147.

Glabrous. Leaves trinerved with 6 pairs from the midrib, reticulations wide elevate beneath, 6 in. long, 2 in. wide; petioles 1 in. long. Panicles 12 in. long with many slender racemes, 8 or 9 in. long. Flowers scattered. Pedicels slender 1 in. long. Bracts

half as long. Sepals outer narrow lanceolate-acuminate, inner wider, with 2 ribs on each, finely dotted, connate at base. Stamens shorter, incurved. *Hab.* Lowland woods. Selangor, Kwala Lumpur and Batu Tiga (Ridley).

3. *TINOMISCIMUM*, Miers.

Big liane. Leaves coriaceous or membranous, 3- to 5-nerved.



FIG. 9.—*Tinomiscium petiolare*.

Racemes solitary or fascicled from the old wood. Flowers white. Males, sepals 9 to 12, 3 outer bract-like, 6 inner narrow oblong. Petals 6 shorter oblong or orbiculate. Stamens 6, opposite petals and as long, free; filaments thick; anther-cells immersed; abortive carpels occasionally present. Females, petals and sepals similar; staminodes 6, lanceolate beaked. Carpels 3, glabrous sub-ovoid. Stigma peltate cerebriform. Drupes 3 or fewer, oblong to ovoid, compressed. Seed obovate with large flat cotyledons. Species 6 to 8, Malayan.

(1) **T. petiolare** Miers, *Ann. Mag. Nat. Hist. Ser. 2*, vii. 44; *Contrib. Bot.* iii. 45, *pl.* 94; *Hook fil. F.B.I.* i. 97; *King, Journ. As. Soc. Beng. l.c.* 379; *Ridl. Journ. Roy. As. Soc. S. Br.* 54, p. 14.

Liane 60 to 100 ft. long much branched; stem ribbed, 2 to 4 in. through, exuding white latex when cut. Leaves coriaceous ovate-oblong, narrowed at base, tip blunt or shortly acuminate, glabrous dark green; nerves from base 3, 1 or 2 pairs above from midrib; 4·5 to 5·5 in. long, 2 to 3 in. wide; petioles slender, geniculate 2·5 in. long. Male racemes fascicled from the old wood, 6 to 10 in. long. Flowers white 3 in. across; pedicels 1 in. long. Sepals 3 or 4, green covered like the pedicels with short red hairs. Outer petals 6, linear oblong obtuse, edges white hairy, inner ones 6, short connivent, oblong, edges incurved, white glabrous. Stamens fleshy thickened at base, connective thickened incurved beak-like; anther-cells wide apart, immersed. No pistillodes. Female inflorescence paniced 18 in. long, racemes pubescent 8 in. long. Outer sepals 2; staminodes 6. Fruit oblong elliptic flat, 1 in. long, 5 in. wide (channelled when dry) smooth, dark green with white spots. *Hab.* Very common in forests and secondary jungle, roadsides, etc. Singapore to Kedah, Alor Sta. *Distrib.* Tonkin, Sumatra, Borneo. *Native names*: Akar Langkap; Akar Lumpang; Akar Nasi; A. Lempoyang; A. Mumbulu. *Use*: As a drug in rheumatism.

4. FIBRAUREA, Lour.

Big liane with yellow wood. Leaves coriaceous glabrous ovate to oblong, 3-nerved. Flowers in lax panicles, white or green. Sepals 6 with 3 minute bracts. Petals 3. Stamens 6; filaments clavate; anthers terminal adnate. Female flower staminodes 6; ovaries 3, 2-ovuled. Drupes oblong terete. Seed oblong, blunt grooved down the centre. Albumen horny. Species 4, Cochin-China, Malay Peninsula and Islands.

(1) **F. chloroleuca** Miers, *Ann. Mag. Nat. Hist. Ser. 3*, xiii. 489; *Contrib. Bot.* iii. 42, *pl.* 93; *King, Journ. As. Soc. Beng. l.c.* 380. *F. tinctoria* Hook. *fil. F.B.I.* i. 98, *not of Loureiro*.

Big liane. Leaves ovate oblong, base rounded, apex acuminate; nerves from base 3, prominent beneath, deep green coriaceous glabrous; 7 in. long, 4 in. wide; petioles 2·5 in. long. Flowers, male, white in lax panicles from old wood, 2 to 6 in. long. Bracts narrow linear acute. Sepals 6, rounded-obovate. Inner petals narrower than outer ones, elliptic. Stamens 6, bluish green. Female flowers green. Carpels 3 obovoid bluish green. Drupe orange colour, elliptic smooth, pulp bitter, 1·5 in. long. Seed oblong, 1 in. long, grooved deeply on the lower surface, ends rounded. *Hab.* Very common in hedges and woods. Singapore to Penang. *Distrib.* Tavoy, Malay Islands to Celebes. *Native names*: Akar Kinching Kerbau (buffalo urine); Akar Kuning.

Use: The wood of the stem and roots formerly used as a yellow dye, and also used in medicine. The whole plant very bitter.

5. COSCINIUM, Colebr.

Climbing shrubs, not very stout. Leaves ovate more or less peltate. Flowers in dense globose heads, in racemes or panicles. Sepals 6, orbicular. Petals 3, large spreading elliptic; anthers adnate, outer 1-celled, inner 2-celled. Female flower, staminodes 6. Ovaries 3 to 6; styles subulate. Drupes globose; endocarp bony. Seed globose, embracing a globose intrusion of the endocarp. Albumen fleshy ruminant. Embryo straight, cotyledons orbicular. Species 6, Indo-Malayan.

Leaves very slightly peltate ovate yellowish tomentose

beneath; flower-heads small (1) **C. Wallichianum**

Leaves oblong distinctly peltate, tomentum white;
flower-heads large (2) **C. Blumeianum**

(1) **C. Wallichianum** Miers, *Ann. Mag. Nat. Hist. Ser. 2*, vii. 37. *C. fenestratum* Hook. *fil. and Thom. Fl. Ind.* i. 99 (*partly*); *King, Journ. As. Soc. Beng.* 381. *C. Maingayi* Pierre *Fl. For. Cochinchine*, pl. 112.

A moderate liane. Stem yellow when cut, tomentose above. Leaves coriaceous ovate-peltate, above glabrous shining, beneath yellowish tomentose; nerves 5, radiating from base, prominent beneath as are the reticulations, with 2 pairs of nerves from the midrib above; 6 to 7 in. long, 4.5 to 6 in. across; petioles woolly, 3 in. long, thick. Male heads of flowers from the branches, in tomentose panicles, 4 in. long; peduncles 1 in. long; heads .2 in. across. Outer sepals short, inner ones longer oblong pilose. Drupes globose 1 in. through, fawn colour, on much thickened branches. *Hab.* Common in woods, but seldom to be found in flower. Singapore, Changi. Malacca (Maingay). Perak. *Distrib.* South India, Ceylon. *Native names*: Akar Kuniyit; Kuniyit Babi; Tol (Sakai). *Use*: In dart poison by the Sakais.

(2) **C. Blumeianum** Miers, *Contrib. Bot.* iii. 23; Hook. *fil. F.B.I.* i. 99; *King, Journ. As. Soc. Beng. l.c.* 381.

A woody climber, whitish woolly. Leaves coriaceous, oblong-ovate or oblong shortly acuminate, base rounded quite peltate, above glabrous, beneath white tomentose; nerves 7 radiating from apex of petiole, reticulations prominent, secondary nerves inarching near the edge; 8 to 15 in. long, 4 to 6 in. wide; petioles 6 to 8 in. long, thickened at both ends. Male inflorescence from the old wood 4 to 5 in. long, woolly-tomentose; branchlets .5 in. long thick. Heads globose .5 in. across. Sepals and petals light yellow, silky-tomentose outside, lanceolate sub-spathulate, inner ones narrower. Stamens 6. *Hab.* Forests. Dindings, Lumut (Curtis). Penang Hill, 200 to 2000 ft. altitude (Wallich, Maingay). Kedah, Alor Sta. *Native name*: Akar Mengkuniyit.

6. DIPLOCLISIA, Miers.

Lianes. Leaves deltoid-ovate edge subcrenate, quite glabrous; petioles very long. Inflorescence of pedicellate cymes on a long raceme from the old wood below the leaves. Sepals 6, cuneate elliptic, concave, inner ones broadest. Petals 6 cuneate, embracing the stamens. Stamens 6, filaments thickened upwards; anthers 4-lobed. Carpels 3; style short; stigmas lobed. Drupe large; endocarp with a depression on each side and the back transversely ribbed. Seed horseshoe-shaped. Species 3, Indo-Malaya, China.

(1) **D. Kunstleri** Diels, *Pflanzenreich*, 227, pl. 77. *Cocculus Kunstleri* King, *Journ. As. Soc. Beng. l.c.* 384; *Ann. Bot. Gard. Calc. v.* (2), 116, pl. 131.

A strong liane, wood yellow, glabrous. Leaves membranous, rounded ovate obtuse peltate; nerves radiating 7; 2·5 to 4 in. long, 3 in. wide; petioles slender, 3 to 3·5 in. long. Inflorescence of several long branches fascicled from the trunk 20 in. long with scattered compound cymes on pedicels 5 in. long. Outer sepals 3, concave oblong elliptic pale, inner 3, wider, yellow shining. Fruit panicles longer. Drupes very fleshy yellow; endocarp woody flat curved pyriform deeply channelled on one face and strongly ribbed on the keel, 1 in. long. Rare. *Hab.* High forest, Perak, Larut (Kunstler). Kelantan on Gunong near Kota Bharu. *Distrib.* Cochin-China and Borneo.

7. ARCANGELISIA, Becc.

Big lianes. Leaves coriaceous, long-petioled, palmate-nerved. Male inflorescence paniced, fruiting rachis thickened. Sepals outer 3 small, inner 8 petaloid spreading. Stamens 9 to 12, filaments connate; anthers terminal 4-locellate. Female flowers, staminodes short and thick. Carpels 3. Ovules 2 superposed. Stigma thick triangular. Drupes 1 to 3, large globose-reniform; endocarp wrinkled or spiny, fibropilose. Seed, albumen ruminate. Species 3, Cochin-China to New Guinea.

(1) **A. Loureiri** Diels, *Pflanzenreich*, 104. *Anamirta Loureiri* Pierre, *Fl. For. Cochinchine*, pl. 110; King, *Journ. As. Soc. Beng. l.c.* 379.

A big powerful liane, 40 to 60 ft. long. Stem 2 to 5 in. through. Leaves stiffly coriaceous glabrous, ovate to elliptic, cordate or truncate at base, acuminate at top; nerves from the base 3 to 5, with one or two pairs rising from the midrib; 3·25 in. long, 2·75 in. wide; petioles slender, geniculate at base and thickened above, 2·5 in. long. Panicles usually from the trunk slender, 4 to 6 in. long, many-flowered. Bracts triangular. Flowers small white. Sepals 3 triangular ciliate; inner sepals and petals ovate boat-shaped obtuse. Stamens 6 to 9 connate in a globose head. Female

flowers, sepals and petals 6, coriaceous narrow oblong. Stamnodes minute scale-like. Carpels 4; stigma sessile papillose. Fruiting panicle thickened; peduncles thick woody. Drupes globose bright yellow, slightly flattened 1.25 in. long; endocarp fibrillose. Seed albumen ruminant. *Hab.* Forests, not common. Malacca (Main-gay). Perak, Batu Togoh (Wray); Larut Hills at low altitude (Kunstler). *Distrib.* Cochin-China.

8. PYCNARRHENA, Miers.

Scandent shrubs. Leaves lanceolate to oblong. Cymes axillary or reduced to 1-flowered pedicels, in fascicles. Flowers minute. Sepals 6 to 9, outer ones ciliate, inner ones larger, innermost sub-orbicular very concave glabrous. Petals 2 to 6 obovate, smaller than the outer sepals. Stamens 2 to 10; filaments very short or hardly any, thickened above; anthers half-immersed globose. Female flower resembling male, but with 2 to 4 ovoid carpels. Stigmas tongue-shaped. Drupes 3 or fewer. Seeds exalbuminous. Species 17, India, China, Malay Islands to Australia.

(1) *P. fasciculata* Diels, *Pflanzenreich*, iv. 94, fig. 17. *Antitaxis fasciculata* Miers, *Ann. Mag. Nat. Hist. Ser. 2*, vii. 41; *Contrib. Bot.* iii. 356, pl. 142; *Hook. fil. F.B.I.* i. 106. *A. lucida* King, *Journ. As. Soc. Beng. l.c.* 388.

A tall slender climber woody, 40 to 60 ft. long. Stem .5 in. through. Leaves coriaceous oblong or lanceolate acuminate acute, base blunt narrowed; nerves 6 pairs inarching far from edge; 3 to 4 in. long, 1.25 to 1.5 in. wide; petioles .5 in. long. Flowers fascicled, as many as 18 together in male, very small on slender filiform pedicels, .4 in. long, on pubescent axillary tubercles. Male flowers, .03 in. long. Sepals, outer ciliate, inner 3 larger concave orbicular. Petals smaller widely obovate. Stamens 2 to 4. Female, pedicels fewer, 2 to 4, robust in fruit, .6 in. long. Drupe pear-shaped 4 to 5 in. long, pulpy glabrous, reddish green. *Hab.* In forests. Malacca (Griffith). Perak, Gunong Bubong (Kunstler) at 400 to 600 ft. altitude in bamboo forests. *Distrib.* Cambodia, Siam.

9. LIMACIA, Lour.

Woody climbers, medium size. Leaves ovate or oblong, not peltate. Inflorescence of compound cymes, false panicked or racemose. Male flowers, sepals 9 pubescent, outer bract-like, inner concave larger. Petals 6, smaller. Stamens 6 or 3; filaments free obconic. Female flowers, staminodes 6 or 3. Carpels 3 pilose. Stigma sub-trilobed recurved. Drupes 3 to 1, gibbous sub-globose fleshy; endocarp smooth except the transversely wrinkled dorsal band. Species 5, Cochin-China and Malay Islands.

Stems and under side of leaves and cymes yellow tomentose (1) *L. velutina*
 Stems and leaves nearly glabrous (2) *L. oblonga*

(1) **L. velutina** Miers, in *Ann. Mag. Nat. Hist. Ser. 2.* vii. 43; *Hook. fil. F.B.I.* i. 100; *King, Journ. As. Soc. Beng. l.c.* 383.

A moderate woody climber; branches and leaves covered with golden fur. Leaves variable in size, elliptic to oblanceolate acuminate or cuspidate, base blunt or shortly narrowed, subcoriaceous; nerves 5 to 6 pairs; 2·5 in. to 5 in. long by 1·6 to 2 in. wide; nerves and midrib and edges at least hairy; petioles ·5 to 1·5 in. long. Cymes axillary, several together or solitary, about ·5 in. long, golden-tomentose. Flowers small crowded at the top. Sepals ovate eventually spreading tomentose outside. Petals clawed embracing the stamens. All yellow. Stamens 6 pilose; anther-cells brown. Carpels in female flower black-hairy. Stigma pale grey. Drupe ovoid flattened, orange yellow, 1 in. long, pulp orange brown. Seed dark brown. *Hab.* Common in open country, secondary jungle and thickets. Singapore very common. Malacca, Selangor, Perak, Penang.

var. *parvifolia* Ridl. A form with all the leaves small 2 to 2·5 in. long and ·8 to 1·3 in. wide. Cymes numerous 5 or 6 together. Penang, Government Hill at 2500 ft. altitude. *Distrib.* Cochinchina, Siam, Tenasserim and Malay Islands.

(2) **L. oblonga** Miers, *Ann. Mag. Nat. Hist. Ser. 2.* vii. 43; *Hook. fil. F.B.I.* i. 100; *King, Journ. As. Soc. Beng. l.c.* 382.

Rather slender woody climber; stems yellowish-tomentose eventually glabrous. Leaves coriaceous, very variable, the terminal ones lanceolate acuminate, 3 in. long by 1 in. wide, the lower ones broadly oblong to elliptic sub-acute, base rounded glabrous, 5·5 to 8 in. long, 4·5 to 5 in. wide; nerves 3 or 4 pairs prominent beneath as are the secondaries and the very fine reticulations; petioles ·75 to 1·25 in. long. Panicles slender 4 to 5 in. long, extra-axillary in lines of fascicles of 2 to 4, pubescent. Flowers small numerous, greenish yellow. Outer sepals lanceolate, inner sub-orbicular. Petals boat-shaped. Stamens glabrous. Drupe very excentric, over ·5 in. long, obovoid flattened. *Hab.* Thickets in open country. Malacca, Bukit Bruang and Pringit (Griffith). Selangor, Kwala Lumpur; Rawang (Kloss). Perak, Goping (Kunstler). Penang up to 1200 ft. altitude, Government Hill, common. *Native name:* Akar China.

10. TILIACORA, Colebr.

Climbing shrubs. Leaves penninerved; petioles short. Panicles usually short. Male flowers 6 to 12. Sepals, outer ones bract-like, inner larger obovate elliptic. Petals 4 to 6 minute obcordate. Stamens 9 to 3, free or more or less connate. Females, staminodes 0. Carpels 30 to 6. Drupe gibbous ovoid, compressed grooved on both sides. Albumen ruminate or scanty or 0. Species 15, mostly African, 3 Indian to Penang.

(1) **T. triandra** Diels, *Pflanzenreich*, 62. *Limacia triandra* Hook. fil. and Thom. Fl. Ind. 188; King, *Journ. As. Soc. Beng. l.c.* 382.

Climbing shrubs, rather slender. Leaves shining, coriaceous or sub-coriaceous glabrous, ovate-lanceolate to lanceolate-oblong, tip acuminate acute, base rounded; nerves 4 pairs inarching far from the margin; 4 in. long by 1.5 in. wide; petioles .2 in. long. Racemes axillary solitary pubescent. Flowers very small 1 to 3, in the axil of a pubescent bract. Sepals, outer 6, minute ciliate, inner ones valvate sub-elliptic larger. Petals 4 to 6 obovate or oblong larger. Stamens 3. Female flowers, solitary in axils of bracts of raceme with 6 semi-ovoid carpels on a raised torus. Fruit obovate, yellowish red. *Hab.* Very rare. Penang, Tanjong Tokong (Curtis). *Distrib.* Tenasserim and Cochin-China. *Native names*: Akar Kunit-Kunit; Akar Kusin.

T. acuminata Hook. fil. "Singapore, Griffith, in Herb. Hooker," is doubtless an error. Griffith was probably never in Singapore at all, and a plant so labelled in *Herb. Wallich.* from Singapore is not a Menispermaceous plant at all.

11. COCCULUS, DC.

Climbing shrubs. Leaves various. Cymes 1 or 2 in axils of leaves. Male flowers, sepals 3, outer small, 3 inner larger concave. Petals usually bifid with inflexed edge. Stamens 6 to 9 free. Female flowers, staminodes 6 or 0. Carpels 6 to 3, semi-ovoid; style cylindric. Drupe obovate rounded compressed, with 2 ridged bands on the back. Species 11. Warm regions of Asia, Africa, Polynesia and North America.

Glabrous leaves lanceolate, blunt	.	.	.	.	(1) C. ovalifolius
Hairy leaves deltoid to lanceolate	.	.	.	.	(2) C. elegans

(1) **C. ovalifolius** DC. *Syst.* i. 526. *Limacia Kunstleri* King, *Journ. As. Soc. Beng. l.c.* 303. *Nephroica sarmentosa* Lour. *Fl. Cochinchine* ii. 692.

A slender twiner. Leaves papery lanceolate blunt at both ends, tips micronulate; main nerves 1 pair from the base and 2 or 3 pairs from the midrib above, very fine, reticulations conspicuous; 2.5 to 3 in. long, 1 in. wide, glabrous; petioles .2 in. long pilose. Compound cymes axillary 1 in. long; rachis and branches pilose. Cymes (branches) .2 in. long, often racemiform. Bracts 2. Sepals 3, outer bract-like, 3 inner ovate elliptic. Petals 6, tips bifid with spreading lobes. Female cymes smaller; carpels 6. Drupes compressed horseshoe-shaped, blue black; endocarp with 2 dorsal keels of ribs and tubercles. *Hab.* Climbing on bushes on the sea-shore in sandy spots. A pretty plant, with its white and yellow flowers. Singapore, Changi. Pahang, Kwala Pahang. *Distrib.* China, Cochin-China, Java, Philippines and Mascarene Islands.

(2) *C. elegans* Ridl. *Nephroica elegans* Ridl. *Journ. Roy. As. Soc. S. Br.* 54, p. 15.

A slender twining laticiferous hairy herb. Leaves deltoid or lanceolate acute, base rounded, 3-nerved with distinct reticulations, sparsely hairy; 2 in. long, .25 to .50 in. wide; petioles .2 in. long, hairy. Racemes axillary, hairy. Sepals, outer ovate obtuse 5, inner ones 3 rounded ovate acute. Petals 6 ligulate oblong with 2 long points. Stamens 6 as long. *Hab.* Open places, twining on grasses. Dindings at Lumut. Tringanu at Cherating River (Ridley).

12. HYPSERPA, Miers.

A slender woody climber. Leaves small coriaceous; nerves palmate. Cymes usually short, rarely paniced. Sepals 8 to 12, outer ones bract-like, inner ones gradually larger, patent, ciliate. Petals 4 to 6 (or 0) obovate fleshy. Stamens 6 to indefinite, free or more or less joined; anthers immersed. Female flowers, staminodes various in number; carpels 6 to 3. Stigma oblong-linear. Drupe transversely ovoid; endocarp grooved and ribbed on back. Albumen copious. Species 16, Indo-Malaya, China, Australia and Polynesia.

(1) *H. cuspidata* Miers, *Ann. Mag. Nat. Hist. Ser 2*, vii. 40. *H. triflora* King, *l.c.* 384 (not of Miers). *Limacia cuspidata* Hook. *fil. F.B.I.* i. 100.

Slender woody climber with dark green shining coriaceous leaves, oblong to oblong-lanceolate; nerves fine and indistinct; 2.5 to 4.5 in. long, .80 to 1.5 in. wide or smaller; petioles .3 in. long, appressed hairy as are the branch tips. Cymes .3 in. long, axillary, appressed hairy, few-flowered. Flowers small .1 in. across, white or yellow. Sepals, outer minute ovate triangular, inner ones larger, obovate. Petals spathulate. Drupes globular .2 in. through, red. *Hab.* In hedges and thickets, not rare. Singapore, Tanglin. Malacca (Maingay). Penang, Batu Feringhi; Pulau Betong (Curtis); Pulau Jerajah (Kunstler). *Distrib.* India and Malay Islands. *Native name*: Akar Minyak.

13. PERICAMPYLUS, Miers.

Slender woody climber. Leaves sub-cordate, edge sub-crenate, more or less pubescent; nerves palmate. Cymes, males 3- to 6-fascicled, females solitary or in pairs. Sepals imbricate, 3 outer minute, bract-like, 6 inner obovate. Petals 6 sub-obovate, margins inflexed round the stamens. Stamens free or connate. Female flowers, staminodes 6; terete longer than the petals. Carpels 3. Stigma bifid or doubly bifid. Drupes 3, sub-orbicular flattened; endocarp with transverse ridges with tubercles. Species 6, Indo-Malaya.

- Stem and leaves grey tomentose (1) **P. incanus**
 Stem sparsely pilose, leaves sparingly puberulous . . . (2) **P. membranaceus**

(1) **P. incanus** Miers, *Ann. Mag. Nat. Hist. Ser. 2*, vii. 40; *Contrib. Bot.* iii. 118, pl. 111; *Hook. fil. F.B.I.* i. 102; *King, l.c.* 385; *Diels, Pflanzenreich*, 217, fig. 74.

Young branches grey-tomentose. Leaves herbaceous ovate obtuse, base broad truncate, above glabrous, beneath grey-tomentose; nerves 5 pairs radiating from base, 1.5 to 2.5 in. long, 1.7 to 2.7 in. wide; petioles .6 in. long, slender tomentose. Compound cymes axillary 2 to 6 together in male, solitary in female, .75 in. long, tomentose. Flowers small fragrant. Males, sepals, outer small sub-ovate, inner ones larger obovate obtuse, green or yellow. Petals spatulate or obovate, hyaline. Stamens free. Females, staminodes short linear. Carpels 3. Drupes 3, transversely obovate; endocarp bony with a linear keel ornate with spines and tubercles. Seed .2 in. long. *Hab.* Common in hedges and thickets. Johor. Kota Tinggi; Genuang; Pulau Aur (Fielding). Pahang. Malacca. Pulau Besar and Ayer Panas (Griffith). Selangor. Perak, Sungei Rayah (Kunstler). Penang (Wallich). Kedah. Setul, Bukit Rajah Wang. Kelantan River. *Distrib.* Indo-Malaya, China. *Native names*: Akar Gasing-Gasing; A. Gegasing; A. Jerkasing; Kelesu.

(2) **P. membranaceus** Miers, *Ann. Mag. Nat. Hist. Ser. 3*, xiv. 122; *Contrib. Bot.* iii. 122. *Cocculus membranaceus* Wall. *Cat.* 4967.

A very slender climber, young parts sparingly pilose. Leaves thin membranous ovate, base truncate rounded slightly peltate; nerves 5 pairs, sparingly puberulous, 1.5 in. long by 1.6 in. when full grown. Leaves at the ends of branches .4 in. long and wide. *Hab.* Penang, (in *montibus* Wallich 4967), also collected here by Gaudichaud and in Java by Hallier and Koorders. Flowers and fruit unknown.

14. STEPHANIA, Lour.

Slender woody or herbaceous climbers with ovate or triangular peltate leaves. Inflorescence of false-umbelled simple or compound cymes, branches usually crowded at the tip. Male flowers, sepals 6 to 8 usually sub-equal concave. Petals 3 to 4 obovate or orbicular. Stamens connate in a peltate head. Female flowers, sepals 3 to 6. Petals 2 to 4, like those of the males. Carpel 1, no style. Stigma lobed. Drupe fleshy; endocarp compressed obovate with 2 rows of spines or tubercles down the back. Seed horseshoe-shaped. Species 32, African and Indo-Malayan and Chinese.

- Inflorescence from bare stems peduncled compound . . . (1) **S. corymbosa**
 Inflorescence from leaf axils.

Leaves ovate acuminate; flowers in small dense heads, discoid (2) **S. capitata**

Leaves pubescent beneath; flowers crowded in heads (3) *S. hernandifolia*
 Leaves thin glaucous beneath; umbel lax,
 spreading (4) *S. rotunda*

(1) *S. corymbosa* Walp. *Rep.* i. 96; *Diels, Pflanzenreich*, 267.
S. ramuliflora Miers, *Contrib. Bot.* iii. 232. *Clypea corymbosa*
Bl. Bijdr. 27.

Glabrous. Leaves membranous to subcoriaceous rounded ovate, base rounded, apex sub-acute 4 to 4·2 in. long, 3 in. wide; petioles 4·5 to 6 in. long; nerves about 11 radiating from petiole apex, beneath glaucescent. Male inflorescence sub-paniculate 2 to 3 in. long. Peduncle 1 in. long. Flowers crowded at ends of branches. Sepals 4, outer linear, puberulous recurved, 4 inner obovate glabrous. Petals 4, conchiform tomentose. Female inflorescence larger compound corymbose. Branches about 3 in. long. Drupes flattened obovate with transverse tubercled ridges. *Hab.* In forests. Rare. Perak, Maxwell's Hill, at 3000 ft. altitude (Wray). *Distrib.* Sumatra, Java, Borneo.

(2) *S. capitata* Spreng. *Syst.* iv. *Cur. Post.* 316; *Diels, Pflanzenreich*, 281.

Rather a stout species, glabrous. Leaves membranous or papery, ovate to nearly lanceolate, base rounded or sub-cordate, apex acuminate 3 to 5 in. long, 2 to 2·2 in. wide; petioles 2 to 2·2 in. long. Inflorescence very short 4 in. long, simple or few-branched; peduncles filiform 5 in. long; in females cymules contracted to a discoid head, 2 in. across. Sepals sub-connate yellow. Drupes very crowded, much compressed, obovate red 2 in. long, whole head 1·5 in. through. Endocarp with four rows of processes on the back. *Hab.* In lowland woods. Johor, Genuang. Perak, Thaiping Hills, about 500 to 800 ft. altitude (Kunstler).

(3) *S. hernandifolia* Walp. *Rep.* i. 96; *Hook. fil. F.B.I.* i. 196 *in part.*

Slender climber more or less pubescent. Leaves membranous ovate, apex acute or acuminate, base rounded, glabrous or partly pubescent, glaucous beneath; nerves about 5, 3 to 4·5 in. long, 2·5 to 3 in. wide; petioles 1 to 4 in. long. Inflorescence more or less puberulous; peduncle slender, 2 to 3 in. long, rays of umbel about 6. Sepals 5 to 8 elongate obovate, yellow. Petals 3 or 4 widely obovate. Female heads discoid 1 in. across. Drupes flattened when dry; endocarp with transverse ribs with tubercles at each end. *Hab.* Penang, Penara Bukit (Curtis). *Distrib.* India, Cochin-China, Malaya, Australia.

(4) *S. rotunda* Lour. *Fl. Cochinchine*, 608; *Diels, l.c.* 275.

Slender glabrous climber. Leaves ovate obtuse membranous, base rounded; nerves 10, beneath glaucescent, 3 in. long, 2·75 in. wide; petioles 2 to 5 in. long, slender. Inflorescence umbellate; peduncle slender 3·75 in. long. Branches 6, 1·5 in. long, rays of umbellule 3 in. long. Flowers racemose on short slender stalks, 1 in. across.

Sepals outer 3, linear oblong narrowed at the base, apex blunt, inner ones ovate-rounded larger 2. Petals 3, lanceolate oblique. Stamens connate in a round stalked disc; anthers below the flattened top. *Hab.* Open lowland country in the north. Lankawi, Kuap (Curtis). Perlis, Bukit Lagi and Telor Jambu (Ridley). *Distrib.* Siam, Cochin-China.

15. CISSAMPELOS, Linn.

Slender climbers. Leaves more or less peltate ovate, hairy or glabrous. Male inflorescence paniculate corymbose, axillary or in compound cymes on axillary branches with reduced leaves. Females few-flowered simple. Male flowers, sepals 4, obovate. Petals forming a cup, rarely free. Stamens connate into a column. Female flowers, sepal 1 obovate. Petal 1, shorter. Carpel 1. Drupes often pilose; endocarp with transverse warted ribs on the back. Species over 20, South American and African with one Cosmopolitan.

(1) *C. Pareira* Linn. *Sp. Pl. ed. i.* 1031; *King, Journ. As. Soc. Beng. l.c.* 386.

Stems and back of leaves softly tomentose or glabrous, orbicular or ovate obtuse, 2 in. long, 2 to 2.5 in. wide; petioles 1 to 1.5 in. long. Male cymes tomentose 1 in. long or less. Fruit red. *Hab.* Hedges, not rare. Malacca, Sungei Hudang. Pahang, Pahang River. Selangor, Kwala Lumpur. Dindings. Province Wellesley, Permatang Bertam. Penang (Wallich). *Distrib.* Cosmopolitan. *Native names:* Gasing-Gasing and Gegasing; Akar Mumpanang.

16. CYCLEA, Arnott.

Slender climbing shrubs usually hairy. Leaves cordate to deltoid, oblong more or less peltate. Inflorescence paniculate to sub-racemose, axillary or from the stem. Branches corymbose. Flowers in small heads. Male flowers, sepals connate into a lobed cup. Petals sometimes free, usually connate into a cup. Stamens connate into a column; anther-cells 4 or 5. Female flowers, sepals 1 or 2 scale-like. Petals 1 or 2, smaller. Carpels globose-ovoid, often hairy. Drupe usually hairy; endocarp sub-compressed, tubercled. Species 19, Indo-Malaya and China.

Leaves ovate acuminate peltate hairy	(1) <i>C. laxiflora</i>
Leaves oblong acuminate glabrous	(2) <i>C. elegans</i>

(1) *C. laxiflora* Miers, *Ann. Mag. Nat. Hist. Ser. 3*, xviii. 20; *Diels, Pflanzenreich, l.c.* 317.

Slender climber, very pilose. Leaves thin ovate peltate acuminate more or less pilose above, stiffly pilose beneath, 3.5 to 6 in. long, 3 to 5.3 in. wide; petioles pilose 2 in. long. Panicle pendulous from the stem, over a foot long, very lax with long branches and many

flowers. Calyx turbinate glabrous, white or creamy, 4-partite to the middle. Petals 4 linear. Drupes white pilose obliquely horseshoe-shaped obovoid compressed; endocarp with 3 tubercled ridges, .2 in. long. *Hab.* Hedges in lowlands up to 4000 ft. altitude in forests. Singapore, Changi; Tanglin; Pulau Ubin. Malacca (Griffith, Maingay). Dindings at Lumut. Perak, Thaiping Hills (Derry, Kunstler); Gunong Kerbau at 4000 ft. altitude (Robinson). Penang Hill (Maingay). *Native name*: Akar Gasing Bukit.

(2) *C. elegans* King, *Journ. As. Soc. Beng. l.c.* 387; *Ann. Bot. Gard. Calc.* vii. 116, *pl.* 132.

Climbing shrub nearly quite glabrous. Leaves lanceolate-ovate acuminate, base cordate or peltate membranous, glabrous; nerves 5 radiating from base, 3 in. long, 1.75 in. wide; petioles 1 in. long. Panicles slender, solitary, axillary. Male flowers crowded minute. Anthers about 4 broad. Drupe pisiform, slightly compressed; endocarp boldly tubercled. *Hab.* Perak, Thaiping Hills, 1500 to 2000 ft. altitude, not common (Kunstler).

ORDER VIII. NYMPHÆACEÆ.

Aquatic perennial herbs. Leaves usually floating round rarely oblong, often peltate. Scapes 1-flowered, naked. Sepals and petals free hypogynous or adnate to a fleshy disc surrounding or enveloping the carpels. Sepals 3 to 5. Petals 3 to 5 or many. Stamens numerous. Carpels 3 or more in 1 whorl, free or connate or sunk in pits in the disc. Stigmas as many as carpels, peltate or decurrent. Ovules few or many. Fruit of connate carpels, or separate indehiscent carpels, or often an enlarged turbinate disc with the carpels sunk in the crown. Temperate and tropical regions. Genera 8. Species 30 to 40.

Carpels confluent with one another; flowers showy white,

blue, red or yellow, patent

1. NYMPHÆA

Carpels confluent with the disc into a berry; flowers hardly opening, dull brown and pink

2. BARCLAYA

Carpels irregularly scattered in a turbinate disc; flowers large, showy

3. NELUMBium

1. NYMPHÆA, Linn.

Large herbs with creeping rhizome. Flowers expanded floating on long radical scapes, white, red or blue. Sepals 4. Petals in many series, inner passing into stamens, all adnate to disc. Stamens many; filaments petaloid; anthers small linear. Ovaries many in 1 series sunk in the fleshy disc forming a many-celled syncarp crowned by connate radiating stigmas. Fruit a berry. Seeds small. Species 20, whole world.

Leaves entire or slightly sinuate; flowers white to blue

(1) *N. stellata*

Leaves toothed; flowers white to pink

(2) *N. Lotus*

(1) **N. stellata** Willd. *Sp. Pl.* ii. 1153; *Hook. fil. F.B.I.* i. 114; *King, Journ. As. Soc. Beng.* lviii. (2), 389.

Leaves elliptic deeply cordate, entire or shortly toothed, purple beneath, 6 to 8 in. long. Flowers 1.5 to 6 in. across, white or tinted pale blue. Petals linear lanceolate, 10 to 30. Stamens 10 to 50, with long appendages. Common in ditches and backwaters of rivers. Flowers very variable in size from little more than an inch across to about 4 or 6 in., according to depth of water. *Hab.* Malacca, Sungei Rambei. Dindings, Pangkor (small form). Pahang, Lake Chenei (Fox) large form. Province Wellesley. Perak, Perlis, and Setul. Kelantan, near Kota Bharu. *Distrib.* Indo-Malaya, Australia. *Native names* : Ati-Ati Payah; Kelipoh; Teratei Kechil.

(2) **N. Lotus** Linn. *Sp. Pl.* 511; *Hook. fil. F.B.I.* i. 114; *Bot. Mag. t.* 4665, *var. pubescens*.

Leaves peltate deeply cordate, edge distinctly sinuate, toothed, purple and pubescent beneath, 9 in. across. Flowers 2 to 5 in. wide. Sepals blunt. Petals white to dark pink. Anthers without appendages. Stigmatic rays with clubbed appendages. *Hab.* Ponds. Malacca (Griffith); Durian Tungul (Burkill), flowers white. Patalung (Gwynne Vaughan), flowers reddish pink. *Distrib.* India, Malaya.

Often cultivated by Chinese and others for ornament; easily known when white-flowered by its strongly toothed leaves. Our form is the variety *pubescens* with leaves pubescent beneath.

2. BARCLAYA, Wallich.

Small aquatic herbs with long villous rootstocks, and floating or erect leaves. Flowers hardly expanding, pinkish. Sepals 5, narrow apiculate, inserted at the base of the ovary. Petals numerous biseriate connate below in a tube confluent with the carpels. Stamens many in many series inserted in the corolla tube; filaments short; anthers pendulous. Ovaries 6 to 8, confluent pink, apex conical; styles triangular connate into a 10-rayed cone. Berry globose pulpy. Seeds elliptic spiny, albumen floury. Species 4, Burma to Borneo.

- | | |
|-------------------------------------------------------------------------------------------------------|--------------------------|
| Leaves rounded cordate, tomentose beneath; sepals tomentose narrow with long glabrous tails | (1) B. Motleyi |
| Leaves thin, oblong ovate broad glabrous, base round; sepals narrow | (2) B. Kunstleri |
| Leaves oblong obtuse, base cordate glabrous; sepals broad, glabrous tails short | (3) B. longifolia |

(1) **B. Motleyi** *Hook. fil. Trans. Linn. Soc.* xxiii. 147, *t.* 21; *King, Journ. As. Soc. Beng. l.c.* 390.

Leaves rather thick, round cordate, blunt or apiculate, glabrous, except the nerves above, tomentose beneath, 3 in. long, 3 to 5 in.

wide; petioles fleshy tomentose reddish 3 to 7 in. long. Peduncle up to 8 or 9 in. long tomentose. Sepals narrow keeled greenish with red tomentum, 1.25 in. long, .15 in. wide. Petals linear, outer series green, inner pink tailed, innermost dark pink incurved blunt, the 2 inmost much shorter triangular incurved violet pink, tip yellow. Stamens yellow. Pistils pink. Fruit 1 in. long ovoid, pink. Seed small elliptic spiny. *Hab.* In slow streamlets in swampy ground in dense forests. Singapore, Bukit Timah. Malacca, Ayer Panas (Maingay); Sungei Hudang (Derry). Pahang. In a mud-



FIG. 10.—*Barclaya Motleyi*.

patch above Kwala Teku, Tahan River. Perak (Kunstler, Wray). Penang, Richmond Pool (Haniff). *Distrib.* Sumatra, Borneo.

(2) **B. Kunstleri** Ridl. *B. Motleyana* var. *Kunstleri*, King.

Glabrous. Leaves thin oblong-ovate, tip round, base slightly retuse 3.75 in. long, 3 in. wide; petioles 4.5 in. long. Peduncle 4.5 in. long. Sepals linear, acuminate 1 in. long, .1 in. wide, shortly apiculate. Petals claret-coloured. Capsule .75 in. long ovoid. Seeds globose echinate. *Hab.* Perak, Bera (Kunstler). Setul, Bukit Rajah Wang (Haniff).

This, in its thin glabrous leaves and globose seeds, is much nearer *B. longifolia*

than *B. Motleyi*, but the sepals are those of *B. Motleyi*, as indeed is the whole flower. In the Setul plant some of the leaves are lanceolate cordate.

(3) **B. longifolia** Wall. *Trans. Linn. Soc.* xv. 442, t. 18; *Hook. fil. F.B.I.* i. 115; *Ic. Pl.* 809, 810.

Glabrous. Leaves narrow oblong, all deeply cordate at base, lobes rounded, 6 to 8 in. long, 1 to 1.5 in. wide; petioles 4 to 9 in. long. Peduncle 6 to 12 in. long, slender. Sepals .75 to 1 in. long, .25 in. wide, lanceolate apiculate keeled. Petals oblong-linear blunt. Fruit sub-globose. Seeds globose, apiculate. *Hab.* Running streams. Lankawi (Curtis). *Distrib.* Burma, Andamans.

3. NELUMBIUM, Juss.

A large aquatic with a stout rhizome. Leaves round peltate glaucous green, on a tall petiole, high above the water. Flowers large rose pink, white or yellow, fragrant. Sepals 4 or 5 caducous. Petals and stamens many hypogynous, many-seriate caducous; anthers with a clubbed appendage. Ovaries many one-celled sunk in the flat top of a turbinate disc, ovules 1 or 2. Carpels ovoid, loose in the fibrous spongy torus. Seed ovoid, testa leathery. Species 2, 1 Asiatic, the other West Indian.

(1) **N. speciosum** Willd. *Sp. Pl.* ii. 1258; *Roxb. Fl. Ind.* ii. 647; *Wight, Ill.* i. t. 9; *King, l.c.* 391.

Leaves 1 to 2 ft. across concave glaucous. Peduncles and petioles 3 to 5 ft. long, smooth or prickly. Flowers 4 to 6 in. across. Petals elliptic, rose pink (rarely white or deep rose). Fruiting torus 2 to 4 in. across. *Hab.* Abundant in ditches in Province Wellesley, and in Pahang near the Pahang River by Pekan in swamps. Frequently cultivated by Chinese, who eat the rhizome and carpels. Possibly not native here. *Native names*: Seroja; Teratai.

ORDER IX. CRUCIFERÆ.

Herbs, often annual, or biennial. Leaves herbaceous, mostly radical, entire or lobed. Flowers bisexual, racemed terminal. Sepals 4, in 2 series. Petals 4, hypogynous, arranged crosswise, equal, white, yellow, or pink. Glands usually 4 (or 2 or 6) at base, or forming a lobed ring. Stamens hypogynous 6; filaments subulate; anthers basifixed, sagittate. Ovary of 2 connate carpels; ovules many (rarely few) parietal; style simple. Stigmas 2. Fruit a silique or silicula, 2-celled. Seeds sub-globose, usually exalbuminous. Whole world, rare in the tropics.

NASTURTIIUM, Br.

Small herbs, leaves usually lobed. Flowers small, white or yellow. Sepals short. Petals hardly clawed. Pod short or

elongate terete. Seeds in 2 rows. Species 20 or more, whole world, chiefly temperate regions.

(1) **N. indicum** DC. *Syst. Veg.* ii. 199; *Hook. fil. F.B.I.* i. 134.

A weed 4 to 8 in. tall glabrous. Leaves runcinate or oblong crenulate simple, decurrent on the petiole, 3 in. long, 1 in. wide; petioles 1 in. long winged. Racemes axillary and terminal, 3 to 4 in. long. Flowers yellow, 2 in. long. Pods linear spreading 1 in. long, 1 in. through. Seeds very numerous. *Hab.* Occasional weed in waste ground. Singapore, Gardens; Bukit Timah road; Chan Chu Kang. Penang, Convalescent Bungalow. *Distrib.* Tropical Asia.

ORDER X. CAPPARIDACEÆ.

Herbs, shrubs or trees, sometimes climbing. Leaves simple or palmately 3- to 9-foliolate. Stipules 2 or 0, sometimes spiny. Flowers solitary, racemed or umbelled, regular or irregular. Sepals 4, free or connate, valvate or imbricate. Petals 4 (rarely 2 or 0), hypogynous or seated on the disc. Stamens 4 to indefinite, hypogynous or perigynous or at the base of or on a long or short gynophore. Ovary sessile or stalked (on a gynophore) 1-celled; style short or 0; ovules indefinite on 2 to 4 parietal placentas. Fruit a capsule or berry. Seeds angled or reniform exalbuminous. Tropical or sub-tropical countries.

Herbs; stamens 6 to 20 sessile on disc	. . .	1. CLEOME
Herbs; stamens 6 adnate to gynophore	below, free	
above	. . .	2. GYNANDROPSIS
Trees or shrubs; stamens indefinite.		
Climber, petalous	. . .	3. ROYDSIA
Shrubby, petalous.		
Petals sessile; stamens inserted on the torus	. . .	4. CAPPARIS
Petals clawed; stamens adnate to the gynophore		5. CRATÆVA

1. CLEOME, L.

Herbs with 3- to 9-foliolate leaves. Flowers racemed (or solitary) yellow, white (or pink). Sepals 4, spreading. Petals 4. Stamens 6 to 20. Ovary sessile or with a gynophore; ovules many on 2 parietal placentas. Capsules oblong or linear, valves 2, separating from the seed-bearing placentas. Seed reniform. Species about 80, Cosmopolitan.

Erect, unarmed herb; flowers yellow, viscid . . . (1) **C. viscosa**
Slender branched prickly herb; flowers small white . . . (2) **C. aculeata**

(1) **Cl. viscosa** Linn. *Sp. Pl.* 672; *Hook. fil. F.B.I.* i. 170; *King, Journ. As Soc. Beng.* lviii. (2), 392. *Polanisia icosandra* W. and A. *Prod.* 22; *Wight. Ic. t.* 2.

An erect viscid herb. Leaves 3- to 5-foliolate, leaflets obovate or ovate, lower ones long petioled, upper ones sometimes sub-

sessile. Flowers yellow in terminal corymbs, long-pedicellate. Petals 5 in. long. Stamens 12 to 20. Capsule glandular pubescent narrowed to the tip, 2 to 3.5 in. long, erect. Seeds small reniform. *Hab.* Common weed carried about by cattle, the plants often springing up from their dung. Whole peninsula from Singapore to Lankawi and Kelantan. *Distrib.* Whole world. *Native name*: Kutepeng.

(2) *Cl. aculeata* Linn. *Syst. ed.* 13 iii. 232. *Cl. Hullettii* King, *l.c.* 391; *Ann. Bot. Gard. Calc. l.c.* 7, *pl.* 133A.

Herb slightly shrubby about 1 ft. tall, branched prickly puberulous. Leaves below trifoliolate petiolate, leaflets obovate, upper ones simple sessile, ovate pubescent, 5 to 7.5 in. long. Flowers small solitary axillary, 5 in. across, on slender pedicels, greenish white. Stamens 6. Capsule terete green 1.5 in. long. Seeds large muricate. *Hab.* Singapore. A weed in the town and the Botanic Gardens and fields near Tanglin. *Distrib.* Native of South America, introduced through Java, rather a small weak form.

2. GYNANDROPSIS, DC.

An annual herb, glabrous or glandular pubescent. Leaves 5-foliolate. Flowers racemed. Sepals 4. Petals 4, long-clawed. Stamens 6, filaments adnate below to the gynophore spreading above. Ovary stalked; ovules many. Capsule elongate erect; valves 2, separating from the seed-bearing placentas. Seed reniform black. Species 10, all tropics.

(1) *G. pentaphylla* DC. *Prodr.* i. 238; *Hook. fil. F.B.I.* i. 171; *King, l.c.* 392.

About 1 ft. tall. Leaves quinate long-petioled, leaflets sessile obovate or cuneate, 1 to 1.5 in. long. Flowers white with purple stamens, .35 to .8 in. long. Capsules cylindric pointed 2 to 4 in. long. *Hab.* Waste ground common from Singapore to Kedah. *Distrib.* Tropics generally. *Native names*: Maman putih; Maman antu. *Use*: As a pot-herb, planted among padi in Tringganu as a vegetable.

3. ROYDSIA, Roxb.

Large woody climbers, unarmed. Branches spotted white. Leaves simple. Flowers racemed or paniced, yellow. Calyx 6-lobed, segments biseriate. Petals 0. Stamens indefinite inserted above the base of the short gynophore. Ovary 3-celled. Styles 3. Ovules many. Fruit fleshy, 1-celled, 3-valved, 1-seeded. Species 10, India, Indo-China.

Leaves obovate, cuspidate	.	.	.	.	.	(1) <i>R. parviflora</i>
Leaves oblong, elliptic	.	.	.	.	.	(2) <i>R. Scortechinii</i>

(1) *R. parviflora* Griff. *Notulæ* iv. 578; *Ic. Pl. As. t.* 607, *f. i.*; *Hook. fil. F.B.I.* i. 409; *King, l.c.* 396.

Woody climber 4 to 8 ft. long. Leaves membranous, oblanceolate

to obovate elliptic acuminate, narrowed at the base; nerves 5 or 6 pairs, prominent beneath 3·5 to 4 in. long, 1·5 to 2·25 in. wide; petioles ·6 in. long. All glabrous. Flowers in racemes, axillary or forming a terminal panicle. Racemes 8 in. long dense-flowered. Sepals 6, velvety on both sides reflexed, ·1 in. long, linear oblong. Stamens 20; filaments equal not compressed. Stigmas 3, globular. Fruit unknown. *Hab.* Forests, Selangor, Sempang, Semangkok Pass. Province Wellesley on a rock (Kunstler) rare. *Distrib.* Burma.

(2) **R. Scortechinii** King, *l.c.* 397; *Ann. Bot. Gard. Calc.* v. 120, *pl.* 139.

A climber, glabrous with pale bark. Leaf oblanceolate shortly acuminate to broadly elliptic or elliptic-ovate, narrowed to the base, membranous; nerves 6 or 8 pairs, rather fine, elevate beneath, 5 to 6 in. long, 1·5 to 2·5 in. wide; petioles ·75 in. long. Flowers in terminal or axillary racemes or panicles about 6 in. long. Sepals 6, linear-oblong, reflexed or tomentose on both surfaces, ·1 in. long. Stamens 30; filaments unequal compressed. Gynophore very short. Stigmas 3 ovate. Fruit ovoid smooth yellow, 1·5 in. long, ·1 in. through. *Hab.* Forests. Selangor, Ginting Bidai. Perak, Larut, rocky jungle at 300 to 800 ft. altitude (Kunstler).

4. CAPPARIS, Linn.

Trees or shrubs erect tomentose or climbing often with stipular thorns. Leaves simple. Flowers white or pink often showy. Sepals 4, free, imbricate in 2 series. Petals 4, sessile imbricate. Stamens indefinite inserted on the torus at the base of the long gynophore. Ovary 1- to 4-celled; stigma sessile; ovules many or 2 to 6, on parietal placentas. Fruit fleshy. Seeds many imbedded in pulp. Species 125, all warm climates except N. America.

Flowers in simple umbels or racemes axillary.

Fruit globose.

Flowers axillary solitary; leaves 1 in. long narrow

(1) **C. Larutensis**

Flowers umbellate terminal; leaves 2 in. long

(2) **C. diffusa**

Flowers umbellate axillary; leaves 2 in. long elliptic

(3) **C. sepiaria**

Flowers racemose large; leaves 5 in. long; fruit 3 to 4 in.

(4) **C. Scortechinii**

Fruit globose 1·75 in. through; leaves 4 to 5 in. long

(5) **C. Kunstleri**

Flowers supra-axillary in rows of 2 or 3.

Leaves large 5 by 3 in.

(6) **C. micracantha**

Leaves 6 by 3 in. strongly nerved

(7) **C. perakensis**

Fruit elongate 4 to 7 in. long

(8) **C. Finlaysoniana**

Fruit elongate 3 in. long

(9) **C. cucurbitina**

Flowers in a terminal panicle of umbels, small

(10) **C. paniculata**

(1) **C. Larutensis** King, *l.c.* 393; *Ann. Bot. Gard. Calc.* v. 118, *pl.* 134.

Sarmentose or scandent prickly shrub, 30 to 40 ft. long. Branchlets and petioles minutely tomentose, prickles in pairs short hooked. Leaves glabrous coriaceous oblong-lanceolate obtuse or retuse; nerves faint 5 to 6 pairs, 1 to 1·25 in. long, 4 in. broad; petioles 2 in. long. Flowers white turning pink, 75 in. across, solitary on pedicels 5 in. long. Sepals fleshy ovate, inner ones round concave. Petals oblong glabrous. Stamens 12. Gynophore nearly 2 in. long. Fruit globose. *Hab.* Thickets. Perak, Larut, climbing on trees (Kunstler); Kampar mines, sarmentose bushes (Ridley).

(2) **C. diffusa** Ridl. *Journ. Roy. As. Soc. S. Br.* 59, p. 68.

Shrub with slender branches pubescent. Thorns hooked very small. Leaves elliptic-lanceolate glabrous, shortly blunt-acuminate, edges crisped; nerves 5 pairs, 2 in. long, 1 in. wide; petioles 15 in. long. Umbel terminal 5-flowered; peduncle 25 in. long; pedicels filiform, 1 in. long. Sepals rounded-ovate pubescent 15 in. long. Petals white oblong blunt, hairy outside. Stamens 12. Gynophore filiform 5 in. long. Ovary ovoid conic. *Hab.* Perlis on limestone rocks at Bukit Lagi.

(3) **C. sepiaria** Linn. *Sp. Pl. ed.* ii. 720; *Hook. fil. F.B.I.* i. 177; *King, l.c.* 393.

A scandent bush, much branched. Thorns short recurved. Leaves membranous, ovate to oblong, sometimes pubescent; nerves 4 or 5 pairs; petioles 05 in. long. Flowers 35 to 5 in. across in terminal umbels with slender 5 in. long pedicels. Buds globose. Sepals oblong. Petals narrow white. Ovary apiculate. Gynophore 25 to 5 in. long. Fruit pisiform, black. *Hab.* In thickets with *C. micracantha*. North of the peninsula. Kedah, Alor Sta. Common. *Distrib.* India, Cochin-China, Timor.

(4) **C. Scortechinii** King, *l.c.* 394; *Ann. Bot. Gard. Calc.* v. (2), 118, *pl.* 135.

A climber, young parts and inflorescence red-woolly. Thorns stipular, in pairs hooked. Leaves coriaceous, broad lanceolate-acuminate, much narrowed at base, eventually glabrous; nerves 6 pairs, prominent beneath, 5 to 6 in. long, 2 to 3 in. broad; petioles 5 in. long. Flowers 15 across, on short woody lateral racemes. Bracts petiolate ovate 75 in. long. Sepals round concave tomentose outside. Petals pink, broadly elliptic obovate notched. Stamens more than 20. Fruit globose 35 to 4 in. through. Gynophore 25 in. long, 6 in. through. *Hab.* Dense jungle in hilly spots. Perak, Batang Padang district (Kunstler). Penang, Batu Feringhi (Curtis).

(5) **C. Kunstleri** King, *l.c.* 396.

Scandent, 40 to 60 ft. tall, glabrous. Thorns in pairs stipular short, hardly 1 in. long. Leaves thinly coriaceous oblong-lanceolate to oblanceolate acute, narrowed and cuneate at the base; midrib and

nerves 7 pairs, curving and inarching within the margin, prominent beneath, 4·5 to 5·5 in. long, 1·5 to 2·25 in. wide; petioles ·5 in. long. Fruit solitary axillary globose, 1·5 to 2 in. through deep yellow. Gynophore stout 2·5 in. long; pedicel 1·5 in. long. *Hab.* Perak, Gunong Bubu, at 400 to 800 ft. altitude (Kunstler). Flowers unknown.

(6) *C. micracantha* DC. *Prodr.* i. 247; *Hook. fil. F.B.I.* i. 179; *King, l.c.* 394.



FIG. 11.—*Capparis micracantha*.

A thorny bush, glabrous, spines in pairs, stipular, straight. Leaves thinly coriaceous dark green, broadly lanceolate to ovate acutely acuminate, base cuneate or rounded; nerves 7 or 8 pairs, 3 to 6 in. long, 1·5 to 2·5 in. wide; petioles ·3 in. long. Flowers 2 or 3 together, supra-axillary 1 to 1·5 in. across. Sepals oblong, puberulous. Petals oblong white, the two lower ones with an orange blotch, soon turning deep purple, at the base. Stamens 15 to 20, shorter than the gynophore. Fruit, 2 to 3 in. through

globose green. *Hab.* Seashores and sandy spots, chiefly in the north. Johor, Pulau Aor, off the Johor coast. Penang, Pulau Badak and Pulau Tikus. Pulau Adang. Kedah, Alor Sta. Perlis, Kanga. Kelantan, Kota Bharu, *Distrib.* Burma, Siam.

(7) **C. perakensis** Ridl. *C. pubiflora* var. *perakensis* King, *l.c.* 394.

A straggling shrub 5 ft. tall, glabrous, with minute thorns in pairs. Leaves membranous, elliptic-oblong acuminate, base narrowed or rounded; nerves 9 or 10 pairs and reticulations prominent, 5 to 7 in. long, 2 to 2.5 in. wide; petioles .25 in. thick sulcate. Flowers 1 in. across, supra-axillary. Bracts narrow acute; pedicels long, slender. Sepals oblong concave, 2 outer ones pubescent outside. Petals white oblong, the 2 posterior united at the base by a gland, pubescent above and round the gland, with a purple blotch. Stamens numerous. Gynophore 1 in. long with ovary pubescent. *Hab.* In damp shady forests. Perak (Scortechini). Kelantan, Chaning Woods, Kelantan River.

(8) **C. Finlaysoniana** Wall. *Cat.* 6992; *Hook. fil. F.B.I.* i. 179; *King, l.c.* 395.

Sarmentose-scandent, glabrous. Thorns stipular nearly straight, in pairs, very short, bases broad, tips blunt black. Leaves coriaceous, broadly lanceolate to elliptic, shortly acuminate; midrib and 7 pairs nerves prominent beneath, 6 to 7.5 in. long, 2.25 to 3 in. wide; petioles .4 in. long. Flowers solitary or in pairs, large white with a golden spot at the base of the lower petals. Sepals lanceolate acute. Fruit cylindric, tapering to tip, 4 to 7 in. long, 1 to 1.5 in. wide, red on a gynophore, 1.5 in. long, with a pedicel as long. Seeds, .4 in. long, ovoid. *Hab.* Singapore, sandy open country, Changi, now very rare. Pahang. P'lawan, Rumpin (Foxworthy). *Native name:* Jambol Merah.

(9) **C. cucurbitina** King, *l.c.* 395; *Ann. Bot. Gard. Calc.* i. (2), 119, *pl.* 136.

A climber, with stout branches nearly glabrous. Leaves coriaceous, elliptic lanceolate to lanceolate acuminate, base shortly narrowed or not; nerves 8 or 9 pairs, prominent beneath inarching .1 in. or less from edge, secondary nerves conspicuous, 5.5 in. to 7.5 in. long, 1.75 to 2.25 in. wide; petioles .2 in. long slender. Flowers in fascicles of 2 or 3, on pedicels over 1 in. long. Sepals ovate lanceolate acuminate puberulous. Petals broadly elliptic obtuse. Stamens 20. Gynophore short. Fruit cylindric, narrowed to base, shortly apiculate, when ripe 3 in. long, 1.25 in. through, orange coloured; gynophore .75 in. long; pedicel 1.25 in. long. Seed ovoid smooth, .4 in. long. *Hab.* Dense mixed jungle at 500 to 700 ft. altitude. Perak, Ulu Bubong (Kunstler). Dindings (Ridley).

(10) **C. paniculata** Ridl. *Journ. F.M.S. Mus.* x. 129.

Long slender thorny climber, much branched. Thorns short

recurved. Leaves thinly coriaceous, elliptic acute, base blunt, 5·5 in. long, 2·5 in. wide; petioles 1·5 in. long. Flowers greenish white, 2·5 in. across, in umbels of 6 on peduncles, 7·5 in. long, in a pendent terminal panicle 6 in. long. Sepals outer boat-shaped, inner ones larger, with a thin white edge. Petals connate at base, broad thin. Stamens little longer. Gynophore hardly longer than filaments. Ovary small conic. Fruit pea-shaped small. *Hab.* In dense forests. Kelantan, near Chaning Estate, Kelantan River. *Distrib.* Borneo. Sumatra.

5. CRATÆVA, Linn.

Trees unarmed. Leaves trifoliolate, membranous. Flowers large in terminal racemes, yellowish white. Sepals 4. Petals 4, obovate long clawed. Stamens indefinite, adnate to the base of the gynophore. Ovary on a slender gynophore, 1-celled. Stigma sessile. Ovules many on 2 parietal placentas. Fruit baccate with a woody pericarp. Seeds numerous imbedded in pulp. Species about 6, tropical countries.

Tree; leaflets elliptic, acute, rather stiff; fruit 2 in.

long, oblong

(1) *C. macrocarpa*

Shrub; leaflets lanceolate, acuminate, thin; fruit 1 in.

long, globose

(2) *C. religiosa*

(1) *C. macrocarpa* Kurz, *Journ. Bot.* 1874, 195, t. 148, figs. 8 to 10; King, *l.c.* 398.

A fairly large tree, about 60 ft. tall. Leaves membranous, leaflets nearly sessile elongate-oblancoate acuminate acute, glabrous; nerves about 8 pairs, prominent beneath inarching within margin, 4 to 6 in. long, 1·75 to 3·2 in. across. Flowers in terminal racemes, 2 to 3 in. long. Sepals green 2 in. long. Petals white, 1·5 in. long, 80 in. wide, ovate clawed, rounded. Stamens pink, 3 in. long. Gynophore as long. Fruit large woody oblong globose, fawn colour with paler spots, 2 or 3 in. long. Seeds 4 in. long, ovoid reniform compressed shortly tubercled on the edges. *Hab.* River banks, not rare. Pahang, Tahan River and Chenei. Malacca, Tampoi; Selangor, etc. Selangor, Batang Berjuntai. Perak, Kwala Kangsa; Kertai River (Kunstler). Penang, Balik Pulau. *Distrib.* Indo-China. *Native names:* Kulumbai; Dala.

(2) *C. religiosa* Forst. *Prodr.* 35; Hook. *fil. F.B.I.* i. 172.

Tree or shrub, not very tall. Leaves deciduous at flowering time, leaflets lanceolate acuminate, narrowed at the base, thinly coriaceous glaucous beneath; nerves about 10 pairs, secondary nerves as conspicuous, 4 to 5 in. long, 2 to 2·25 in. wide; petiolules 1 in. long; petioles 2·25 in. long. Flowers in a short raceme, about 4 in. long. Sepals narrow lanceolate acute 2 in. long. Petals obovate round clawed, cream colour, 1 in. long, 5 in wide,

narrowed somewhat at the tip. Stamens violet, slender. Gynophore slender, as long. Fruit globose to ovoid, about 1 in. long. *Hab.* Malacca, sandhills, Tanjong Kling. Selangor at Pudok. A dwarf form on the sandhills, not more than 4 ft. tall, but flowering. Possibly not native in either place, but it seemed to have established itself at Tanjong Kling, far away from the village. Plants occasionally are to be seen in gardens. *Distrib.* India. *Native name*: Cadat.

ORDER XI. VIOLACEÆ.

Herbs or shrubs or small trees. Leaves alternate, entire or serrulate, stipulate. Flowers regular or irregular bibracteate. Sepals 5, imbricate in bud equal or unequal. Petals 5 hypogynous, equal or unequal, imbricate or contact in bud. Stamens 5; filaments short thick; anthers free or connate, cells often with apical processes, connective broad produced beyond the cells. Ovary sessile superior, 1-celled; style simple. Stigma capitate or truncate entire or lobed. Ovules many on 3 parietal placentas, anatropous. Fruit a 3-valved capsule. Seeds small or very small. Albumen fleshy. Genera 21. Species 240, temperate and tropical regions of both hemispheres.

Herbs; corolla irregular; lower petal dissimilar	.	.	1. VIOLA
Shrubs or trees; corolla regular, no staminodes	.	.	2. ALSODEIA
Herbs, erect; corolla regular; staminodes numerous	.	.	3. NECKIA

1. VIOLA, L.

Herbs usually stoloniferous. Flowers on 1- rarely 2-flowered peduncles, axillary. Sepals produced at base. Petals erect or spreading, lowest the largest spurred or saccate at the base. Anthers connate, connectives of the 2 lower ones often spurred at the base. Style clavate or truncate. Stigma blunt lobed or cupular. Capsule 3-valved. Seeds ovoid or globose. Species 100, all cool regions.

(1) *V. serpens* Wall. *Roxb. Fl. Ind.* ii. 449; *Hook. fil. F.B.I.* i. 184; *King, l.c.* 399.

Stoloniferous glabrous (or hirsute). Stems long, leafy. Leaves ovate-cordate blunt or acute, crenate-serrate, 1.5 to 2.3 in. long, 7 to 1.3 in. wide, hairy beneath. Stipules toothed. Sepals acute .2 in. long. Corolla pale lavender, lower petals streaked darker violet purple, rarely all white, .5 in. long, spur short rounded. Petals blunt. Capsule .4 in. long; valves blunt. *Hab.* Banks and shady spots, at 3000 to 4000 ft. altitude. Perak, Telom, Ulu Batang Padang on stream banks and in clearings at 4000 ft. altitude. Penang, Government Hill at 3000 ft. altitude (now extinct here). *Distrib.* India, Java, Sumatra, China.

2. ALSODEIA, Thouars.

Treelets or shrubs. Leaves alternate or opposite entire or serrate. Flowers small white or yellow, solitary, racemed or paniculate, axillary or terminal. Sepals 5, sub-equal. Petals 5 sub-equal sessile. Stamens 5, filaments free or connate, inserted on or inside an annular disc, with long or short dorsal membranous appendages; anther-cells sometimes with linear processes. Ovary ovoid; style straight. Stigma terminal. Ovules few or many. Capsule 3-valved. Seeds few. Species about 50, tropics generally.

i. PROSTHESIA. *Anthers with a subulate appendage from the tip of each cell and broad dorsal appendages from the connective.*

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| Capsule globose bluntly angled, pale, warty;
leaves large, glabrous | (1) <i>A. Wallichiana</i> |
| Capsule ovate acute; leaves broad, glabrous | (2) <i>A. Kunstleriana</i> |
| Capsule unknown.
Leaves broad lanceolate, acuminate; with
flowers hairy | (3) <i>A. hirtella</i> |
| Capsule globose warty.
Cymes very short; flowers small; leaves about
3 in. long glabrous | (4) <i>A. lankawiensis</i> |
| Capsule ovoid glabrous.
Cymes very short; flowers small; leaves thin
and hairy | (5) <i>A. dasycaula</i> |
| Capsule valves 1 in. long, boat-shaped.
Cymes racemose .5 in. long | (6) <i>A. Wrayi</i> |
| Capsule valves .75 in. long
Cymes paniced, 1 in. long; leaves large 7 in.
long | (7) <i>A. Hookeriana</i> |
| Capsule ovoid .5 in. long.
Cymes corymbose peduncled; flowers rather
large | (8) <i>A. Maingayi</i> |
| Capsule ovoid .75 in. long.
Raceme of cymes terminal 4 in. long | (9) <i>A. cinerea</i> |

ii. PENTALOBA. *Anthers with broad appendages from connectives only.*

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|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| Fruit not spiny hairy.
Cymes very small; leaves 3 in. long ovate | (10) <i>A. minutiflora</i> |
| Cymes small not peduncled.
Leaves lanceolate; capsule silky small | (11) <i>A. lanceolata</i> |
| Leaves oblong; capsule glabrous 1.25 in. long | (12) <i>A. pachycarpa</i> |
| Leaves lanceolate, long, acuminate large;
capsule .5 in. | (13) <i>A. Scortechinii</i> |
| Cymes corymbose peduncled many-flowered.
Flowers .08 in. long; numerous crowded | (14) <i>A. condens</i> |
| Flowers .15 in. long; leaves 4 in. long | (15) <i>A. floribunda</i> |
| Flowers .3 in. long; leaves 10 in. long | (16) <i>A. grandiflora</i> |
| Capsules covered with soft bristles. Cymes small.
Leaves oblong lanceolate; capsule sparsely
bristly | (17) <i>A. capillata</i> |
| Leaves lanceolate acuminate toothed; capsule
densely bristly; anthers with a subulate
process from each cell, no appendage to
connective | (18) <i>A. comosa</i> |
| Leaves, oblong, obovate, toothed; capsule 2 in.
across, densely felted | (19) <i>A. echinocarpa</i> |

(1) **A. Wallichiana** Hook. *fl. F.B.I.* i. 187; *King, l.c.* 400.

A glabrous shrub, 10 to 15 ft. tall. Leaves membranous, oblong-lanceolate or elliptic acuminate, sometimes serrulate, base rounded; nerves 10 to 12 pairs, 9 to 12 in. long, 2·5 to 5 in. wide; petioles 5 to 1·5 in. long. Stipules linear lanceolate 75 in. long. Racemes shorter than petioles. Bracts many, linear. Flowers 4 to 8, yellow, unisexual. Males, sepals acute lanceolate as long as petals. Petals oblong. Filaments short, attached to a 5-lobed disc; anthers ovate, a small point on each lobe in front and a large orbicular one on the back. Females, sepals ovate acute, shorter than petals. Petals oblong, tips recurved. Filaments longer than in males but anthers without pollen. Ovary sessile ovoid-conic. Capsule sub-globular, bluntly 3-angled warty 35 in. long; valves blunt. Seeds mottled. *Hab.* Woods. Johor, Pulau Aor; Pulau Tioman (Burkill). Malacca, base of Mt. Ophir. Selangor, Batu caves. Perak, Lenggong; Goping (Kunstler). Penang (Wallich). Government Hill (all collectors). *Native name*: Suntan Tiga.

(2) **A. Kunstleriana** King, *l.c.* 401; *Ann. Bot. Gard. Calc.* vii. 122, *pl.* 141.

A glabrous shrub or treelet. Leaves sub-coriaceous, oblong-lanceolate acuminate, base narrowed sub-cordate, minutely serrulate or not, rather rough; nerves 14 to 16 pairs, prominent, 6 to 10 in. long, 2·25 to 3 in. wide; petioles 25 in. to 5 in. long. Stipules lanceolate 25 in. long. Flowers, female 3 in. long, white in axillary racemes, very short 3- to 8-flowered. Sepals ovate blunt, edges ciliate, shorter than petals. Petals ovate acute, stiff. Filaments short, flat; anthers broad with two linear anterior appendages and one dorsal-, one halberd-shaped, all connivent to a cone over the ovoid-conic ovary. Capsules ovoid 5 in. long; valves narrow pointed. Seeds 1 to each valve, ovoid, white. *Hab.* Forests. Johor, Gunong Pantai; Gunong Janeng (Kelsall). Pahang River. Malacca, base of Mt. Ophir (Hullett). Selangor, Batu caves. Dindings. Perak, Lenggong; Goping and Gunong Pondok (Kunstler). *Native names*: Ligoh Sigoniah; Marujan Nunko.

(3) **A. hirtella** Ridl. *Kew Bulletin* 1914, p. 377.

Small tree. Branches, petioles, nerves of leaves and inflorescence covered with stiff hairs. Leaves lanceolate, long-acuminate obtuse, base narrowed, unequal, edges serrulate or nearly entire; nerves 16 pairs, 6 to 10 in. long, 2 to 2·5 in. wide, glabrous above, stiffly hairy beneath on midrib and nerves; petioles 6 to 1 in. long, hairy. Racemes short axillary 6-flowered. Flowers white. Sepals 3, outer ones orbicular imbricate, hairy outside, strongly ribbed, inner 2 glabrous. Petals little longer oblong obtuse or truncate with a few processes at the tip, glabrous. Stamens glabrous; filaments flat, as long as the anther; anther-cells with elongate processes; dorsal appendage wider ovate acute. Ovary hairy. Capsule 6 in. long, valves ovate sub-acute, hairy pale green.

Hab. Open forest Penang, Waterfall (Curtis). *Rare.* *Distrib.* Borneo.

(4) **A. lankawiensis** *Ridl. Journ. Roy. As. Soc. S. Br.* 59, p. 70. Shrub. Stems pale. Leaves coriaceous, 4 to 8 in. long, 1·5 to 2·5 in. wide, elliptic-lanceolate or ovate-lanceolate acuminate, base narrowed, edge slightly serrulate; nerves 9 pairs; petioles ·5 in. long, glabrous or hairy. Racemes small axillary; pedicels ·12 in. long. Flowers as long, unisexual. Males, sepals ovate, edges ciliate. Petals oblong, twice as long. Filaments terete; anthers oblong, with 2 short horns at the tip; appendages (dorsal) reniform, thin. Females, similar but staminodes with narrow lanceolate appendages. Ovary globose; style cylindric, stout. Disc annular. Fruit globose, brown warty. *Hab.* Lankawi at Kwah and Terutau (Curtis).

(5) **A. dasycaula** *Miq. Fl. Ind. Bat. Supp.* i. 391. *A. membranacea* *King, l.c.* 402; *Ann. Bot. Gard. Calc.* vii. 122, *pl.* 140B. *A. hispida* *Ridl. Journ. Roy. As. Soc. S. Br.* 61, p. 50.

Tree 20 to 30 ft. high, 4 to 8 in. through. Branchlets pubescent. Leaves thin, oblique obovate elliptic, abruptly acuminate, serrate, base narrowed, glabrous except the nerves, 6 to 8 pairs and midrib beneath, 5 to 7 in. long, 2·5 to 3 in. wide; petioles pubescent, ·5 in. long. Stipules subulate, pubescent, ·2 in. long. Racemes axillary very short, ·2 in. long, few-flowered. Sepals 5, unequal ovate, pubescent outside. Petals obovate-oblong obtuse, ciliate. Filaments very short; anthers cordate or reniform, with 2 small subulate processes on the cell tips and a cordate-acuminate appendage on the back. Ovary villous; style glabrous. Capsule ovoid glabrous, valves blunt. Seeds globular, caruncle beaked. *Hab.* Perak, Goping (Kunstler). Perlis, Kanga. Pulau Adang. *Distrib.* Sumatra. *Native name:* Melor Angin.

Miquel's specimens in Herb. Kew and his description of *A. dasycaula*, l.c. are both poor, but indistinguishable from King's plant. My *A. hispida* seems to be a more hairy form only.

(6) **A. Wrayi** *King, l.c.* 403; *Ann. Bot. Gard. Calc.* vii. 124, *pl.* 142B.

Tree 15 to 20 ft. tall. Stem 2 to 3 in. through. Leaves membranous, bright green, oblanceolate acuminate, serrulate or not, narrowed to the base, 5·5 to 8 in. long, ·9 to 2·5 in. wide; petioles ·1 to ·2 in. long. Stipules linear, ·1 in. long. Racemes very short, ·5 in. long, crowded axillary. Bracts ovate pubescent. Sepals lanceolate, tomentose. Petals oblong obtuse, tomentose on midrib. Anthers ovate-cordate with 2 terminal processes and an ovate acute dorsal process as broad as itself. Ovary and base of style villous. Capsule velvety when young, glabrous when old, valves 1 in. long, boat-shaped. Seed mottled. *Hab.* Hill woods, Perak, Kenering (Wray); Goping and Thaiping, altitudes up to 1000 ft. (Kunstler).

(7) **A. Hookeriana** King, *l.c.* 402; *Ann. Bot. Gard. Calc.* vii. 123, *pl.* 142A.

Tree 20 to 30 ft. tall with hanging branches. Leaves membranous, glabrous, lanceolate or oblanceolate, abruptly acuminate, entire or serrulate, narrowed to base; nerves 7 to 9 pairs, curved, 5 to 8 in. long, 1·5 to 2 in. wide; petioles 25 in. long. Stipules ovate, 1 in. long, glabrous. Panicles axillary and below the fallen leaves, numerous, short compact when young, increasing to 1 in. and lax when old. Pedicels 1 in. long. Sepals ovate equal, pubescent. Petals white, ovate obtuse or lanceolate. Filaments glabrous as long as the long disc; anthers ovate-cordate, cells with 2 apical points and a dorsal appendage ovate acute, wider than the anther. Ovary pubescent. Capsule ovoid, valves smooth blunt boat-shaped, 9 in. long, 3 in. wide. Seeds subglobose, caruncle papillose pitted. *Hab.* Hill woods 1800 to 2000 ft. altitude. Perak, Larut (Kunstler); Hermitage Hill. Pahang, Bentong (Foxworthy). *Native name*: Kayu Chempaka Ayer.

(8) **A. Maingayi** Hook. *fil. F.B.I.* i. 188; King, *l.c.* 402.

A small tree, glabrous. Leaves membranous sub-sessile, elliptic acuminate, base cuneate, crenulate, serrate or nearly entire; nerves 10 to 12 pairs, prominent as are the secondary parallel nerves, 5 to 10 in. long, 3 in. wide; petioles 1 in. or less long. Cymes 5 in. long on peduncles, 5 to 7 in. long, 8- to 16-flowered. Sepals 2 in. long, imbricate, oblong, edges ciliate, outer 3 larger than the inner 2. Petals imbricate ovate, longer, villous in centre. Stamens, filaments short, thick, villous, connective tomentose on back; anthers with two setose anterior and one ovate villous sub-terminal dorsal appendage. Ovary and style villous, disc glabrous. Capsule ovoid, nearly glabrous, valves sub-acute 5 in. long. Seeds smooth with a white caruncle. *Hab.* South of the peninsula; Johor, Ulu Batu Pahat (Kelsall). Malacca (Griffith and Maingay).

(9) **A. cinerea** King, *l.c.* 403; *Ann. Bot. Gard. Calc.* vii. 124, *pl.* 143A.

Shrub 6 to 8 ft. tall, glabrous. Leaves membranous, elliptic-ovate or lanceolate acuminate, narrowed to the base, serrulate, drying pale; nerves 8 to 10 pairs, 4 to 6 in. long, 1·5 to 2·5 in. wide; petioles 2 to 4 in. long. Stipules scarious ovate acute, puberulous, 25 in. long. Panicles terminal, 4 to 6 in. long, narrow with rather distant cymes, 2 to 4 in. long. Bracts ovate scarious. Sepals ovate ciliate. Petals oblong obtuse, tips undulate or toothed, edges ciliate. Anthers ovate, terminal appendages subulate, dorsal one ovate, from the middle of the back. Ovary glabrous. Capsule ovoid, glabrous, 75 in. long, valves blunt. Seeds globose with an ovoid beaked hilum. *Hab.* Forests. Perak, Larut Hills at base (Kunstler). var. *hirsutiflora* King, *l.c.* 404; sepals tomentose, filaments villous. Perak, Changkat Jerin (Wray).

(10) **A. minutiflora** *Ridl. Journ. Roy. As. Soc. S. Br.* 59, p. 71.

Shrub. Branches slender, hairy. Leaves elliptic-ovate to ovate, edges dentate, base cuneate or rhomboid, 1.5 in. long, .75 in. wide, glabrous; petioles .1 in. long. Flowers solitary axillary with oval bracts at base, white, .1 in. long; pedicels .25 in. long. Sepals ovate, rounded. Petals lanceolate obtuse. Stamens, anthers elliptic-oblong, appendages lanceolate acute, narrower but little shorter than petals. Style in female flower long, slender with short arms. Capsule .5 in. long, valves boat-shaped, beaked by the persistent style. Seeds globose, white .12 in. through, 2 in each valve. *Hab.* Perlis at Kanga (Ridley). *Distrib.* Siam.

(11) **A. lanceolata** *Wall. Cat.* 4023; *Hook. fil. F.B.I.* i. 188; *King, l.c.* 404.

Shrub 6 to 8 ft. tall, glabrous. Leaves membranous, elongate lanceolate, blunt acuminate, base narrowed; nerves 9 to 12 pairs, secondaries transverse, 5 to 8 in. long, 1.25 to 1.75 in. wide; petioles .2 in. long. Racemes axillary .5 in. long or less, 4- to 6-flowered; pedicels pubescent. Flowers .2 in. long. Sepals ovate blunt, pubescent. Petals lanceolate acuminate, centre villous. Anthers as long as filaments, linear-lanceolate with 1 terminal lanceolate appendage. Ovary villous. Fruit sub-globose, pubescent, .35 in. long, valves beaked. *Hab.* Malacca, Mt. Ophir (Ridley). Penang, on Government Hill (all collectors). Common here. *Native name* : Ina Kechil.

(12) **A. pachycarpa** *King, l.c.* 408.

Small glabrous tree 20 to 25 ft. tall. Leaves membranous, oblong to elliptic-lanceolate acuminate, minutely serrate, base narrowed; nerves 11 to 14 pairs, 5 to 7 in. long, 2 to 3 in. wide; petioles .4 in. long. Panicle small dense axillary. Flowers numerous, crowded. Bracts oblong, ciliate at the tip. Outer sepals 3 orbicular-ovate, backs silky, edges ciliate, inner 2 more ovate glabrous. Petals ovate obtuse. Filaments shorter than anthers; anthers lanceolate with a narrow lanceolate point at the tip. Ovary cylindric, glabrous; style stout. Stigma discoid. Capsules on short thickened branches, 1.25 in. long, narrowed at the base, valves boat-shaped, separating when ripe into an outer leathery pubescent or glabrous layer and an inner pale cartilaginous one. Seeds angular. *Hab.* Hill forests. Selangor, Semangkok Pass (Ridley). Perak, Waterloo estate (Curtis).

(13) **A. Scortechinii** *King, l.c.* 405; *Ann. Bot. Gard. Calc.* v. (2), 126, *pl.* 144.

Shrub or tree 20 to 25 ft. tall. Leaves membranous large, elliptic acuminate to lanceolate serrulate; nerves 12 to 13 pairs, secondaries transverse, 7 to 9 in. long, 2 to 3 in. wide; petioles .2 in. long. Racemes short sessile condensed, several together, axillary. Bracts ovate. Flowers pedicelled, white, .2 in. long. Sepals broadly ovate. Petals oblanceolate acuminate, longer.

Stamens, filaments slender, longer than anthers; anthers short ovate with one terminal appendage. Ovary globose, glabrous warty. Capsule ovoid, .5 in. long, valves boat-shaped, beaked. Seeds 2, rounded, smooth. *Hab.* Forests, Selangor, Kwala Lumpur (Curtis). Perak, Larut Hills (Kunstler). *Distrib.* S. Siam.

(14) **A. condensa** King, *l.c.* 405; *Ann. Bot. Gard. Calc.* v. (2), 126, *pl.* 145.

Glabrous tree 30 to 40 ft. tall, 6 to 10 in. through. Leaves membranous, elliptic sub-acute, serrulate, base cuneate unequal; nerves 13 to 15 pairs, elevate beneath, secondaries transverse, 8 to 14 in. long, 3 to 4.5 in. wide; petioles .25 to .35 in. long. Stipules subulate, .35 to .5 in. long. Panicles axillary compact, much branched, 1.75 to 2.5 in. long. Bracts numerous, ovate acute. Flowers pale green, .1 in. long. Sepals unequal, outer 2 or 3 larger, round, inner ovate pubescent. Petals little longer, ovate villous. Anthers cordate with one ovate appendage. Ovary glabrous. Capsules ovoid pointed, glabrous. *Hab.* Chandleriang under 800 ft. altitude (Wray); Kedah at Yan (Ridley).

(15) **A. floribunda** King, *l.c.* 406; *Ann. Bot. Gard. Calc.* v. (2), 125, *pl.* 143B.

A shrub 8 to 10 ft. tall, or tree to 60 ft. high; young branches tomentose. Leaves membranous, oblong-lanceolate to elliptic acute, more or less serrulate, base rounded, above glabrous except nerves, beneath minutely tomentose; nerves 14 to 16 pairs, secondaries transverse, 4.5 to 7 in. long, 1.5 to 2.5 in. wide; petioles .1 to .2 in. long. Stipules lanceolate, pubescent, .25 in. long. Cymes axillary 1.5 in. across, on peduncles, 1 to 1.5 in. long, many-flowered. Flowers yellowish white. Bracts oblong obtuse, pubescent. Sepals unequal pubescent, 3 ovate round and 2 ovate. Petals ovate-oblong blunt, tips reflexed. Disc 10-lobed, pilose. Filaments dilate and pilose towards the tip; anthers elongate ovate; appendage terminal ovate. Ovary villous; style puberulous. Capsule ovoid pubescent, valves blunt. *Hab.* Woods, Singapore, Ang-mo-kio. Perak, Larut Hills; Goping and Tapa; Gunong Bubu (Kunstler). *Distrib.* Sumatra.

(16) **A. grandiflora** Ridl. *Kew Bulletin* 1914, p. 377.

A shrub about 8 ft. tall, glabrous. Leaves large elliptic-lanceolate acuminate, base rounded; nerves 10 pairs with transverse secondaries elevate beneath, 8 to 10 in. long, 2 to 4 in. across; petioles hardly any. Panicles axillary or extra-axillary, 1.5 to 3 in. long. Peduncle over 1 in. long. Flowers numerous, white. Sepals lanceolate sub-acute, edges ciliate, .1 in. long. Petals .3 in. long, linear-lanceolate obtuse; midrib silky. Stamens, filaments as long as anthers, hairy; anthers narrow lanceolate acute, with a lanceolate prolongation at the tip. Ovary villous; style cylindric, villous. Disc rather deep, glabrous, 5-lobed. *Hab.* Woods, Singapore at Ang-mo-kio. Johor, Ulu Batu Pahat (Kelsall).

(17) **A. capillata** King, *l.c.* 407; *Ann. Bot. Gard. Calc.* v. (2), 127, *pl.* 146A.

A shrub 4 to 8 ft. tall. Branchlets tomentose. Leaves membranous, lanceolate acuminate at both ends, serrulate, above glabrous except nerves, beneath pubescent; nerves 11 pairs bold, 6 to 7 in. long, 1.5 to 1.75 in. wide; petioles .25 in. long. Stipules lanceolate, outside pubescent. Flowers in 3- to 5-flowered small axillary-cymes. Sepals narrow oblong obtuse, tomentose outside. Petals



FIG. 12.—*Alsodeia echinocarpa*.

linear-oblong sub-acute, tip reflexed, hairy outside. Stamens glabrous; anthers small ovate, with an ovate acute terminal appendage. Ovary villous. Capsule .5 in. long, pubescent densely with soft pubescent spines .5 in. long. Seeds ovoid. *Hab.* Forests. Perak, Larut (Kunstler); Bujong Malacca and Gunong Keledang. Selangor, Ulu Gombak. Dindings, Lumut and Telok Sera.

(18) **A. comosa** King, *l.c.* 407; *Ann. Bot. Gard. Calc.* v. (2), 127, *pl.* 146B.

Shrub or small tree. Branchlets tomentose. Leaves membranous oblong-lanceolate caudate-acuminate, serrulate, base

rounded, above glabrous, beneath pubescent; nerves 11 to 14 pairs, 5.5 in. to 7.5 in. long, 1.5 to 2.5 in. wide; petioles .2 in. long. Stipules subulate, .3 in. long. Flowers white or yellow. Sepals ovate blunt tomentose. Petals lanceolate acuminate, pubescent outside. Both with terminal tufts of hairs. Filaments shorter than anthers; anthers narrow ovate, each cell with a terminal seta, no appendage. Ovary sparsely villous; style pubescent. Capsule .5 in. long densely covered with soft pubescent spines about .5 in. long. *Hab.* Forests, Selangor, Dusun Tua; Rawang (Kloss). Perak, Tapa (Wray); Goping (Kunstler). *Distrib.* Cochin-China.

(19) **A. echinocarpa** Korth. *Ned. Kruidk. Arch.* ii. 360; *King, l.c.* 407.

A bush or small tree as much as 30 ft. tall. Young branches tomentose. Leaves membranous, obovate or ovate-elliptic abruptly acuminate, boldly serrate, base rounded or cuneate, above glabrous except nerves, beneath pubescent; nerves 11 to 15 pairs, prominent, 6.5 to 9 in. long, 2.25 to 3.25 in. wide; petioles .1 to 2 in. long. Stipules ovate acute .25 in. long, acute pubescent. Cymes axillary, pubescent, condensed sessile, 3- to 6-flowered. Bracts lanceolate. Sepals ovate obtuse tomentose. Petals little longer, oblong pubescent outside, white. Stamens and disc glabrous; anthers ovate-cordate, with a small terminal appendage. Ovary villous. Capsule large, 1 to 2 in. across covered with tomentose felted fibres, valves compressed, blunt, .75 in. long. Seed subglobose. *Hab.* Common in woods from Singapore to Tringganu. *Distrib.* Southern Siam, Borneo, Sumatra and Cochin-China, Laos. *Native names:* Aho Lumut; Ardani (Penang); Jenta-Jenta; Lalada or Lelada; Sebilik; Segumpa betina; Kayu Rembut; Medang Gombot; Jangut Baong. *Use:* Seeds as a purgative.

3. NECKIA, Korth.

Small herbs with slightly woody erect stems usually simple and more or less covered with bristly hairs (stipules). Leaves lanceolate, serrate. Flowers small, pink or white on long peduncles axillary. Sepals sub-equal. Petals equal. Staminodes dimorphous, outer setaceous or gland-like, inner 10 connate with the stamens into a tube. Stamens, filaments very short; anthers oblong. Ovary many-ovuled. Capsule septicidally 3-valved. Seeds numerous. Species about 7, Malay Islands.

(1) **N. malayana** Ridl. *Journ. Roy. As. Soc. S. Br.* 49, p. 11.

Whole plant 3 to 12 in. tall. Stipules of red brown bristles .25 in. long. Leaves lanceolate acuminate at both ends, edges bi-serrate, shortly pale beneath, 1.5 to 7 in. long. Flowers on peduncles 1 in. long. Sepals lanceolate acute, toothed. Petals ovate obtuse, rose pink. Stamens monadelphous, 10. Capsule ovoid acute, longer than sepals. Seed obovoid, punctate. *Hab.*

Stream banks in forest. Johor, Gunong Janeng, and Telepak; Gunong Pantai (forma *minor*, leaves 2·5 in. long, ·5 in. wide), Pahang, Tahan River (forma *major*, leaves 6 in. long, ·75 in. wide) (Ridley).
Distrib. Lingga island.



FIG. 13.—*Neckia malayana*.

ORDER XII. PITTOSPOREÆ.

Trees or shrubs. Leaves alternate opposite or whorled, entire, exstipulate. Flowers terminal or axillary, bisexual. Sepals 5, imbricate. Petals 5, hypogynous imbricate. Torus small. Stamens 5, opposite sepals; anthers versatile. Ovary 1- to 3-celled; placentas 2 to 5 parietal or 2- to 5-celled by projection of the placentas; style simple. Stigma 2- to 5-lobed. Ovules many parietal or axile anatropous. Fruit capsular. Seeds many, albumen copious. Genera 9. Species about 90, Australasian chiefly. (King, *Journ. As. Soc. Beng.* lix.)

1. **PITTOSPORUM**, Banks.

Trees or shrubs. Petals erect, claws connivent or connate. Ovary incompletely 2- to 3-celled; ovules 2 or more on placenta. Capsule 1-celled, woody, coriaceous; valves placentiferous in middle. Seeds imbedded in red pulp. Species about 50, Asia, Australia and Polynesia.

- Leaves membranous; nerves very inconspicuous . . . (1) ***P. ferrugineum***
 Leaves coriaceous; nerves prominent, reticulate both sides (2) ***P. reticosum***

FIG. 14.—*Pittosporum ferrugineum*.

(1) ***P. ferrugineum*** Ait. DC. *Prodr.* i. 346; *Hook. fil. F.B.I.* i. 199; *King, l.c.* 129; *Bot. Mag. t.* 2075.

A small tree about 20 ft. tall. Young parts tomentose. Leaves membranous lanceolate or ovate-lanceolate acute or acuminate at both ends, edges undulate, dull green backs paler, glabrous; nerves 7 to 8 pairs, yellowish, 2 to 3 in. long, 1 to 1.5 in. wide. Flowers in short terminal corymbs, yellowish white, .25 in. long,

fragrant. Sepals lanceolate pubescent. Petals linear, tips recurved, pubescent. Ovary cylindric, tomentose; style excentric. Stigma bilobed. Capsule orange coloured. Seed black, aril red. *Hab.* Dry gravelly spots usually near the sea. Common. Singapore, Johor, Pahang, Malacca, Dindings, Penang, Lankawi isles, Kelantan, Pulau Adang. *Distrib.* Carimon isles, Burma to Malay Archipelago and Australia. *Native names:* Suroras; Giramong; Chempurei Ikan; Trang Nok; Bunga Sapong; Pulau Puak.

(2) ***P. reticosum* Ridl.**

A small tree 10 to 15 ft. tall, bark pale. Leaves opposite, rigid sub-coriaceous glabrous lanceolate, pale beneath; nerves impressed above, strongly reticulate above and beneath, 2 in. long, 1.25 in. wide; petioles pubescent 1 in. long, ultimately glabrous. Fruit oval .25 in. long on a slender peduncle 1.5 in. long. Stigma bilobed, lobes globose. *Hab.* Pahang in thickets on the Padang at 5000 to 6000 ft. altitude (Robinson, Ridley).

No flowers of this plant have been seen, but in its stiff reticulate leaves it is quite distinct from any species known.

ORDER XIII. POLYGALACEÆ.

Herbs, erect or scandent shrubs or trees. Leaves alternate rarely whorled, reduced to scales or 0, simple entire. Stipules 0. Flowers irregular bisexual 3 bracteate. Sepals 5 unequal, 2 inner often petaloid. Petals 5 or 3 unequal, inferior usually keel-shaped (keel). Stamens 8 (rarely 4 or 5) hypogynous, filaments united, rarely free; anthers opening by terminal pores (rarely by slits). Ovary free 1- to 3-celled; style curved. Stigma capitate. Ovules 1 or more in each cell, anatropous. Fruit 2-celled, 2-seeded, loculicidally dehiscent or indehiscent, 1-seeded or of 3 indehiscent carpels. Seed strophiolate albuminous. Species 500, the whole world except New Zealand.

Herbs or rarely erect shrubs. Capsule dehiscent.

Stamens 8, 2 interior sepals petaloid.

Stamens 4 to 5, leafy annuals

Stamens 4 to 5, leafless parasites

Climbing shrub; fruit a 1-celled, indehiscent samara

Erect trees or shrubs.

Stamens 5 united; fruit of 3 samaras

Stamens 8 distinct; fruit a drupe or berry

1. POLYGALA

2. SALOMONIA

3. EPIRHIZANTHES

4. SECURIDACA

5. TRIGONIASTRUM

6. XANTHOPHYLLUM

1. POLYGALA, L.

Herbs or rarely shrubs. Sepals persistent, inner 2 larger, petaloid. Petals 3, united at base with the staminal sheath, the lower one keel-shaped and often crested (the keel). Stamens 8; filaments united for the lower half into a split sheath. Ovary

2-celled, 2-ovuled; capsule 2-celled, loculicidal. Seeds usually strophiolate and albuminous. Whole world except Tasmania, about 250 species.

Shrubs; flowers axillary.

- | | |
|--------------------------------------------------------------------------------------------|-----------------------------|
| Fleshy plant; fruit winged | (1) P. venenosa |
| Woody plant; fruit not winged | (2) P. pulchra |
| Shrublet; raceme terminal, erect; flowers white | (3) P. monticola |
| Small herb with small yellow flowers, prostrate
with narrow lanceolate leaves | (4) P. brachystachya |
| Erect herb; leaves ovate; flowers many very small
yellow | (5) P. cardiocarpa |

(1) **P. venenosa** Juss. in Poir. Dict. v. 493; King, l.c. 130.

A glabrous shrubby plant 4 to 6 ft. tall. Leaves thin rather fleshy, lanceolate and oblong-lanceolate acuminate and narrowed at the base; nerves 7 to 10 pairs, 5 to 8 in. long, 1.5 to 4 in. wide; petioles .2 in. long. Racemes axillary pendulous 1 to 3 in. long. Sepals translucent, tipped with pink. Petals white, keel not crested chrome yellow withering to violet pink with a crimson keel. Capsule reniform .3 in. long 4-winged all round purple. Seed with scarlet aril. *Hab.* In mountain forests from 1500 to 5500 ft. altitude. Rarely below this. The form here is the var. *robusta*, Miq. Fl. Ind. Bat. i. (2), 126. Pahang, Pulau Tawar. Selangor, Ginting Bidai (Kloss); Menuang Gasing (Kloss); Semangkok. Perak, Thaiping Hills (all collectors). Gunong Kerbau (Robinson); Gapis Pass (Curtis); Gunong Batu Putih (Wray); Penang, West Hill (Curtis). *Distrib.* Malay Islands. *Native name*: Katumbit Hitam.

(2) **P. pulchra** Hassk. Flor. xxv. (2); Beibl. 32.

Slender woody shrub 4 ft. tall. Leaves membranous thin, oblong-lanceolate; nerves 9 pairs, 8 in. long, 3 in. wide; petioles .25 in. long. Racemes 1 in. long, pendulous. Sepals 2 outer ones, one saccate ovate acute, the other small ovate; petaloid sepals obovate round, .25 in. long. Petals 2 short oblong blunt; keel 4-lobed, fleshy not crested. All white tinted yellow. Capsule obovoid orbicular deeply retuse, not winged except at tip, green tipped with purple or nearly all purple, .2 in. long, .3 in. wide. Seed sub-globose, aril scarlet. *Hab.* Hill woods, Negri Sembilan, Bukit Tangga. Selangor, Ginting Bidai (Ridley); Ulu Langat (Kloss). Perak, Goping (Kunstler). *Distrib.* Java and Sumatra.

This is easily recognised by the slender woody stem, narrower leaves and smaller flowers.

(3) **P. monticola** Ridl. Journ. Linn. Soc. xxviii. 803.

A simple erect shrublet 2 ft. tall. Leaves 3 to 4 in. long, 1.5 in. wide, lanceolate acuminate at both ends, glabrous or with a few hairs; nerves 8 pairs; petioles .5 in. long. Raceme dense erect. Flowers white, keel pink .25 in. long; pedicels very short. Sepals outer ovate rounded pubescent. Petals oblong, keel crested pink

yellow-edged. Capsule reniform bilobed nearly .25 in. across. *Hab.* Rocky places on mountains 4000 to 6000 ft. altitude. Pahang, Gunong Tahan; Gunong Benom (Barnes). Selangor, Semangkok; Mengkuang Lebah (Robinson). Perak, Gunong Bubu (Kunstler).

var. *major* Ridley. Leaves 6 in. long, 2 in. wide; petioles 1 in. long; raceme 9 in. long. Pahang, Gunong Tahan (Ridley).

(4) ***P. brachystachya*** *Bl. Bijdr.* 59; *King, l.c.* 131.

A slender erect or prostrate herb. Branches puberulous angled above, 4 to 6 in. long. Leaves linear-lanceolate bristle-pointed glabrous, .4 in. long, .05 in. wide. Racemes slender 2 in. long axillary, few-flowered; pedicels nearly as long as flowers. Flowers .15 in. long yellow. Petaloid sepals obovate oblong. Petals small, keel narrow at base, apex suddenly dilated trilobed. Capsule sub-orbicular emarginate, edges ciliolate. *Hab.* In turf, roadsides, and grass plots. Singapore, grass plots in the Gardens; Macpherson Road. Pahang, Pulau Tawar. Malacca. Sungei Bharu Ulu; Chabau. Tringganu (Yapp). *Distrib.* Java and Sumatra. *Use:* An antidote for snake-bite.

(5) ***P. cardiocarpa*** *Kurz, Journ. As. Soc. Beng.* xli. (2), 293; *Ridl. Journ. Roy. As. Soc. S. Br.* 54, p. 16.

A slender herb branched erect, glabrous 6 in. or more tall. Leaves ovate obtuse 1 to 2 in. long, .1 in. wide narrowed to the petioles .5 in. long. Spikes slender 2 in. long. Flowers very numerous .1 in. long, yellow. Sepals 4 ovate rounded, outers larger. Petals oblong-ovate, keel not crested broad, ovate, tip prolonged. Capsule heart-shaped retuse, wings ribbed. Seed elliptic black pustulate; caruncle small black. *Hab.* On limestone rocks. Selangor, top of Batu caves rocks. Lankawi Islands (Curtis). Perak, Goping (Kunstler). *Distrib.* Siam and Tenasserim.

King's plant identified as *P. triphylla* var. *glaucescens* is this species. Its capsule is not entire, but emarginate, and the flowers are yellow.

2. SALOMONIA, Lour.

Small leafy annuals. Flowers minute in dense terminal spikes, pink. Sepals nearly equal, 2 inner somewhat larger. Petals 3, united at the base with the staminal tube, lower keel-shaped galeate not crested. Stamens 4 or 5; filaments united into a sheath for half their length. Ovary 2-celled with one ovule in each cell. Capsule compressed laterally, 2-celled loculicidal, edges toothed. Seed not or hardly strophiolate. Species about 8, east tropical Asia and Australia.

Leaves ovate, cordate, petioled	(1) <i>S. cantoniensis</i>
Leaves sessile, elliptic	(2) <i>S. oblongifolia</i>
Leaves sessile, amplexicaul, edges ciliate	(3) <i>S. ciliata</i> .

(1) ***S. cantoniensis*** *Lour. Fl. Cochinchine* 14; *King, l.c.* 132.

A branched annual about 6 in. or less tall. Branches winged.

Leaves ovate cordate petioled 3-nerved, .25 to .4 in. long, .25 to .5 in. wide. Spikes numerous terminal, dense above, lax below, 1 to 3 in. long. Flowers .05 in. long pink. Sepals linear. Capsule flat reniform, edges with short recurved triangular teeth, adhesive. Seeds black. *Hab.* Common on paths and sandy spots. Singapore. Malacca, Negri Sembilan, Selangor, Penang. *Distrib.* India, Malay Islands. *Native name*: Rumput Bua.

(2) *S. oblongifolia* DC. *Prod.* i. 354; *Hook. fil. F.B.I.* i. 207; *Deless. Ic. Sel.* iii. t. 19; *King, l.c.* 132. *S. obovata* Wight. *Ill.* i. t. 22B.

An erect simple or little branched annual 3 to 6 in. tall. Branches very slightly winged. Leaves elliptic or elliptic-lanceolate, sessile .15 to .14 in. long. Bracts linear. Spikes terminal 1 to 3 in. long. Flowers crowded above pink .05 in. long. Sepals nearly equal lanceolate. Capsule reniform, teeth spreading filiform. *Hab.* Rather rare in dry sandy heaths. Singapore, at Changi. Province Wellesley, Tasek Gelugur, and Butterworth. Setul Heath (Ridley). *Distrib.* India and Malay Islands, Siam, Cambodia, Australia.

(3) *S. ciliata* DC. *Prod.* i. 334; *Hook. fil. F.B.I.* i. 206. *S. cordata* Arn. *Pug. Ind.* 4; *Wight. Ill.* i. t. 22C.

A small branched herb, annual 4 to 9 in. tall. Leaves sessile amplexicaul oblong-ovate sub-acute, base broad, margins ciliate; nerves 3 from the base, .25 in. long, 6 in. wide. Spikes dense 2 in. long. Flowers very small pink, .1 in. long. Sepals sub-equal lanceolate denticulate. Capsule oblong-reniform, teeth spreading filiform. *Hab.* Sandy country. Rare, on Setul Heath. *Distrib.* Ceylon.

3. EPIRHIZANTHES, Bl.

Flesh-coloured parasitic herbs erect, simple or branched. Branches ascending. Leaves 0, represented by small ovate distant scales. Spikes terminal elongate dense, many-flowered. Bracts persistent. Flowers very small sessile. Sepals 5 broadly ovate or lanceolate. Petals clawed, lamina rounded obtuse. Stamens 5 monadelphous, adnate at base to petals. Ovary 2-celled, 2-seeded. Capsule transversely oblong or globose, unarmed. Seed black strophiolate. Species 2, Malayan.

(1) *E. elongata* Bl. *Flor. Bot. Zeit.* 1825, p. 123; *Penzig Ann. Jard. Buitenz.* xvii. 142, *pl.* xxiv. *Salomonina aphylla* Griff. *Trans. Linn. Soc.* xix. 342; *King, l.c.* 132. *S. parasitica* Griff. *Notulæ* iv. 538.

Slender branched herb 3 to 7 in. tall. Spikes very slender. Flowers minute, flesh colour. Bracts very short. Style slender. *Hab.* In dense dark forest, widely scattered. Johor, Batu Pahat; Gunong Pantai. Pahang, Tahan Woods. Malacca, Bukit Sadanen. Selangor, Semangkok Pass. Perak, Gunong Kerbau (Robinson at 3500 ft. altitude). *Distrib.* Mergui, Java, Sumatra, Borneo, China.

4. SECURIDACA, L.

Climbers. Flowers in terminal panicles or compound racemes (or in simple racemes or axillary), small. Sepals 2, outer boat-shaped, 2 inner large petaloid. Petals 3, lateral ones separate from the crested keel except at the base, upper ones absent. Stamens 8; filaments united; anthers opening by pores. Ovary 1-celled 1-ovuled. Fruit a broad-winged samara, wing chopper-shaped. Species about 25, chiefly in America, a few Asia and Africa.

Leaves ovate oblong to elliptic; flowers paniced; bracts caducous	(1) S. Tavoyana
Leaves elliptic; flowers in short paniced racemes; bracts persistent.	(2) S. bracteata

(1) **S. Tavoyana** Wall. Cat. 4196; Benn. in Hook. fl. F.B.I. i. 208.

Climber. Branches, petiole, back of leaves, and inflorescence pubescent. Leaves thin coriaceous ovate to oblong acute, base round or shortly narrowed, smooth shining above, 4 in. long, 1.5 in. wide or less; petioles .2 in. long. Panicle lax spreading 6 in. long. Branchlets pubescent, slender. Bracts very small caducous. Flowers .25 in. long pink to mauve; upper petal with yellow tip. Sepals short oblong-ovate blunt. Lateral petals adnate to keel at base, keel crested. Samara 3 in. long, wing oblique, tip rounded, strongly veined. *Hab.* Pahang, Gunong Senyum (J. H. N. Evans). *Distrib.* India, Burma, Java, China.

(2) **S. bracteata** Benn. l.c. i. 208; King, l.c. 133.

Stout climber puberulous. Leaves elliptic acuminate, base round or shortly narrowed pubescent beneath, 2.5 to 3 in. long, 1 to 1.25 in. wide. Panicles of pubescent short racemes 1 in. long. Bracts persistent very small. Outer sepals ovate hairy, inner large round. Petals oblong truncate, keel-crest recurved plaited. Samara 3 to 3.4 in. long. *Hab.* Not common, Malacca (Maingay). Perak, Simpang (Wray).

The leaves are more fleshy and thinner than in *S. Tavoyana* and panicles shorter and fruit smaller.

5. TRIGONIASTRUM, Miq.

Tree. Leaves white beneath. Flowers in terminal axillary panicles. Sepals 5, the 2 outer a little larger than inner. Petals 5 unequal, 2 lower partly united forming a keel, odd petal largest, base saccate with a hairy gland. Stamens 5 or 6; filaments united. Ovary hairy 3-locular; ovules pendulous solitary. Fruit of 3 samaroid carpels, each with 1 seed. Species 2, Malay Peninsula and Islands.

(1) **Tr. hypoleucum** Miq. *Fl. Ind. Bat. Supp.* i. 395; *King, l.c.* 133; *Ann. Hort. Bot. Calc.* v. (2), 135, *pl.* 159.

Tree 30 to 70 ft. tall. Stem 15 to 18 in. through. Leaves elliptic lanceolate short acuminate, base narrowed, beneath white, minutely pubescent; nerves 6 pairs prominent, 4 to 6 in. long, 1·25 to 2 in. wide; petioles 2 to 3 in. long. Panicles 3 to 6 in. long. Flowers 25 in. across, white. Samaras 2 in. long strongly nerved; wing rounded 75 in. across, greenish yellow. *Hab.* Forests, Singapore, Bukit Timah. Johor, Pinerong (Cantley). Negri Sembilan. Perak, Larut Hills 600 to 1000 ft. altitude (Kunstler). Penang, near the Spout (Curtis). *Distrib.* Sumatra. *Native names* : Marajali; Marasawa.

6. XANTHOPHYLLUM, Roxb.

Trees of medium or large size, or bushes. Leaves coriaceous, often light green when dry. Racemes axillary and terminal. Flowers white, pink or yellowish. Sepals 5 sub-equal. Petals 5 or 4, lower keel not crested. Stamens 8, free, 2 attached to base of petals. Ovary often surrounded by a disc, stipitate 1-celled; ovules various. Fruit 1-celled, 1-to many-seeded, indehiscent. Seed exalbuminous estrophiolate. Species about 30, mostly Malayan, a few Indian, 1 Australian.

Ovary and style glabrous.

Ovules more than 4.

Leaves, small 3 to 8 in. long.

Flowers large 6 in. long.

Flowers small 25 in. long

Fruit small pulpy orange to black; tree

Fruit dry globose green; bush or small tree

Fruit large as a cricket ball, many seeded

Leaves large bullate; nerves puberulous beneath

(1) **X. Scortechinii**

(2) **X. Kingii**

(3) **X. affine**

(4) **X. obscurum**

(5) **X. bullatum**

Ovules 4 only.

Leaves large, 9 to 18 in. long base narrowed; a bush

Leaves large, 9 to 18 in. long, base cordate;

tree

(6) **X. Hookerianum**

(7) **X. venosum**

Ovary and style pilose.

Ovules more than 4.

Leaves rufous hairy beneath

Leaves yellow hairy

Leaves glabrous small; fruit large, rind thick glabrous

Leaves glabrous 48 in. long; fruit 75 in., rind thin tomentose

(8) **X. rufum**

(9) **X. sulphureum**

(10) **X. stipitatum**

(11) **X. pulchrum**

Ovules 4 only.

Leaves pubescent beneath

Leave glabrous; fruit glabrous rind thick

Leaves large elliptic 7 by 3 in.

(12) **X. puberulum**

(13) **X. Kunstleri**

- Leaves elliptic lanceolate 4 by 1·25 . . . (14) **X. Curtisii**
 Fruit glabrous small, smooth; flowers
 pink; big tree (15) **X. glaucum**
 Fruit glabrous 1 in. through; flowers few
 white, small tree (16) **X. discolor**
 Leaves glabrous; fruit warty when dry.
 Leaves 4 in. long, 2 wide elliptic acuminate . . (17) **X. verrucosum**
 Leaves 9 in. by 4 in. elliptic (18) **X. Wrayii**
 Leaves 2 in. by 1 in. elliptic cuspidate . . (19) **X. palembanicum**
 Leaves glabrous; fruit hairy; leaves elliptic
 stiff coriaceous large (20) **X. hebecarpum**
 Leaves glabrous; fruit tomentose; leaves
 elliptic lanceolate small (21) **X. Griffithii**

(1) **X. Scortechinii** King, l.c. 140; *Ann. Hort. Bot. Calc.* v. (2), 130, *pl.* 163.

A glabrous tree 25 to 30 ft. tall. Leaves thinly coriaceous ovate blunt acuminate, base cuneate, pale shining; nerves 3 pairs, not prominent, 2 to 2·25 in. long, 1 in. wide; petioles ·35 in. long. Racemes axillary 2 in. long. Flowers few, ·5 in. long pink; pedicels ·35 in. long. Sepals glabrous, edges ciliolate, outer 3 ovate blunt, inner rounded. Petals broad obovate clawed, keel pubescent; filaments as long, flat pubescent. Ovary shortly stalked, ovoid glabrous; ovules 6. Fruit globose 2 in. through; pericarp ·3 in. thick. *Hab.* Rare, forests. Perak, Relau Tujor (Wray). Penang Hill (Curtis).

(2) **X. Kingii** Chodat. *Bull. Herb. Boiss.* iv. 255. *X. ellipticum* Benn. in *Hook. fil. F.B.I.* i. 211; King, l.c. 140 (*not of Miquel*).

A tree 30 to nearly 60 ft. tall. Leaves shining deep green subcoriaceous elliptic-lanceolate to elliptic, shortly blunt acuminate; nerves 5 to 6 pairs, 2·5 to 4 in. long, 1·2 to 1·75 in. wide; petioles ·25 in. long. Flowers in racemes 2 in. long, white turning yellow ·25 in. long on longer pedicels. Sepals ovate, glabrous unequal dark red. Petals much longer, ·25 in. long. Ovary glabrous, stipitate, stipes surrounded by a shallow undulate ring-shaped disc; ovules 10. Drupe sub-globular ·5 to ·75 in. through, orange turning deep red, pulpy sweet. Seed, 1. *Hab.* Not rare in open country and woods. Flowers in January. Singapore, Tanglin. Johor, Sungei Tebrau. Malacca (Griffith). Pahang, Pekan. Selangor, Perak, Ulu Kerling and Ulu Kal (Kunstler). *Distrib.* Borneo.

(3) **X. affine** Korth. in *Miq. Ann. Mus. Bot. Lugd. Bat.* i. 271; King, l.c. 142.

Usually a large bush, but growing to a tree 30 to 60 ft. tall glabrous except the inflorescence. Leaves thinly coriaceous, drying yellowish green, elliptic to oblong-lanceolate, shortly blunt-acuminate, base cuneate; nerves 5 to 8 pairs, 4 to 7 in. long, 1·8 to 2·5 in. wide; petioles ·3 to ·4 in. long. Panicles axillary and terminal, minutely tomentose 3 to 10 in. long. Flowers numerous, white withering yellow ·35 in. long; pedicels nearly as

long. Sepals unequal ovate-rounded, tomentose. Petals oblong blunt, glabrous, or base and keel pubescent. Ovary glabrous, stipitate; style pilose; ovules 8 to 18. Fruit hard smooth green, globose .5 to 1.25 in. through. *Hab.* Edges of woods, thickets and on river-banks. The commonest species, lowlands up to 3000 ft. altitude. Singapore, Malacca, Ayer Panas (Derry, Griffith, Maingay). Selangor, Rantau Panjang (Kloss). Perak, Ulu Bubong; Larut (Kunstler); Thaiping (Wray); Chandleriang (Kunstler). Dindings, Pangkor (Curtis). Penang, Penara Bukit (Curtis, Wallich). *Distrib.* Tenasserim, Siam and Borneo, Java. *Native name*: Limah Berok jantan.

(4) **X. obscurum** Benth. *l.c.* i. 211; *King, l.c.* 141. *X. insigne* Benth. *l.c.* 211; *King, l.c.* 144.

A large tree with deep green shining coriaceous leaves, elliptic blunt, narrowed at base; nerves 5 to 9 pairs, 4.25 to 4.75 in. long, 2 to 2.25 in. wide; petioles .4 in. long. Racemes axillary 1 to 1.5 in. long, few-flowered. Flowers .5 in. long. Sepals oblong blunt, edges ciliate, light green, gibbous at base, 3 outer ones small. Petals oblong sub-spathulate, white often tinted rose pink, .5 in. long. Ovary ovoid glabrous. Fruit globose as big as a cricket-ball or larger, pericarp thick brownish green. Seeds several large embedded in sweet white pulp. *Hab.* Forests, Singapore, Tanglin, etc., Malacca, Bukit Sabukor. *Native name*: Buah Kapas.

(5) **X. bullatum** King, *l.c.* 142.

A shrub or small tree. Leaves bullate coriaceous sub-sessile, elliptic-oblong, shortly bluntly acuminate, base cordate sub-auriculate; nerves 10 to 25 bold puberulous, 11 to 10 in. long, 4 to 6.5 in. wide; petioles .25 in. long glandular. Panicles many-branched pubescent 6 in. long. Bracts ovate. Flowers .4 in. long. Sepals unequal rounded tomentose, inner ones thin ciliate. Petals ovate rounded, little longer than the sepals, glabrous. Ovary ovoid glabrous. Ovules 8. Fruit globose, glabrous .75 in. through. *Hab.* Forests, rare. Selangor, Dusun Tua. Perak, Thaiping Hills at base (Kunstler).

(6) **X. Hookerianum** King, *l.c.* 139.

A glabrous shrub. Leaves coriaceous elliptic-oblong, point abrupt 1 in. long blunt, base slightly narrowed to petiole, nerves 6 to 10 pairs, prominent beneath, 9 to 11 in. long, 3 to 4 in. wide; petioles .75 in. long. Flowers .4 in. long; pedicels very short. Sepals sub-equal broadly ovate, tomentose, edges ciliolate. Petals oblong obtuse, glabrous deep yellow, keel pubescent. Filaments flat, puberulous. Ovary sessile ovoid, tomentose; ovules 4. *Hab.* Rare. Perak at Goping (Kunstler). Pahang, Sungei Lenget, Rumpin (Foxworthy). *Native name*: Medang Mangas.

(7) **X. venosum** King, *l.c.* 139.

A glabrous tree 25 to 30 ft. tall. Leaves coriaceous, oblong

sub-acute, narrowed to a rounded or cordate base; nerves 14 to 16 pairs prominent beneath and inarching .2 in. from edge, secondary nerves and reticulations fine and distinct, 9 to 14 in. long, 2.5 to 3.25 in. wide; petioles .75 in. to 1 in. long. Flowers .4 in. long in few-branched axillary panicles 3 to 6 in. long. Sepals sub-equal broad ovate puberulous. Petals oblong obtuse, keel pubescent, waxy light yellow or pink. Filaments flat puberulous. Ovary ovoid tomentose 4-ovuled. Fruit globose with conical top, rugose verrucose dark blue black. *Hab.* Rare in dense jungle, Selangor, Dusun Tua; Rawang (Kloss). Perak, Ulu Bera and Ulu Bubong (Kunstler).

(8) **X. rufum** Benn. in *Hook. fil. F.B.I.* i. 210; *King, l.c.* 143.

Tree 40 to 50 ft. tall. Leaves coriaceous elliptic to ovate, or obovate-elliptic suddenly acuminate, glabrous above, paler pubescent beneath; nerves 7 or 8 pairs, 4.5 to 6.5 in. long (point .5 in. long), 2.25 to 2.75 in. wide; petioles .5 in. long. Panicles terminal or axillary, from upper axils, 3 to 7 in. long, tomentose, ends of branches rufous. Flowers .6 in. long. Bracts ovate. Sepals unequal ovate or sub-reniform rufous-tomentose. Petals more than twice as long, oblong blunt glabrous, keel tomentose, reddish brown. Ovary sessile tomentose. Ovules 12 to 16. Fruit .75 in. through, globose, with 4 vertical rufous ridges. *Hab.* Not rare in Malacca, Selangor; Bukit Bruang. Negri Sembilan, Bukit Sulu (Cantley). Selangor, Bukit Chiraka, Klang (Foxworthy). *Distrib.* Sumatra. *Native name* : Tuloh Buaya.

(9) **X. sulphureum** King, *l.c.* 143.

A tree 100 to 150 ft. tall. Leaves coriaceous elliptic oblong, or sub-obovate acuminate, base cuneate above glabrous shining, beneath minutely sulphureous pubescent, especially on midrib and nerves 6 or 7 pairs, 5.5 to 7.5 in. long, 2 to 2.5 in. wide; petioles .5 to .65 in. long. Panicles tomentose many-branched axillary or terminal 3 in. long. Sepals unequal ovate-round, minutely tomentose, edges ciliate. Petals oblong blunt glabrous, tips pubescent, keel obovate, tomentose yellow. Filaments glabrous. Ovary stipitate 8-ovuled. Fruit globose yellow glabrous. *Hab.* Old jungle on low hills. Perak, Batang Padang district (Kunstler).

(10) **X. stipitatum** Benn. *l.c.* i. 210; *King, l.c.* 140.

A tree 60 to 70 ft. tall. Leaves small sub-coriaceous ovate obtuse, base rounded, 2.5 in. long, .75 in. wide (drying dark); nerves indistinct 3 or 4 pairs; petioles .1 in. long. Flowers dull red, few on terminal and axillary glabrous racemes 1 to 1.5 in. long; pedicels slender longer than the flowers. Sepals sub-equal, oblong blunt. Petals twice as long, spatulate. Ovary on a long stalk as long as itself, pilose; ovules 8 to 12. Fruit 2 or 3 in. long, about 2 in. through, oval dark purple. *Hab.* Open jungle, not common. Malacca (Maingay, Hervey). Perak, Larut (Kunstler); Bikam, Sungkai (Foxworthy).

(11) **X. pulchrum** King, *l.c.* 141; *Ann. Bot. Gard. Calc.* v. (2), 138, *pl.* 164.

Shrub or small tree. Leaves coriaceous elliptic acute, or shortly blunt-acuminate, base rounded, above shining, beneath glaucous; nerves 5 or 6 pairs with reticulations prominent, 4 to 8 in. long, 2.25 to 4 in. wide; petioles thick .2 in. long. Racemes axillary rufous-tomentose dense 3 in. long. Bracts broad, ovate concave, coloured. Sepals sub-equal ovate rounded, midrib tomentose, edges ciliate. Petals oblong, .5 in. long, blunt, glabrous, yellowish tinged with pink, keel pubescent. Filaments short, flat, puberulous. Ovary ovoid, pointed tomentose; ovules 12. Disc thin deep, glabrous. Fruit globose, .75 in. through, minutely tomentose green, pericarp crustaceous. *Hab.* Open jungle, hilly localities. *Distrib.* Perak, Blanda Mabok (Wray); Larut (Kunstler). Penang, Telok Bahang (Curtis) and Penara Bukit.

(12) **X. puberulum** Ridl. *Journ. Roy. As. Soc. S. Br.* 73, p. 139.

Large shrub. Branches pubescent. Leaves oblong-elliptic or lanceolate cuspidate, shortly narrowed at base, thinly coriaceous 5.5 to 8 in. long, 2.25 to 2.75 in. across; nerves 5 or 6 pairs, elevate beneath, reticulations large, all pubescent; petioles .25 in. long. Flowers white, in short terminal panicles 2 to 3 in. long, pubescent, few-branched. Sepals unequal, ovate obtuse, minutely puberulous. Petals spatulate, glabrous .5 in. long, keel slightly pubescent. Stamens glabrous except at base. Ovary villous, stipitate; ovules 4. *Hab.* Not common, Selangor, by the stream at Klang gates. Dindings at Lumut (Ridley).

(13) **X. Kunstleri** King, *l.c.* 139; *Ann. Bot. Gard. Calc.* v. (2), 137, *pl.* 162.

A glabrous tree 50 to 80 ft. tall. Leaves large coriaceous elliptic to elliptic-oblong, shortly suddenly acuminate, base rounded or narrowed shining; nerves 8 to 10 pairs, prominent beneath as are secondaries and reticulations when dry, 4.5 to 9 in. long, 2.25 to 4.25 in. wide; petioles 6 to .75 in. long. Panicle terminal few-branched or racemes stout, 6 in. long. Flowers .6 in. long. Sepals ovate rounded fleshy, midrib thickened minutely tomentose. brown. Petals oblong obtuse, glabrous except pubescent keel, yellow. Filaments with an ovoid swelling pubescent above the base. Ovary sub-sessile, ovoid, grooved, 4-ovuled tomentose. Fruit globose .65 in. wide, smooth. *Hab.* Forests in low country. Perak, Thaiping Hills (Kunstler). Penang, Government Hill (Curtis).

Resembles *X. Curtisii*, but much more robust, leaves much larger and drying greenish yellow.

(14) **X. Curtisii** King, *l.c.* 138.

A glabrous tree 30 to 60 ft. tall with a dense head of foliage. Leaves coriaceous, deep shining green, ovate-lanceolate acuminate,

base rounded or cuneate; nerves 5 to 6 pairs not very prominent, 3 to 5 in. long, 1 to 1.3 in. wide; petioles .4 in. long. Panicles axillary or terminal .3 in. long, buds yellow. Sepals sub-equal, rotund, tomentose. Petals oblong obtuse, glabrous except the keel broadly obovate pubescent. Filaments with an ovoid pubescent swelling near base. Ovary sessile, ridged, pubescent; ovules 2 to 4. Disc glabrous fleshy angled. *Hab.* Forests. Singapore Gardens, in jungle. Malacca, Bukit Bruang (Curtis). Penang, Moniots Road (Curtis).

(15) **X. glaucum** Wall. *Cat.* 4199; *Benn. l.c.* i. 209; *King, l.c.* 137. **X. microcarpum** Chodat, *l.c.* 263.

A big tree with a stout trunk, 30 to 60 ft. tall. Leaves sub-coriaceous, shining above, glaucous beneath, lanceolate to elliptic-lanceolate sub-acute, base narrowed; nerves 8 to 10 pairs, 3 to 4 in. long, 1 to 1.4 in. wide; petioles hardly 25 in. long. Flowers .25 in. long, rose pink in terminal racemes or panicles 3 to 4 in. long, lax pubescent or hairy. Sepals unequal, oblong pubescent. Petals glabrous except the keel. Ovary tomentose. Fruit globose .25 in. through, smooth glabrous. *Hab.* North of the peninsula in open country. Setul and Perlis at Kanga. *Distrib.* Siam (Trang), Chittagong and Burma.

Chodat separates King's plant as *X. microcarpum*, saying it has "Fructus parvus nec verrucosus nec costatus," a good description of Wallich's type of *X. glaucum*.

(16) **X. discolor** Chodat, *Bull. Herb. Boiss.* iv. 257.

A small tree, bark grey. Leaves lanceolate oblong acuminate 4 to 5 in. long, 2 in. wide, above smooth, green, beneath glaucous; nerves fine 6 to 7 pairs inarching within margin, base shortly cuneate; petioles .1 in. long. Racemes few axillary and terminal, puberulous .75 in. long few-flowered. Sepals unequal ovate obtuse. Petals .5 in. long, white, glabrous, connate with the very short staminal tube at the base only. Ovary shortly stipitate, pilose. Fruit globose, smooth, green hairy, .75 in. through. *Hab.* In woods, rare. Singapore in the Garden Jungle and at Selitar. Pahang, Rumpin (Foxworthy). *Native name*: Sisyor.

(17) **X. verrucosum** Chodat, *l.c.* 263. **X. eurhynchum** King, *l.c.* 137 (*not of Miquel*).

Tree 30 to 50 ft. tall. Leaves sub-coriaceous elliptic-lanceolate acuminate sub-acute or rounded at base; nerves 4 or 5 pairs, 4 to 5.5 in. long, 1.75 to 2.5 in. wide; petioles .3 in. long. Flowers .25 in. long in pubescent axillary and terminal racemes 3 in. long, or in few-branched panicles. Sepals unequal, ovate-oblong blunt, tomentose. Petals spatulate glabrous except keel. Style and ovary villous; ovules 4. Fruit globose .75 in. across, verrucose green. *Hab.* Perak, Thaiping; Goping (Kunstler). Dindings, Pangkor (Curtis). Penang, Batu Feringhi (Curtis). *Distrib.* Sumatra.

Chiefly distinguished from *X. Palembangicum* by its much larger leaves.

(18) **X. Wrayii** King, *l.c.* 138; *Ann. Bot. Gard. Calc.* v. (2), 136, *pl.* 161.

A shrub 3 to 8 ft. or more tall. Branchlets puberulous. Leaves sub-coriaceous, drying yellow green, shining above, elliptic to oblong acuminate, base rounded or narrowed; nerves 10 to 13 pairs, prominent, inarching within the edge, 6 to 10 in. long, 2.25 to 4.5 in. wide; petioles .3 to .6 in. long. Flowers .35 in. long in terminal or axillary racemes or panicles 3 in. long. Sepals ovate blunt,



FIG. 15.—*Xanthophyllum Palembanicum*.

puberulous. Petals oblong, obtuse, puberulous, base pubescent, cream colour. Ovary densely villous on a glabrous stalk, 4-ovuled, disc glabrous. Fruit globose .75 in. through, silky when young, ripe glabrous and warty. *Hab.* In dense forests in the low country not rare. Perak, Gunong Pondok (Kunstler); Gunong Bubu. Penang Hill (Burkill).

Distinguished from *X. affine* Korth. by the distinctly inarching fewer nerves, villous silky ovary and 4 ovules only. The panicles are also much denser and the fruit wrinkled.

(19) **X. Palembangicum** Miq. *Ann. Mus. Bot. Lugd. Bat.* i. 317; *King, l.c.* 137. **X. Maingayi** Benn. *l.c.* i. 210; *King, l.c.* 136.

A tree 15 to 40 ft. tall, with lanceolate or elliptic caudate-acuminate leaves, base acute; nerves 4 to 5 pairs inarching within the margin, 3 to 4 in. long (tail often 1 in. long), 1 to 1.3 in. wide, bright dark green; petioles .25 in. long. Racemes axillary few-flowered, 1 to 1.5 in. long, minutely tomentose. Sepals unequal, oblong obtuse. Petals spathulate glabrous white, keel silky. Ovary and style villous; ovules 4. Fruit green globose glabrous .75 in. through, verrucose and grooved when dry. *Hab.* Common in woods in the low country. Singapore, Garden Jungle. Malacca (Griffith, Hervey). Pahang. Bentong (Foxworthy). Perak, Larut Hills (Kunstler). Penang (Curtis). *Distrib.* Sumatra.

The wrinkles in the fruit by which King distinguishes *Palembanicum* from *Maingayi* only appear when the fruit is dried, and are of no value as a character.

(20) **X. hebecarpum** Chodat, *Bull. Herb. Boiss.* iv. 263.

Leaves elliptic acuminate blunt, thickly coriaceous glabrous, 8 in. long, 4 to 5 in. wide; nerves 5 pairs, prominent beneath, midrib prominent; petioles about 2 in. long. Fruit 1 in. through, cerebriform, velvety; pericarp .1 in. thick. *Hab.* Rare and very incompletely known. Dindings on Pangkor Island (Curtis, 1639).

I have great doubt that this is a *Xanthophyllum* at all.

(21) **X. Griffithii** Benn. *l.c.* i. 210; *King, l.c.* 136.

A tree 40 to 60 ft. tall, glabrous except the inflorescence. Leaves coriaceous, elliptic-lanceolate to lanceolate acute or acuminate, base acute, shining above, sub-glaucous beneath, reticulations and 3 or 4 pairs of nerves distinct, 3 to 4 in. long, 1 to 1.5 in. wide; petioles thick .35 in. long. Racemes axillary tomentose, 3 to 6 in. long on terminal panicles 6 in. or more long. Flowers .35 in. long, greenish yellow or dark yellow, on short stout pedicels. Sepals broad ovate blunt, tomentose outside. Petals oblong blunt glabrous keel pubescent. Filaments hairy below. Ovary sessile, tomentose; ovules 4, base and style cylindric pilose. Fruit globular tomentose. *Hab.* Dense forests. Malacca, Batang Malaka. Selangor, Kwala Lumpur. Perak up to 6700 ft. altitude. Gunong Batu Putih. Penang, Batu Feringhi (Curtis). *Distrib.* Mergui. *Native names*: Dudali paya; Rawai.

* ORDER XIV. CARYOPHYLLACEÆ.

Herbs. Leaves opposite, simple entire. Flowers bisexual cymose simple or dichotomous, many- or few-flowered. Bracts opposite, edges or all scarious. Sepals 4 to 5 free (or connate). Petals as many, entire bifid or lacerate (or absent). Stamens

3 to 10 insert with the petals; filaments filiform; anthers bilocular. Ovary free 1-celled (rarely 2- to 5-celled). Styles 2 to 5. Ovules 2 to many, from base of ovary or on a central column. Capsule membranous or crustaceous, splitting into as many valves as styles (or with apical teeth). Seeds few or many reniform globose or obovoid. Species 1000, whole world, very rare in tropics.

1. *DRYMARIA*, Willd.

Diffuse herbs. Leaves flat. Flowers pedicelled small in dichotomous cymes terminal (or axillary). Sepals 5, herbaceous edge scarious. Petals 5, 2- to 6-cleft. Stamens 5 or fewer, perigynous. Ovary 1-celled; ovules many. Styles 3. Capsule 3-valved. Species about 40, 1 in tropical Asia and Africa, 1 Australian, the rest American.

(1) *D. cordata* Willd. *Roem and Schultes, Syst. Veg.* v. 406.

A branching diffuse herb, glabrous or nearly so, about 1 ft. tall. Leaves in distant pairs thin ovate rounded, base cuneate, .5 in. long and as wide (or larger); petioles very short. Flowers small in compound cymes terminal. Bracts small ovate. Sepals 5 oblong acute striate green, edges white scarious, .1 in. long. Petals 5 shorter bifid with lanceolate lobes, white. Stamens shorter slender. Styles 3. Ovary globose; ovules 3 or more. Capsule ovoid-trigynous 3-valved. Seeds many orbicular muricate. *Hab.* Roadsides or waste ground at 2500 ft. altitude. An alien. Selangor, Semangkok Pass. Abundant in January 1921. I never saw it here before. *Distrib.* India, Ceylon, Java, Sumatra, Papua, tropical Africa.

ORDER XV. PORTULACACEÆ.

Herbs rarely shrubby. Leaves opposite or alternate entire, nodes with scarious or hairy appendages. Sepals 2 imbricate. Petals 4 or 5 fugacious hypogynous or perigynous. Stamens 4 to many; filaments slender; anthers 2-celled. Ovary free or half inferior, 1-celled; ovules 2 or many. Style 2- to 8-fid. Capsule transversely or by 2 or 3 valves, dehiscent. Seeds 1 or many. Cosmopolitan chiefly American, about 125 species.

1. *PORTULACA*, L.

Diffuse succulent herbs; nodal appendages scaly or hairy. Flowers terminal surrounded by a whorl of leaves. Sepals connate below, free part deciduous. Petals 4 to 6. Ovary half-inferior. Style 3- to 8-fid. Ovules many. Capsule crustaceous, dehiscing transversely. Seeds many, reniform. Tropical regions, chiefly American, 2 cosmopolitan weeds.

- Flowers in terminal heads; petals 5 (1) *P. oleracea*
 Flower solitary terminal; petals 4 (2) *P. quadrifida*

(1) *P. oleracea* Linn. *Sp. Pl.* 445; *Dyer in Hook. fil. F.B.I.* i. 246; *King, l.c.* 144.

Annual fleshy, 6 to 12 in. long, nodal appendages scarious. Leaves cuneate oblong obtuse, often purplish or red, .25 in. to 1.25 in. long, petiolate. Flowers in few-flowered and terminal heads or dichotomous cymes, sessile, surrounded by scarious bracts. Petals 5, yellow. Stamens 8 to 12. Style 3- to 8-fid. Seed punctate. *Hab.* A common weed of cultivation, or in waste grounds all over the peninsula from Singapore to Perlis. *Distrib.* All warm countries. *Native name*: Segan. *Use*: As a pot-herb.

(2) *P. quadrifida* Linn. *Mantissa*, i. 73; *Wight, Ill.* ii. t. 109; *King, l.c.* 145. *P. geniculata* Royle, *Ill.* 221.

Annual, stems diffuse, rooting at nodes, nodal appendages pilose. Leaves ovate to lanceolate acute, sub-sessile .2 to .35 in. long. Flower solitary, terminal. Calyx-tube partly immersed in top of axis, surrounded by long silky hairs and 4 bracteoles. Petals 4, yellow. Stamens 8 to 12. Style 4-fid. Seeds tuberculate. *Hab.* A weed in towns and garden paths and sandy places by the sea. Singapore, Town; Changi. Malacca. Penang Fort. Pulau Redang (Yapp). *Distrib.* Tropics of Africa and Asia. *Native name*: Rumput Segan.

ORDER XVI. HYPERICACEÆ.

Herbs, shrubs or trees. Leaves opposite, often gland-dotted. Stipules 0. Flowers solitary or cymose, terminal (rarely axillary). Sepals 5. Petals 5, rarely 4. Stamens indefinite (rarely definite), 3- to 5-adelphous, rarely free, or all connate. Ovary 3- to 5-carpellary, 3- to 5-celled; styles as many, filiform. Ovules few or many on parietal or axile placentas. Fruit capsular, rarely baccate. Seeds exalbuminous, sometimes winged. Warm and temperate regions of whole world, species about 200.

- Herb with yellow flowers 1. HYPERICUM.
 Shrubs or trees; flowers pink or white 2. CRATOXYLON.

1. HYPERICUM, Linn.

Herbs or small shrubs. Leaves opposite, usually sub-sessile and punctate. Flowers solitary, cymose or paniced, yellow (rarely white). Sepals and petals 5 each. Stamens free or connate in 3 bundles, alternating with hypogynous glands. Ovary carpels 1 or more, perfectly 3- to 5-locular. Ovules many, rarely few. Capsule septicidally dehiscent. Seeds very small not winged. Species 160, whole world, chiefly in temperate regions.

(1) **H. japonicum** Thunb. *Fl. Jap.* 295, t. 31; *Hook. fil. F.B.I.* i. 256; *Ridl. Journ. Straits Br. Roy. As. Soc.* 54, p. 16.

Small glabrous, prostrate or ascending herb, 5 to 10 in. tall. Branches slender. Leaves sessile ovate blunt, 1·25 in. long. Flowers solitary axillary ·25 in. across on slender peduncles ·25 in. long. Sepals oblong-lanceolate. Petals as long yellow. Stamens free nearly to the base. Capsule elliptic-oblong, or ovoid ·1 in. long dehiscent into 3 valves. *Hab.* In pepper- and rice-fields. Singapore and Penang, Kelantan, Kota Bharu. *Distrib.* India, China, Japan, Java, Australia and New Zealand.

2. CRATOXYLON, Blume.

Shrubs or trees of moderate size. Leaves entire. Inflorescence axillary or terminal cymose. Sepals 5. Petals 5. Stamens 3 to 5 bundles, with fleshy alternating glands. Ovary 3-celled; styles distinct; ovules 4 to 8 in. each cell. Capsule 3-valved. Seeds winged. Tropical Asia, about 12 species.

Petals sub-persistent, no scales at base (1) **C. polyanthum**

Petals not persistent with a scale at base.

Shrub; flowers in terminal racemes; leaves obovate

(2) **C. microphyllum**

Trees; flowers in terminal panicles, deep red

(3) **C. arborescens**

Trees; flowers in short axillary cymes flowering with the young leaves.

Flowers rose pink, ·75 in. long; capsule ·6 in.;

valve ·25 in. across

(4) **C. formosum**

Flowers white, ·6 in. long; capsule ·3 in. long;

valve ·1 in. across

(5) **C. Maingayi**

(1) **C. polyanthum** Korth. *Verh. Nat. Gesch. Bot.* 175, t. 36; *Hook. fil. F.B.I.* i. 257; *King, l.c.* 145.

A medium-sized or tall tree with red stems, and bark flaking off, glabrous 30 to 60 ft. tall. Leaves membranous, lanceolate or elliptic-oblong, acute at both ends; nerves 7 to 10 pairs, 1·5 to 3·5 in. long, ·75 to ·25 in. wide; petioles ·1 in. long. Flowers supra-axillary solitary or in 2- or 3-flowered cymes, ·5 in. across. Sepals elliptic obtuse, green. Petals oblanceolate, rose pink. Glands large, fleshy oblong. Capsule little longer than the sepals ·5 in. long; valves broad. Seeds obliquely winged. *Hab.* Open woods in the low country. Singapore, Malacca, Negri Sembilan, Perak and Penang. *Distrib.* India, China, Malay Archipelago to Philip-pines.

var. *Wightii*. *King, l.c.* 146; *C. Wightii*. *Blume, Mus. Bot.* ii. 18; *Ancistrolobus* sp. *Wight. Ill.* i. 111.

A bush. Leaves oval blunt more coriaceous. *Hab.* Perak (Kunstler). Setul, sandy heaths. *Distrib.* Burma, Siam. *Native names*: Klochus; Beluchus.

(2) **C. microphyllum** *Miq. Fl. Ind. Bat. Supp.* i. 500.

A bush. Leaves coriaceous obovate, tip rounded mucronulate, base cuneate decurrent on the petiole, 1·5 to 3 in. long, ½ in. wide, beneath glaucous; nerves fine invisible beneath; petioles ½ in. long. Racemes terminal 3 in. long. Flowers rather scattered, sometimes 2 on a peduncle. Sepals unequal, oblong-lanceolate stiff, ¼ in. long. Petals red ovate rounded, blunt, ½ in. long. Basal glands horseshoe-shaped. Stamens shorter than petals. Capsule oblong woody ⅓ in. long. Seeds linear flat. *Hab.* Mountains at 3000 ft. altitude, rare, only on Mt. Ophir at the Padang Batu (Ridley). *Distrib.* Borneo and Banka.

(3) **C. arborescens** *Blume, Mus. Bot.* ii. 17; *King, l.c.* 146.

A lofty tree with a straight stem 60 to 80 ft. tall. Leaves coriaceous broadly oblanceolate, obovate-elliptic or oblong-obovate, shortly acuminate, dotted on the back; nerves numerous, fine, parallel inconspicuous beneath, 3 to 4·5 in. long, 1·25 in. to 2 in. wide; petioles thick, ¼ in. long. Cymes in terminal panicles 4 to 6 in. long. Flowers ⅓ in. across. Sepals unequal, ovate rounded, ¼ in. long. Petals as long, cuneate deep red with lacinate basal scales. Capsule ¼ in. long; valves oblong blunt. Seeds winged all round. *Hab.* In woods in the low country. Singapore, Bukit Timah; Garden Jungle. Malacca (Griffith). Selangor, Kwala Lumpur (Burn-Murdoch). Perak, Larut (Kunstler). Penang Hill (Burkill).

var. *Miquelii* *King, l.c.* 146; *C. cuneatum* *Miq. Fl. Ind. Bat.* i. (2), 517.

Small tree. Leaves narrow lanceolate 3 in. long, 1·10 in. wide, acuminate. Flowers smaller; buds much smaller. Leaves very finely reticulate in a specimen from Scortechini. *Hab.* Perak (Wray, Scortechini). Penang, Government Hill (Curtis). Probably a mountain form. *Distrib.* Burma, Borneo and Sumatra. *Native name:* Gerongang. *Use:* Valued as a timber, wood red.

(4) **C. formosum** *Benth. and Hook. fil. Gen. Pl.* i. 166; *King, l.c.* 147. *Tridesmis formosa* *Korth. Verh. Nat. Gesch. Bot.* 179, t. 37.

A glabrous tree 30 to 60 ft. tall. Leaves membranous, at first lanceolate acute, then broadly elliptic to oblong, acute or rounded, base narrowed, shining, beneath dotted; nerves 6 to 8 pairs, 3 to 4 in. long, 1·75 to 2·25 in. wide; petioles ¼ in. long. Cymes axillary, 2- or 3-flowered. Flowers ¾ in. long on ½ in. long pedicels. Sepals elliptic pointed. Petals elliptic clawed, with a narrow scale above the claw, rose pink. Glands oblong crimson. Stamens exsert. Capsules cylindric acute, 6 in. long; valves ¼ in. across. Seed ⅓ in. wing obtuse, obovate, unilateral. *Hab.* Borders of woods and open country, whole peninsula from Singapore to Perlis. *Distrib.* Siam, Malay Islands to the Philippines. *Native name:* Munipat Merah or M. hitam.

A very beautiful tree. It sheds its leaves before flowering, and as the new leaves appear the flowers are produced. The young leaves are at first lanceolate and deep red, then gradually in a few days become green and oblong.

(5) *C. Maingayi* Dyer, in *Hook. fil. F.B.I.* i. 258; *King, l.c.* 145; *Ann. Bot. Gard. Calc.* 138, *pl.* 165.

Tree about 40 ft. tall, glabrous. Leaves coriaceous, lanceolate (young) acute, narrowed to base, 2 in. long, .5 in. wide; adult



FIG. 16.—*Cratoxylon formosum*.

elliptic sub-obtuse, 5 in. long, 2.1 in. wide; nerves numerous, slender; petioles .25 in. long. Cymes axillary appearing after fall of the leaf. Flowers 3 or 4 in a cyme white; pedicels .1 in. long. Sepals oblong. Petals .36 in. long elliptic clawed, basal scale lanceolate acute. Capsule .3 in. long; valves .1 in. across. Seeds .25 in. long; wing unilateral oblong rounded. *Hab.* Hill forests, local. Penang, common all over Government Hill, and very conspicuous in flower. Flowers in March. *Native name*: D'rum.

This tree sheds its leaves as does *C. formosum*, and as the young leaves appear so do the flowers. The flowers and fruit are much smaller than in *C. formosum* and the flowers white.

ORDER XVII. FLACOURTIACEÆ.

Trees or shrubs. Leaves alternate usually coriaceous. Flowers small, usually unisexual in cymes, fascicles or racemes. Sepals free, connate, 5 to 8. Petals 5, often absent. Stamens 5 to 8 or more. Ovary superior; styles free or connate. Disc usually none. Fruit baccate or capsular. Tropics.

Flowers bisexual; petals 4 to 6.

Stamens numerous; flowers baccate

1. SCOLOPIA

Stamens 5 or 6; fruit capsule

2. ERYTHROSPERMUM

Flowers unisexual.

Petals 0, disc present; fruit baccate

3. FLACOURTIA

Petals 5 to 8; fruit hard baccate; stamens free .

Sepals free 5; petals 5; stamens 5 to 8

4. HYDNOCARPUS

Sepals free 4; petals 8; stamens 20 to 30

5. TARAKTOGENOS

Sepals connate in a cup; stamens free 20 to 25 .

6. PANGIUM

Sepals connate in a spathe-like limb; stamens free 8

7. SCAPHOCALYX

Sepals connate in a tube; stamens connate in a column

8. RYPAROSA

1. SCOLOPIA, Schreb.

Spiny or unarmed small tree. Leaves alternate crenulate or entire. Flowers small, bisexual in axillary racemes. Sepals 4 to 6 imbricate. Petals 4 to 6 imbricate. Stamens many with a row of glands outside them; anthers ovoid, the connective produced into an appendage. Ovary 1-celled; style 1 erect. Stigma entire or lobed. Ovules few. Berry 2- to 4-seeded. Species about 15, tropics of Africa, Asia and Australia.

Racemes 3 to 4 in. long, terminal and axillary

(1) *S. rhinanthera*

Racemes 1 in. or less, all axillary

(2) *S. Roxburghii*

(1) *S. rhinanthera* Clos. *Ann. Sc. Nat. Ser. 4*, viii. p. 252; *Hook. fil. F.B.I.* i. 190; *King. l.c.* 114. *Phoberos rhinanthera* Benn. *Pl. Jav. Rar.* 189, t. 39.

Bush or tree, nearly glabrous except the inflorescence. Leaves coriaceous, ovate to ovate-lanceolate acuminate, base rounded, obscurely crenate-dentate; nerves 7 pairs fine, 3.5 to 5 in. long, 1.75 to 2.5 in. wide; petioles .85 in. long, biglandular at the apex. Racemes axillary and terminal, 3 to 4 in. long pubescent. Flowers about 20, .3 in. across; pedicels short. Sepals 4, ovate-lanceolate tomentose outside. Petals 4, larger round, tomentose on edges and midrib. Stamens indefinite; anthers very small; appendages lanceolate glabrous. Stigma entire. Fruit baccate black. Seeds 2 to 6. *Hab.* Usually on sea-shores, but sometimes inland. Singapore, Serangoon river bank. Malacca. Selangor, Port Swettenham

(Haniff). Penang, Government Hill (Curtis). Kedah, Alor Sta. Lankawi, Dayang Bunting (Robinson). *Distrib.* Java and Borneo, S. Siam.

S. crenata Clos., given by King as from Penang and Perak, can hardly be separated, but in any case it is South Indian and the plants referred to it by King are all *S. rhinantha*.



FIG. 17.—*Scolopia rhinantha*.

(2) *S. Roxburghii* Clos. *l.c.* 250; *Hook. fil. F.B.I.* i. 190; *King, l.c.* 115.

A glabrous shrub or tree 20 to 30 ft. tall spiny below. Leaves coriaceous ovate to ovate-lanceolate, shortly or rather long acuminate, base cuneate or rounded, edge crenate or nearly entire; nerves 5 pairs decurrent on midrib, 4.5 to 6.5 in. long, 1.75 to 3.3 in. wide; petioles .35 in. long biglandular at tip. Racemes pubescent 1 in. long or less, 2- to 6-flowered, tomentose. Sepals and petals 5 to 6 each ovate, tomentose, .1 in. long. Stamens indefinite; appendages ciliate. Ovary ovate. Stigma 3-lobed. Fruit sub-globose 1 in. through. *Hab.* Forests to 500 ft. altitude. Malacca (Maingay). Penang, Government Hill (Curtis). Perak, Larut (Kunstler). *Distrib.* Burma, Sumatra.

2. ERYTHROSPERMUM, Lam.

Trees or shrubs. Leaves alternate. Racemes simple or paniced. Flowers small, bisexual. Sepals 4 to 6 imbricate. Petals 4 to 6 small. Stamens 4 to 6; anthers lanceolate-sagittate, connective dilate. Ovary 1-celled; style short. Stigma entire or lobed. Ovules many on 3 to 4 parietal placentas. Capsule coriaceous 3- to 4-valved. Seeds few; testa coriaceous or fleshy. Species 8, 6 Mascarene, 1 Ceylon, 1 Malay Peninsula.

(1) **E. Scortechinii** King, *l.c.* 116.

Small tree 30 to 40 ft. tall glabrous. Leaves thickly membranous oblanceolate-elliptic cuspidate, crenate-serrate, base narrowed; nerves 5 to 6 pairs, inarching .25 in. from edge, 4 to 5 in. long, .2 to 2.5 in. wide; petioles .5 in. grooved. Racemes 2 to 4 paniculate, terminal one 3 to 4 in. long in flower, twice as long in fruit. Flowers unknown. Ovary glabrous; ovules 12 to 20; style glabrous. Stigma 3-lobed. Capsules on .5 in. long pedicels, globular, smooth .35 in. through. Seed 1 globular with red pulp. *Hab.* Very rare. Perak, no locality given (Scortechini).

3. FLACOURTIA, Commers.

Spiny or unarmed trees with alternate leaves usually more or less crenulate. Flowers unisexual (rarely hermaphrodite) in short axillary racemes or fascicles, small apetalous. Sepals 5. Stamens indefinite, rising from a fine 5-lobed or entire fleshy disc. Ovary flask-shaped; styles 4 to 6 free or connate for part of their length. Fruit baccate, globose with 4 or 5 flat seeds. Species 8, Indo-Malayan.

Trees; leaves large.

Leaves 6 in. long, 2.5 in. wide, elliptic cuspidate;

styles far apart

(1) **F. Rukam**

Leaves 3 to 4 in. long, 1.25 in. wide, lanceolate;

styles connate

(2) **F. Cataphracta**

Bush; leaves small obovate

(3) **F. sepiaria**

(1) **F. Rukam** Zoll. and Moritz, *Verz.* 33; Hook. *fl.* F.B.I. i. 192; King, *l.c.* 117.

A small tree, very thorny below. Leaves elliptic, narrowed at the base, edges crenulate, cusp 1 in. long; nerves 7 or 8 pairs, 6 to 7 in. long, 2.5 in. wide, membranous glabrous; petioles .3 in. long. Flowers unisexual in small axillary fascicles, numerous; pedicels pubescent. Sepals ovate obtuse, pubescent. Disc 5-lobed, white or yellow. Stamens in male numerous. Pistillode o. Female, as in male but no stamens; disc less lobed. Pistil flask-shaped; styles 4 to 6 spreading. Berry globose; styles widely spreading, .5 in. through, purplish green. *Hab.* Common in damp lowland woods. Singapore, Johor. A form with fewer nerves

and more glabrous flowers occurs at Pekan in Pahang, Tapah and Goping in Perak and in Penang, also in Borneo at Sarawak.

var. *domestica* Ridl. Unarmed tree. Leaves smaller and pubescent on the branches; petioles and nerves beneath. Cultivated and around villages. Malacca and Perak. *Distrib.* Borneo, etc. This fruits earlier than *F. Cataphracta*, in September. The fruit is eatable, but not so good as that of *F. Cataphracta*.

var. *erythrocarpa* Ridl. Small tree quite unarmed. Leaves broad, ovate acuminate crenate, 6 in. long, 2 in. wide; petioles and branches softly pubescent. Flowers not seen. Fruit globose about 4 in. through, bright red, sweet; styles distant 8. In cultivated ground in Singapore and Penang.

A very distinct plant in its absolutely unarmed stem and bright red sweet fruit. It cannot be *F. inermis* Roxb., as that has the styles all connate into a star, whereas they are separate in this plant. It is probably a distinct species, but I have only seen one or two trees of it and no flowers.

(2) **F. Cataphracta** Roxb. in Willd. *Sp. Pl.* iv. 30; *Pl. Corom.* iii. 222; *Hook. fil. F.B.I.* i. 193; *King, l.c.* 117.

A spiny tree about 20 ft. tall. Stem armed with strong dense branched spines at the base. Branches unarmed. Leaves membranous, glabrous lanceolate acuminate crenulate denticulate or entire, dark green (red when young), 3 to 4 in. long, 1.25 in. wide. Flowers unisexual in small axillary tufts. Sepals green ovate, edges hairy. Stamens in males yellow, numerous from a yellow ring-shaped disc. Females as in males, but with a flask-shaped pistil, and a stout cylindric style with 4 recurved arms free only at tip. Fruit globose $\frac{1}{2}$ in. through (rather smaller than in *F. Rukam*) dark brown red, pulp greenish yellow enclosing 4 or 5 flat seeds. *Hab.* Common in all villages. *Distrib.* Malay Islands.

This is the true Rukam and the best eating one. When ripe it is of a firm texture and very astringent, but after rubbing in the hands a short time it becomes quite soft and sweet. The tree is usually at least unisexual.

(3) **F. sepiaria** Roxb. *Pl. Corom.* i. 48, t. 68; *Hook. fil. F.B.I.* i. 194.

Shrub often spiny. Leaves obovate rounded crenate at apex, base narrowed; nerves ascending from base, membranous, glabrous 1.5 in. long, .75 in. wide; petioles slender, .5 in. long. Male flowers small. Sepals ovate. Stamens numerous. Female flowers in short racemes, .1 in. long with numerous lanceolate bracts; pedicels puberulous .1 in. long. Sepals lanceolate acute, ciliate. Style cylindric with 4 to 6 short arms. Fruit .5 in. through. *Hab.* Open country. Perlis at Kanga. *Distrib.* India.

4. HYDNOCARPUS, Gaertn.

Trees, medium to large. Leaves alternate, coriaceous, serrate or entire. Flowers solitary or in fascicles or racemes, axillary unisexual. Sepals 5 imbricate. Petals 5 with a scale at base. Males, stamens 5 to 8; anthers reniform with large connectives. Females, stamens sterile or abortive. Ovary 1-celled. Stigmas 3 to 6 spreading, lobed. Ovules many, on 3 to 6 parietal placentas. Berry large globose, rind hard. Seeds many in pulp, testa crustaceous, albumen oily. Species 12, Indo-Malayan.

Leaves entire.

Flowers small .05 in.; fruit globose; .75 in. through .

(1) *H. nana*

Flowers 1 in. across; fruit large globose.

Leaves coriaceous, large, elliptic .

(2) *H. castanea*

Leaves thinly coriaceous, lanceolate-elliptic .

(3) *H. Curtisii*

Leaves coriaceous, oblong cuspidate .

(4) *H. Scortechinii*

Fruit long, pear-shaped; flowers .3 in. across .

(5) *H. cucurbitina*

Fruit, ovoid velvety; flowers .5 in. across .

(6) *H. Wrayi*

Leaves spiny on edge; flowers rather large .

(7) *H. ilicifolia*

(1) *H. nana* King, l.c. 118; *Ann. Bot. Gard. Calc.* v. (2), 128, pl. 147.

Small tree 10 to 20 ft. tall. Stem 2 to 3 in. through glabrous. Leaves sub-coriaceous, ovate or oblong-lanceolate, long acuminate, base rounded or cuneate unequal, edges minutely serrulate; nerves 5 to 8 pairs more or less pubescent prominent beneath, 2.5 to 5 in. long, .75 to 2.5 in. wide; petioles .25 to .35 in. long. Stipules linear-lanceolate pubescent. Male cymes short .2 in. long pubescent. Flowers white .25 in. across. Sepals round pubescent, imbricate. Petals smaller fleshy, with long white silky hairs outside; scales small oblong. Females, solitary on .5 in. long pedicels. Ovary tomentose. Stigmas 3 large. Fruit globular, brownish green velvety-tomentose 1 in. through. Seeds 3 or 4 plano-convex, .5 in. long. *Hab.* Forests 300 to 1500 ft. altitude. Selangor, Sungei Buluh. Perak, Goping; Tea Gardens; Thaiping Hills (Kunstler). Province Wellesley, Permatang Bertam. Penang, Telok Kumba (Curtis).

var. *pubescens*. A pubescent form at Goping, Perak (Kunstler).

(2) *H. castanea* Hook. fil. *F.B.I.* i. 197; King, l.c. 118.

Tree 50 to 60 ft. tall, 8 to 12 in. through. Leaves stiffly coriaceous, elliptic or oblong, apex blunt, base blunt unequal; nerves 4 to 9 pairs, strongly elevate, 7 to 14 in. long, 2.5 to 4.5 in. wide; petioles thickened at both ends, geniculate above .75 to 1 in. long. Flowers white, fragrant, in axillary clusters of 2 to 6; pedicels pubescent, 1.25 in. long. Sepals obovate imbricate, outside tomentose. Petals .6 in. long, linear-oblong; scales linear obtuse. Stamens, filaments subulate; anthers ovate. Females as male,

but stamens barren and ovary ovoid tomentose. Fruit 1 to 1.5 in. through, brown-tomentose. Seeds large angular. *Hab.* Not rare in dense forests. Malacca (Griffith). Pahang, Tahan River, Selangor, Kwala Lumpur; Batu Caves. Dindings, Lumut. Perak, Maxwell's Hill; Goping (Kunstler). Penang Hill. Lankawi Islands, Gunong Raya (Haniff). *Distrib.* King's Island, Mergui. *Native name* : Alai Batu.



FIG. 18.—*Hydnocarpus Curtisii*.

(3) **H. Curtisii** King, *l.c.* 119; *Ann. Bot. Gard. Calc.* vii. 129, *pl.* 148.

A shrub or treelet 15 to 25 ft. tall, glabrous. Leaves coriaceous, oblong-lanceolate, apex acuminate, base unequally rounded or cuneate; nerves 7 to 11 pairs, elevate beneath, 6 to 12 in. long, 2.25 to 3 in. wide; petioles .2 in. long stout. Male flowers in short axillary cymes, .75 in. across. Sepals ovate blunt, minutely pubescent .3 in. long. Petals narrow oblong blunt, .5 in. long; scales linear .4 in. long. Anthers longer than filaments. Female flowers on shorter pedicels. Ovary long, ovoid tomentose. Stigmas

3 bifid. Fruit globose, light grey, tinged brown, velvety, 1 in. through, 1·5 in. long, with a long ridged papilla. Seeds ¼ in. long, plano-convex. *Hab.* Thin stony woods. Penang common, Waterfall, about 600 ft. altitude (Curtis). Lankawi, Burau (Robinson).

(4) **H. Scortechinii** King, *l.c.* 120.

Glabrous tree. Leaves coriaceous, elliptic-oblong acuminate, base rounded, unequal; nerves 7 or 8 pairs, 5 to 7 in. long, 2·5 to 3 in. wide; petioles ½ in. long. Cymes small ½ in. long, 2- or 3-branched with many bracts. Males on pedicels ¾ in. long. Sepals elliptic, blunt, puberulous. Petals smaller; scales nearly as long linear. Anthers narrow. Females on short pedicels. Ovary round below, cylindric above, ridged glabrous. Stigma large. Fruit ovoid, glabrous, 2 in. through. *Hab.* Dindings, Pangkor (Curtis and Scortechini).

(5) **H. cucurbitina** King, *l.c.* 120; *Ann. Bot. Gard. Calc.* v. (2), 129, *pl.* 149.

Tree 60 to 80 ft. tall. Stem 1·5 to 2 ft. through. Leaves coriaceous (young ones mealy) elliptic-oblong, shortly cuspidate, base rounded; nerves 5 to 6 pairs slender, prominent as are reticulations, 3·5 to 5 in. long, 1·5 to 2·25 in. wide; petioles thick ¼ in. long. Cymes dioecious ¾ to 1 in. long, axillary, pedunculate branched. Male flowers ¾ in. across. Sepals ovate blunt, pubescent outside. Petals pale green ovate-round, glabrous; scales nearly as large, edges white, ciliate. Filaments conical; anthers ovate, cordate. Females fewer. Ovary cylindric silky. Fruit obovate-cylindric, tip mammillate, base narrowed, 3 to 5 in. long, dark brown. Seeds 1 or 2·1 in. long. *Hab.* Open jungle. Rare. Perak, at Goping, 500 to 1000 ft. altitude (Kunstler).

(6) **H. Wrayi** King, *l.c.* 121; *Ann. Bot. Gard. Calc.* v. (2), 130, *pl.* 150.

Tree 15 to 25 ft. tall. Stem 3 to 5 in. through, puberulous. Leaves coriaceous large elliptic shortly abruptly acuminate, base obtuse, glabrous except midrib and 8 to 9 pairs puberulous nerves, elevate inarching, reticulations prominent, 8 to 10 in. long, 3·5 to 5 in. wide; petioles stout ½ in. long. Flowers male, ½ in. across in very short axillary cymes. Sepals round pubescent. Petals little smaller; scales fleshy cuneate apex toothed. Stamens 15, short glabrous; filaments thickened at base. Fruit narrow ovoid tapering to both ends, 3 in. long, 1·75 in. through, velvety yellow covered with brown fluff; apical mammilla ¾ in. long, crowned by 3 bifid stigmas. Seeds ¾ in. long. *Hab.* Forests in the low country. Perak, Larut (Kunstler); Relau Tujur (Wray).

(7) **H. ilicifolia** King, *Ann. Bot. Gard. Calc.* v. (2), 130, *pl.* 151.

A small bushy tree. Leaves coriaceous, oblong acuminate or lanceolate, long-acuminate, edges nearly entire or thorny serrate,

base acuminate; nerves 7 pairs, reticulations distinct, 3 or 3½ to 6 in. long, 1·25 to 2·25 in. wide; petioles ¾ in. long. Flowers in axillary fascicles or racemes. Buds globular, on pedicels ½ in. long, softly golden velvety. Sepals 4, in 2 pairs round concave, brown, imbricate. Petals 4 (or 8) smaller, erose ciliate; scales sub-quadrate. Stamens 20, white; filaments short pubescent. Fruit globular velvety, 1·5 in. through. *Hab.* On rocky limestone hills, often very abundant. Lankawi at Kwah. Perlis, very common on and round limestone rocks. *Distrib.* Cambodia and Java.

5. TARAKTOGENOS, Hassk.

Trees with entire alternate leaves. Flowers in axillary cymes, some bisexual, others male only. Males, sepals 4, in decussate pairs, imbricate round concave. Petals 8 in 2 rows smaller, with a fleshy cuneate scale often dentate at the tip to each petal. Stamens 20 to 32; filaments short; anthers cordate. Female flowers, sepals often 3, petals 6 and stamens 17. Ovary long ovoid sulcate with 4 deflexed stigmatic lobes, 1-celled; ovules many on 4 parietal placentas. Fruit large globose or ovoid with a hard fibrous or woody rind, and several seeds imbedded in pulp. Seeds, testa hard, albumen copious, cotyledons large cordate. Species 3 or 4, Indo-Malayan.

Quite glabrous except petals; stamens 20 to 24 . (1) **T. Scortechinii**
Leaves pubescent to tomentose beneath; stamens 32 . (2) **T. Kunstleri**.

(1) **T. Scortechinii** King, *l.c.* 122.

Large glabrous tree. Bark dark coloured. Leaves coriaceous, oblong, lanceolate in equilateral or oblong, edges undulate, apex shortly bluntly acuminate, base narrowed; nerves 4 to 5 ascending, prominent beneath, reticulations prominent, above smooth, 3½ to 7 in. long, 1·5 to 2·75 in. wide; petioles ½ to ¾ in. long. Cymes trichotomous 1 in. long; peduncles ½ in. long axillary. Male flowers ½ to ⅙ in. across on pedicels ¼ in. to ⅓ in. long. Sepals round, glabrous. Petals silky outside; scales less than half as long. Stamens 20 to 24; filaments hirsute. Anthers sagittate. *Hab.* Perak, Bujong Malacca (Scortechini).

var. *gracilipes*, King, *l.c.* Specimens with smaller leaves and slender pedicels.

(2) **T. Kunstleri** King, *l.c.* 122; *Ann. Bot. Gard. Calc.* v. (2), 131, *pl.* 152.

Tree 40 to 60 ft. tall, 10 to 15 in. through. Branchlets puberulous. Leaves bright green, coriaceous unequal-sided, oblong-lanceolate to elliptic cuspidate; nerves prominent beneath, puberulous, 5 or 6 pairs, 4½ to 6 in. long, 1·5 to 3 in. wide; petioles ¾ to 1 in. long, puberulous. Cymes dense, many-flowered. Male flowers as in

T. Scortechinii. Scales of petals hairy, half as long as petals. Stamens 32, hairy. Female flowers, sepals 3. Petals 6. Stamens 17. Ovary ovoid, glabrous 1-celled, with 4 many-ovuled parietal placentas. Stigmas 4 radiating. Fruit globular smooth 2.5 in. through; pericarp green thick, inner part woody. Seeds .75 in. long. *Hab.* Forest 300 to 2000 ft. altitude (in Sumatra). Perak, Goping (Kunstler). *Distrib.* Sumatra.

var. *tomentosa*. *T. tomentosa* King, l.c. 123. Leaves hairy beneath. *Hab.* Perak, Batang Padang (Kunstler).

6. PANGIUM, Reinwtd.

A lofty tree about 50 ft. tall. Leaves entire or 3-lobed, ovate-cordate, acuminate. Flowers in axillary racemes, unisexual. Sepals 2 or 3 concave. Petals 5 or 6 with large scales at the base. Male flowers, stamens 20 to 25; filaments broad flat; anthers ovate. Pistillode 0. Females, ovary ovoid, 1-celled, 2 parietal placentas many-ovuled. Staminodes 5 or 6. Stigma sessile 2- to 4-lobed. Fruit large, oblong-ovoid; pericarp woody wrinkled. Seeds many large ovoid. Albumen large oily. One species only.

(1) *P. edule* Reinwtd. *Pl. Soc. Ratisbon*, ii. 13; *Benn. Pl. Jav. Rar.* 205, t. 43; *Blume Rumphia*, iv. 20, t. 178.

Leaves reddish buff pubescent beneath, 6 to 8 in. long, 4 to 5 in. wide; petioles 2 to 4 in. long. Male flowers in racemes 4 in. long, few-flowered. Bracts linear 1 in. long. Flowers 1.5 in. across, greenish white. Female flowers solitary on a 3-in. peduncle. Fruit from 7 to 12 in. long, 3.75 in. through or more, brown. Seeds 2 in. long, roughly triangular in an oily pulp. *Hab.* By riverbanks and in villages. Selangor, road to Bukit Kutu; Batu Caves. Pahang, banks of Pahang River. Perak, Temengoh; Ulu Bubong (Kunstler). Kelantan. *Distrib.* Malay Islands. *Native name*: Kepayung or Payung. Seeds also known as K'luak. *Use*: The seeds boiled, cut up and macerated in water are eaten, the oil extracted used in cookery. Fresh seeds and oil contain a poisonous glucoside breaking down and producing prussic acid, used in dart poison by Sakais, and the bark is used as a piscicide (Gimlette, Malay Poisons 76). The oil is also used for attracting fish.

7. SCAPHOCALYX, Ridley.

Small trees. Leaves alternate 3-nerved, thin, coriaceous. Flowers unisexual, fascicled from pubescent extra-axillary tubercles on the branches, pedicelled. Calyx spathaceous covering the rest of the flower and splitting on one side or at the top with 4 lobes. Petals narrow, as long as calyx or longer, 5. Stamens 6; filaments short; anthers linear or lanceolate longer. Pistillode 0. Female

flowers unknown. Fruit globose crowned by 6 to 8 minute stigmas. Seeds numerous imbedded in pulp. Species 2, Malay Peninsula.

Calyx splitting along one side persistent boat-like . (1) **S. spathacea**
 Calyx splitting in 4 at the top; flowers very small . (2) **S. parviflora**

(1) **S. spathacea** Ridl. *Journ. Bot.* (1920), 149.

Tree 10 to 25 ft. tall. Leaves elliptic base cuneate, 3-nerved; lateral nerves from midrib to side nerve about 18 pairs, 6 to 8 in. long, 2 to 3 in. wide; petioles .15 in. long. Pedicels slender .5 in. long. Calyx boat-shaped beaked, .4 in. long. Petals linear acuminate, .3 in. long. Stamens 6; filaments very short hairy; anthers linear acuminate, much longer. Fruit white 1 in. through crowned with 6 to 8 minute stigmas. Seeds numerous. *Hab.* Forests. Malacca, Bukit Kamuning (Derry). Negri Sembilan, Tampin Hill (Goodenough, Burkill). Selangor, Ulu Gombak; Weld's Hill (Foxworthy).

(2) **Sc. parviflora** Ridl. *l.c.*

Leaves as in *S. spathacea*, but broader, ovate-elliptic acuminate; lateral nerves 13 pairs, 9 in. long, 4 in. wide; petioles .20 in. long. Flowers male, very small .3 in. wide; pedicels .1 in. Calyx splitting into 4 acute points tipped with hairs .15 in. long. Petals 4, little shorter, white, lanceolate acute. Stamens 6; anthers linear lanceolate; filaments very short. *Hab.* Perak, Temengoh (Ridley).

8. RYPAROSA, Bl.

Trees. Leaves entire alternate often glaucescent beneath. Flowers small unisexual. Males in long axillary racemes. Females in shorter racemes or solitary. Calyx globose, at length 3- to 5-cleft. Petals 5 imbricate. Male flowers, filaments united in a column with 5 anthers at the top. Female flowers with large silky scales at the base of the petals, 5 staminodes, a 1-celled ovary, placentas, parietal with 2 ovules. Stigmas 2 or 3 sessile emarginate. Fruit baccate; pericarp tomentose. Seeds 1 or 2. Species about 10, Malay Peninsula, Java and Sumatra.

Racemes axillary on branches long slender.

Leaves thick; peduncles short 1.5 in. long . . . (1) **R. Wrayi**
 Leaves thin; peduncles slender 6 in. long . . . (2) **R. Hullettii**
 Leaves narrow, lanceolate; racemes velvety . . . (3) **R. Wallichii**

Racemes axillary and terminal short stout sub-globose (4) **R. Kunstleri**

Racemes from trunk.

Leaves oblanceolate 6 to 10 in. long; racemes dense (5) **R. Scortechinii**
 Leaves lanceolate pale, 15 in. long; racemes lax . . . (6) **R. fasciculata**

(1) **R. Wrayi** King, *l.c.* 126; *Ann. Bot. Gard. Calc. l.c.* 133, pl. 155.

Tree 60 to 70 ft. tall. Stem 10 to 24 in. through, glabrous except flowers. Leaves coriaceous, ovate-lanceolate to elliptic obtuse, base

narrowed; nerves 4 pairs sub-erect and midrib prominent beneath, 6 to 10 in. long, 2.5 to 4.5 in. wide; petioles 1 to 1.25 in. long, winged at top. Racemes axillary and from below the leaves 6 to 9 in. long, elongating in fruit. Flowers dark yellow. Males, pedicel 1 in. long. Calyx teeth 3, broad ovate, reflexed. Petals 5 oblong-ovate pubescent outside; scales triangular silky. Staminal tube pubescent; anthers 5 ovate. Females, disc annular with 5 conical staminodes. Ovary globular, pubescent. Stigmas 2 sub-bifid yellow. Fruit globular, .75 in. through, creamy grey with light spots, pubescent, 1-seeded. *Hab.* Dense jungle 400 to 600 ft. altitude. Perak, Ulu Bubong (Kunstler).

(2) **R. Hullettii** King, *l.c.* 126.

Glabrous. Leaves membranous, obovate-elliptic, glabrous, abruptly cuspidate sub-acute, base narrowed, light green above, pale green beneath; nerves 3 pairs ascending and midrib prominent beneath, 5 to 7 in. long, .3 in. wide; petioles 1.5 in. long. Male racemes axillary 12 to 15 in. long, puberulous. Calyx with 3 ovate teeth. Petals 5 ovate; scales densely silky. Staminal tube glabrous; anthers 5 ovate. Female flowers, calyx cup-shaped. Pistil cylindric with a 4-lobed stigma. Fruit fusiform 4-angled reticulate pustular 1.5 in. long. *Hab.* Dense forest, local and rare. Singapore, Bukit Timah fern valley and Chan Chu Kang.

(3) **R. Wallichii** Ridl. *Journ. Roy. As. Soc. S. Br.* 73, p. 139.

A tree. Branchlets covered with red hair. Leaves glabrous above coriaceous lanceolate-oblong, base slightly narrowed, apex acuminate acute, pale beneath; midrib hairy; nerves 5 pairs elevate beneath, at first hairy, 8 to 10 in. long, 2 in. wide; petioles 1.5 in. long. Male, spikes 6 to 9 in. long, rachis hairy. Bracts small lanceolate. Flowers scattered yellow .2 in. across; pedicels .25 in. long. Sepals ovate short blunt hairy. Petals 4 or 5 much longer, ovate hairy inflexed; scales half the size of the petals, hairy. Staminal column glabrous; anthers 4 or 5 oblong. *Hab.* In forests. Singapore, Garden Jungle. Penang, "A climber from the hills, October" (Wallich 7847B and Herb. Finlayson 7847A).

The spikes in Wallich's specimens (very young) are borne in the axils of the leaves, in the Singapore plant they are fully developed on the trunk.

(4) **R. Kunstleri** King, *l.c.* 127; *Ann. Bot. Gard. Calc. l.c.* 134, *pl.* 157.

A big tree 40 to 100 ft. tall, 15 to 24 in. through, glabrous. Leaves coriaceous, glossy dark green, ovate-oblong to oblong bluntly short acuminate, base narrowed beneath, reticulate; midrib and nerves 5 to 7 pairs prominent, 5 to 8 in. long, 2.5 to 3.5 in. wide; petioles 1.25 to 1.75 in. long, swollen and bent at apex. Racemes axillary 1 to 3 together, male ones 6 to 8 in., females 3 to 4 in. long. Male, calyx pubescent, teeth ovate. Petals oblong lanceolate pubescent outside; scales silky. Staminal tube

glabrous. Female, no staminodes. Ovary ovoid angled tomentose. Stigmas obovate. Fruit globular yellow 1·5 in. through. Seeds 5 or 6 oblong, 75 in. long. *Hab.* Dense forest, 500 to 3000 ft. altitude. Perak, Goping; Batang Padang; Ulu Kerling; Larut Hills (Kunstler).

(5) **R. Scortechinii** King, *l.c.* 126; *Ann. Bot. Gard. Calc. l.c.* 134, *pl.* 156.

Spreading tree 15 to 40 ft. tall, 6 to 8 in. through. Branchlets and inflorescence rusty. Leaves coriaceous, oblong-lanceolate or oblanceolate shortly acuminate narrowed from middle to base, glabrous dark green above, bluish grey beneath; nerves 5 or 6 pairs and midrib prominent, 10 to 15 in. long, 4 to 6 in. wide; petioles 2 to 2·5 in. long thickened and bent at tip. Racemes in tufts from tubercles on stem and branches. Males 8 to 12 in. long, females shorter. Male flowers, calyx tomentose splitting into 3 ovate segments. Petals 4 oblong; scales round silky. Female flowers purple. Ovary tomentose 4-angled; styles 2. Fruit angled when young, transversely oblong when ripe and 1·5 in. long by 1 in. wide, velvety brown or black. Seeds 2. *Hab.* Thick forests under 1000 ft. altitude. Pahang, Kwala Tenok. Selangor, Ginting Bidai. Perak, Larut (Kunstler). Penang, Waterfall. Kelantan, Kwala Lebir.

(6) **R. fasciculata** King, *l.c.* 127; *Ann. Bot. Gard. Calc. l.c.* 135, *pl.* 158.

Big tree 50 to 60 ft. tall. Stem 10 to 15 in. through. Leaves coriaceous glabrous, narrow oblong acuminate, base narrowed, deep green; midrib and nerves 7 pairs and reticulations beneath elevate, 9 to 15 in. long, 2·25 to 3·25 in. wide; petioles 1 to 1·25 in. long. Racemes fascicled on trunk and large boughs, 4 to 7 together, from 6 to 8 in. long. Sepals and petals reflexed, rounded, both tomentose. Stamens glabrous. Female flowers, staminodes conic. Stigmas large, reniform. Fruit sessile, globose-pear-shaped, apex mammillate, tomentose 2 in. long, 1·5 in. through, yellowish green. Seeds about 6. *Hab.* Dense forest, Malacca, at Selandor. Sungei Ujong, Bumban (Cantley). Perak, Chanderiang and Ulu Bubong (Kunstler). *Native names*: Tajam B'lat; Musakana Putih; Rambai Ayam.

ORDER XVIII. GUTTIFERÆ.

Trees or shrubs with yellow or greenish resinous juice. Leaves opposite, coriaceous or more rarely membranous. Flowers solitary, fascicled, racemose or paniced, axillary or terminal, white, yellow or red, regular, unisexual or bisexual. Sepals 2 to 6 imbricate or in decussate pairs. Petals 2 to 6, rarely 0, usually imbricate. Male flowers, stamens usually indefinite, free, or filaments connate

monadelphous or in as many bundles as there are petals, a rudimentary pistil or o. Female flowers, staminodes various. Ovary 1- to 2- or many-celled; style slender or none. Stigmas as many as ovary-cells, free or connate. Ovules 1 to 2 or many, axile, or erect from cell-base. Fruit baccate, drupaceous, or rarely dehiscent. Seeds large exalbuminous. Tropics of Asia, America and Africa, about 320 species. (*King, Journ. As. Soc. Beng.* lxi. 147.)

Flowers unisexual on different trees; fruit baccate;

stigma sessile	1. GARCINIA
Flowers bisexual.	
Calyx dividing into 2 lobes	2. OCHROCARPUS
Calyx 4- to 5-lobed.	
Ovary 1-celled; ovule 1; flowers white, numerous;	
stigma peltate	3. CALOPHYLLUM
Ovary 1-celled; ovules 4; flowers few; stigma 4-fid	4. KAYEA
Ovary 2-celled; ovules 4; flowers very large;	
stigma peltate	5. MESUA

1. GARCINIA, L.

Tree of medium or large size, rarely shrubs, with abundance of yellow resinous latex. Leaves opposite, coriaceous. Flowers solitary or fascicled, axillary or terminal, unisexual. Sepals 4 to 5 decussate. Petals 4 or 5 decussate. Male flowers, stamens indefinite in fascicles or forming a globose or conic mass, rarely free. Pistillodes present or not; anthers sessile or on short filaments 2- to 4-celled dehiscent by slits or pores or circumsciss. Females, staminodes free or connate. Ovary 2- to 12-celled. Stigma sessile or sub-sessile peltate, entire or lobed. Ovules solitary in each cell attached to the inner angle. Berry with a fleshy or coriaceous rind. Seeds with a pulpy aril. Species about 100, tropical Asia, Africa and Polynesia.

i. EU-GARCINIA. Sepals and petals 4.

(a) Stamens in males on both sides of 4 fleshy processes; anthers usually 2-celled (4-celled in *G. cuspidata*).

Flowers very small; anthers 2-celled.

Leaves 2 to 3 in. long by .9 to 1 in. wide;

flowers paniced

Leaves 2 to 3 in. by 1.75; flowers densely crowded

Flowers twice as large

Leaves lanceolate; flowers in cymes of 3 moderately large

Leaves elliptic blunt, 4 by 3 in.; flowers .25 in. long

Anthers 4-celled. Habit of *G. rostrata*

(b) Stamens in male in a 4-lobed mass; anthers 2-celled; leaves and flowers large stiff coriaceous; fruit large; pericarp crustaceous.

Leaves broad, ovate; nerves conspicuous

(1) *G. eugeniæfolia*

(2) *G. rostrata*

(3) *G. merguensis*

(4) *G. lanceolata*

(5) *G. diversifolia*

(6) *G. cuspidata*

(7) *G. Hombroniana*

- Leaves elliptic-lanceolate; nerves very slender faint
- Leaves ovate; flowers very large, pink (no male trees known), female with abortive stamens
- (c) Stamens 2-celled in an unlobed mass.
- Stamens in a cone
- Stamens on a stipitate receptacle; leaves strong nerved, sub-coriaceous
- (d) Stamens in whorls on a fleshy receptacle.
- Flowers large red; fruit large pulpy lobed; leaves narrow
- (e) Stamens on a flat or convex sessile receptacle.
- Anthers cuneate, connective large, 2-celled.
- Leaves and fruit large; fruit lobed, pink
- Leaves very large, strongly ribbed; fruit apple-like, sessile, green
- Leaves stiff obovate; nerves fine inconspicuous
- Leaves large elliptic; fruit green, pulpy; flowers small, fascicled
- Leaves large oblong-elliptic; flowers 1.5 in. wide; stamens in a globose head
- Leaves thin; fruit as big as cherry; anther-cells orbicular
- Leaves 2 in. long lanceolate; flowers solitary
- Leaves 3 in. long elliptic cuspidate; flowers sessile, terminal
- Leaves 3 in. long ovate, very coriaceous.
- Flowers solitary axillary
- Flowers minute in short cymes; leaves elliptic blunt
- Anthers 4-celled.
- Leaves coriaceous; flowers small; fruit pulpy, small.
- Leaves 3 to 6 in. long; stamens sub-sessile; fruit oblong umbonate
- Leaves 2 to 3 in. long; stamens on a column; fruit globose, not umbonate
- Leaves 4 to 5 in. long; stamen-heads sessile; fruit elliptic umbonate
- Leaves membranous, elliptic acuminate 4 in. long; flowers cuneate
- Anthers surrounding a central connective, dehiscing transversely.
- Leaves sub-coriaceous 2 to 4.75 in. long; flowers female nearly .5 in. wide
- Leaves sub-coriaceous, elliptic 5.5 in. long; flowers .5 in. across, solitary
- Leaves large; nerves sunk above; flowers very small in fascicles
- Leaves thin ovate long-cuspidate 2 in. long; nerves faint; flowers solitary or paired
- Dubious; leaves large; flower solitary terminal
- (8) *G. penangiana*
- (9) *G. Mangostana*
- (10) *G. Malaccensis*
- (11) *G. Maingayi*
- (12) *G. atroviridis*
- (13) *G. costata*
- (14) *G. Griffithii*
- (15) *G. elusæfolia*
- (16) *G. bancana*
- (17) *G. Curtisii*
- (18) *G. Forbesii*
- (19) *G. montana*
- (20) *G. Murdochii*
- (21) *G. monantha*
- (22) *G. minutiflora*
- (23) *G. nigrolineata*
- (24) *G. globulosa*
- (25) *G. parvifolia*
- (26) *G. Kunstleri*
- (27) *G. Gaudichaudii*
- (28) *G. uniflora*
- (29) *G. dumosa*
- (30) *G. urophylla*
- (31) *G. opaca*
- ii. XANTHOCHYMUS. Sepals and petals 5; filaments connate in 5- (or 4-) pedicelled spatulate bodies; anthers at top very small.
- Leaves very coriaceous 9 to 20 in. long; nerves strong
- (32) *G. nervosa*

- Leaves 5 to 10 in. long coriaceous; nerves not strong (33) *G. dulcis*
 Leaves elliptic coriaceous, 5 in. long; flowers numerous, crowded, rather small (34) *G. glomerata*
 Leaves thin, coriaceous, 8 in. long; flowers crowded in terminal head, large (35) *G. Prainiana*
 Leaves coriaceous, 5 in. long; flowers solitary; fruit large, pear-shaped (36) *G. pyrifera*

(1) *G. eugeniæfolia* Wall. Cat. 4873; Hook. fil. F.B.I. i. 268; Pierre, Fl. For. Cochinchine, vi. pl. 6 (partly); King, l.c. 150.

A tree 50 to 60 ft. tall or less. Leaves thinly coriaceous, elliptic acuminate at each end; nerves very fine numerous and parallel, 2 to 3·5 in. long, '9 to 1·35 in. wide; petioles '2 to '25 in. long. Male flowers '2 in. across, white in axillary fascicles of 20 to 30. Pedicels '2 in. long. Sepals 4 orbicular, outer pair small, inner as large as petals. Petals 4 orbicular. Stamens numerous forming 4 orbicular-oblong fleshy processes with anthers on both sides. Rudimentary stigma large hemispheric, style cylindric. Females '25 in. across in axillary peduncled cymes of 3 flowers. Sepals and petals as in male, no staminodes. Stigma large, sub-papillose nearly covering the ovary. Fruit '75 in. through. *Hab.* In forests in low country, Singapore. Dindings. Perak. Penang (Wallich). *Distrib.* Tenasserim, Andamans. *Native name:* Tentulang Merah. *Use:* In house-building.

(2) *G. rostrata* Benth. and Hook. fil. Gen. Plant. i. 174; Pierre, Fl. For. Cochinchine, vi. pl. 91B; King, l.c. 151.

A tree 30 to 40 ft. tall. Leaves thinly coriaceous, elliptic-oblong blunt cuspidate, base much narrowed, midrib prominent; nerves very numerous, sub-horizontal rather distinct, 2·5 to 3·5 in. long, 1·25 to 1·75 in. wide; petioles '2 in. long. Male flowers '15 in. across in slender lax 3- to 9-flowered cymes fascicled 2 to 4 in the axils. Buds depressed globose; pedicels '25 to '35 in. long. Sepals 4, orbicular inner as large as the petals. Petals 4 orbicular, pink or white. Anthers sessile on the sides of 4 fleshy processes; cells 2. Stigma large, discoid. Hermaphrodite flowers in 3-flowered axillary sessile solitary cymes. Sepals, petals and anthers as in male. Stigma sub-sessile discoid. Fruit ovoid sub-orbicular '5 to '65 in. long and rather less through, crowned by the discoid stigma. *Hab.* Woods, not rare. Singapore, Malacca. Province Wellesley. Penang. Dindings. Perak. *Distrib.* Java. *Native name:* Loli.

(3) *G. merguensis* Wight, Ill. 122; Ic. t. 116; Hook. fil. F.B.I. i. 267; Pierre, Flor. For. Cochinchine, vi. pl. 68, 69, 91D; King, l.c. 150. *G. Wrayi* King, l.c. 152; Ann. Bot. Gard. Calc. v. (2), 140, pl. 168.

A tree 30 to 40 ft. tall. Branches terete. Leaves ovate-elliptic to lanceolate, caudate-acuminate, base cuneate; nerves indistinct, 3 to 3·5 in. long, 1·1 to 1·4 in. wide; petioles '25 in. long. Male

flowers 15 in. wide in axillary cymes of 3 to 6 flowers; pedicels 2 in. long. Sepals 4, outer ones ovate orbicular, inner ones orbicular. Petals 4 orbicular. Anthers on both sides of 4 fleshy processes. Rudimentary style cylindric long. Stigma discoid. In bisexual flowers the petals are orbicular reniform, and the stigma is sessile large convex. In female flowers there are no staminodes, the stigma hemispheric. Fruit globular 75 in. wide covered by the concave smooth stigma. *Hab.* Common all over



FIG. 19.—*Garcinia merguensis*.

the peninsula up to 4500 ft. altitude. Malacca. Pahang. Perak. Singapore. Johor. Penang, road to Waterfall (Curtis). Province Wellesley. Lankawi Islands. *Distrib.* Tenasserim and Cambodia. *Use*: This yields the Malay varnish, Getah Luli (Wray). *Native name*: Lulai.

(4) *G. lanceolata* Ridl. n. sp.

Small tree. Leaves lanceolate acuminate blunt, base cuneate; nerves over 20 pairs very fine and inconspicuous, 3 in. long, 75 in wide; petioles 1 in. long. Male flowers 3 together in very shortly peduncled cymes; pedicels 1 in. long. Sepals orbicular 1 in.

long. Petals orbicular, thin, apparently white. Stamens in 4 broad oblong masses, narrowed at base entirely covering the pistillode; anthers minute very numerous on both sides. Pistillode large. Stigma very large orbicular convex. *Hab.* Lankawi, Pulau Terutau at Telok Hudang (Haniff).

(5) *G. diversifolia* King, l.c. 153.

Tree 40 to 60 ft. tall. Branches 4-angled yellowish. Leaves lanceolate sub-acute to elliptic shortly bluntly cuspidate, base cuneate; nerves numerous visible above only, 2.5 to 4.5 in. long, 1.5 to 2.75 in. wide; petioles .2 to .4 in. long. Male flowers .75 in. across in 3- to 6-flowered axillary cymes; pedicels .2 to .4 in. long. bracts orbicular. Sepals 4 orbicular, outer ones small, united at base and denticulate, inner ones as large as the petals. Petals 4 ovate orbicular. Stamens numerous on 4 processes; anthers sessile, 2-celled, with thick bifid connectives. Pistillode, style cylindric. Stigma large hemispheric entire, papillose. Female flowers as in males, but cymes fewer-flowered and often terminal. Staminodes 0. Ovary globose. Stigma sessile discoid entire. Fruit sub-globular .6 in. through. *Hab.* Mountains at 3000 to 3500 ft. altitude. Perak, Gunong Batu Putih (Wray).

This has the habit of *G. densiflora* King.

(6) *G. cuspidata* King, l.c. 152.

Tree 60 to 70 ft. tall. Leaves elliptic-ovate sub-spathulate cuspidate, base narrowed; nerves sub-horizontal distinct .1 in. apart, inarching with an intra-marginal nerve, 2.5 to 3.25 in. long, 1.1 to 1.5 in. wide; petioles .3 in. long. Male flowers .15 in. across in short peduncled axillary 6- to 9-flowered cymes; buds pyriform; pedicels .3 to .6 in. long. Sepals 4 equal, orbicular. Petals 4 white thin orbicular, a little larger. Stamens on both sides of 4 fleshy processes; filaments short and thick; anthers 4-celled. Style cylindric short. Stigma capitate small concealed by the stamens. *Hab.* Forests, rare. Perak at Selama (Wray) and Ulu Bubong (Kunstler). Female flowers and fruit unknown.

(7) *G. Hombroniana* Pierre, *Fl. For. Cochinchine*, vi. pl. 79, figs. D, E, F, I; King, l.c. 155. *G. opaca* King, l.c. 160 (mostly).

Tree resembling a mangosteen, but more strict with whitish bark, unisexual, about 30 to 60 ft. tall. Leaves oblong to elliptic, slightly narrowed at the base, with numerous parallel slightly ascending nerves, 6 in. long, 3 in. wide; petioles .25 in. long. Male flowers .75 in. across, creamy white. Sepals 2 outer orbicular cherry red as is the pedicel, 2 inner cream, with central red bar. Petals ovate obtuse, yellow. Stamen-mass 4-lobed. Female flowers, sepals and petals as in male. Ovary short broad, covered by the large sessile pulviniform, slightly lobed stigma. Fruit globose, like a small mangosteen 2 in. across bright pink. Seeds numerous, pulp white acid with a peach flavour. Whole fruit

scented of apples. *Hab.* Whole peninsula wild or planted, Singapore. Malacca. Pahang. Dindings. Province Wellesley. Penang. *Distrib.* Nicobars. *Native names* : Mangis Hutan ; Barus or Bruas. *Use* : Fruit eatable but rather acid.

(8) **G. penangiana** Pierre, *Fl. For. Cochinchine*, vi. pl. 46A ; *King, l.c.* 157. *G. fascicularis* Wall. *Cat.* 4053.

Tree 30 to 40 ft. tall, 8 to 15 in. through. Branchlets 4-angled. Leaves oblong-lanceolate to lanceolate acuminate blunt, base narrowed ; nerves very numerous, fine faint, 4·5 to 7 in. long, 1·5 to 3 in. wide ; petioles ·5 in. long. Male flowers in terminal fascicles of 3 to 6 ; pedicels slender ·25 in. to ·5 in. long. Sepals, outer ones round fleshy ·25 in. long red, inner ones larger elliptic obtuse. Petals longer, creamy white. Stamens united into a slightly 4-lobed mass ; anthers short, broad. Pistillode 0. Females solitary larger ; peduncles thicker. Ovary globular. Stigma large hemispheric corrugate 4-lobed. Fruit globular 1·75 in. long. Seeds few. *Hab.* Forests usually at about 1000 ft. altitude. Perak, Thaiping Hills. Penang, upper part of the hill.

Vesque separates *fascicularis* Wall. from *G. penangiana* King, but the plants seem to me identical.

(9) **G. Mangostana** Linn. *Sp. Pl.* 635 ; Pierre, *Fl. For. Cochinchine*, i. 54 ; *King, l.c.* 156 ; *Bot. Mag. t.* 4847.

A tree about 20 to 30 ft. tall. Bark smooth. Leaves thickly coriaceous, elliptic-oblong acute, base cuneate, deep shining green ; nerves numerous, inarching with a double extra-marginal nerve, 6 to 10 in. long, 2·5 to 4·25 in. wide ; petioles ·75 to 1 in. long. Female flowers 2 in. across, solitary or paired at the ends of branches, on stout ·5 in.-long pedicels. Sepals 4 rounded yellowish. Petals 4 ovate dark rosy pink, larger. Stamens 15 to 20, all free, slender with small elliptic white anthers, all abortive. Ovary globular 4- to 8-celled. Stigma sessile 4- to 8-rayed yellow. Fruit depressed globular 3 in. through, deep brown crimson, rind thick rose pink within. Seeds 6 to 8 enclosed in a white juicy aril. Cultivated all over the peninsula. Not known in a wild state. I have never seen a male tree, male flowers or a fertile stamen, though the seeds are almost always fertile. The male flowers described by Roxburgh and King are doubtful. *Native name* : Manggis. *Use* : A very popular fruit, the rind, which is astringent, used in dysentery.

(10) **G. Malaccensis** Hook. *fil. F.B.I.* i. 261 ; Pierre, *Fl. For. Cochinchine*, vi. pl. 78, fig. D ; Vesque, *Epharm.* ii. pl. 147.

Tree. Branchlets 4-angled, drying dark. Leaves elliptic-oblong, short blunt acuminate, base narrowed ; nerves faint, horizontal 4 to 8 in. long, 1·5 to 2·5 in. wide ; petioles ·4 to ·6 in. long channelled. Male flowers 4- to 6-fascicled terminal ; pedicels ·35 to ·65 in. long, thick. Sepals elliptic-orbicular sub-similar. Petals twice as long, red ovate clawed. Stamens very numerous in a sub-cylindric

conic mass; anthers broadly ovoid 2-celled, connectives broad. Female flowers 1·5 to 2 in. across terminal solitary. Ovary globose, 8-celled. Stigma sessile convex corrugated, deeply 8-lobed. *Hab.* Very rare, only known from Maingay's specimen from Malacca. This closely resembles *Hombrovia*, but the stigma is lobed.

(11) **G. Maingayi** Hook. *fil. F.B.I.* i. 267; *King, l.c.* 158; *Pierre, Fl. For. Cochinchine*, vi. *pl.* 17.

A tree 40 to 60 ft. tall. Branchlets thick 4-angled. Leaves oblong-elliptic tip blunt rounded or shortly apiculate, base cuneate; nerves 9 to 13 bold elevated, deep green, 4·5 to 9 in. long, 2·25 to 3·25 in. wide; petioles ·75 in. long not wrinkled. Male flowers in terminal or axillary peduncled umbels 3 to 12 in a head, 1 to 1·25 in. across white or light yellow, whole inflorescence as much as 1·5 in. long. Sepals orbicular, outer ones rather smaller than inner ones. Petals larger, ovate-orbicular. Stamens forming a dense globular mass; filaments slender in rows on a stipitate receptacle. Pistillode cylindric, discoid stigma. Female flowers solitary terminal sub-sessile. Staminodes few. Ovary globose 4- to 6-celled. Stigma large convex papillose slightly 4-lobed. Fruit globular 2 to 2·5 in. through, crowned by the discoid lobed style, which in some forms is borne on a stout grooved style and is 8-lobed. *Hab.* Forests. Malacca (Maingay). Dindings, Pangkor; Telok Sera (Curtis). Perak, Thaiping Hills in low country (Kunstler). Ulu Leding (Wray).

(12) **G. atroviridis** Griff. in Hook. *fil. F.B.I.* i. 266; *Pierre, Fl. For. Cochinchine*, vi. *pl.* 80, *fig. c*; *King, l.c.* 159.

A handsome tree 20 to 60 ft. tall. Leaves deep green (red when young) narrow oblong sharply acuminate, base cuneate; nerves numerous inarching ·05 to ·1 in. from the edge, 4·5 to 8 in. long, 1·25 to 2 in. wide; petioles ·6 to ·75 in. long. Male flowers 1·25 in. across in terminal clusters of few-flowered cymes; pedicels ·25 to ·75 in. long. Sepals, outer ones oblong or orbicular, inner ones thin-edged, larger. Petals large bright crimson orbicular-obovate. Stamens, filaments slender inserted in whorls on a fleshy receptacle; anthers narrow oblong, forming with large convex. Stigma a globose mass. Female flowers terminal solitary. Sepals and petals as in male, but petals smaller. Staminodes attached to an annulus. Ovary cylindric ribbed 12- to 16-celled. Stigma convex, pileate deep red. Fruit 3 in. or more through sub-globose, top flattened with many large ribs and grooves, brilliant orange yellow, juicy. *Hab.* Wild and occasionally cultivated, in forests at 1500 ft. altitude. Singapore. Johor. Malacca. Perak. Penang. *Native name*: Asam Gelugur. *Use*: Fruit dried and eaten in curries or stewed, also used in medicine.

(13) **G. costata** Hemsl. *King, l.c.* 161.

Tree 50 to 70 ft. tall, 12 to 18 in. through. Leaves dark green, thinly coriaceous, elliptic acute, base cuneate; nerves elevate

13 to 18 pairs, 6 to 14 in. long, 3·5 to 6 in. wide; petioles 1 to 1·5 in. long. Male flowers 1 to 1·25 in. across in terminal cymes of 3 to 5; pedicels stout ·25 to ·5 in. long. Sepals equal orbicular. Petals larger, pale yellow, tinged reddish, orbicular-ovate. Stamens forming an oblong 4-angled mass with stigma; filaments inserted on a fleshy receptacle; anthers cuneate. Stigma large discoid. Female flowers solitary terminal. Staminodes 12. Ovary grooved. Stigma discoid with radiating grooves. Fruit depressed spheroidal, 3 in. by 2 in. with many grooves, pale rose to crimson. *Hab.* Forests. Perak, Thaiping Hills 2000 to 3000 ft. altitude and Gunong Bubu (Kunstler). *Native name*: Glugor. *Use*: Fruit eaten.

In foliage and flowers closely resembling *G. Maingayi*, but in fruit resembling *G. atroviridis*.

(14) *G. Griffithii* T. Anders. in Hook. fil. F.B.I. i. 266; King, l.c. 161.

A smooth-barked tree usually about 40 to 60 ft. tall, with angled yellowish branches. Leaves large coriaceous bullate oval or oval-elliptic, light green, base narrowed; nerves 16 to 24 pairs bold, 9 to 16 in. long, 4 to 8 in. wide; petioles ·6 in. long. Male flowers ·75 in. across (hardly expanding) in dense 3- to 10-flowered cymes in leaf axils on tubercles; pedicels ·25 in. long. Sepals equal orbicular fleshy. Petals oblong blunt fleshy, green. Stamens 25 to 40 in a square flat-topped mass; anthers broad oblong. Pistillode none. Female flowers in few-flowered axillary cymes. Perianth as in males. Staminodes in 4 bundles. Ovary ribbed 12-celled; style short. Stigma peltate papillose, edges crenate. Fruit 3 in. through globose flattened at the top, brownish green, resembling a russet apple, acid. *Hab.* In woods, common, Singapore, Malacca and Perak. *Native name*: Kandis Gajah.

(15) *G. clusiæfolia* Ridl. Journ. Roy. As. Soc. S. Br. 73, p. 140.

Tree. Branches black not angled. Leaves stiffly coriaceous obovate, base cuneate; nerves very fine ascending inconspicuous above, almost invisible beneath, 5 to 5·5 in. long, 2·25 to 3 in. wide; petioles ·5 in. long stout not rugose. Male flowers in fascicles upon tubercles, axillary 10 or more together, very small. Bracts ovate numerous. Pedicels thick 25 in. long. Sepals 4, 2 outer ones coriaceous, orbicular concave, 2 inner thinner, obovate-oblong. Petals oblong obtuse as long. Stamens connate into a sub-conic mass not lobed; anthers sessile, minute 2-celled; cells separated by the broad triangular connective. Pistillode 0. *Hab.* Mountains, rare, Pahang at Wray's camp on Gunong Tahan (Ridley).

(16) *G. bancana* Miq. Fl. Ind. Bat. Supp. 494; King, l.c. 162.

A tree 20 to 80 ft. tall. Stem 18 to 24 in. through. Branchlets stout, nodular, black. Leaves coriaceous broadly obovate-lanceolate, tip rounded or mucronulate, base narrowed to petiole; nerves very numerous, close and parallel, keel prominent, 5 to 7 in. long,

2 to 3 in. wide; petioles winged .75 to 1.25 in. long. Male flowers small .1 in. long, densely clustered in the axils of fallen leaves, yellow. Bracts very numerous, lanceolate. Pedicels .25 in. long. Sepals orbicular, inner pair smaller. Petals ovate. Stamens numerous in a convex mass; anthers sub-sessile with 2 small oval cells at the end of the transverse connective. Pistillode o. Female flowers similar with 6 to 10 staminodes. Ovary globular. Stigma hemispheric with 8 rays. Fruit fleshy, green ovoid. *Hab.* Swampy wet forest, occasionally in tidal woods, common. Singapore, Selitar; Changi. Malacca. Johor, Kota Tinggi, river bank. Perak, Goping (Kunstler). *Distrib.* Sumatra and Banca.

(17) **G. Curtisii** Ridl. n. sp.

Tree. Branches hardly angled. Leaves lanceolate obtuse or acute, base long-narrowed; nerves numerous parallel inarching near the margins, 5 to 10 in. long, 1.5 to 3.5 in. wide; petioles 1 in. long. Male flowers in terminal or axillary fascicles with slender pedicels .25 in. long. Sepals 4, orbicular sub-equal .1 in. long. Petals oblong obtuse a little longer. Stamens numerous in a globose head with very short filaments; anthers 2-celled oblong-quadrate with narrow connective. Pistillode o. *Hab.* Penang, near Waterfall and at Telok Bahang (Curtis 691; 240).

(18) **G. Forbesii** King, l.c. 162.

A small tree about 15 ft. tall. Leaves thin coriaceous oblanceolate short acuminate, base cuneate, 3.5 to 5 in. long, 1.5 to 2.5 in. wide; petioles .3 to .4 in. long. Male flowers .25 in. wide in clusters of 3 or 4 axillary. Sepals small round. Petals orbicular crimson. Stamens in a convex mass, the connectives small; anthers subsessile sub-orbicular 2-celled. Female flowers solitary. Petals red or orange. Stigma sessile convex covering the ovary, papillose. Fruit pulpy globose as big as a cherry, red. Aril of seeds red. *Hab.* In lowland forests, Singapore, Garden Jungle; Bukit Mandai. Johor, Tanjong Kupang. Pahang Kwala Tenok, Tahan River. Perak, Upper Perak 300 ft. altitude (Wray). *Distrib.* Sumatra.

(19) **G. montana** Ridl. n. sp.

A small tree 15 ft. tall. Branches 4-angled. Leaves thickly coriaceous, lanceolate bluntly acuminate; nerves invisible except the midrib, 2 in. long, .75 in. wide or smaller; petioles .3 in. long. Male flowers solitary, terminal .25 in. across greenish yellow, on pedicels .12 in. long, thick. Sepals ovate obtuse. Petals rounded. Stamens crowded into a sessile sub-globose head; anthers numerous, linear. Pistillode o. Female flowers terminal. Sepals and petals as in males. Style cylindric. Stigma capitate. Berry flask-shaped beaked .75 in. long. *Hab.* On Mt. Ophir, at 3000 ft. altitude on the Padang Batu (Ridley).

(20) **G. Murdochii** Ridl. *Journ. Roy. As. Soc. S. Br.* 82, p. 169.

Branches slender yellow, angled. Leaves coriaceous elliptic abruptly blunt-cuspidate, base cuneate; nerves very fine, 3 in.

long, 1·5 in. wide; petioles ·35 in. long. Flowers solitary terminal, sessile ·5 in. wide. Sepals 4. Petals 4 obovate red. Male flowers, stamens in a globose head; anthers peltate cells curved. Female flowers, pistil sub-cylindric. Stigma large cushion-shaped covering pistil, rest as in males. Perak, Bikum reserve (Burn-Murdoch). *Distrib.* Borneo.

(21) *G. monantha* Ridl. *Journ. F.M.S. Mus.* vi. 138.

Small tree. Branchlets grey. Leaves coriaceous ovate or lanceolate-ovate acutely acuminate 3 in. long, 2 in. wide; nerves 25 pairs indistinct beneath; petioles ·5 in. long. Female flowers axillary solitary; peduncles ·25 in. long. Ovary ·25 in. long. Stigma large fleshy, circular entire. *Hab.* Pahang, Gunong Tahan, stream banks at 5500 ft. altitude (Ridley). Males unknown.

(22) *G. minutiflora* Ridl. *Journ. Roy. As. Soc. S. Br.* 82, p. 169.

Tree. Branches rough brown knotted. Leaves coriaceous bright green, elliptic blunt, base cuneate, edge thickened; nerves faint 7 pairs visible above, midrib prominent, 2 in. long, 1·1 in. wide; petioles ·15 in. long. Cymes on tubercles on nodes, ·20 in. long, 3-branched. Branches yellow angled. Flowers ·75 in. long. Sepals 4 ovate yellow. Petals oblong-obovate little larger white. Stamens minute in a globose head; anthers oblong, connectives of moderate size, cells 2 linear. *Hab.* Rare. Lankawi Islands, Goa chinta (Curtis). Females and fruit unknown.

(23) *G. nigrolineata* Planch. in Hook. *fl. F.B.I.* i. 263; *Pierre, Fl. For. Cochinchine*, vi. pl. 81, fig. F.

Tree 30 to 40 ft. tall. Leaves lanceolate acuminate, 6 to 8 in. long, 1 to 2 in. wide; nerves fine; petioles ·5 in. long. Male flowers umbellate 4 to 10; pedicels 4, ·1 in. long. Stamens 20 in a compact mass; filaments short; anther-cells 4 connective thick. Pistillode 0. Females larger in fours. Stigmas large papillose convex. Fruit fleshy oblong-globose with a thick style and pustular stigma. *Hab.* Forests. Singapore, Changi; Sungei Morai. Johor, Gunong Pulai. Pahang, Pekan. Malacca, Nyalas (Derry), Bukit Bruang. Dindings, Pangkor. Penang, Waterfall (Curtis). Lankawi, Kwah. *Distrib.* Carimon Isles, Siam, Burma. *Native name*: Kandis Jantan.

(24) *G. globulosa* Ridl. *Journ. Roy. As. Soc. S. Br.* 54, p. 20.

A straight tree with scaly bark, 60 ft. or more tall. Leaves elliptic acuminate, many-nerved, 2 to 3 in. long, 1·5 in. wide; petioles ·25 in. long. Male flowers in terminal and axillary clusters of 6 or 8, yellow ·2 in. long. Sepals rounded gibbous. Stamens 20 in a short cylindric column; anthers square at the top. Female flowers larger 4 to 5 in. an umbel axillary and terminal. Sepals rounded orbicular. Stigma sessile round, pustular. Fruit globose orange not umbonate ·5 in. through. Stigmas almost concealed in a depression. *Hab.* Common in woods. Singapore, Malacca, Selangor and Perak. *Native name*: Kandis. Fruit eatable.

(25) **G. parvifolia** *Miq. Fl. Ind. Bat. Supp.* 495; *Ridl. Journ. Roy. As. Soc. S. Br.* 54, p. 20.

Small tree, rather rough barked, 20 to 30 ft. tall. Leaves dark green thinly coriaceous, elliptic acuminate, base narrowed, tip cuspidate, 4·5 in. long, 1·5 in. wide; petioles ·5 in. long. Male flowers axillary in loose heads of 2 or 3. Sepals ovate yellow. Petals oblong spreading ·25 in. long, cream colour. Stamens about 30 in a sessile head; filaments oblong short, spreading; anthers quadrate. Females in sessile cymes of 3 to 5. Sepals, outer ovate rounded green, inner smaller, yellow. Petals yellow oblong ·1 in. long. Staminodes 4 linear, clubbed. Stigma orbicular, edges lacerate with short papillæ, obscurely 6-lobed. Fruit elliptic, pulpy orange, top umbonate. Stigma minute sunk and concealed; ovary cells 6. Seeds 3 to 5. *Hab.* Woods, Singapore, not rare, Tanglin. *Distrib.* Sumatra.

(26) **G. Kunstleri** *King, l.c.* 165.

Shrub 6 to 15 ft. tall. Branches not angled. Leaves membranous oblanceolate acuminate; nerves faint, 3·5 to 5 in. long, 1·15 to 1·8 in. wide; petioles ·35 to ·6 in. long. Males ·15 in. across, in fascicles of 3 to 6. Petals broad ovate. Stamens 15 in a convex mass; anthers 4-celled, connective broad. Females solitary. Petals 0. Stigma convex, papillose 10-lobed. Fruit pulpy orange yellow sub-globose 1·5 in. through. *Hab.* Limestone rocks, Perak, Kwala Dipang (Kunstler, Scortechini); Tapa (Wray).

(27) **G. Gaudichaudii** *Planch. and Triana, Ann. Sc. Nat. Ser.* 4, xiv. 357; *Pierre, Fl. For. Cochinchine, pl.* 75; *Vesque, Epharm.* ii. t. 126, 127. *G. Scortechinii* *King, l.c.* 166.

Tree 20 to 40 ft. tall. Branchlets yellowish angled. Leaves thinly coriaceous, ovate-elliptic to ovate-lanceolate, base acute; nerves 5 to 6 pairs inarching ·2 in. from the edge, conspicuous, 2·75 to 4·75 in. long, 1·5 in. wide, ·25 in. long. Male flowers ·2 in. across, sessile or shortly pedicelled, 3 to 6 on axillary tubercles, cream colour turning pink with age. Sepals orbicular thin. Petals broadly ovate. Stamens 10 to 20 on a 4-angled receptacle; anthers with peltate tips, cells round the edge; filaments shorter. Pistil-lode 0. Female flowers nearly ·5 in. across, axillary solitary. Ovary globose. Stigma sessile, 4-lobed. Fruit globular, pericarp leathery, ·6 to ·75 in. through. Seeds 4. *Hab.* Perak, Thaiping Hills; Gunong Batu Putih. Penang, Telok Bahang, a shrub (Curtis). *Distrib.* Cochin-China.

var. *minor* *Ridl.* Leaves 3 in. long, 1·25 in. wide. Fruit smaller. Johor, Kota Tinggi. Malacca (Griffith).

(28) **G. uniflora** *King, l.c.* 167.

A small tree 8 to 10 ft. tall. Branches rather stout. Leaves ovate-oblong to elliptic-oblong thinly coriaceous, acuminate, base cuneate; nerves 12 to 20 pairs fine but prominent; 5·5 in. to 7·5 in. long, 2·5 to 4·25 in. wide; petioles ·75 to 1 in. long, thick

channelled. Male flowers .75 in. across, solitary, sessile in the axils of fallen leaves, waxy yellow. Sepals sub-equal, obovate-orbicular, membranous. Petals smaller orbicular. Stamens numerous in a globose mass; anthers sessile peltate dehiscing by a circular infra-marginal slit. Females solitary axillary. Staminodes 0. Stigma convex papillose. *Hab.* Dense jungle on high rocks at 1500 to 4000 ft. altitude. Rare. Johor, Gunong Pantai. Pahang. Tahan River (Ridley). Perak, Gunong Batu Putih (Kunstler).

(29) *G. dumosa* King, *l.c.* 167.

A bush or shrub 3 to 4 ft. tall. Branchlets angled, yellow. Leaves thinly coriaceous ovate-lanceolate to oblong-lanceolate caudate-acuminate, base acute, dark green, drying lighter colour; nerves 7 to 9 pairs, prominent, 4.5 to 5.5 in. long, 1.5 to 2 in. wide; petioles .25 in. long. Male flowers .2 in. across, in dense 6- to 10-flowered fascicles, axillary; pedicels .1 in. long. Sepals membranous orbicular, outer ones shorter and thicker. Petals smaller fleshy, yellow or yellowish green. Stamens on a receptacle, filaments short; anthers reniform. Pistillode 0. Females in fewer flowered fascicles. Staminodes 10. Stigma convex with 8 radiating ridges. Fruit ovoid pointed. *Hab.* At altitudes of 100 to 200 ft. Perak, Batu Togoh and Thaiping (Wray).

(30) *G. urophylla* Scort. in King, *l.c.* 167.

A tree 30 ft. tall. Branchlets thinly coriaceous, ovate-lanceolate-caudate-acuminate, base cuneate; nerves 5 pairs, 2.25 to 3 in. long, .7 to 1.2 in. wide; petioles .15 in. long. Male flowers .2 in. wide, solitary or paired, from axillary tubercles; pedicels .1 in. long or less. Sepals sub-equal ovate orbicular. Petals orbicular. Stamens 6 to 12 with flat circular tops; anthers round the edge; filaments fleshy. Pistillode 0. Females axillary solitary. Staminodes 6. Ovary cylindric. Stigma convex tabulate, 4-cleft. Fruit ovoid-orbicular .4 in. long, .35 in. wide. *Hab.* Perak (Scortechini); Gunong Inas at 3900 ft. altitude (Yapp). *Distrib.* Sumatra.

DOUBTFUL SPECIES

(31) *G. opaca* King, *l.c.* 160.

Tree 30 to 40 ft. tall, 4 to 6 in. through. Leaves thin coriaceous, lanceolate rather long cuspidate, base cuneate; nerves quite invisible, 4 in. long, 1.25 in. wide; petioles .25 in. long. Flowers female, solitary terminal. Petals oblong .25 in. long. Pistil cylindric narrowed at top. Stigma obscurely lobed. Fruit bright red top-shaped, nearly 2 in. long, 1.25 in. through. *Hab.* Perak. A rare mangosteen tree. Dense jungle near top of Gunong Malacca, 3500 to 4000 ft. altitude (Kunstler 7232).

The flower resembles that of *G. anomala* Planch, but the foliage is totally different. King's description of *G. opaca* appears to belong partly to this plant, but two out of three specimens so labelled by King are *G. Hombroniana*: Male flowers not known.

(32) **G. nervosa** Miq. *Ann. Mus. Bot. Lugd. Bat.* i. 208; *King, l.c.* 169. *G. Andersoni* Hook. *fil. F.B.I.* i. 270.

A medium-sized tree (40 to 80 ft. tall, *vide* King). Branchlets angled, 2 angles winged. Leaves pubescent beneath, deep green coriaceous, oblong-lanceolate or oblong-ovate, narrowed to the rounded or cordate base; nerves 15 to 20 pairs very prominent beneath, inarching with an intra-marginal nerve $\cdot 1$ in. from edge, 9 to 20 in. long, 3·5 to 7 in. wide; petioles 1·25 in. long. Female flowers $\cdot 75$ in. across, yellowish green, in axillary fascicles of 8 to 10; pedicels 1 to 1·25 in. long pubescent. Sepals 5 unequal, coriaceous pubescent. Petals 5 much larger, orbicular. Disc of 5 fleshy glands with 5 minute staminodes between them. Ovary ovoid 5-celled. Stigma 5-rayed. Fruit ovoid, yellow, blotched red, 2 in. long, 1·5 in. through, with an excentric mammilla and 5-lobed stigma. Seeds 2. *Hab.* Forests. Not rare, Singapore, Malacca, Selangor and Perak. *Distrib.* Sumatra.

(33) **G. dulcis** Kurz, *For. Flora Burma*, i. 92; *Pierre, Fl. For. Cochinchine* vi. 4; *King, l.c.* 169. *Xanthochymus dulcis* Roxb. *Cor. Pl. t.* 270; *Wight, Ic.* 270; *Bot. Mag. t.* 3088.

Medium tree 20 to 40 ft. tall. Branchlets 4-angled¹, yellow. Leaves deep green coriaceous ovate-oblong, shortly acuminate, base rounded; nerves 10 pairs, inarching near edge, not very prominent, 5 to 10 in. long, 1·75 to 4·5 in. wide; petioles $\cdot 4$ to $\cdot 6$ in. long stout. Flowers globular hardly expanding $\cdot 25$ in. across, greenish yellow, unisexual or male and bisexual mixed, in dense many-flowered fascicles in the leaf axils; pedicels $\cdot 25$ to $\cdot 35$ in. long. Sepals 4 to 6 orbicular, 3 outer smaller. Petals usually 5, larger. Stamens 40 in pedicelled fan-shaped groups. Disc in male corrugated, fleshy, in female 5-lobed. Stigma in males 0, in bisexuals, 5-rayed. Fruit 2·5 to 3 in. long globular, ovoid or pear-shaped, peduncled, pulpy yellow. Seeds 1 to 5 oblong. *Hab.* In orchards and village compounds cultivated. Singapore, Perak, etc. *Distrib.* Malay Islands. *Native name*: Mundu. *Use*: Fruit eaten, raw or cooked. It makes excellent jam.

(34) **G. glomerata** Vesque, *DC. Monogr.* 320. *G. densiflora* King, *l.c.* 171 (*not of Vieillara*).

Tree 60 to 80 ft. tall. Branches 4-angled. Leaves thickly coriaceous, broad elliptic to elliptic-oblong sub-acute or blunt, base cuneate, midrib stout; nerves 10 to 12 pairs inarching $\cdot 1$ in. from edge, 4·5 to 6 in. long, 2·5 to 3·75 in. wide; petioles $\cdot 6$ in. long channelled. Male flowers $\cdot 35$ in. across, in dense many-flowered clusters, 1 to 1·5 in. across; pedicels $\cdot 2$ to $\cdot 35$ in. long. Sepals 5, 3 outer larger orbicular puberulous, edges ciliate, inner 2 as large as petals. Petals 5 orbicular, fleshy yellow. Stamens in 5 fan-shaped branches of 12; filaments fleshy; anthers with 2 orbicular cells. Disc corrugated fleshy 5-lobed. Pistillode, style cylindric. Stigma oblong, small. Female flowers and fruit unknown. *Hab.* Rare in hill jungle. Perak at Goping (Kunstler).

(35) **G. Prainiana** King, *l.c.* 171.

A stout cylindric tree about 30 ft. tall. Branchlets not angled. Leaves deep green coriaceous, elliptic-oblong, narrowed to the rounded or cordate base; nerves 12 to 15 pairs inarching near edge, rather prominent, 4·5 to 9 in. long, 1·75 to 4 in. wide; petioles 2·5 in. long, stout. Male flowers 4 in. across in dense 6- to 12-flowered terminal cymes. Bracts lanceolate keeled. Sepals 5 orbicular, fleshy. Petals 5 sub-orbicular pink. Stamens in a 5-lobed ring 2-celled. Pistillode globose. Fruit globose flat-topped fleshy yellow, 2 in. through. Stigma smooth concave, sessile. Seeds flat with sweet pulp. *Hab.* In Campongs and orchards. Perak, Kwala Dipang, Pahang, Temerloh and Pahang River. *Native names:* Cherapu; Chupu; Chekow; Menchepu. *Use:* Fruit eaten like mangosteens.

Female flowers not seen.

(36) **G. pyrifera** Ridl. *Journ. Roy. As. Soc. S. Br.* 73, p. 141.

A tree. Branchlets yellow angled. Leaves coriaceous, elliptic, sub-acute shortly narrowed at the base; nerves very numerous horizontal, meeting in an intra-marginal nerve close to the edge, very fine, margin not thickened, 3·5 to 5·5 in. long, 1·75 to 2·25 in. wide; petioles very stout wrinkled 5 in. long. Male flowers unknown. Females solitary, axillary, from tubercles covered with short ovate bracts. Fruit obovoid-pear-shaped, yellow, 2·5 to 3 in. through, on a 1·75-in. long peduncle. Sepals small ovate. Stigma small 5-lobed, lobes rounded. Seeds 2 or 3 reniform brown, 1 in. long, 2·5 in. wide. *Hab.* Penang, Penara Bukit (Curtis 3094).

Near but distinct from *G. densiflora*.

2. OCHROCARPUS, Thouars.

Trees with stiff coriaceous leaves. Flowers in fascicles on the branches. Calyx closed before flowering opening into 2 sepals. Petals 4 to 7. Stamens indefinite; filaments filiform. Ovary 2-celled; ovules 2 in a cell; style short stout. Stigma 3-lobed. Berry 1- to 4-seeded. Seeds large. Species 4 or 5, Africa, Madagascar, India, Siam.

(1) **O. siamensis** T. Anders. *F.B.I.* i. 270.

Leaves oblong-lanceolate shortly blunt-acuminate; main nerves very inconspicuous, very finely and conspicuously reticulate all over, 7 in. long, 2 in. wide; petioles thick yellow 7·5 in. long. Flowers 1 or 2 together 5 in. across, white fragrant. Berry fusiform about 1 in. long narrowed to both ends with persistent coriaceous sepals at base. *Hab.* Langkawi, Burau (Robinson). *Distrib.* Pegu and Siam.

3. CALOPHYLLUM, L.

Trees, rarely shrubs, with opposite shining coriaceous leaves with innumerable very slender parallel nerves at right angles to midrib. Flowers bisexual in axillary or terminal panicles white. Sepals and petals 4 to 12, or petals 0, imbricate in 2 or 3 series. Stamens indefinite; filaments filiform free or connate at base; anthers 2-celled, dehiscence vertical. Ovary 1-celled; style slender. Stigma small peltate; ovule 1 erect. Drupe with a thin fleshy pericarp. Seed ovoid or globose. About 35 species, chiefly tropical Asiatic, a few American.

The generic Malay name for these trees is Bintangor, from Bintang, a star, in allusion to the bright flowers. The timber of all is highly valued in shipbuilding.

Series A. No petals.

Flowers axillary solitary or in pairs rarely in very short panicles, very small.

- | | |
|-----------------------------------------------------------------------------------------------|------------------------------|
| Leaves obovate | (1) <i>C. parvifolium</i> |
| Leaves lanceolate; flowers in pairs | (2) <i>C. lanceola</i> |
| Leaves lanceolate; flowers in panicles of 5 | (3) <i>C. rupicolum</i> |
| Flowers in axillary fascicles | (4) <i>C. Kunstleri</i> |
| Flowers in axillary racemes, quite glabrous. | |
| Leaves less than 5 in. long. | |
| Leaves ovate to ovate lanceolate; pedicels twice as long as flowers | (5) <i>C. pulcherrimum</i> |
| Leaves elliptic oblong; pedicels as long as flowers | (6) <i>C. Prainianum</i> |
| Leaves elliptic lanceolate; racemes densely crowded; pedicels not exceeding flowers | (7) <i>C. floribundum</i> |
| Buds, petioles, inflorescence pubescent. | |
| Bush. Leaves ovate or elliptic 1 to 1.5 in. long | (8) <i>C. pisiferum</i> |
| Trees. Leaves obovate obtuse | (9) <i>C. retusum</i> |
| Trees. Leaves elliptic | (10) <i>C. oblongifolium</i> |
| Leaves narrow oblong 3 in. long | (11) <i>C. ferrugineum</i> |
| Leaves more than 5 in. long. | |
| Leaves narrow elliptic 6 to 12 in. long | (12) <i>C. spectabile</i> |
| Midrib only pubescent. | (13) <i>C. Curtisii</i> |
| Whole leaf beneath tomentose | (14) <i>C. molle</i> |
| Flowers sub-panicled terminal | (15) <i>C. canum</i> |

Series B. Petals 4 or more.

- | | |
|---------------------------------------------------------------------------------------|------------------------------|
| Leaves elliptic thinly coriaceous | (16) <i>C. inophyllum</i> |
| Leaves obovate retuse thickly coriaceous | (17) <i>C. inophylloide</i> |
| Leaves elliptic ovate small; petals 4 to 6 | (18) <i>C. venustum</i> |
| Leaves elliptic; flowers and fruit small; petals 4 | (19) <i>C. fœtidum</i> |
| Leaves oblong sub-sessile | (20) <i>C. subsessile</i> |
| Leaves oblong petiolate. | |
| Inflorescence rufous tomentose | (21) <i>C. Wallichianum</i> |
| Inflorescence glabrous; flowers .35 in. across; fruit globose 1 in. through | (22) <i>C. Griffithii</i> |
| Flowers 1 in. across; fruit ellipsoid 5 in. long | (23) <i>C. macrocarpum</i> |
| Leaves sessile orbicular | (24) <i>C. rotundifolium</i> |

(1) **C. parvifolium** *Vesque, DC. Monogr.* 604. *C. microphyllum* *T. Anders. in F.B.I.* i. 272; *King, l.c.* 173 (not of *Choisy*).

A shrub with angled branchlets. Leaves obovate cuneate or obovate obtuse much narrowed at base, .75 to 1.5 in. long, .35 to .75 in. wide; petioles .1 to .2 in. long. Flowers solitary or in pairs axillary, very small. Sepals sub-orbicular. Petals 0. Fruit pea-shaped .25 in. long. *Hab.* Mountains, Johor, Gunong Pantai. Malacca, Mt. Ophir (Griffith, Maingay).

(2) **C. lanceola** *Ridl.*

A small tree. Leaves lanceolate narrowed nearly equally to both ends, tip acuminate obtuse, base acuminate to petiole, 2 in. long, .75 in. wide; petioles .25 in. long. Flowers axillary solitary or in pairs. Perianth unknown. Drupe small globose apiculate .25 in. long on slender peduncles .5 to .75 in. long. *Hab.* Kedah Peak, about 4000 ft. altitude (Ridley 5751).

(3) **C. rupicolum** *Ridl. Trans. Linn. Soc.* iii. 278.

A bush, 6 ft. tall. Branchlets 4-angled. Leaves narrow lanceolate sub-acuminate, narrowed at base dark green, 2 to 2.5 in. long, .75 in. wide; petioles .12 in. long. Panicles short 5-flowered axillary .5 in. long. Flowers .12 in. across. Sepals 4 obovate oblong, tips rounded. Petals 0; filaments short flexuous. Drupe .25 in. long, elliptic orange. Seed oblong-elliptic hardly .25 in. long. *Hab.* Rocky river-banks. Pahang, Tahan River (Ridley).

(4) **C. Kunstleri** *King, l.c.* 174.

A tree 40 to 60 ft. tall, 12 to 18 in. through. Branchlets 4-angled, glabrous except the buds; branchlets, petioles and base of inflorescence red pubescent. Leaves narrowly elliptic-oblong obtusely acuminate, base tapering; nerves very close, 3.5 to 5 in. long, 1.25 to 1.4 in. wide; petioles .3 to .4 in. long. Flowers in solitary axillary fascicles from the axils of older or fallen leaves, 1.5 in. long, 1- to 6-flowered. Bracts at base of pedicels 4 ovate pubescent. Flower .25 in. across; pedicels unequal 1 in. long or less. Sepals 4, outer obovate oblong, inner oblong obtuse. Petals 0. Drupe oblong-globose, glabrous .3 in. long. *Hab.* Pahang Kwantan. Perak, Ulu Kerling and Thaiping (Kunstler). Penang, Muka Head; Batu Feringhi (Curtis). Lankawi, Kwah (Curtis). *Native name*: Buitangor Ara.

(5) **C. pulcherrimum** *Wall. Cat.* 4848; *Hook. fil. F.B.I.* i. 271; *Pierre, Fl. For. Cochinchine, pl.* 104; *King, l.c.* 174.

Glabrous tree 20 to 80 ft. tall, 15 to 20 in. through. Branchlets 4-angled. Leaves lanceolate to elliptic-lanceolate bluntly acuminate, base long narrowed, 1.75 to 2.5 in. long, .8 to 1.2 in. wide; petioles .3 in. long. Racemes solitary 1 to 2 in. long from axils of older leaves spreading 5- or 6-flowered. Flowers .25 in. across; pedicels .5 in. long. Sepals broadly ovate, inner slightly the larger. Petals 0. *Hab.* Common in forests, Singapore (Wallich 4848); Changi. Malacca, Merlimau and Bukit Sabukor. Pahang, Rumpin

River. Perak. Penang, Muka Head (Curtis); Moniot's Road. Kedah, Sungei Batu Asap (Haniff). *Distrib.* Cambodia, Sumatra, Borneo. *Native name*: Bintangor Batu.

C. mesuæfolium Wallich, Cat. 4850, Singapore, is, I think, a scrap of a seedling of this plant.



FIG. 20.—*Calophyllum pulcherrimum*.

(6) *C. Prainianum* King, *l.c.* 175; *Ann. Bot. Gard. Calc.* v. (2), 142, *pl.* 170.

A glabrous tree 40 to 60 ft. tall, 10 to 15 in. through. Leaves elliptic-oblong, shortly bluntly acuminate, base narrowed acute, 3 to 3.5 in. long, 1 to 1.5 in. wide; nerves fine conspicuous parallel close; petioles .5 in. long. Racemes solitary axillary lax 2 in. long; pedicels .24 to .5 in. long slender. Flowers about 7, .25 in. across. Sepals 4, outer ones orbicular, inner ones larger thinner orbicular-oblong. Fruit spherical 1 in. diameter. *Hab.* Forests, Singapore, Garden Jungle. Perak, Thaiping (Kunstler), Negri Sembilan, Pengkalan Kempas (Foxworthy).

(7) **C. floribundum** Hook. *fil. F.B.I.* i. 272; *King, l.c.* 175.

Tree glabrous. Branchlets glaucous angled. Leaves elliptic-lanceolate bluntly acuminate, base narrowed acuminate; nerves very numerous and close, 1·24 to 1·5 in. long, ·5 to ·6 in. wide; petioles ·25 in. long. Racemes very numerous and short 1 in. long; pedicels ·1 in. long or little longer. Flowers ·25 in. across. Sepals outer broadly ovate, inner as long broadly obovate thinner. Stamens short. Fruit oblong globose ·25 in. long. *Hab.* Singapore and Malacca (Maingay). Pahang, Betimbang Chini (Foxworthy). *Native names*: Bintangor Batu; Bintangor Che Relis.

Perhaps a form only of *C. pulcherrimum*.

(8) **C. pisiferum** Planch. *Triana, Ann. Sc. Nat. Ser.* 4, xiv. 266.

A bush with dense branches. Branchlets angled with decurrent ribs from the petioles, red hairy. Leaves ovate or elliptic obtuse, 1 to 1·5 in. long, ·75 in. wide, base blunt or rounded; nerves close conspicuous on both surfaces, petioles ·2 in. long hairy. Racemes numerous ·5 in. long; peduncles hairy. Outer sepals orbicular ·1 in. long obtuse, inner ones longer thinner sub-spathulate blunt. Drupe globose, ·25 in. long, creamy yellow. *Hab.* In swamps, Malacca (Griffith and Maingay). *Distrib.* Cochin-China.

Confused with the very distinct *C. retusum* of Wallich by all botanists except Planchon.

(9) **C. retusum** Wall. *Cat.* 4846.

Tree. Branchlets, buds and peduncles densely hairy. Leaves obovate obtuse or retuse, base cuneate, 2·25 in. long, 1·25 in. wide; nerves very fine above, almost invisible beneath; petioles ·25 in. long. Racemes 6-flowered; peduncles hairy above glabrous 1 in. long; pedicels ·25 in. long. Sepals orbicular coriaceous, ·1 in. long, inner ones thinner. Petals 0. *Hab.* Rare. Singapore (Wallich, Cantley).

(10) **C. oblongifolium** Ridl. *C. pulcherrimum* var. *oblongifolium* T. *Anders. in F.B.I.* i. 271.

A tree 50 to 60 ft. tall, 15 to 20 in. through. Buds and peduncles and petioles ferruginous-hairy. Leaves elliptic-oblong blunt, long narrowed to base, 2 to 3 in. long, ·75 to 1 in. wide; nerves very fine and close; petioles ·5 in. long. Racemes axillary 1·5 to 2·5 in. long lax; peduncle hairy; pedicels ·5 in. long. Flowers ·5 in. across. Sepals oblong ovate, inner ones slightly larger. Petals 0. Fruit oblong, 1 in. long. *Hab.* Malacca (Maingay). Pahang, Sungei Mentiga, Chini (Foxworthy). Perak, Ulu Bubong (Kunstler); Ulu Slim (Kunstler).

Differs from *C. pulcherrimum* Wall. in its hairy buds, peduncles and petioles, and the form of the leaf, the much longer racemes and flowers, nearly twice as large, and the oblong pointed fruit.

(11) **C. ferrugineum** Ridl. *Journ. Roy. As. Soc. S. Br.* 54, p. 17.

A large tree about 80 or more ft. tall. Branchlets 4-angled.

Leaves elliptic oblong coriaceous, tip round retuse, glabrous except the midrib red tomentose beneath, 3 in. long, 1·5 in. wide; petioles ·5 in. long. Racemes spreading axillary 2·5 to 3 in. long. Flowers 8, glabrous; peduncle 1 in. long red-tomentose; pedicels ·5 in. long or less. Flowers ·25 in. across. Sepals 4, outer ones ovate smaller, inner sub-orbicular. Petals 0. Drupe obovoid narrowed at top glabrous, 1 in. long. *Hab.* Forests, rare. Singapore, Garden Jungle (Ridley).

(12) **C. spectabile** Willd. *Mag. Berl.* 1811, p. 80; *T. Anders. F.B.I.* i. 271; *Pierre, Fl. For. Cochinchine, pl.* 107; *King, l.c.* 175. *C. tetrapetalum* Roxb. *Fl. Ind.* ii. 608; *Wall. Cat.* 4843 (*Penang*).

A very lofty tree, 30 to 100 ft. tall, glabrous except the buds and young parts, which are rufous-pubescent. Leaves oblong obtuse or sub-acute, base narrowed; nerves very numerous, 6 to 12 in. long, 1·5 to 3 in. wide; petioles ·5 to ·75 in. long. Inflorescence axillary umbelliform; racemes ·2 in. long. Outer sepals orbicular-boat-shaped, inner ones thinner obovate. Petals 0. Drupe spherical ·75 in. through. *Hab.* Common in forests. Singapore, Malacca. Penang (*Wall.* 4843), Pahang on Gunong Tahan; Kwantan (Foxworthy). *Distrib.* Malay islands and Cochin-China.

(13) **C. Curtisii** King, *l.c.* 176.

A small tree. Young branches, petioles and inflorescence rufous-pubescent. Leaves narrowly elliptic blunt or retuse, base narrowed; nerves very fine and close, midrib pubescent, 2 to 2·75 in. long, 1 to 1·4 in. wide; petioles ·4 in. long. Racemes solitary or in pairs, axillary umbellate dense 3- to 5-flowered, ·75 in. long. Bracts at base boat-shaped ferrugineous. Flowers ·25 in. across; pedicels ·2 in. long, lengthening in fruit to ·5 in. long. Sepals 4, outer oblong sub-obovate rufous-tomentose, inner smaller oblong, sub-glabrous. Petals 0. Fruit ovoid. *Hab.* Rare. Penang Hill at 500 ft. altitude (Curtis).

(14) **C. molle** King, *l.c.* 177.

A tree 40 to 80 ft. tall. Young shoots, buds, under-surface of leaves and fruit softly tomentose. Leaves narrow oblong gradually narrowed above to the blunt tip, base rounded or slightly narrowed, above glabrous except midrib, beneath tomentose, 5 to 8 in. long, 1·25 to 2·25 in. wide; petioles ·4 to ·6 in. long. Racemes solitary axillary, 1 in. long, 1- or 2-flowered densely tomentose. Sepals 4 rounded-oblong tomentose. Petals 0. Fruit globular, 1 in. long. *Hab.* Not common, woods at 1500 to 2000 ft. altitude. Perak, Thaiping 300 to 800 ft. altitude (Kunstler); Tapa Road (Foxworthy). Penang, back of Western Hill and Moniot's Road (Curtis). *Distrib.* Sumatra.

(15) **C. canum** Hook. *fl. F.B.I.* i. 271; *King, l.c.* 177.

Tree 40 to 80 ft. tall, glabrous except inflorescence. Leaves narrow elliptic oblong, bluntly short acuminate, base acute; midrib stout; nerves very fine, 5 to 7 in. long, 1·75 to 2·25 in. wide;

petioles .5 to .75 in. long. Flowers in terminal pubescent panicles 1.5 to 6 in. long, or in axillary racemes, .75 in. across, on pedicels .15 in. long. Sepals orbicular, puberulous outside, inner larger and thinner. Petals 0. Fruit ovoid smooth .75 in. long. *Hab.* Forests, Singapore, Bukit Mandai. Pahang, Pekan. Malacca (Maingay). Negri Sembilan, Senawang Reserve (Long). Perak, Taiping (Kunstler). Penang, Government Hill (Curtis).

(16) *C. inophyllum* Linn. *Sp. Pl.* 732; *Wight. Ill.* 128; *Ic.* 77; *Hook. fil. F.B.I.* i. 273; *King, l.c.* 178.

A glabrous tree 60 to 80 ft. tall. Main stem short and very stout. Leaves elliptic or obovate-oblong, tip rounded or emarginate, base acute, deep shining green, 4 to 6 in. long, 2.5 to 3.5 in. wide; petioles .75 in. long. Racemes very many in upper axils, 4- to 6-flowered. Flowers .75 in. wide; pedicels slender, 1 to 1.75 in. long. Sepals 4, inner pair petaloid. Petals 4 longer; filaments 4-delphous. Ovary stipitate. Fruit globular green 1 in. through. *Hab.* Seashores in sandy places common, also often planted. Singapore, Pahang. Malacca, Perak, Penang. *Distrib.* Seashores of Africa, S. India, Ceylon, Malaya, Australia and Polynesia. *Native names:* Bintangor Bunga; Penaga Laut; Pudik. *Use:* In shipbuilding for knees of boats.

(17) *C. inophylloide* King, *l.c.* 178.

A glabrous tree, except buds and young pedicels hairy, 60 to 80 ft. tall, 2 to 3 ft. through. Leaves thickly coriaceous obovate or obovate oblong, tip retuse or emarginate, edges thickened, narrowed to cuneate base; midrib stout, 3.25 to 4.5 in. long, 1.75 to 2.75 in. wide; petioles .6 to 1 in. long. Racemes from upper axils, 2 to 3 in. long, few-flowered. Flowers .75 in. across. Sepals outer rounded, inner larger petaloid. Petals 4 narrower. Fruit ovoid .75 in. long. *Hab.* Forests. Singapore, Garden Jungle and Changi. Perak, Tapa (Burn-Murdoch). Batang Padang district (Kunstler).

(18) *C. venustum* King, *l.c.* 180.

A small tree rising to 30 ft. tall, glabrous. Leaves elliptic-ovate retuse, base cuneate; nerves rather distant, 1.75 to 3 in. long, 1 to 1.5 in. wide; petioles .3 to .4 in. long. Racemes solitary axillary 2.5 in. long, 3- to 5-flowered, spreading. Flowers .5 in. across, on pedicels .75 in. long. Sepals 4 orbicular. Petals 4 to 6 narrower, oblong blunt. *Hab.* Mountains. Pahang, Gunong Tahan (Robinson) at 5000 ft. altitude. Perak, Batang Padang district (Kunstler).

(19) *C. foetidum* Ridl. *Journ. Roy. As. Soc. S. Br.* 54, p. 18.

A straight tree about 80 ft. tall and 8 in. through. Leaves elliptic narrowed at base and shortly narrowed to blunt tip, 1.5 to 3.5 in. long, 1 to 1.25 in. wide; petioles .5 in. long. Flowers in lax axillary 8-flowered racemes 3 in. long. Flowers .25 in. across foetid; pedicels slender .5 in. long. Bracts very small ovate.

Sepals 4 ovate-lanceolate. Petals 4 obovate-sub-spathulate. Fruit small elliptic .25 in. long. *Hab.* In forests, Singapore, Garden Jungle. Malacca, Bukit Bruang (Derry).

(20) **C. subsessile** King, *Ann. Bot. Gard. Calc.* v. (2), 142, pl. 171.

A glabrous tree 60 to 80 ft. tall, 2 to 3 ft. through. Branchlets 4-angled. Leaves elliptic-oblong, tip obtuse or emarginate, base cordate, 3.5 to 6 in. long, 1.75 to 2.5 in. wide; petioles very short and thick .1 in. long. Racemes solitary axillary few-flowered 3.25 in. long. Flowers .5 in. across on pedicels .25 to .5 in. long. Sepals rounded orbicular. Petals ovate blunt little longer. Fruit globose 1 in. through, minutely pubescent. *Hab.* Rare in low wet ground in dense jungle, Perak, Thaiping (Kunstler).

(21) **C. Wallichianum** Planch. and Triana, l.c. 249; Hook. fil. *F.B.I.* i. 273; King, l.c. 179.

A tall tree. Branchlets yellowish 4-angled and with buds, under-surface of young leaves and inflorescence minutely red-tomentose. Leaves narrowly elliptic-oblong, tip blunt acuminate, base acute; midrib slender, 4.5 to 6 in. long, 1.5 in. wide; petioles .75 in. long rufous. Racemes axillary and terminal, long red-tomentose. Flowers .5 in. across; pedicels .2 in. long. Sepals 4 orbicular red-tomentose on both sides. Petals 4 cuneate oblong. Fruit 1 in. through globose. *Hab.* Common in forests, Singapore, Bukit Timah. Johor, Kota Tinggi. Pahang, Rumpin River (Foxworthy). Malacca, Ayer Panas (Griffith). Negri Sembilan, Bukit Angsi (Kinsey). Penang (Curtis). *Native names:* Bintangor Merah; Penaga Ayer.

(22) **C. Griffithii** T. Anders. *F.B.I.* i. 273; King, l.c. 179.

A fine tall tree, glabrous. Branchlets quadrangular. Leaves oblong or elliptic-oblong acute or blunt, base cuneate, 4 to 6 in. long, 1.75 to 2 in. wide; petioles .4 to .6 in. long. Racemes solitary axillary 1.5 to 2.5 in. long. Flowers about 7, .35 in. across; pedicels .2 to .5 in. long. Sepals 4, outer ones orbicular, inner ones longer and narrower. Petals 4 oblong obtuse. Fruit globose 1 in. through. *Hab.* On river-banks in the south, not very common, Singapore, Sungei Morai. Johor, Bukit Tana Abang (Kelsall). Malacca, Ching (Griffith). Penang, Government Hill (Curtis).

(23) **C. macrocarpum** Hook. fil. *F.B.I.* i. 273; King, l.c. 179.

A tall straight tree with pendulous branches. Branchlets 4-angled. Leaves narrow oblong, or elliptic-lanceolate bluntly short-acuminate, base narrowed, 5 to 10 in. long, 2 to 3 in. wide; petioles 1 to 1.25 in. long. Racemes axillary solitary .2 in. long, 6- to 10-flowered. Flowers 1 in. across; pedicels 1 to 1.25 in. long. Sepals 4, outer ones puberulous outside, inner ones larger oblong petaloid. Petals smaller oblanceolate clawed. Drupe ellipsoid 5 in. long, 3 in. through, dark green. Seed ellipsoid 2 in. long, 1.5 in. through. *Hab.* Overhanging streams and near the sea, not common, Singa-

pore. Changi. Johor, Kota Tinggi. Malacca. Perak, banks of Bernam River (Kunstler). *Distrib.* Borneo. *Native name*: Bintangor Rimbah.

Remarkable for its very large fruit.

(24) **C. rotundifolium** Ridl. *Journ. Fed. Mal. States Mus.* v. 29.

Shrub. Leaves crowded rigidly coriaceous sessile broadly elliptic to orbicular, retuse, base cordate, 2 to 2·5 in. long and as wide. Flowers 1 or 2 terminal on peduncles ·4 in. long. Sepals, outer ones coriaceous orbicular ·2 in. long, inner ones oblanceolate obtuse much smaller. Petals obovate clawed, rounded ·4 in. long. Fruit unknown. *Hab.* Mountains at 5000 ft. altitude. Selangor, Gunong Mengkuang Lebah (Robinson).

DOUBTFUL SPECIES

C. marginatum Wall. *Cat.* 4845.

Penang Hill (Porter). Portions of a seedling of some *Calophyllum* with curious bivalve bud-galls. Quite common in Singapore, Penang, etc., but what it eventually becomes I do not know.

C. neriifolium Ridl. *Journ. Roy. As. Soc. S. Br.* 82, p. 170.

Tree. Buds scurfy. Leaves stiff narrow linear-lanceolate blunt, base cuneate, midrib raised on both sides, edge thickened, 3·5 in. long, ·5 in. wide; petioles ·15 in. long. Fruit oblong globose ·6 in. long; pedicels ·6 in. long apparently solitary axillary. *Hab.* Malacca, Mt. Ophir (Ridley).

Perhaps near *C. spectabile*, but leaves very narrow. I could not get flowers.

4. KAYEA, Wall.

Trees or shrubs never large, hardly resinous except the fruit. Leaves opposite more or less coriaceous; nerves few distant. Flowers white or pink bisexual, large and solitary or smaller and collected in terminal panicles. Sepals and petals 4 each, imbricate. Stamens numerous free or connate at base; anthers 2-celled. Ovary 1-celled; style slender. Stigma 4-fid. Fruit sub-drupaceous dry. Seeds thick. Species 12 or more, tropical Asia.

- | | |
|---------------------------------------------------------------------------------------|--------------------------|
| Flowers in panicles terminal | (1) K. rosea |
| Flowers racemose, 1·5 in. across | (2) K. Wrayi |
| Flowers ·5 in. across. | |
| Leaves broad strongly nerved | (3) K. racemosa |
| Leaves smaller, nerves inconspicuous | (4) K. ferruginea |
| Flowers cymose terminal. | |
| Leaves 9 to 18 in. by 3 to 4 in., nerves strong;
flowers 1·25 in. across | (5) K. grandis |
| Leaves 3 to 5 in. long, nerves strong; flowers 1·75 in.
wide | (6) K. nervosa |

- Flowers 1 to 3 terminal and axillary, 1 in. across;
fruit ovoid beaked; pedicel of flowers .75 in.
long (7) **K. Kunstleri**
Fruit conic beaked; flowers sub-sessile (8) **K. rivulorum**
Flowers fascicled terminal 1 in. across; pedicel
.15 in. long (9) **K. parviflora**
Flowers always solitary very small; leaves 2 to
3.5 in. long; leaves obovate cuspidate (10) **K. caudata**
Leaves lanceolate acuminate (11) **K. elegans**

(1) **K. rosea** Ridl. *Journ. Roy. As. Soc. S. Br.* 54, p. 22.

A medium-sized tree. Leaves in distant pairs elliptic cuspidate tip acute, base blunt or shortly narrowed, coriaceous glabrous; nerves 20 to 25 raised beneath, 8 in. long, 3 in. wide; petioles .25 to .5 in. long, thick. Panicles terminal 1 or 2, 3 in. long. Branches short. Flowers rosy white on pedicels .5 in. long. Sepals, orbicular .25 in. long. Petals ovate longer. Stamens short. *Hab.* Mountain forests by streams rare. Johore. By streams on Gunung Pantai (Ridley).

(2) **K. Wrayi** King, *l.c.* 181.

A small glabrous tree with thick often whorled branches. Leaves very thickly coriaceous broadly elliptic obtuse or shortly acuminate; nerves prominent beneath only 15 pairs, 3 to 4.5 in. long, 1.75 to 2.25 in. wide; petioles thick .4 in. long. Racemes axillary or terminal 2 to 3 in. long stout, 3- to 5-flowered. Flowers white 1 to 1.25 in. across; pedicels .5 to 1.25 in. long. Sepals orbicular nearly equal, inner pair thinner. Petals much larger broad obovate or orbicular clawed. Stamens much shorter. *Hab.* Mountain forests. Rare. Perak, Gunong Berumbun at 7000 ft. altitude (Wray).

(3) **K. racemosa** Planch. and Triana, *l.c.* 269; King, *l.c.* 181; Hook. *fil. F.B.I.* i. 276.

A glabrous tree 40 to 60 ft. tall. Leaves coriaceous elliptic-oblong with a short blunt point, base cuneate; nerves 18 to 25 pairs elevate beneath, 6 to 9 in. long, 1.5 to 2.5 in. wide; petioles .75 in. long. Racemes short .5 in. long few-flowered crowded into heads, terminal or axillary. Flowers .5 in. across. Sepals rounded. Petals thin longer. Stamens numerous short. *Hab.* Hill forests. Penang (Curtis, Maingay). Perak, no locality (Scortechini).

(4) **K. ferruginea** Pierre, *Fl. For. Cochinchine*, pl. 99; Ridl. *Journ. Roy. As. Soc. S. Br.* 54, p. 21. K. Manii King, *Ann. Bot. Gard. Calc.* v. 144, pl. 174A.

A fairly large straggling tree. Leaves coriaceous stiff lanceolate caudate-acuminate, 3 to 9 in. long, 1 to 2 in. wide; nerves very fine 10 to 12 pairs, reticulations fine, visible beneath; petioles .25 to .5 in. long. Racemes 1 or more, axillary or extra-axillary. Flowers 2 or 3, .5 in. across; pedicels thick .5 in. long or less. Sepals orbicular. Petals broadly ovate slightly smaller. Stamens much longer. Fruit 1 in. through, enlarged sepals leathery, scurfy

outside, polished inside. *Hab.* Overhanging streams and rivers in forests. Singapore (Wallich 4836, *Mesua Singaporiana*). Johor, Kota Tinggi; Kwala Sembrong. Pahang near Pekan. Dindings. *Distrib.* Andamans. *Native name*: Buah Sembawang.

(5) **K. grandis** King, *l.c.* 182; *Ann. Bot. Gard. Calc.* v. 143, *pl.* 172.

A tree 40 to 80 ft. tall. Leaves coriaceous oblong to elliptic-oblong sub-acute narrowed at base; nerves 20 to 25 pairs prominent, 9 to 18 in. long, 3 to 4·5 in. wide; petioles ·4 to ·75 in. long. Flowers crowded in axillary cymes 6 or more together 1·25 in. across, white; pedicels stout ·5 in. long. Sepals pale green round, inner ones thinner than outer ones. Petals elliptic-oblong longer. Fruit turbinate 2 to 2·5 in. through, completely enveloped by the thickened sepals. *Hab.* Not rare in forests. Pahang, Sungei Chenei (Fox). Malacca (Maingay); Nyalas; Selandor. Negri Sembilan, Gunong Berumbun (Cantley). Perak, Gunong Bubu, and Thaiping Hills at 500 to 1000 ft. altitude (Kunstler). Penang, Telok Bahang (Curtis). Dindings, Lumut; Telok Sera. *Native names*: Chindarahan Gajah; Bunuai. *Use*: For timber, wood heavy, sinks in water, dark coloured, squares from 5 to 8 in. (Cantley).

(6) **K. nervosa** T. Anders. in Hook. *fil. F.B.I.* i. 277; King, *l.c.* 183 in *part.*

Tree 30 to 40 ft. tall and 10 to 15 ft. through. Branchlets hairy scabrid. Leaves elliptic or ovate-elliptic obtuse or shortly acuminate, base rounded, 3 to 5·5 in. long, 1·5 to 2·5 in. wide; nerves 12 pairs, elevate beneath, secondaries nearly as much so; petioles ·1 in. long hairy. Flowers solitary terminal or several axillary, white, 1·5 in. across, on peduncles ·1 in. long. Bracts at base lanceolate acuminate. Sepals unequal, outer ones orbicular, inner ones oblong obtuse twice as big. Petals thin oblong-obovate. Fruit sub-globular beaked leathery, ·75 in. through. *Hab.* Rare in dense jungle in low wet ground. Perak, Thaiping (Kunstler). *Distrib.* Burma.

* The Malacca (Maingay) specimens quoted by King as this species are, I think, *K. rivulorum*.

(7) **K. Kunstleri** King, *l.c.* 182; *Ann. Bot. Gard. Calc.*, v. (2), 143, *pl.* 173. *K. Curtisii* King, *l.c.* 144, *pl.* 174B.

A large shrub or small tree up to 50 ft. tall. Leaves thinly coriaceous in distant pairs elliptic-lanceolate acutely long-acuminate mucronulate, base long narrowed, 4 to 6 in. long, 1 to 2·25 in. wide; nerves 20 to 24 pairs prominent; petioles ·25 to ·4 in. long. Flowers solitary axillary or several together, also terminal, white 1·75 in. across; pedicels ·75 in. long with several lanceolate subulate bracts at the base. Sepals unequal. Petals oblong acuminate ·5 in. long. Fruit ovoid apiculate to conic-beaked 1·5 in.

long. *Hab.* Forests low down local. Selangor, Sungei Buluh (Foxworthy). Perak, Thaiping (Kunstler). Dindings. Penang, common (Curtis). *Native name:* Serendah.

King separates the shrubby plant of Penang Hill in part from his *K. Kunstleri*, but retains the specimens (1418 Curtis), obviously the same plant, under *Kunstleri*. Allowing for reasonable variation in specimens, I keep them all as one species.

(8) **K. rivulorum** Ridl. *Journ. Roy. As. Soc. S. Br.* 54, p. 22.

A small straggling tree. Branches with long internodes. Leaves lanceolate with a long cusp, base hardly narrowed, 5 to 6 in. long, 1.5 to 2 in. wide; nerves 14 pairs elevate beneath; petioles 1 to 2 in. long. Above each pair of leaves are 4 ovate acuminate sessile stipular-like leaves, .25 in. long. Flowers solitary or 3 terminal sub-sessile. Bracts ovate acuminate. Sepals ovate .5 in. long. Petals longer linear-oblong narrowed. Stamens long. Fruit conic acuminate 1.5 in. long, .5 in. through. *Hab.* Over streams in forests, Malacca at Sungei Hudang. Selangor, Kanching (Ridley). *Native name:* K'luet.

(9) **K. parviflora** Ridl. *Journ. Roy. As. Soc. S. Br.* 82, p. 170.

Tree? Branches slender. Leaves coriaceous lanceolate acuminate blunt, base narrowed, edge thickened; nerves very faint, midrib prominent, 2 in. long, .5 in. wide; petioles .15 in. long. Flowers 5 or 6 fascicled on ends of branches, very small, about .1 in. across; pedicels slender .25 in. long. Sepals orbicular. Petals 4 oblong. *Hab.* Perak, Tapa (Burn-Murdoch).

The flowers are very young and may be bigger when open.

(10) **K. caudata** King, *l.c.* 183.

Slender tree 20 to 30 ft. tall. Leaves membranous obovate elliptic abruptly caudate, base narrowed; nerves 12 to 14 pairs, 3 to 3.5 in. long, 1 to 1.5 in. wide; petioles .15 in. long. Flowers solitary on very short pedicels. Sepals coriaceous ovate. Petals pale pink. Fruit ovoid-cylindric tapering to tip, 2 to 2.5 in. long, 1 to 1.25 in. through. *Hab.* Perak, Gunong Batu Putih (Wray); Batang Padang (Kunstler); Tapa.

(11) **K. elegans** King, *l.c.* 183.

A glabrous tree 40 to 60 ft. tall. Branchlets dropping thin. Leaves stiff coriaceous lanceolate acuminate, base acute; nerves inconspicuous, 2.25 in. to 3 in. long, .5 to .75 in. wide; petioles .25 to .35 in. long. Flowers solitary axillary terminal white .4 in. across. Sepals sub-equal. Petals oblong acute smaller. Fruit (unripe) conic beaked 1.25 in. long, .5 in. through. *Hab.* Forests. Selangor, Klang Gates. Perak, Gunong Bubu (Wray).

5. MESUA, L.

Trees. Leaves opposite stiffly coriaceous; nerves very numerous slender. Flowers bisexual showy, axillary or terminal solitary. Sepals and petals 4 each imbricate. Stamens very numerous;

filaments filiform; anthers oblong 2-celled. Ovary 2-celled; style long; ovules 2 in each cell erect. Stigma peltate. Fruit thinly woody 1-celled, at length 4-valved, 4-seeded. Species 2 or 3, tropical Asia.

(1) *M. ferrea* Linn. *Sp. Pl.* 734; *Wight. Ill.* 127, *Ic. t.* 118; *King, l.c.* 184.

Usually a tall straggling tree when wild, bush-shaped with short stem in cultivation. Leaves linear-lanceolate to oblong-lanceolate acute, base acute, deep smooth green above, white or glaucous beneath (when young pink); 3 to 6 in. long, .75 to 1.25 in. wide. Flowers 3 in. across. Sepals orbicular fleshy. Petals obovate long white. Stamens white; anthers yellow. Very fragrant. Fruit ovoid-conic or sub-globose 1 to 2 in. long. *Hab.* Dry woods not rare. Malacca. Negri Sembilan. Pahang. Selangor, Perak. Province Wellesley. Penang, Lankawi. *Distrib.* India, Cambodia, Siam. *Native names:* Matopus; Penaga Lilin, Penaga Sabut; Penaga Putih; Penaga Suga; Penaga Kunyet. *Use:* The wood, though small, is extremely hard, and used for cart axles, tool-handles, etc. Flowers dried used in medicine.

(2) *M. lepidota* T. Anders. in *Hook. fil. F.B.I.* i. 288; *King, l.c.* 185.

A glabrous tree 60 to 80 ft. tall. Leaves coriaceous narrow elliptic or oblong-lanceolate acuminate, base acute; nerves indistinguishable, 2 to 3 in. long, .75 to 1.2 in. wide; petioles .15 in. long. Fruit solitary terminal pedicelled, ovoid or depressed globular apiculate 1 in. through with 4 lignified sepals at base; pericarp thick dehiscent vertically into 2 or 3 valves. Seeds 2 planoconvex or 1 globose. *Hab.* Malacca, Sungei Hudang; Merbimau and Batang Malacca (Derry). Pahang, Bentong (Foxworthy). Perak, Goping (Kunstler). *Native names:* Jambu Dulek; Kelat putih.

Flowers of this remarkable tree have never been met with. Young trees cultivated in the Singapore Botanic Gardens resembled *M. ferrea* in habit.

ORDER XIX. TERNSTRÆMIACEÆ.

Trees or shrubs (rarely climbers, *Actinidia*). Leaves alternate, entire or serrulate. Flowers white or pink, often showy, bisexual or unisexual, solitary on pedicels, rarely racemed or paniced. Sepals 5, often unequal. Petals 5, imbricate. Stamens numerous, adnate to corolla; anthers basi-fixed or versatile. Ovary superior, free (except *Anneslea* half-inferior) 2- to 3- (or many)-celled; styles as many as cells; ovules 2 to 8 in cell. Fruit capsular or baccate. About 300 species, tropics of Asia and America, rare in Africa, few in temperate zone. The Sauraujas are sometimes nowadays referred to *Dilleniaceæ*; I retain them here as they have been so long classed as *Ternstræmiaceæ*.

Peduncles 1-flowered.

- | | |
|-------------------------------------------------------|----------------|
| Fruit half inferior, drupaceous | 1. ANNESLEA |
| Fruit superior; anthers basifixed; flowers bisexual. | |
| Fruit drupaceous | 2. ADINANDRA |
| Flowers large, long-pedicelled; fruit large | 3. TERNSTRÆMIA |
| Flowers small, short-pedicelled; fruit very small. | 4. EURYA |
| Anthers versatile; peduncle 1-flowered. | |
| Fruit large, indehiscent | 5. PYRENARIA |
| Fruit dehiscent, globose; seed winged | 6. SCHIMA |
| Fruit dehiscent, oblong; seed winged | 7. GORDONIA |
| Fruit small, dehiscent; flowers small | 8. PENTAPHYLAX |

Peduncles many-flowered.

- | | |
|----------------------------------------------------------------------------------|--------------|
| Climber; flowers unisexual | 9. ACTINIDIA |
| Trees (or shrubs); flowers bisexual lateral cymose,
baccate | 10. SAURAUJA |
| Flowers in terminal crowded panicles; capsule de-
hiscent from base | 11. ARCHYTÆA |

1. ANNESLEA, Wall.

Glabrous trees or shrubs. Flowers in terminal corymbs, large, white. Sepals 5, lower part fleshy, connate and adherent to ovary. Petals 5 connate by bases. Stamens numerous, filaments short, inserted on a torus; anthers elongate 2-celled with a long apiculus. Ovary half immersed in torus, 3-celled; style cylindric trifid; ovules many. Fruit a berry crowned by sepals. Seed oblong flattened, testa hard. Species 2, Burma and Cambodia and Malay Peninsula.

(1) *A. crassipes* Hook. *fil. in Choisy, Mem. Ternst.* 41; *Dyer, in Hook. fil. F.B.I.* i. 280; *King, l.c.* 187.

A stout shrub or small tree. Leaves coriaceous obovate or oblanceolate with a blunt point or oblong-lanceolate acute, base narrowed; nerves 6 to 8 pairs very inconspicuous, margin often crenulate, midrib prominent, 2.5 to 6 in. long, 1.5 to 2.25 in. wide; petioles .6 to 1 in. long. Flowers 1 to 1.25 in. across in corymbs of 3 to 6; pedicels .5 to 1.25 in. long recurved thick. Free part of sepals yellow or red, .65 in. long. Petals smaller acute white. Stamens about 30. Fruit ovoid 1 to 1.5 in. long bearing the much enlarged sepals near the top. *Hab.* Mountains in open spots and woods at from 3000 to 7000 ft. altitude. Malacca, Mt. Ophir. Pahang, Gunong Tahan. Perak, Gunong Inas (Yapp); Gunong Batu Putih (Wray); Gunong Kerbau (Haniff); Gunong Bintang, Kedah boundary (Kloss). *Distrib.* Cochin-China. The var. *obovata* King, l.c. is not worth keeping up.

2. ADINANDRA, Jack.

Trees, of medium size. Leaves coriaceous. Peduncles solitary axillary recurved bibracteate at the apex. Flowers white. Sepals 5 orbicular coriaceous usually slightly unequal often silky outside. Petals 5 connate at the base. Stamens many often 1- to 4-delphous, inner ones smaller; anther-cells narrow, connective prolonged to a point usually silky. Ovary 3- to 5-celled; style elongating entire

or shortly 3- to 5-fid; ovules many in each cell. Fruit globose green or brown, subtended by the calyx and crowned by the style. Seeds many, small. Species about 20, chiefly Malayan, a few Indian, and 1 African.

Whole plant glabrous except the stamens. Flowers hardly expand.

- | | |
|---------------------------------------------------------------------------|---------------------------|
| Nerves invisible | (1) <i>A. dumosa</i> |
| Nerves conspicuous 9 to 11 pairs | (2) <i>A. acuminata</i> |
| Glabrous except the buds silky; branchlets angled; leaves large | (3) <i>A. angulata</i> |
| Leaves and buds glabrous; sepals silky. | |
| Buds glabrous; nerves 6 to 8 pairs | (4) <i>A. parvifolia</i> |
| Buds silky; nerves 15 to 20 pairs | (5) <i>A. macrantha</i> |
| Leaves pubescent beneath. | |
| Petals glabrous ovate acute | (6) <i>A. maculosa</i> |
| Petals glabrous oblong blunt | (7) <i>A. Hullettii</i> |
| Petals silky; branchlets pilose; nerves 7 to 9 pairs | (8) <i>A. villosa</i> |
| Branchlets pilose; nerves 10 to 14 pairs | (9) <i>A. integerrima</i> |

(1) *A. dumosa* Jack, in *Mal. Misc.* ii. No. 7, p. 50; Dyer, in *Hook. fil. F.B.I.* i. 282; King, *l.c.* 188.

A small tree about 20 ft. tall and 6 in. through glabrous. Leaves coriaceous oblong-lanceolate to elliptic usually shortly blunt acuminate, base narrowed, edge entire or obscurely serrulate; nerves invisible, 2 to 4 in. long, 1.25 to 1.75 in. wide; petioles 1 to 2 in. long. Flowers pendulous on peduncles .4 to .75 in. long. Bracts 2 ovate close to calyx. Sepals rounded ovate blunt. Petals longer oblong-lanceolate connivent, white apiculate. Stamens 30; filaments united at base, pilose; anther-connective pilose. Fruit .4 to .5 in. through baccate green. *Hab.* In secondary jungle, in open country extremely common all over the peninsula. The flower is fertilised by the bee *Xylocopa*, and the fruit dispersed by bats. *Distrib.* Malay islands. *Native names:* Tiup-Tiup; Medang Petutu; Kayu Gula (Penang).

(2) *A. acuminata* Korth. *Verh. Nat. Gesch. Bot.* 109; Dyer, in *Hook. fil. F.B.I.* i. 282; King, *l.c.* 188.

Tree 20 to 60 ft. tall. Stem 8 to 12 in. through, glabrous. Leaves coriaceous oblong-lanceolate acuminate, base acute, dark glossy green; nerves 9 to 11 pairs, inarching twice within the edge, 3.5 to 6 in. long, 1 to 2.5 in. wide; petioles .25 in. long. Flowers white .9 in. across, on peduncles .75 to 1 in. long, warty after flowering. Bracts lanceolate. Sepals coriaceous, 2 outer ones small ovate, 2 inner ones larger round, edges serrulate. Petals larger round connivent. Stamens about 40; filaments pilose. Ovary pubescent. Fruit .5 to .75 in. long, glabrous when ripe. Seeds oval flat. *Hab.* Common in woods from the low country to about 2000 ft. altitude. Singapore, Garden Jungle. Johor, near Castlewood; Ulu Batu Pahat (Kelsall). Perak, Maxwell's Hill, Thaiping Hills. Penang, Government Hill (Curtis). *Distrib.* Sumatra. *Native name:* Mongol.

(3) **A. angulata** Ridl. *Journ. Linn. Soc.* xxxviii. 304.

A big tree 40 to 50 ft. tall. Branchlets flattened angled. Buds sparingly silky. Leaves elliptic obtusely acuminate stiffly coriaceous, 4 to 7 in. long, 2 to 4 in. wide; nerves 20 pairs conspicuous; petioles thick .5 in. long. Flower-bud conical .5 in. long. Sepals ovate glabrous round-tipped .25 in. long. Petals lanceolate fleshy. Stamens .25 in. long; filaments nearly glabrous; anthers silky. Ovary glabrous. Fruit globose 3 in. long, dilated upwards. *Hab.* Pahang woods of the Teku river on Gunong Tahan, at 4600 to 5500 ft. altitude (Robinson, Ridley).

(4) **A. parvifolia** Ridl. *Journ. Roy. As. Soc. S. Br.* 54, p. 23. *A. montana* Ridl. *Journ. F.M.S. Mus.* vi. 44.

A fairly large glabrous tree 30 to 40 ft. tall. Leaves ovate narrowed at the base or obovate blunt, base sub-acute, margins entire or slightly glandular-serrate coriaceous; nerves fine 6 to 8 pairs rather faint, with reticulations somewhat conspicuous, inarching within the margin, black glandular dotted on the back, 1.5 to 2.75 in. long, .5 to 1.5 in. across; petioles .25 in. long. Flower 1 in. across; peduncles .5 in. long glabrous. Bracts small ovate close to flower. Sepals orbicular minutely pustular coriaceous silky, eventually glabrescent, .5 in. long. Petals expanded much longer oblong glabrous except for a silky line running up to the tip. Anthers silky on back and tip. Pistil glabrous. *Hab.* Mountains at altitudes of 5000 to 6000 ft. Pahang, Gunong Tahan (Robinson) at 5500 ft. altitude. Perak, Thaiping Hills at the top near the cottage at 5000 ft. altitude (Ridley); Gunong Kerbau (Robinson). The flowers very large and wide-expanded for the genus.

(5) **A. macrantha** Teysm. and Binn. *Nat. Tijds. Ned. Ind.* xxv. 421; *King, l.c.* 191.

Tree 20 to 80 ft. tall, 1.5 to 2 ft. through. Buds silky. Leaves thinly coriaceous elliptic-oblong, tip rounded or with short blunt point, base narrowed, glabrous drying greenish yellow; nerves 15 to 20 pairs doubly inarching fine but conspicuous, 5 to 7 in. long, 2 to 3.25 in. wide; petioles .25 in. long, stout winged to base. Flowers 1.4 in. across on peduncles 1 to 1.25 in. long. Sepals sub-equal round, inner ones a little wider, edges ciliate. Petals larger round. Stamens 40 to 50 silky. Ovary smooth. Fruit globose .75 in. through, glabrous. Seeds few large reniform. *Hab.* Johor, Kota Tinggi. Selangor, Langat River. Pahang River; Bentong (Foxworthy). Perak, Thaiping Hills (Kunstler). *Distrib.* Sumatra, Java. *Native name:* Kelat Pamah.

(6) **A. maculosa** T. Anders. in *Hook. fil. F.B.I.* i. 282; *King, l.c.* 189.

Tree 40 to 60 ft. tall. Branchlets pubescent. Leaves coriaceous glabrous above, often puberulous beneath, elliptic to oval-oblong abruptly blunt acuminate entire, base acute; nerves 8 to 10 pairs indistinct, 3.5 to 5.5 in. long, 1.5 to 2.25 in. wide; petioles .25

to 4 in. long. Flowers .75 in. across; peduncle .25 in. long pubescent. Bracts round close to calyx. Sepals 2 inner smaller round to broad ovate thick pubescent. Petals ovate acute glabrous. Stamens 30; filaments glabrous. Fruit globular 4-celled pubescent, at length glabrous. *Hab.* Mountain woods. Perak, Thaiping 3000 to 4000 ft. altitude (Kunstler). Penang (Porter); Telok Bahang. *Native name*: Gula Merah.

(7) **A. Hullettii** King, *l.c.* 191.

A tree about 40 ft. tall. Branchlets tomentose. Leaf coriaceous elliptic-oblong shortly acuminate, base acute, edges denticulate, glabrous above, tomentose beneath; midrib prominent; nerves 10 pairs, 3.5 to 5.5 in. long, 1.5 to 2.5 in. wide; petioles .25 in. long tomentose. Sepals outer ones larger round tomentose, inner ones smaller ovate, centre of backs tomentose only. Petals longer oblong blunt glabrous. Stamens 40 to 50; anthers pubescent. Berry silky globose small. *Hab.* Woods in the south of the peninsula. Singapore, Garden Jungle (Hullett); Selitar. Johor, Sedenah (Ridley).

(8) **A. villosa** Choisy, *Mem. Ternstr.* 24; Dyer, in Hook. *fil. F.B.I.* i, 283; King, *l.c.* 190.

Tree 40 to 50 ft. tall. Branchlets pilose. Leaves coriaceous oblong-lanceolate or elliptic, shortly acuminate entire or faintly crenulate, base rounded, glabrous above except midrib sparsely or rather thickly pubescent, hairy beneath; nerves 7 to 9 pairs, inarching within the edge, 4 to 5.5 in. long, 1.5 to 1.75 in. wide; petioles .2 in. long pilose. Flowers .75 in. long; peduncle pilose .4 in. to nearly 1 in. long. Bracts ovate, in middle of peduncles. Sepals sub-equal round fleshy pilose outside. Petals ovate, silky outside, edges glabrous. Ovary silky, 5-celled. Fruit .5 in. through silky. *Hab.* Mountain woods 3000 to 4000 ft. altitude Selangor, Sempang mines. Perak, Thaiping Hills, and Gunong Batu Putih (Wray). *Distrib.* Tavoy.

(9) **A. integerrima** T. Anders. in Hook. *fil. F.B.I.* i. 282; Pierre, *Fl. For. Cochinchine*, t. 125.

A small tree. Leaves sub-coriaceous ovate or ovate-oblong shortly acuminate, base rounded or acute, edge minutely serrulate above glabrous, below sparsely pubescent, with many black glandular dots; nerves 10 to 14 pairs inarching within the margin, elevate on both sides, 3.5 to 5 in. long, 1.4 to 2.25 in. wide; petioles .2 to .25 in. long. Flowers .6 in. across on short .25 in. strigose or hairy peduncles. Bracts ovate acute close to calyx. Sepals broadly ovate acute, outer 2 larger thick, serrulate, silky outside. Petals smaller ovate acute connivent glabrous except for a silky patch on back. Stamens 30; filaments glabrous. Fruit appressed pubescent .7 in. through. *Hab.* Penang (Wallich). Perak, Waterloo (Curtis). Lankawi at Kwah. *Distrib.* Cambodia.

3. TERNSTRÆMIA, L.

Trees or shrubs. Leaves coriaceous entire or crenate serrate; peduncles solitary axillary in the axils of leaves, or of minute bracts, or fascicled. Flowers usually unisexual white or yellow. Sepals 5 umbricate. Petals 5 connate at the base. Stamens many adherent to corolla-base; anthers glabrous. Ovary 2- or 3-celled; ovules 2 in each cell; style simple or o. Stigma 2- or 3-lobed. Fruit baccate. Seeds few large. Tropical Asia and America, about 300 species.

Flowers about 1 in. across.

Leaves very thick; nerves almost or quite invisible.

Fruit 1·25 in. long; seeds 1 or 2 (1) **T. bancana**

Fruits ·75 in. long; seeds 4 (2) **T. penangiana**

Leaves oblanceolate thinner; nerves visible;

fruit very large (3) **T. Wallichiana**

Flowers under 1 in. across.

Leaves 4·5 in. long; peduncles ·5 in. long (4) **T. Scortechinii**

Leaves 3 in. long; flowers small; peduncles ·15 in. long (5) **T. Maclellandiana**

Leaves 3 in. long, obovate — 7

Leaves 3 in. long oblanceolate (6) **T. montana**

(1) **T. bancana** *Miq. Fl. Ind. Bot. Supp.* 477. *Adinandra Miquelii* *King, l.c.* 192.

Tree 30 ft. or more tall. Bark pale. Leaves thickly coriaceous oblanceolate-obovate or elliptic obtuse, with a short abruptly blunt point, narrowed at base to petiole, entire; nerves invisible when alive, inconspicuous 5 to 7 pairs when dry, 4 to 6 in. long, 1·5 to 2·25 in. wide; petioles ·6 to ·75 in. long, thick. Flowers about ·75 in. across, white scattered about below the upper leaves axillary and extra-axillary; peduncles ·75 to 1 in. long. Sepals coriaceous rounded, outer ones larger than inner. Petals larger round clawed. Stamens pubescent. Ovary globose. Stigma bifid. Fruit sub-drupaceous ovate-oblong 1·25 in. long, strawberry coloured. Seeds 1 or 2 oblong brilliant red, ·75 in. long. *Hab.* Usually near the sea, occasionally in land. Singapore, Selitar; top of Bukit Timah Hill; Johor, Tana Merah. Dindings, Lumut; Bruas and Pangkor. Pahang, Rumpin River (Evans). *Distrib.* Banca. *Native names:* Kwak; Tengah Hutan; Medang Pergam.

The Singapore plant has short thick rounded leaves obovate. The Dindings ones are oblanceolate with more conspicuous nerves, like the Banca one.

(2) **T. penangiana** *Choisy, Mem. Ternstr.* 30; *King, l.c.* 193.

Tree. Leaves thick coriaceous obovate blunt, base narrowed; nerves 5 to 9 pairs inconspicuous, 4 to 6 in. long, 1·75 to 2·5 in. wide; petioles 1 in. long. Flowers unisexual solitary axillary; peduncles 1·5 in. long. Sepals round. Petals larger cream colour. Stamens numerous in males, none in females. Stigmas 2, 6- to

8-lobed. Fruit globular ovoid .75 in. long. Seeds 4 oblong. *Hab.* Penang Hill (Wallich, Curtis), at 3000 ft. altitude.

(3) **T. Wallichiana** Ridl. *T. penangiana* Dyer, in Hook. fil. *F.B.I.* i. 281; *Pierre Fl. For. Cochinchine*, t. 123; *King*, l.c. 193, not of Choisy. *Erythrochiton Wallichianum* Griff. *Notulæ*, iv. 565, t. 585A, fig. 7.

Tree 50 to 60 ft. tall. Leaves thinly coriaceous oblanceolate sub-acute, base narrowed; nerves 5 to 7 pairs invisible in life, 3.5 to 7 in. long, 1.5 to 3 in. wide; petioles .6 to .75 in. long. Flowers unisexual .8 to 1.25 in. across, cream colour solitary axillary; pedicels .75 in. long. Sepals round. Petals larger with a broad claw, edges denticulate. Stamens very numerous (reduced to filaments in the female). Stigmas 2 large reniform. Berry oblong to globular 1 to 1.5 in. long with sepals at base thickened. Seeds 4 oblong. *Hab.* Near the sea, Singapore, Changi; Pulau Tekong. Pahang, river mouth; Kwantan (Foxworthy). Tringganu (Ridley). Penang Hill (Wallich 4456, Curtis), at 2500 ft. altitude. *Distrib.* Andamans and Nicobars, Cambodia, Siam. *Native name* : Medang Bunga Lawang.

(4) **T. Scortechinii** King, l.c. 193; *Ann. Bot. Gard. Calc.* v. (2), 145, pl. 175.

Tree 20 to 30 ft. tall. Leaves coriaceous whorled oblanceolate, tip shortly bluntly acuminate, narrowed to base entire; nerves invisible, 3 to 5 in. long, 1.25 to 2 in. wide; petioles .4 to .5 in. long. Flowers unisexual waxy yellow, .6 to .7 in. across, axillary solitary or fascicled; peduncles 1 to 1.5 in. long. Sepals sub-equal round. Petals much larger orbicular to reniform clawed. Anthers subsessile. Female flowers with fewer stamens. Ovary imperfectly 2-celled. Stigmas 2, flat, each divided into 3 or 4 lobes with thick wrinkled edges. Fruit ovoid .75 in. long and .2 in. through black. Seeds 2 horseshoe-shaped. *Hab.* Not common in mountain forests. Perak, Taiping Hills at 300 to 500 ft. altitude (Kunstler, Scortechinii); Gunong Berumbun (Ridley), 6000 ft. altitude. Pahang, Kluang Terbang (Barnes).

(5) **T. Maclellandiana** Ridl. *Journ. F.M.S. Mus.* vi. 140.

Small tree 20 ft. tall. Leaves thickly coriaceous obovate obtuse; nerves 3 pairs hardly visible, 3.5 to 5 in. long, 1 to 2 in. wide; petioles stout .25 in. long. Flowers 1.5 in. across white; peduncles .5 in. long solitary axillary. Sepals short rounded. Petals twice as long, base oblong, above obovate-rounded denticulate. Stamens sub-sessile; anthers longer than filaments. *Hab.* Pahang, Gunong Tahan on the Padang at 5500 to 6000 ft. altitude (Robinson and Ridley).

(6) **T. montana** Ridl. *Journ. Roy. As. Soc. S. Br.* 73, p. 141.

Branches stout. Leaves thick coriaceous oblanceolate blunt long narrowed to the petiole; nerves above invisible, beneath often distinct, 3 or 4 pairs inarching some way from the edge,

2·5 to 3 in. long, 1 to 1·25 in. wide; petioles ·25 to ·5 in. long. Flowers in the upper axils of the leaves or below the leaves. Pedicels short and thick ·20 in. long. Flowers over $\frac{1}{2}$ in. across glabrous. Sepals sub-equal round coriaceous. Petals coriaceous round denticulate. Stamens glabrous; anthers linear-oblong, longer than the filament. *Hab.* Perak, Gunong Kerbau at 4500 ft. altitude (Robinson).

4. EURYA, Thunb.

Shrubs or small trees. Leaves narrow usually crenate serrate. Flowers small, unisexual, sessile or sub-sessile, in axillary fascicles. Sepals 5. Petals 5 connate at base. Stamens 15 or less. Ovary 3, rarely 2-celled; styles 3, free or united; ovules many in the inner angles of the cells. Fruit baccate small. *Distrib.* Indo-Malaya. Polynesia. Fruit glabrous.

Petals and sepals rounded.

Branches glabrous (1) *E. acuminata*

Branches velvety; leaves thick blunt; nerves depressed (2) *E. monticola*

Petals ovate acute; leaves thin (3) *E. Wrayi*

Fruit pubescent; leaves thin elliptic cuspidate; pedicels long slender (4) *E. trichocarpa*

(1) *E. acuminata* DC. *Mem. Ternstr.* 26; *King, l.c.* 195.
E. angustifolia Wall. *Cat.* 1465.

A shrub or small tree about 15 ft. tall. Branchlets slender pubescent. Leaves thinly coriaceous oblong-lanceolate or oblanceolate acuminate, serrulate, base acute, glabrous above pubescent or not beneath, 2·5 in. to 3·5 long, ·5 to ·75 in. wide; petioles ·1 in. long or none. Flowers ·25 in. across in 2- to 6-flowered clusters; pedicels short pubescent. Sepals unequal, outer ones smaller, round pubescent. Petals white larger and thinner glabrous. Male flowers, stamens 12 glabrous. Pistillode conic or 0; styles none. Female flowers, sepals and petals narrower. Stamens 0. Ovary ovoid conic glabrous 3 or 2 cells. Styles 3 free or united. Fruit globular ·15 in. across. *Hab.* Open country. Common and variable all over the peninsula except Singapore. Indo-Malaya.

(2) *E. monticola* Ridl. *E. acuminata* var. *monticola* Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 1.

Tree 20 to 30 ft. tall. Branches and young leaves silky-velvety hairy. Leaves entire, coriaceous blunt, base rounded, ·75 to 2 in. long, ·5 to ·75 in. wide; nerves depressed above, nerves and midrib hairy beneath. Flowers glabrous. Styles connate for two-thirds of their length. *Hab.* Mountains 5000 to 6000 ft. altitude. Perak, Gunong Berumbun (Ridley). Gunong Kerbau (Haniff).

This species most resembles *E. Ceylanica* Wight, but the leaves are larger.

(3) *E. Wrayi* King, *l.c.* 196.

Small tree. Branchlets hairy. Leaves thinly coriaceous oblong-

lanceolate, base rounded broad, margins serrulate, beneath sparsely hairy, 2 to 2·75 in. long, ·5 to ·7 in. wide; petioles hardly any. Flowers narrow ovate pointed glabrous ·2 in. long, hardly expanding solitary axillary or in 2- to 6-flowered umbels; peduncles ·1 to ·15 in. long. Sepals ovate acute unequal. Petals ovate acute. Stamens 15. Ovary ovoid glabrous. *Hab.* Perak. Tapa (Wray).

(4) **E. trichocarpa** *Korth. Verh. Nat. Gesch. Bot.* p. 114.

Branches slender, young parts appressed silky hairy. Leaves lanceolate acuminate at both ends, or elliptic caudate membranous bluntly serrulate, above glabrous, beneath with appressed hairs when young; midrib thickly appressed hairy, 1·5 to 3·5 in. long, ·75 to 1 in. wide; petioles ·1 in. long red hairy. Flowers small on pedicels ·1 in. long, hairy, solitary or in pairs. Sepals rounded sparingly silky, outer ones a little smaller. Styles 3 to 5 connate at the base. Fruit globose ·1 in. through densely appressed hairy. *Hab.* Rare in mountains. Selangor, Semangkok Pass (Ridley). Perak, Gunong Kerbau at 4200 ft. altitude (Robinson). *Distrib.* Amboina, Sumatra.

5. PYRENARIA, Bl.

Shrubs and trees. Leaves sub-membranous serrate. Flowers axillary sub-sessile. Sepals usually 5, unequal, graduating from bracts to the petals. Petals connate at the base white. Stamens very numerous adnate to base of petals. Ovary 5-celled; styles 5, free or partly united; ovules 2 in each cell. Fruit drupaceous, fleshy. Seeds oblong, large with thick woody testa, albumen none. Species about 7, Indo-Malaya.

Leaves hairy beneath	.	.	.	.	.	(1) P. acuminata
Leaves glabrous	.	.	.	.	.	(2) P. Kunstleri

(1) **P. acuminata** *Planch. in Choisy, Mem. Ternstr.* 84; *King, l.c.* 200.

Small tree about 20 ft. tall. Branchlets tomentose. Leaves oblanceolate or lanceolate to elliptic acuminate serrulate, base slightly narrowed blunt, above glabrous except nerves beneath hairy; nerves 10 pairs, 5·5 to 7 in. long, 1·8 to 2·5 in. wide; petioles ·3 to ·4 in. long. Flowers solitary axillary; pedicels short thick ·1 in. long. Bracts 2, ovate, silky-tomentose. Sepals ovate acuminate 5·5 to 7 in. long, 1·8 to 2·5 in. wide. Petals ·5 in. long, white, oblong silky-tomentose outside. Stamens numerous; filaments 4 times the length of the anthers. Styles united below. Fruit globose, green 1·5 in. long, like a small hard apple slightly hairy outside, cell-walls woody. Seeds few, large reniform. *Hab.* In forests. Common. Whole peninsula to Province Wellesley. Singapore, Garden Jungle; Chan Chu Kang. Johor, Mt. Austin (Maingay). Pahang, Kwantan (Foxworthy). Selangor, Batu Tiga. Perak,

Batang Padang and Ulu Bubong (Kunstler). *Distrib.* Medang Gelugur; Lidah Kerbau (Buffalo-Tongue); Samak Jantan; Lidah Lumbu; Perupoh.

(2) **P. Kunstleri** King, *l.c.* 200; *Ann. Bot. Gard. Calc.* v. (2), 178, *pl.* 147. *P. Wrayi* King, *l.c.* 201; *Ann. Bot. Gard. Calc. l.c. pl.* 146.

Tree 15 to 40 ft. tall, completely glabrous except the flowers and very young leaf-buds. Leaves elliptic or oblong-lanceolate acuminate serrulate, base entire acute; nerves 6 to 8 pairs, 5·5 to 2·5 in. wide; petioles 3 to 4 in. long. Flowers 75 in. across; peduncles 1 in. long. Sepals round pubescent outside. Petals round, glabrous white. Anthers ovate, 4 or 5 times as long as filaments. Ovary 5-celled, pubescent. Fruit 1·25 in. long, ovoid, resembling that of *P. acuminata*, globose yellow and covered with hairs. *Hab.* Forests to 4000 ft. altitude. Perak, Thaiping Hills (Kunstler); Pahang, Telom (Ridley).

P. Wrayi King, seems identical, but King says it has 6-merous flowers with 3 styles. It was collected at Relau Tujor in Perak by Wray.

6. SCHIMA, Reinwdt.

Trees. Flowers showy white, solitary axillary or the upper most shortly racemed. Sepals 5, sub-equal, united below. Petals 5, much larger, connate at the base. Stamens many adnate to base of petal, shorter. Ovary 5- rarely 4- or 6-celled; ovules 2 to 6 in each cell. Styles united or partly free at the tip. Stigmas spreading. Capsule woody, depressed-globose, loculicidal with a persistent axis. Seeds flat, kidney-shaped. Species 4 or 5, tropical Asia.

(1) **S. Noronhæ** Reinwdt. in *Bl. Bijdr.* 130; *Korth. Verh. Nat. Gesch. Bot.* 143, *t.* 29, *figs.* 21 to 27; *King, l.c.* 202. *S. crenata* *Korth. l.c. t.* 29, *figs.* 1 to 20; *Pierre, Fl. For. Cochinchine, pl.* 21.

Tree 40 to 50 ft. tall. Leaves sub-coriaceous elliptic or elliptic-lanceolate acuminate more or less crenate, base narrowed and rounded, glabrous; nerves 9 to 10 pairs, 4·5 in. long, 1·4 to 2·5 in. wide; petioles 75 to 1·25 in. long, flat. Flowers 1 to 1·5 across, axillary often crowded at the branch ends and forming false corymbs; peduncles 1 to 1·5 in. long, pubescent or glabrous. Sepals rounded, glabrous or nearly so, edges ciliate. Petals obovate or crowded, pubescent at base, edges ciliate, white. Ovary hemispheric, silky. Fruit 12 to 5 in. across, silky when young, glabrous when old. *Hab.* Mountain woods from 2000 ft. altitude upwards. Common on all the ranges, but rarely in the low country. Selangor, Bukit Hitam (Kelsall). Perak, Gunong Inas (Wray); Thaiping Hills. Penang, upper part of the hill. Lankawi at Batu Asap and Kwah. Setul on Bukit Rajah Wang. *Distrib.* Burma, Cambodia, Malay islands.

var. *rigida* Ridl. Small tree 20 to 25 ft. tall. Leaves very stiffly coriaceous, 2·5 to 4·5 in. long, 1·75 to 2·5 in. wide, lanceolate acuminate, ovate or elliptic, base slightly narrowed, margins usually distinctly crenulate; petioles stout 15 in. long. Peduncles 2 in. long, stout, glabrous. Flowers and fruit rather larger, glabrous except the edges of the sepals, which are much smaller than in the typical form. Pahang, Gunong Tahan (Ridley), 5000 to 5500 ft. altitude. A mountain form with very much stiffer, larger leaves.

7. GORDONIA, Ellis.

Trees or shrubs. Leaves coriaceous, entire or slightly crenate. Flowers rather large, white, often sub-sessile, solitary in leaf-axils, bibracteolate. Sepals usually 5 unequal, graduating from bracts to sepals, coriaceous, silky, rounded. Petals united at the base or free, imbricate. Stamens indefinite, 5-adelphous or monadelphous, adnate to petals. Ovary 3- to 5-celled.; style 1 (rarely 3). Stigma round sometimes lobed. Ovules pendulous 4 to 8 in each cell. Capsule oblong-conic woody, loculicidal, column persistent. Seeds flat, winged. Species about 15, tropical Asia and N. America.

Trees or shrubs, quite glabrous except the flowers.

Tall tree; petiole winged to base (1) *G. singaporeana*

Tree; petiole not winged to base; leaves rather thin (2) *G. multinervis*

Tree 100 ft. tall; petiole not winged; leaves stiff (3) *G. concentricatrix*

Shrub; petiole not winged; bracts numerous (4) *G. imbricata*

Trees; branchlets and buds pubescent.

Style 1.

Stamens very numerous (5) *G. penangensis*

Leaves glabrous 2 to 5 in. long (6) *G. Taipingensis*

Leaves glabrous 11 in. long (7) *G. Maingayi*

Midrib hairy, back of leaf all hairy (8) *G. hirtella*

Styles 3; stamens 30 (9) *G. Scortechinii*

(1) *G. singaporeana* Wall. Cat. 1457. *G. grandis* King, l.c. 203.

A strict tree 60 to 100 ft. tall, quite glabrous except the flowers. Leaves coriaceous, serrate-crenate above, narrowed and decurrent to the base of the petiole; nerves 10 to 12 pairs inarching 15 in. from margin, 4·5 to 6 in. long, 1·5 to 3 in. wide. Flowers white, 2 in. across, solitary axillary on pedicels 3 in. long, puberulous. Bracts few, small, fugacious. Sepals round coriaceous, silky outside. Petals much larger. Stamens very numerous; anthers oblong; style 1. Ovary ovoid. Capsule woody, 1 to 1·5 in. long, hairy, bluntly 4-angled. Seeds 6 in. long, wing 5 in. long. *Hab.* Forests especially in the south. Common. Singapore, common. Johor, Malacca, Perak, Thaiping; Penang, rifle range (Curtis).

Wallich's specimens were obtained in the small islands round Singapore.

(2) **G. multinervis** King, *l.c.* 205.

A tree 40 to 50 ft. tall, glabrous except the flowers. Leaves thinly coriaceous obovate rounded at tip or mucronate, faintly crenate-serrate narrowed to the petiole; nerves 12 to 18 pairs inarching .2 in. from the edge, 5.5 to 8 in. long, 2.5 to 3.25 wide; petioles .2 to .25 in. long, stout. Flowers 1.25 in. across; peduncles .5 to .6 in. long. Bracts few small fugacious. Sepals round silky outside. Petals similar larger and thinner, spreading. Anthers short ovate one-fourth the length of the filaments. Ovary ovoid-conic silky, 5-celled; style 1. Stigma discoid 5-lobed. *Hab.* Woods and forests. Singapore, Bukit Timah (Ridley). Malacca, Brisu (Derry). Perak (Scortechini). *Native name*: Samak Pulut.

(3) **G. concentricatrix** Burkill, *Journ. Roy. As. Soc. S. Br.* 76, p. 153, figs. 10, 11; Cubitt, *ibid.* 78, p. 49, pl. 3.

Tree 100 ft. tall. Leaves obovate crenulate abruptly acuminate or quite blunt, 4 in. long, 2.2 in. wide; petioles .4 in. long. Flowers yellowish 1.6 in. wide. Sepals and petals silky outside. Anthers very numerous. Ovary densely silky. Capsules sub-sessile nearly 1.6 in. long, opening in 5 thick blunt valves. Seeds .8 in. long. *Hab.* Forests. Malacca, Brisu (Derry). Pahang. Selangor, Rantau Panjang (Watson); Bangi (Cubitt). Dindings (Curtis). *Use*: Timber for house-building, bark for dyeing nets and cloth.

(4) **G. imbricata** King, *l.c.* 204; *Ann. Bot. Gard. Calc.* v. (2), 148, pl. 179B.

A low shrub, with coriaceous oval-oblong or oblanceolate leaves, tip obtuse, quite entire or faintly serrulate, base narrowed roundish; nerves 12 pairs, thick but inconspicuous, 1.27 to 2.25 in. long, .9 to 1.1 in. wide; petioles .15 in. long. Flowers solitary axillary sub-sessile in the upper axils, buds elongate obovoid. Bracts numerous passing into the sepals, orbicular and pubescent outside with scarious edges. Petals larger orbicular minutely pubescent outside, with a brown coriaceous patch on the back at the tip. Stamens numerous; anthers ovate one-fourth of the length of the filaments. Ovary ovoid-conic pubescent 3-celled; style 1, 5-ridged. Fruit under 1 in. long, .4 in. through, 5-angled pubescent, subtended by the long imbricate cup formed by sepals and bracts. Seeds .75 in. long. *Hab.* Open places on mountains from 4000 ft. altitude upwards. Pahang, Gunong Tahan 5000 to 6000 ft. altitude; Kluang Terbang (Barnes). Perak (Scortechini); Gunong Kerbau at 4500 to 5500 ft. altitude (Robinson).

(5) **G. penangensis** Ridl. *Journ. Roy. As. Soc. S. Br.* 73, p. 142. *G. excelsa* King, *l.c.* 203, not of Blume nor Korthals.

A tree 30 to 40 ft. tall, 10 to 15 in. through. Branchlets silky pubescent. Leaves thinly coriaceous glabrous lanceolate-elliptic acuminate, edges serrulate or entire, base acuminate; nerves very faint sometimes almost invisible 5 to 7 pairs inarching doubly within the edge, 2.5 to 4 in. long, 1 in. to 1.75 in. wide; petioles

·25 in. long rather thick at base. Flowers 1·25 in. across cream white or yellow; pedicels very short silky. Sepals round silky outside. Petals round narrowed at base, backs silky. Stamens very numerous; anthers oblong. Ovary conic, silky; style stout pubescent 5-lobed. Capsule 5- or 6-angled, 1·25 to 1·5 in. long, conic hairy or glabrous, valves acute. *Hab.* Open forest. Singapore, very rare, Selitar. Penang Hill, common.

(6) **G. Taipingensis** *Burkill, Journ. Roy. As. Soc. S. Br.* 76, p. 148.

Tree 40 to 50 ft. tall. Leaves elliptic to elliptic-obovate acuminate, base narrowed, upper edge crenate, 11·4 in. long, 2·8 in. wide; petioles ·8 in. long. Flowers yellowish 2·4 in. wide. Sepals and petals densely silky. Stamens very numerous. Ovary silky. *Hab.* Perak, Taipang Hills (Haniff).

(7) **G. Maingayi** *Dyer, in Hook. fil. F.B.I. i.* 291; *King, l.c.* 204; *Ann. Bot. Gard. Calc.* v. (2), 147, *pl.* 179A.

A tree 30 to 40 ft. tall. Branchlets pubescent. Leaves coriaceous oblanceolate obscurely serrulate in the upper part, base gradually attenuate, glabrous except pubescent midrib and edges beneath; nerves 6 pairs indistinct 2·5 to 3 in. long, 1 to 1·4 in. wide; petioles ·25 in. long. Flowers sub-sessile ·75 in. across. Bracts, sepals and petals all silky. Sepals and petals orbicular. Stamens numerous shorter. Ovary ovoid-conic silky 4- or 5-celled; styles 1. Stigmas 4 or 5. Capsule 4- or 5-angled woody, 1 to 1·25 in. long, 5 to 6 in. through, backs of valves flat. Seed 9 in. long. *Hab.* Hill forests. Malacca (Maingay). Perak (Scortechini, Wray), about 1000 ft. altitude.

(8) **G. hirtella** *Ridl. Journ. Roy. As. Soc. S. Br.* 73, p. 142.

A tree. Buds and shoots appressed silky. Leaves coriaceous elliptic-lanceolate acuminate, base narrowed sub-acute; margins crenulate near the tip; nerves very fine much reticulate and secondary nerves and reticulations almost as distinct as the primaries or quite invisible beneath; midrib prominent, above glabrous, beneath appressed hairy, 3·5 to 6 in. long, 1·5 to 2 in. wide; petioles ·25 in. long. Flowers rather small cream colour; peduncles silky ·1 in. long or less. Sepals orbicular silky tomentose ·2 in. long. Petals obovate silky on the back. Stamens apparently few. Fruit ·75 in. long appressed pubescent outside, valves sub-acute. *Hab.* Forests on mountains. Selangor, Bukit Kutu at 3000 ft. altitude. Perak, Gunong Batu Pahat, lower camp (Wray).

(9) **G. Scortechinii** *King, l.c.* 204.

Tree. Branchlets and buds puberulous. Leaves coriaceous narrowly elliptic blunt or sub-emarginate, slightly narrowed to base; nerves 8 pairs very inconspicuous, 2 to 3 in. long, ·8 to 1·4 in. wide; petioles ·25 in. long. Flowers solitary axillary ·6 in. across; peduncles very short pubescent. Sepals unequal orbicular silky outside. Petals twice as large puberulous outside. Stamens

about 30; anthers ovate. Ovary ovoid pubescent, 3-celled; styles 3, pubescent. *Hab.* Perak (Scortechini).

8. PENTAPHYLAX, Gardn.

Shrubs with small coriaceous leaves. Flowers in axils of bracts below the terminal leaves or in pseudo-spikes (the leaves being



FIG. 21.—*Pentaphylax malayana*.

suppressed), small, bisexual. Petals and sepals 5 each. Stamens 5, basifixed dehiscing by terminal pores. Ovary 5-celled; cells 2-ovuled. Capsule loculicidally dehiscing. Seeds winged above. Species 2, 1 Chinese, 1 Malayan.

(1) **P. malayana** *Ridl. Journ. Linn. Soc.* xxxviii. 305.

Bush about 6 ft. tall. Leaves thickly coriaceous, ovate blunt, base round; nerves inconspicuous, 2 in. long, 1 in. wide. Pseudo-spikes 1 in. long, dense. Bracts 4 ovate, edges ciliate. Sepals ovate-round ciliate. Petals linear-oblong retuse, white, .2 in. long. Stamens shorter. Style cylindric, short. Stigma 5-lobed. Capsule .25 in. long. Seeds linear curved. *Hab.* Abundant on rocky open mountains 5500 ft. altitude, but local. Very conspicuous from its young red leaves; Pahang, Gunong Tahan; Kluang Terbang (Barnes); Selangor, Gunong Mengkuang Lebah (Robinson); Gunong Ulu Kali (Burn-Murdoch).

9. ACTINIDIA, Lindl.

Glabrous or more or less tomentose shrubs often climbing. Leaves usually membranous entire or serrate. Flowers unisexual or bisexual in axillary cymes. Sepals 5, connate at base. Petals 5, somewhat contorted imbricate. Stamens many. Ovary many-celled. Styles as numerous, divergent and elongate after flowering. Fruit baccate. Species 25, China, Japan and Himalaya, 2 Malayan.

(1) **A. Championii** *Benth. Fl. Hong Kong*, 26. A. Miquelii *King, l.c.* 196; *Ann. Bot. Gard. Calc.* v. (2), 145, *pl.* 176.

Scandent, 30 to 60 ft. tall. Leaves membranous, ovate acuminate to sub-rotund, minutely glandular-dentate, base rounded or cordate, above glabrous except nerves and midrib, beneath tomentose; nerves 5 pairs, 3 to 4 in. long, 2.5 to 3.5 in. wide; petioles 1.25 to 1.5 in. long. Cymes tomentose spreading; peduncles 1.5, lengthening to 3 in. long in fruit. Flowers unisexual, numerous, .5 in. across. Sepals ovate, blunt, tomentose. Petals larger, oblong-obovate. Stamens glabrous; anthers cordate. Ovary (in males 0 or rudimentary) pilose. Fruit ovoid, .75 in. long, .4 in. through, crowned by 15 to 20 styles. *Hab.* Hill woods, local, not common, climbing on trees. Muar at Biawak (Curtis). Perak, Thaiping Hills. Selangor, near Ulu Selangor. *Distrib.* Hong Kong, Sumatra.

10. SAURAUJA, Willd.

Trees or shrubs. Branches and leaves strigose or scaly when young. Leaves crowded towards the ends of branches, membranous or chartaceous, usually serrate. Inflorescence cymose, sub-paniculate from the axils of fallen leaves, sometimes from the trunk. Flowers usually bisexual, rather small, white or pink. Sepals imbricate. Petals 5, connate at base. Anthers many, dehiscing by pores or suturally. Ovary 3- to 5-celled; styles as many, free or connate. Fruit baccate. Species about 60, tropical Asia and America.

Flowers in small fascicles on the branches; stamens dehiscent suturally.

Styles 3; fruit slightly exceeding calyx; ovary glabrous (1) *S. tristyla*

Styles often 5.

Fruit covered by calyx; ovary pubescent . . . (2) *S. nudiflora*

Stamens dehiscent by pores; flowers panicled from branches and trunk, white . . . (3) *S. grandis*

Flowers in large fascicles on tubercles on the trunk and large branches.

Flowers white; sepals hairy (4) *S. cauliflora*

Flowers pink; sepals glabrous (5) *S. rubens*

(1) *S. tristyla* DC. *Mem. Ternstr.* 31, t. 7; *King, l.c.* 197. *Ternstroemia pentapetala* Jack, *Malay Misc.* i. 5, 40.

A straggling tree about 30 ft. tall. Branchlets strigose and scurfy. Leaves oblanceolate shortly acuminate, minutely serrate, base acute, glabrous except a few hairs on the nerves; nerves 10 to 12 pairs, prominent beneath, 5 to 8 in. long, 1.5 to 3 in. wide; petioles .5 to 1 in. long. Flowers .2 to .3 in. across, pearly white or pink in fascicles of 2 or 3 on small tubercles on the branches or axillary; pedicels slender. Male flower, sepals unequal, 2 outer smaller, ovate blunt. Petals larger. Stamens 25; anthers dehiscent suturally. Pistillode none. Female flowers as in male, but stamens none. Ovary ovoid, glabrous. Styles 3. Fruit globose, scarcely exceeding the calyx. *Hab.* Forests from 1000 ft. upwards to 2000 ft. altitude, rarely lower, by streams. Singapore, Bukit Timah. Johor, Gunong Pantai. Pahang, Malacca, Selangor, Negri Sembilan. Perak. Tomoh, Legeh (Machado). Penang. *Distrib.* Cambodia, Siam.

(2) *S. nudiflora* DC. *Mem. Soc. Geneve* i. 422; *King, l.c.* 198.

A bush or tree up to 30 ft. tall. Branchlets scaly. Leaves oblanceolate, sharply shortly acuminate, minutely glandular-serrate, base acute, glabrous except midrib and 12 or 13 pairs of nerves; puberulous above, hairy beneath, 6 to 10 in. long, 2.25 to 3.75 in. wide; petioles .5 to 1.25 in. long. Flowers white solitary or 2 or 3 in a fascicle, on tubercles in axils of leaves or of fallen leaves; pedicels .5 to 1 in. long. Sepals round. Petals oblong-ovate emarginate. Stamens 25 to 30; anthers dehiscent suturally. Ovary pubescent; styles 3 to 5 united in lower half. Fruit covered by the accrescent calyx. *Hab.* Mountain forests; less common than *S. tristyla*, but not rare; Pahang, Tahan River. Selangor, Semangkok Pass. Perak, Thaiping Hills; Temengoh; Relau Tujur (Wray); Ulu Kal (Kunstler).

(3) *S. grandis* Ridl. *Journ. F.M.S. Mus.* iv. 6.

A large tree 60 ft. or more tall. Young parts hairy. Leaves elliptic sub-acute, base broad, above dark green, beneath white (young leaves red) undulate serrate, adults glabrous, young ones hairy; nerves 12 pairs elevate beneath, 9 to 12 in. long, 5 to 5.5 in. wide; petioles 1.5 in. long. Panicles usually pendent from branches, occasionally on trunk; peduncle 4 in. long, branches

1 in. covered with lanceolate acuminate hairs. Sepals hairy, orbicular. Corolla 1 in. across. Petals oblong obtuse, white, rarely rose. Stamens more than 30, opening by terminal pores. Styles 5, free to base. *Hab.* Pahang, Telom River banks, abundant (Ridley).

(4) *S. cauliflora* Bl. *Bijdr.* 120; *DC. Mem. Soc. Geneve* i. 425; *var. calycina* King, *l.c.* 199.

A fair-sized tree. Young branches, petioles and leaves covered with long paleaceous hairs. Leaves elliptic-oblong, acutely acuminate, base slightly narrowed blunt, edges serrate-aristate, above glabrous, beneath hairy on nerves and midrib; nerves 12 to 14 pairs, 6 to 10 in. long, 2 to 4 in. wide; petioles very hairy, 1 to 2.5 in. long. Flowers 4 in. across white, on slender hairy pedicels, 1 in. long, from tubercles on stem and branches. Sepals round, outer ones hairy, inner ones larger glabrous, thinner. Petals obovate-oblong, much longer than the sepals, united below. Styles 3, united at base. Stamens 25, dehiscing by apical pores. Fruit enveloped in the hairy sepals .25 in. long. Seeds ovate-round, compressed. *Hab.* Limestone woods. Rare. Selangor, Batu Caves. Perak, Batu Kurau (Scortechini). *Distrib.* Java.

The peninsular variety differs in the hairier branches, petiole and sepals, and rather smaller corolla.

(5) *S. rubens* Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 1.

A large shrub or small tree 20 ft. tall, glabrous. Leaves oblanceolate acute, narrowed to base, decurrent on petiole, edges entire, 9 in. long, 4 in. wide; petioles 1.5 in. long. Flowers numerous in fascicles on the trunk; pedicels 2 in. long. Buds rose pink. Sepals ovate orbicular, deep rose .25 in. long. Petals ovate orbicular, white. Stamens 20, free from petals; anthers opening by pores. Ovary glabrous; styles united half their length. *Hab.* Hill woods, local, Selangor, Semangkok Pass (Ridley).

11. ARCHYTÆA, Martius.

Trees or shrubs. Leaves semi-amplexicaul. Flowers solitary in upper axils. Bracts large, leaf-like. Sepals and petals 5 each. Stamens numerous 5-adelphous; anthers versatile. Ovary 5-celled; styles distinct or wholly united; ovules many in many imbricating rows. Capsule acuminate, septicidal from base with persistent axis. Seeds linear sub-cylindric. Species 4, tropical Asia and America.

(1) *A. VahlII* Choisy *Mem. Ternst.* 73; *Dyer, in Hook. fil. F.B.I.* i. 294; *Pierre, Fl. For. Cochinchine*, t. 129; *King, l.c.* 206. *Ploiarium elegans* Korth. *Verh. Nat. Gesch. Bot.* 135, t. 25.

A slender tree about 20 ft. tall, occasionally on mountains, shrubby, glabrous. Leaves thinly coriaceous, sessile, oblanceolate

acute entire, base truncate; nerves 15 pairs, 3 to 4·5 in. long, 5 to 7·5 in. wide. Flowers 1 to 1·25 in. wide; peduncles crowded at ends of branches. Sepals ovate rounded green, edged red. Petals white flushed and tipped on the back with pink, obovate. Stamens white; anthers fawn colour. Fruit 75 in. long, narrow ovoid acuminate. *Hab.* Open country usually in damp spots, common all over the peninsula at low elevations and at 3000 ft. altitude on Mt. Ophir (dwarf mountain form). *Distrib.* Borneo. *Native names:* Poko Riag Riag (Cicada tree); Kuat-Kuat. *Use:* Timber red; good for building, though small.

ORDER XX. DIPTEROCARPACEÆ.

Resinous trees tall to vast, rarely small. Leaves alternate, coriaceous, simple entire. Flowers small or medium, white, yellow or pink, fragrant, in axillary and terminal panicles, often secund. Bracts usually small. Sepals free or connate in a short tube more or less free or adnate to the base of the ovary. Petals contort, free or connate at the base. Stamens numerous, 15, 10 or 5, free or adnate to petals, hypogynous; anther 2-celled, connectives often awned or prolonged. Ovary slightly immersed in a torus, 3-celled; ovules 2 in a cell; style subulate. Stigmas 1 to 3, minute. Fruit nut-like, 1-seeded, surrounded by the persistent sepals, 2 or more of which are prolonged into linear or oblong wings, the rest shorter occasionally (*Pachynocarpus*) not prolonged, the calyx forming an adnate cup. Species about 300, tropics of India, Siam, Cochin-China, Ceylon and Malaya, 1 in the Seychelles.

These trees are among the biggest in the forests, and produce the valuable timbers known as Serayah, Meranti, Merawan, Chengei or Penak, Damar Laut, Resak (see "Timbers of the Malay Peninsula," *Agric. Bull. Straits Settlements*, new series, vol. i. 52). They also produce the resin, Dammar, used in varnishes, and for torches (*Shorea*, *Hopea*, *Balanocarpus*), and wood oil, Minyak Keruwing (*Dipterocarpus*), and camphor, Kapur Barus (*Dryobalanops*) (see "Dammara and Wood Oil," *Ridl. Journ. Roy. As. Soc. S. Br.* xxxiv. 89). The trees flower and fruit in some cases annually, in others sexennially, and many not till they have attained their full size in about 30 years or even much later. On account of their great height specimens are very difficult to procure. (King, *Journ. As. Soc. Beng.*, lxii. Part II, No. 2, p. 87.)

Sepals prolonged as wings; fruiting calyx with a distinct tube covering the fruit.

Tube quite free from the fruit.

Sepals developed into long wings, 4 . . .

1. DRYOBALANOPS

Sepals developed into wings 2, the others very short . . .

2. DIPTEROCARPUS

Tube adnate to fruit; wings 2 . . .

3. ANISOPTERA

Sepals united at base only. In fruit developed into erect wings longer than fruit.

Wings 3 long, 2 shorter.

Flowers large; petals broad, thin 4. PENTACME

Flowers small; petals narrow.

Fruit small, pericarp coriaceous; wings much longer 5. SHOREA

Fruit large, pericarp woody; wings hardly longer 6. PACHYCHLAMYS

All 5 wings equally long 7. PARASHOREA

Wings 2 large, 3 small 8. HOPEA

Sepals free to base.

Wings 2 long, 3 shorter ovate.

Leaves stiff coriaceous 9. COTYLELOBIUM

Leaves thin coriaceous 10. SYNAPTEA

Sepals in fruit all equal, often shorter than fruit.

Stamens 10 to 15; sepals in fruit oblong or ovate 11. VATICA

Stamens 30 to 36; sepals orbicular 12. ISOPTERA

Sepals not winged in fruit, reduced to a small cup.

Sepals in fruit coriaceous, separate 13. BALANOCARPUS

Sepals in fruit woody-corky, forming a more or less lobed cup, or short corky processes 14. PACHYNOCARPUS

1. DRYOBALANOPS, Gaertn.

Very large trees containing camphor. Leaves coriaceous. Flowers in panicles or racemes terminal and in the upper axils. Calyx-tube short, free with oblong lobes. Petals lanceolate. Stamens 35 to 45; filaments short; anthers bifid at the tip, connective apiculate. Ovary 3-celled; cells 2-ovuled; style entire. Fruit conic elongate in a cup formed by the connate bases of the sepals; wings 5, elongate equal. Species 7, Malay Peninsula and islands.

Leaves short, ovate cuspidate, base round (1) *D. aromatica*.

Leaves oblong lanceolate acuminate, base broad (2) *D. Beccariana*

(1) *D. aromatica* Gaertn. *Fruct.* iii. 49, t. 186. *D. Camphora* Colebr. *Asiat. Research* xii. 535; *Davies, Agric. Bull. Straits* ix. 297; *Ridl. l.c.* 299. (Fig. 23, a, b, c, p. 213.)

Tree 150 ft. tall, buttressed, girth 35 ft. Leaves stiff coriaceous ovate abruptly acuminate, base round, 3 in. long, 1.25 in. wide, deep green polished; nerves very fine close parallel and numerous; petioles .5 in. long. Panicles terminal 2 in. long. Flowers white, fragrant. Sepals lanceolate acute, .25 in. long, scurfy on the back. Petals as long, thin, lanceolate, blunt. Fruit 1 in. long, the wings oblong, 3 in. long, .5 in. wide, finely ribbed, cup sub-globose, .5 in. long and wide. *Hab.* Forests, usually gregarious, the whole forest consisting of this tree only; lowlands on low hills. Johor, Endau River; Penyabong (Foxworthy). Pahang, Rumpin River; Kwantan. Selangor, Kanching. Negri Sembilan, Seremban (Kinsey). Perak, Kanding (Burkill). *Distrib.* Sumatra, Borneo. *Native name*: Kapur Barus. *Use*: This tree produces camphor oil and camphor, which is collected by the Malays for sale, chiefly to the Chinese.

This is the original source of camphor, the Formosa Laurel-camphor being a discovery of much later date. (For the story of the collection, Camphor language, etc., see *Journ. Roy. As. Soc. S. Br.* 26, p. 35, and *Journ. F.M.S. Mus.* ix. 53, 59.) Timber highly valued for building, deep red, heavy and close in texture. Bark used by Malaysans for walls of houses.

(2) **D. Beccariana** Dyer, *Journ. Bot.* 1874, p. 100, *pl.* 142, *figs.* 6, 7.

Big tree. Leaves oblong-lanceolate acuminate, base rounded; nerves very numerous, fine and closely parallel, 2 to 3 in. long, 5 to 1 in. wide. Young leaves caducously scurfy on the back; petioles 25 in. long. Panicles terminal and in upper axils, lax 4 in. long. Flowers white, fragrant. Sepals lanceolate, 2 in. long, sub-acute. Petals thin, oblong, twice as long. Stamens half as long. Fruit 5 in. long, cup very short, 1 in. long, wings linear-oblong, 2 in. long, 25 in. wide. *Hab.* Pahang, Endau River (Watson); Buntar, Rumpin (Foxworthy). Selangor, Rantau Panjang (Foxworthy). Perak, Bikum (Foxworthy). *Distrib.* Borneo (Sarawak). *Native name*: Keladan.

2. DIPTEROCARPUS, Gaertn.

Vast trees more or less stellate-pubescent. Leaves usually large, sometimes sinuate-crenate; lateral nerves connected by marginal loops. Stipules large, enclosing the terminal bud, caducous. Flowers, the largest in the order, white or pink, very fragrant. Calyx-tube free. Petals contort at base, pubescent on the back. Stamens numerous; anthers linear, equivalved, acuminate. Ovary 3-celled; ovules 2 in each. Fruit large, enclosed in calyx-tube but free; wings 2, long. Species 60, Indo-Malaya.

The timber is inferior. The resin takes the form of wood-oil and is obtained by cutting a large hole in the tree-trunk and burning it within. It is known as Minyak Keruing.

Ripe fruit globose, not angled or winged.

Young branches, petioles and nerves stiffly hairy.

Fruit quite glabrous

Fruit stellate hairy

Young branches and leaves pubescent

Branches glabrous

Ripe fruit with 5 tubercles on top, globose

Ripe fruit oblong, 4-angled, glabrous

Ripe fruit oblong, 4-angled, grey-velvety

Ripe fruit prominently 4-winged.

Leaves glabrous; fruit very large winged to base

Leaves glabrous; fruit large not winged to base

Leaves hairy beneath; fruit unknown

Leaves pubescent on nerves small; fruit small pubescent

- | |
|-----------------------------|
| (1) D. crinitus |
| (2) D. Duperreanus |
| (3) D. Skinneri |
| (4) D. Kerrii |
| (5) D. cornutus |
| (6) D. fagineus |
| (7) D. oblongifolius |
| (8) D. grandiflorus |
| (9) D. Kunstleri |
| (10) D. rigidus |
| (11) D. costatus |



FIG. 22.—Dipterocarpaceæ.

- a*. *Hopea Curtisii*. *c*, *d*. *Anisoptera Curtisii*.
b. *Isoptera borneensis*. *e*. *Pachychlamys Thiseltoni*.
f. *Dipterocarpus grandiflorus*.



FIG. 23.—Dipterocarpaceæ.

a, b, c. *Dryobalanops aromatica.* *d, e.* *Vatica Ridleyana.*
f. *Balanocarpus Curtisii.*

(1) **D. crinitus** Dyer, in *Hook. fil. F.B.I.* i. 296; *King, l.c.* 90.

A vast tree 90 to 100 ft. tall. Young branches, petioles, under-surface of leaves, midrib and nerves, pedicels and outside of bracts covered with stiff yellow hairs in fascicles. Leaves very coriaceous ovate or obovate acute, base round blunt, sparsely hairy; midrib thickly hairy above (glabrescent when old); nerves 12 to 18 pairs very prominent beneath, 5 to 6 in. long, 2·5 to 3 in. wide; petioles 1·5 to 2 in. long. Racemes about 6-flowered. Flowers pink, 2 in. long. Calyx glaucous glabrous. Petals puberulous linear blunt. Stamens 15. Fruit ovoid, glaucous glabrous, 75 in. long, wings linear-oblong blunt, 1-nerved, reticulate, 3·5 in. long, 5 in. wide. *Hab.* Forests, common. Johor, Bukit Jitan; Penyabong (Foxworthy); Pahang, Lipis (Phillips); Bentong (Foxworthy). Malacca, Sadanen. Selangor. Negri Sembilan. Selangor. *Distrib.* Borneo, Sumatra. *Native names:* Gombang; Minyak Keruing Bulu; Keruing Pekat; Keruing Bobi; Menkeluang (Pahang). *Use:* Timber for houses and bridges; bark for house walls.

(2) **D. Duperreanus** Pierre, *Fl. For. Cochinchine*, 14, t. 219. *D. Scortechinii* King, *l.c.* 91.

A big tree about 100 ft. tall. Branchlets and buds densely rough hairy. Leaves elliptic, shortly blunt acuminate; nerves 9 to 10 pairs, above glabrous, beneath softly tomentose with tufted hairs, edges undulate, base shortly narrowed or truncate, 8 to 9 in. long, 5 in. wide; petioles densely hairy, 1·5 in. long. Flowers 6 to 8 sessile in a spike. Calyx-tube oval-cylindric, shortly hairy. Petals linear-oblong pink, 1·8 in. long. Fruit globose 1 in. long, wings linear-oblong, 6 in. long, 1 in. wide; nerves 3, reticulations conspicuous, minutely pustulate with stellate hairs and on nut with bristly hairs. *Hab.* Forests. Pahang, Bukit Goh, Kwantan (Foxworthy). Selangor, Dusun Tua; Weld's Hill, Kwala Lumpur (Foxworthy). Perak (Scortechini). Lankawi, Gunong Raya (Haniff). *Distrib.* Cambodia.

(3) **D. Skinneri** King, *l.c.* 91.

A tree 50 to 70 ft. tall. Bark warty. Buds narrow, golden-silky. Branchlets pubescent. Leaves oblong-elliptic acute or acuminate, base rounded, margins undulate, above glabrous except the hairy midrib, beneath nerves 16 to 19 pairs prominent, hairy, 7 to 8 in. long, 3 to 3·5 in. wide; petioles 7 to 1 in. long, tomentose. Panicles short, 4 in. long, pubescent. Branches 2 or 3 with 3 to 4 flowers each. Calyx campanulate short lobes rounded small, 5 in. long, stellate tomentose, long lobes linear-oblong 5 in. long. Petals linear-oblong, blunt longitudinally half pubescent. Fruit globose, 75 in. through, glabrous; wings coriaceous, linear-oblong blunt, 3-nerved at base, 2 outer nerves running half-way; mid-nerve stouter, much-branched, 5 in. long, 5 in. wide, short lobes obovate-round, 5 in. long. *Hab.* Forests, Province Wellesley, Tasek

Gelugur. Penang, West Hill at 1000 ft. altitude (Curtis). *Distrib.* Mergui.

In the Province Wellesley specimen the 3 wing-nerves run to the end of the wing, which is 1 in. wide.

var. hirtus Ridl. Young branches covered with stellate hair tufts, and single longer red hairs. Leaves as in type, but nerves fewer, 12 pairs, midrib both sides and nerves beneath covered with appressed hairs; nervules hairy; petioles velvety. Fruit top hairy, small wings very small and folded back. *Hab.* Pahang (Foxworthy). Probably only a local variety.

(4) **D. Kerrii** King, *l.c.* 93.

A lofty tree, quite glabrous except the petals. Leaves ovate-elliptic acute or shortly blunt acuminate, edges undulate, base cuneate; nerves 8 to 11 pairs, elevate beneath, 3 to 4 in. long, 2 to 2.5 in. wide (young leaves 7 in. long, 4.5 in. wide); petioles .9 to 1 in. long. Panicles short, few-flowered. Calyx funnel-shaped .4 in. long, short lobes broad blunt ovate, long ones .3 in. long. Petals linear-oblong, pubescent outside, 1 in. long. Fruit globular-turbinate, lenticellate, 1 to 1.5 in. through; short wings oblong blunt, spreading .12 in. long, long wings linear-oblong, 3-nerved, with numerous short branches, 5 in. long, 1.25 in. wide. *Hab.* Dense forests. Singapore, Bukit Timah. Malacca, Alor Gajah (Griffith); Sungei Hudang (Derry). Negri Sembilan, Kopis (Foxworthy). Selangor, Kajang (Mitchell). Dindings, Gunong Tunggul (Curtis). Penang, Waterfall (Curtis). *Native name*: Keruwng Chaia.

This is hardly distinct from *D. turbinatus*, Gaertn. of India, Assam and Burma, but that has larger and rounder leaves, pubescent buds, and more acute calyx-lobes. *Duvaliella problematica* Heim, *Bull. Mens. Par.* 1892, p. 1009, was a name given to what appears to be a scrap of this plant with a long pointed gall, which Heim mistook for a fruit. It was collected in Penang by Curtis, and there is a similar specimen from Cantley.

(5) **D. cornutus** Dyer, *l.c.* i. 296; *Journ. Bot.* 1874, p. 103, t. 143, fig. 15; King, *l.c.* 93.

A tree 50 to 70 ft. or more tall. Branchlets rufous-tomentose. Leaves coriaceous, oblong blunt at both ends, edges undulate, above glabrous, beneath densely covered with minute whitish tomentum; nerves 16 to 19 pairs, prominent, transverse nervules conspicuous, 9 to 14 in. long, 5 to 8 in. wide; petioles 2 to 3 in. long, pale tomentose. Raceme or panicle 4 to 5 in. long, rachis flexuous. Calyx-tube 5-winged tomentose, .5 in. long, lobes linear obtuse longer. Petals oblong or sub-spathulate stellate-canescens. Fruit 1 in. long, turbinate with 5 blunt lobes at the top; wings linear-oblong, blunt, 3-nerved reticulate 7.5 in. long, 1.75 in. wide. *Hab.* Forests. Common. Singapore (Wallich); Bukit Timah; Changi. Pahang, Pulau Tawar; Bentong (Foxworthy); Negri Sembilan, Pasoh (Foxworthy); Kopis (Kinsey). Perak, Ulu

Selama (Wray); Kwala Kangsar (Foxworthy); Penang, Waterfall. *Distrib.* Sumatra. *Native name*: Minyak Keruwing Dadeh.

(6) **D. fagineus** *Vesque, Comptes rendus lxxviii.* 625; *King, l.c.* 94. *D. prismaticus* *Dyer, Journ. Bot.* 1874, p. 104, t. 144, fig. 17.

A tree 40 to 80 ft. tall. Branchlets and buds glabrous, or when quite young pulverulent. Leaves coriaceous, elliptic acute or elliptic-ovate, base long cuneate, edges undulate, backs glaucescent, glabrous or the nerves appressed hairy, 10 to 13 pairs, 2·5 to 3·25 in. long, 1·3 to 1·75 in. wide; petioles ·5 in. long, rather slender. Panicles slender, glabrous, 2 to 3 in. long, 3- to 4-flowered. Flowers 1·25 in. long. Calyx-tube campanulate with 5 ridges, small lobes short round, long ones linear, ·2 in. long. Petals oblong blunt, ·65 in. long, backs mealy. Fruit ovoid to ellipsoid, 5-angled, glaucous, 1 in. long, outer wings linear-oblong, base narrowed, 2·5 to 3 in. long, ·75 in. wide, the inner lobes very short, hardly distinct. *Hab.* Hill forests. Perak, Taiping Hills, 500 to 1000 ft. altitude (Kunstler). Penang Hill, 500 to 600 ft. altitude (Curtis). *Distrib.* Borneo.

This has the smallest leaves of any of our species.

(7) **D. oblongifolius** *Blume, Ann. Mus. Bot. Lugd. Bat.* ii. 36; *Dyer, Journ. Bot.* 1874, p. 105. *D. pulcherrimus* *Ridl. Trans. Linn. Soc.* iii. 283.

A large tree 40 to 80 ft. tall. Leaves sub-coriaceous, glabrous, long-elliptic acute or acuminate, base narrowed rounded; nerves 14 pairs slender, prominent beneath, conspicuous above, 6 to 8 in. long, 2 to 2·5 in. wide; petioles 1 in. long. Flowers in silky axillary panicles, 6 in. long, sub-sessile. Calyx-tube 5-angled, silky, ·75 in. long, short lobes oblong silky, long ones lorate, over ·5 in. long. Petals lorate blunt, pubescent outside, cream yellow tinted rose colour, 2 in. long, ·5 in. wide. Fruit pink, glabrous when ripe, 1·25 in. long, obconic, 5-ridged; outer wings lorate lanceolate blunt, 4 in. long, 1 in. wide; nerves 3, branched, inner wings short lanceolate velvety ·2 in. long. *Hab.* Overhanging streams in dense jungle chiefly on the east coast. Pahang, Tahan River, very abundant; Lipis (Foxworthy). Tringganu, Sai Telubin (Down). Perak (Scortechini). *Distrib.* Sumatra, Borneo. *Native name*: Neram or Nerrum.

The flowers of this beautiful tree are very fragrant. It is one of the smallest trees in the genus. The wood is red and fairly good.

(8) **D. grandiflorus** *Blanco, F. Filipp. (Ed. 2),* 314; *Dyer, Journ. Bot.* 1874, p. 106, t. 45, fig. 19; *King, l.c.* 95. *D. pterygo-calyx* *Scheff. Obs. Phyt.* ii. 35. (Fig. f, p. 212.)

A vast tree 100 to 150 ft. tall. Branchlets hoary at length glabrous. Leaves stiff coriaceous, ovate-elliptic, base broad, edges entire or undulate, crenate glabrous; nerves 14 to 16 pairs, strongly

elevate, 6 to 9 in. long, 3·5 to 5 in. wide; petioles 2 to 3 in. long. Racemes 4-flowered. Flowers 2 in. long. Calyx-tube ·5 in. long, angled with 5 wings for the whole length. Petals linear-oblong, pink, backs mealy 1 in. long. Fruit oblong 2·5 in. long with 5 strong wings, ·5 in. wide running the whole length; sepaline wings oblong blunt, coriaceous, 7 to 9 in. long, 1·5 to 2 in. wide; nerves 3 to 5, much-branched, small wings ovate orbicular, ·5 in. long. *Hab.* Common in forests in the whole peninsula from Johor to Kedah (on Kedah peak) and Pulau Adang. *Distrib.* Lingga, Labuan, Bangka, Philippines. *Native names:* Minyak Keruing Dadak; Minyak Keruing Beku; Minyak Gombang Kechil. *Use:* Oil used in varnish (Ridl. *Journ. Roy. As. Soc. S. Br.* xxxiv. p. 93).

(9) **D. Kunstleri** King, *l.c.* 96; *Ann. Bot. Gard. Calc.* v. (2), 149, *pl.* 180.

A tree 100 to 120 ft. tall, and 2 or 3 ft. through. Branchlets at first pubescent, later glabrous with pubescent rings above each axil. Leaves coriaceous elliptic shortly acuminate, base round or cuneate, edges undulate, glabrous; nerves 16 to 18 pairs prominent, 7 to 11 in. long, 4·5 to 7 in. wide; petioles 1·5 to 2 in. long. Panicles 6 to 8 in. long. Branches 2 from a peduncle 1 in. or more long. Flowers 4 to 6, glaucous, 2·5 to 3 in. long. Calyx-tube obconic with 5 ridges. Petals linear blunt. Fruit dark bluish green 2·5 in. long, 1 in. through with 5 low wings in the upper part about ·25 in. wide. Sepaline wings 6 in. long, 1·5 in. wide, oblong, narrowed at base; nerves 3 branched and reticulate, short wings obovate ·5 in. long. *Hab.* Dense jungle, Perak, Taiping Hills at 300 ft. altitude (Kunstler).

(10) **D. rigidus** Ridl. *Journ. Roy. As. Soc. S. Br.* 82, p. 171.

Branches stout, densely softly hairy. Leaves rigid coriaceous, ovate sub-acute, base shortly narrowed blunt, above glabrous, beneath velvety; nerves 10 to 11 pairs, sunk above, strong elevate as is midrib beneath hairy, 6 in. long, 4 in. wide; petioles 2 in. long, hairy stout. Panicles 4 in. long, glabrous above. Flowers large. Calyx-tube distinctly but narrowly winged, 1 in. long, lobes velvety outside, glabrous inside, short wing oblong blunt, 1·2 in. long, long wing blunt linear-oblong ·75 in. long. Petals linear-oblong, grey velvety both sides 2 in. long. *Hab.* Johor, Penyabong (Foxworthy).

Nearest to *D. Kunstleri*, but much more hairy and with fewer nerves to the leaves.

(11) **D. costatus** Gaertn. *Fruct.* iii. 50, *t.* 187.

A tree 60 to 70 ft. tall. Young branches golden velvety. Leaves oblong-ovate acute, base very shortly narrowed, thinly hairy to glabrous except the nerves pubescent above, all pubescent beneath; nerves 12 pairs elevate, 5 in. long, 2·75 in. long; petioles

stout velvety, .75 in. long. Flowers 2 or 3, raceme and calyx-tube golden-pubescent. Calyx-tube .5 in. long, short lobes .1 in. sub-triangular, long lobes linear oblong, .5 in. long. Petals about .75 in. long, glaucous, puberulous outside. Fruit sub-globose, .5 in. long with 5 low wings pubescent. Sepaline wings oblong, narrowed, blunt at tip, glabrous; nerves and reticulations prominent 3.5 in. long, nearly 1 in. wide, short inner lobes ovate .25 in. long, rarely 2 in. long. *Hab.* Penang Hill (Burkill). Lankawi, Burau Bay (Ridley). *Distrib.* Tenasserim, Andamans, Siam.

I only found fruit of this, the rest of the description from Burmese specimens.

3. ANISOPTERA, Korth.

Vast trees with buttresses. Leaves usually coriaceous. Flowers in lax terminal and axillary panicles, medium or small, white or yellow. Calyx-tube short adnate to base of ovary. Petals contort at base longer. Stamens indefinite; anthers oblong-ovoid long-awned. Ovary 3 (rarely 4- to 5)-celled; ovules 2 in a cell; style oblong. Fruit adnate to calyx-tube; wings 2 long linear oblong, strongly 3-nerved and reticulate. Species 6, Malayan.

Petals acuminate lanceolate.

Leaves coriaceous, broad oblong, tomentose beneath (1) *A. costata*

Leaves coriaceous, elliptic, yellow scaly beneath . (2) *A. Curtisii*

Petals oblong blunt.

Leaves coriaceous, yellowish beneath not scaly . (3) *A. marginata*

Leaves sub-coriaceous, green, glabrous (4) *A. lævis*

Petals linear.

Leaves thin, glabrous (5) *A. thurifera*

(1) *A. costata* Korth. *Verh. Nat. Gesch. Bot.* 67, t. 6; *Ridl. Journ. Roy. As. Soc. S. Br.* 54, p. 25.

A gigantic tree, 120 to 150 ft. tall with large buttresses. Leaves coriaceous, glabrous above with close yellow brown tomentum beneath, oblong blunt, base broad; nerves 25 pairs elevate beneath, 4 to 6 in. long, .3 in. wide; petioles 1.5 in. long, rough. Panicles axillary and terminal 6 in. long, covered with scurfy wool in tufts. Flowers .25 in. long, yellow. Sepals lanceolate acuminate, tomentose. Petals glabrous, lanceolate acuminate. Fruit globular 1 in. through, tomentose, light brown, outer wings 7 in. long, 1.5 in. wide, linear-oblong obtuse, 3 strong nerves, transverse bars elevate, 3 inner wings very narrow, 1 to 3 in. long, with 2 main nerves. *Hab.* Dense jungle, Singapore, Garden Jungle. Malacca, Batu Tiga. Negri Sembilan, Kwala Pilah (Burkill). Selangor, Banji, Kajang (Mitchell). *Distrib.* Borneo, Tenasserim. *Native names:* Mersawar Ular; Mersawa Merak; Sepah Petri.

(2) *A. Curtisii* King, *l.c.* 100. (Fig. 22 c, d, p. 212.)

Tree 80 to 100 ft. tall. Branchlets tomentose. Leaves oblong acute, base obtuse or broadly elliptic, above glabrous, beneath

densely yellow scaly sparingly stellate pubescent; nerves 18 to 20 pairs, prominent, 2 to 3·5 in. long, ·75 to 1·25 in. wide; petioles ·5 to ·75 in. long. Panicles scurfy, 4 to 5 in. long, many-flowered. Calyx-lobes lanceolate, sub-acute, ·1 in. long, scurfy. Petals narrow, lanceolate acuminate, glabrous. Fruit globose, ·4 in. through, smooth, outer wings linear-spathulate obtuse, 3-nerved, transverse nerves conspicuous, 4 in. long, ·6 in. wide, inner wings ·3 in. long. *Hab.* Forests. Perak, Thaiping Hills. Dindings, Pangkor (Curtis). Penang, Muka Head and Government Hill, at 800 to 2000 ft. altitude. *Distrib.* Borneo. *Native name*: Rengkong.

(3) *A. marginata* Korth. *Verh. Nat. Gesch. Bot.* 66, t. 6, fig. 1A to 13A.

A big tree, glabrous except young parts and inflorescence covered with scales and soft pubescence. Leaves elliptic-oblong, yellow brown beneath, thin coriaceous, base rounded; nerves 10 to 14 pairs, elevate beneath, reticulations fine but conspicuous beneath, 2 to 4 in. long, 1·25 to 1·75 in. wide; petioles ·2 to ·5 in. long. Panicles terminal and in upper axils, 2 to 6 in. long, velvety pubescent. Sepals ·12 in. long grey-velvety, lanceolate. Petals oblong rounded, glabrous white, ·2 in. long. Stamens numerous; filaments very short; anthers short, oblong with a much longer hair-like process. Ovary pubescent. *Hab.* Pahang, Tanjong Api, Kwantan (Foxworthy). *Distrib.* Bangka, Borneo. *Native name*: Mersawa or Sanai.

(4) *A. lævis* Ridl. n. sp.

Big tree 100 ft. tall. Leaves glabrous coriaceous, oblong-lanceolate rather abruptly acuminate, base round; nerves fine 10 pairs, reticulations fine and conspicuous on both sides, 3 to 6 in. long, 1·5 in. wide; petioles ·5 in. long. Flowers unknown. Fruit globose ·5 in. long, outer wings linear blunt, 3·5 in. long, ·25 in. wide; nerves 3, central one broadest, transverse bars and reticulations prominent, inner wings linear, ·5 in. long. *Hab.* Forests. Singapore, Garden Jungle. Malacca, Selandor; Merlimau (Cantley); Machap (Derry). Pahang, Bukit Sungei Nilam, Bentong (Foxworthy). *Native names*: Mersawa; Lah; Meranti Jamang.

This was referred to *A. glabra* of Kurz by me in *Journ. Roy. As. Soc. S. Br.* 54, p. 25, but that, which is only known from fruiting specimens, has larger fruits than this plant.

(5) *A. thurifera* Blume, *Ann. Mus. Bot. Lugd. Bat.* ii. 42.

Tree. Branchlets scurfy. Leaves thinly coriaceous, elliptic-oblong, shortly acuminate, base rounded, margin undulate; nerves fine ascending, 13 pairs, reticulations pustular, beneath scurfy when young, 3·5 to 5 in. long, 2 in. wide; petioles ·5 to 1 in. long. Panicles 3 to 5 in. long, lax, scurfy-tomentose. Sepals lanceolate obtuse, densely tomentose, ·1 in. long. Petals linear, glabrous.

Stamens 12 to 14. Fruit globose .6 in. long, smooth, outer wings linear spatulate dilated upwards gradually, 3-nerved reticulations prominent, 4 in. long, .5 in. wide near the top, inner wings .1 in. long linear. *Hab.* Rare in forests. Perak at Sungei Njing, Plus Reserve (Burn-Murdoch). *Distrib.* Philippines.

4. PENTACME, DC.

Trees with broad leaves obtuse or cordate at the base. Flowers large, paniced. Calyx-tube short, lobes imbricate. Petals broad, thin, rounded. Stamens 15; filaments short, broad; anthers much larger, the cells each bearing 2 appendages and the connective 1, so that each anther has 5 terminal points. Ovary glabrous; style filiform. Fruit ovoid acuminate, free from the sepals, which are connate only at the base; wings 3 long narrow thin, many-nerved, 2 shorter, all narrowed towards base and thin, expanding. Species 3, Burma, Siam, Malay Peninsula north, and Philippines.

(1) *P. malayana* King, *l.c.* 107; *Ann. Bot. Gard. Calc.* v. (2), 151, *pl.* 184.

A medium-sized tree. Leaves coriaceous, glabrous, elliptic to ovate, shortly acuminate, base broad round sub-cordate; nerves 16 pairs, 5 to 7 in. long, 2.75 to 4.5 in. wide; petioles .75 to 1 in. long. Panicles lax spreading, 6 in. long, axillary. Flowers cream colour, .75 in. wide. Sepals ovate acute, tomentose. Petals 3 times as long, partly puberulous outside. Stamens nearly as long, connective-awn shorter and thicker than the others deflexed. Fruit ovoid apiculate, 1 in. long, wings 4 in. long, .6 in. wide; nerves 9, 3 short, wings linear-oblong, 2 in. or less long, narrow. *Hab.* Limestone rocks usually near the sea. Kedah Peak, Semling (Bell and Haniff). Lankawi, Pulau Segai; Terutau (Curtis). Perlis, near Chupeng. *Native name*: Temah Batu.

5. SHOREA, Roxb.

Large, often vast trees 180 ft. tall with buttresses. Leaves entire, coriaceous, rarely large. Stipules large or small, persistent or fugacious. Flowers small or medium in lax panicles usually axillary. Flowers secund, more or less silky. Sepals imbricate 2 external, 3 within. Petals contort, white, yellow or red. Stamens 15, 20 or 30; anthers ovate or oblong, connective usually awned. Ovary 3-celled, often with a stalk (stylopodium), cells 2-ovuled; style subulate. Stigma minute, entire or 3-toothed. Fruit surrounded by the dilate bases of the petals sometimes adnate to it; wings 2 shorter and narrower, 3 long linear-oblong, thin with 8 to 10 nerves. Species about 60, India, Cochin-China, Malay islands.

The timber is of two classes: a soft red wood, Seraya or Meranti, and a dark hard, very valuable wood, Dammar Laut. The Dammar is opaque or

nearly so, yellowish white, yellow or brown. It is only used for torches, caulking boats, etc.

Anthers without apical appendages.

Leaves elliptic pustulate beneath 4·5 by 2 in. . . (1) *S. leprosula*

Leaves elliptic with scattered stellate hairs beneath,
at length glabrous 3 by 1·5 in. . . (2) *S. scutulata*

Leaves oblong, 6 in. by 1·5 in. pustulate
beneath . . . (3) *S. rigida*

Leaves lanceolate, glabrous, glaucous beneath;
stamens not ciliate . . . (4) *S. Curtisii*

Leaves ovate, glabrous, glaucous beneath; stamens
ciliate at top . . . (5) *S. glauca*

Anthers mostly unappendaged, a few minutely appendaged.

Leaves oblong, pustulate beneath; flowers rough,
silky . . . (6) *S. sericea*

Leaves broad elliptic, scurfy beneath; fruit small,
wings 3, unequal; flowers unknown . . . (7) *S. palustris*

Anthers with very short apical appendages.

Leaves 2·5 to 4 in. long; fruit wings 2·5 in. long . . . (8) *S. parvifolia*

Leaves 4 in. long; fruit 3·5 in. long; branch tips
with large oblong bracts . . . (9) *S. acuminata*

Leaves 4 to 6 in. long; fruit 4·5 in. long; wings
broad, no bracts . . . (10) *S. macroptera*

Anther-appendages much longer than anthers.

Stamens 20 to 25 . . . (11) *S. gratissima*

Flowers 2·5 in. long or less; leaves 3 to 4 in. long,
ovate-lanceolate.

Nerves 9 to 10 pairs faint; petals not saccate;
style short . . . (12) *S. Ridleyana*

Nerves 6 pairs; petals saccate at base; style
long . . . (13) *S. Maxwelliana*

Flowers 2·5 in. long, glabrous; leaves ovate
often cordate, 5 to 8 in. long . . . (14) *S. materialis*

Flowers 4 in. long; leaves 5 in. long, strongly
nerved with 9 to 11 pairs of nerves . . . (15) *S. pauciflora*

Flowers 5 in. long, crowded; leaves 4 in. long,
stiff . . . (16) *S. Kunstleri*

Flowers 5 in. long in lax panicles; leaves 4 in.
long, thin . . . (17) *S. gibbosa*

Flowers 6·5 in. long; panicles large with large
bracts . . . (18) *S. bracteolata*

Anther-appendages with 3 to many cilia.

Stamens 30.

Flowers 2·5 in. long; petals long, narrow; cilia,
from all tips of anthers . . . (19) *S. ciliata*

Flowers 1 in. wide; petals ovate blunt; appen-
dages all ciliate . . . (20) *S. alba*

Flowers 1 in. wide; petals blunt broad; anthers
bearded at base and tip . . . (21) *S. barbata*

Stamens 20.

All appendages ciliate; leaves ovate cuspidate,
stiff coriaceous; wings of fruit 1·10 in. long,
4 in. wide oblanceolate . . . (22) *S. utilis*

Leaves oblong; appendages 2- to 3-ciliate . . . (23) *S. collina*

Stamens 15.

Outer row only ciliate-appendaged; leaves
oblong, rather thin . . . (24) *S. costata*

Flowers unknown.

Leaves glabrous 4·5 in. long, oblong base broad, round, stiff, coriaceous; fruit globose (25) *S. crassifolia*

Leaves thin, 2·5 in. to 4 in. long; fruit oblong, conic, silky (26) *S. lævis*

Leaves 2 in. long, stellate hairy beneath (27) *S. globifera*

(1) *S. leprosula* Miq. *Fl. Ind. Bat. Supp.* i. 487; *Ridl. Straits Agric. Bulletin*, viii. 364, pl. iii; *King, l.c.* 110. *S. maranti* Burck, *Ann. Jard. Buitenz.* vi. 217; *King, l.c.* 120.

A tree 150 to 180 ft. tall, 2 ft. through with buttresses. Branchlets minutely stellate-tomentose. Leaves coriaceous elliptic to oblong acute or sub-acute, base rounded, above glabrous, beneath tomentose with densely stellate hairs on the midrib and nerves; nerves 10 to 13 pairs prominent beneath, 3 to 6 in. long, 1·25 to 3·25 in. wide; petioles ·35 to ·75 in. long. Panicles axillary and terminal, 1·5 to 4 in. long, stellate tomentose. Flower-branchlets silky. Flowers in two rows, secund sessile, cream yellow. Sepals ovate velvety. Petals ·3 in. long, oblong-spathulate, silky outside. Stamens 15; filaments dilate longer than anthers, no awns. Fruit ovoid apiculate tomentose, 6 in. long; three outer wings narrow oblong sub-acute, narrowed to base, 7-nerved, reticulate yellow, 3 in. long, ·7 in. broad, 2 inner ovate caudate. *Hab.* Common in forests, Singapore, Pahang, Malacca, Perak, Selangor, Negri Sembilan. *Distrib.* Sumatra and Borneo. *Native names:* Serayah Batu; Meranti tembaga; Meranti bunga. *Use:* Timber used for furniture, boxes and planking, rather soft and red, and not very durable but much used.

S. leprosula has a great variety of galls on it and the leaves have in the axils of the nerves beneath almost invariably linear-oblong elevations, which are the nests of mites (Domatia), *Shorea maranti* Burck, is based on young plants of this species. The most characteristic galls on this plant are a globose one covered with processes like a *Castanopsis* fruit, and a perfectly smooth cone-shaped brown one an inch long.

(2) *S. scutulata* King, *l.c.* 110.

A large tree. Branchlets stellate, pubescent. Leaves elliptic, rather abruptly acuminate, base broad rounded or truncate, glabrous above, stellate hairy beneath, 3 to 3·5 in. long, 1·5 to 1·75 in. wide; petioles ·3 in. long stellate-pubescent. Panicles axillary and terminal, 4·5 to 5 in. long with very short branchlets ·25 in. long, stellate pubescent. Bracts ovate hoary ·1 in. long. Sepals broad lanceolate blunt tomentose. Petals oblong obtuse, half pubescent outside. Stamens 15, in 3 rows; filaments broad, inner ones longest, awns short, deciduous. Ovary glabrous with 5 pubescent ridges. Fruit ovoid apiculate tomentose, ·6 in. long; outer wings linear obtuse, 2·5 in. long, ·75 in. wide; nerves 7, transverse nervules distinct, inner wings ·8 in. long, linear blunt. *Hab.* Penang, Government Hill at 1000 ft. altitude (Curtis).

The leaves have the same scaly domatia on the backs in the nerve axils as in *S. leprosula*.

(3) *S. rigida* Brandis, *l.c. Pl. t. 2402.*

Tree rising to 100 ft. tall. Branchlets pustulate hairy. Leaves oblong acuminate acute, base slightly narrowed, coriaceous, above glabrous, beneath midrib hairy, hairs from pustules; nerves and nervules pustular, nerves 15 pairs elevate beneath, nervules conspicuous, parallel, .6 in. long, 1.75 in. wide; petioles pustular, hairy, .75 in. long. Panicle lax, terminal, pubescent, 5 in. long. Flowers .5 in. long, shortly pedicelled ebracteate. Sepals unequal, oblong hairy. Corolla .5 in. across, creamy white. Petals linear-oblong, hairy outside. Stamens 50, no awns; filaments long, slender. Fruit pink, ovoid conic acuminate, .5 in. long, outer wings 4.5 in. long, .5 in. wide, spatulate linear, conspicuously 11-nerved, transverse nervules ascending, conspicuous, 3 smaller wings 2.75 in. long, .25 in. wide. *Hab.* Singapore, Garden Jungle (Ridley). Malacca, Tebong (Burkill). Negri Sembilan, Senaling (Cubitt). *Native name*: Kepong Labu.

(4) *S. Curtisii* King, *l.c. III.*

Big tree 60 to 150 ft. tall, 2 to 3 ft. through. Leaves coriaceous silvery grey, oblong-lanceolate acuminate, base sub-acute or nearly rounded, adult leaves glabrous above, minutely pale tomentose beneath; nerves 10 to 14 pairs, ascending slender, 3 to 4 in. long, 1.2 to 1.4 in. wide; petioles .4 to .6 in. long. Panicles axillary and terminal, 2 to 3 in. long, glabrous. Flowers .3 in. long in second rows of 4 or 5; buds enveloped in broad deciduous bracts. Sepals ovate tomentose. Petals twice as long, linear-oblong, pubescent outside. Stamens 15 in 3 rows; filaments long; anthers ovoid not awned. Ovary ovoid tomentose above. Fruit narrow ovoid, .75 in. long, tomentose; outer wings linear-oblong, 8-nerved. 2.25 in. long, .5 in. wide, inner ones 1 in. long, spatulate. *Hab.* Forests, Singapore, Bukit Timah at 500 ft. altitude. Negri Sembilan, Senaling (Burkill). Malacca, Sungei Hudang (Foxworthy). Penang, Government Hill (Curtis) 500 to 2000 ft. altitude. Perak (Kunstler). *Native names*: Meranti tahi; Meranti Sutra.

(5) *S. glauca* King, *l.c. 117.*

Tree 80 to 100 ft. tall. Branchlets puberulous. Leaves rather stiff, coriaceous, ovate-lanceolate acuminate, base broad round, above glabrous smooth shining, beneath glaucous when young; nerves slender ascending 7 to 9 pairs, 3.5 to 4.5 in. long, 1.4 to 2 in. wide; petioles .45 to .6 in. long, wrinkled. Panicles lax, few-flowered, 3 in. long or more, hoary. Flowers pedicellate about .15 in. wide. Sepals oblong blunt, tomentose both sides. Petals short, broad. Stamens 15; anthers with no awn, ciliate at top; filaments much dilated at the hairy base. Ovary tomentose; stylopodium short. Fruit ovoid-globose, top rounded, .25 in. through, scurfy pale, outer wings oblong-sub-spatulate, 2.25 in. long, .6 in. wide, narrowed at the base; nerves 7 to 12, inner ones nearly as large. *Hab.* Forests. Dindings, Gunong Tunggul (Curtis).

Penang, Batu Feringhi (Curtis). *Distrib.* Sumatra. *Native name* : Damar Laut daun besar.

(6) *S. sericea* Dyer, in *Hook. fil. F.B.I.* i. 306; *King, l.c.* III.

Tree 50 to 60 ft. tall. Branchlets tomentose. Leaves coriaceous oblong or elliptic-oblong, shortly acuminate or sub-acute, base rounded or sub-cuneate, above glabrous, midrib and nerves depressed, beneath stellate pubescent, and warty especially on midrib and 22 pairs of nerves, 3·5 to 6·5 in. long, 1·5 to 2·75 in. wide; petioles ·6 to ·8 in. long. Panicles axillary and terminal, 3 to 7 in. long; ultimate branchlets with 4 or 5 second sessile bracteate flowers. Bracts broad ovate, silky outside. Sepals ovate, golden-silky outside. Petals similar, half silky. Stamens 40 in several rows; filaments longer than the ovate anthers, no awns. Ovary conic silky. Fruit ovoid, ·5 in. long, outer wings linear obtuse narrowed to base, 3·5 in. long, ·6 in. wide, 10-nerved, 2 inner ones 2·5 in. long. *Hab.* Singapore, Garden Jungle. Malacca (Main-gay). Negri Sembilan, Perhentian Tinggi. Perak, Thaiping (Kunstler). Penang, Telok Bahang (Curtis). *Distrib.* Borneo. *Use* : Timber for planks and furniture.

(7) *S. palustris* Ridl. n. sp.

Tree. Branches rather stout. Leaves broadly blunt elliptic, base round, thickly coriaceous, above glabrous; nerves sunk beneath, scurfy on the strongly raised midrib and 13 pairs of nerves, 6 in. long, 3·25 in. wide; petioles thick, scurfy, ·5 in. long. Panicles axillary, scurfy-pubescent in fruit, 6 in. long. Flowers unknown. Fruit ovoid sub-cylindric acute, ·25 in. long, ·15 in. through, pale tomentose, much longer than the short calyx-cup which is velvety pubescent, outer three wings thin, oblong-linear, tips round, pubescent at the base, 1·25 in. long, ·25 in. wide, one a little shorter than the other 2; nerves 6 to 8, nervules branched, inner wings linear-acuminate, pubescent hairy ·25 in. long. *Hab.* Malacca, Merlimau (Foxworthy). *Native name* : Meranti Paya.

Allied to *S. sericea*, but leaves quite different in shape. Fruit smaller with the 3 large wings unequal.

(8) *S. parvifolia* Dyer, in *Hook. fil. F.B.I.* i. 305; *King, l.c.* II2.

Tree 40 to 150 ft. tall, 24 in. to 4 ft. through. Branchlets at first densely hairy. Leaves coriaceous, ovate to ovate-lanceolate acuminate-caudate, base sub-cuneate, above glabrous, beneath scurfy on the midrib and nerves; nerves 12 pairs oblique, inconspicuous above, transverse nerves and reticulations very small distinct, 2·5 to 4 in. long, 1 to 1·8 in. wide; petioles ·35 to 45 in. long, scurfy. Panicles axillary and terminal, 2 to 4 in. long, many-flowered, scurfy-tomentose. Flowers ·25 in. wide white or pink, second sub-sessile. Sepals ovate acute tomentose. Petals twice as long, elliptic, half silky. Stamens 15; filaments 4 times as long as anthers; awns as long as anthers, deflexed. Ovary puberulous.

Fruit ovoid-globose apiculate; outer wings linear-oblong, tip rounded, base narrowed, thickened base shorter than the nut, 1·5 in. long, ½ to ⅔ wide, inner ones half as long, narrower. *Hab.* Common in forests. Singapore, Johor, Malacca, Pahang, Selangor and Negri Sembilan. *Native names:* Meranti Kerap; Meranti Sarang Punai; Meranti Daun Kechil; Meranti Samah; Meranti bunga.

(9) *S. acuminata* Dyer, *l.c.* i. 305; King, *l.c.* 113.

A tree 100 to 150 ft. tall. Branchlets scurfy. Stipules oblong blunt, ½ to ⅔ in. long, 5-nerved, red, long persistent on the branch tips. Leaves ovate to lanceolate acuminate, base usually rounded unequal, drying dark brown; nerves 7 to 9 pairs, prominent



FIG. 24.—*Shorea macroptera*.

beneath, midrib and nerves scurfy, scaly when young, 3 to 4·5 in. long, 1·75 to 2·5 in. wide; petioles ⅓ to ⅔ in. long, scurfy. Panicles axillary and terminal 2 to 3 in. long, stellate pubescent, many-flowered. Flowers ⅓ in. long secund. Sepals ovate, grey tomentose. Petals twice as long, broad ovate pubescent outside. Stamens 15 in 3 rows; filaments longer than anthers; awns minute. Fruit cylindric-conic apiculate, puberulous ¼ in. long. Sepal bases shorter; outer wings narrow, oblong blunt, narrowed to base, 10- to 12-nerved, 2 in. long, ¼ in. wide, 2 inner ones narrow linear, ⅔ in. long. *Hab.* Woods, Malacca, Ayer Panas (Griffith); Bukit Sadanen (Goodenough); Merlimau (Derry). Negri Sembilan (Burn-Murdoch); Pasoh and Pasir Panjang (Burkill). *Distrib.* Lingga, Borneo. *Native names:* Rambek Daun; Meranti Hijau.

(10) *S. macroptera* Dyer, *l.c.* i. 308; King, *l.c.* 113.

Tree 50 to 80 ft. tall. Stem straight smooth, grey. Leaves

coriaceous, narrow-oblong acuminate, base rounded, glabrous; nerves 15 to 20 pairs, ascending transverse; nervules conspicuous beneath, 4 to 6, 1·35 to 1·75 in. wide; petioles 4 to 5 in. long. Panicles axillary and terminal 4 to 7 in. long, scurfy puberulous. Flowers 25 in. long, sessile often secund. Sepals ovate acute, free nearly to base, tomentose yellowish green. Petals narrow oblong, very spirally twisted, crimson outside and half very silky, yellow or pink and glabrous within. Stamens white, 15 in 2 rows; filaments broad at base; awns long, slender. Ovary elongate-ovoid, yellowish green, hairy on stylopodium. Fruit 6 to 75 in. long, ovoid; outer wings very large oblong blunt, base auricled, 3·5 to 4 in. long, 1 to 1·25 in. wide, red; nerves 9, transverse nervules conspicuous; inner wings short. *Hab.* The commonest species ranging from Singapore to Pahang, Penang and Perak up to 1200 ft. altitude (Penang). Burkill's var. *pallida* has white flowers and fruit-wings not so wide at the base. *Distrib.* Borneo. *Native names*: Kepong; Kepong Antu. *Use*: Bark used for walls of houses and rice-bins.

The plant, especially when young, has often cone-shaped galls with white scurfy scales and globose beaked shining galls over an inch long.

(11) *S. gratissima* Dyer, *l.c.* i. 307; *King, l.c.* 115.

A tree about 80 ft. tall. Branchlets glabrescent. Leaves coriaceous glabrous elliptic acuminate, base rounded or shortly cuneate, margins undulate; nerves faint 12 to 14 pairs, 2·5 to 3 in. long, 1·25 to 1·5 in. wide; petioles 6 to 75 in. long. Panicles axillary and terminal, 3 to 6 in. long, pubescent. Flowers 25 in. long. Sepals, petals and stamens all cream colour. Sepals pubescent lanceolate. Petals base and edge stellate pubescent. Stamens 15 to 25; awns twice as long as anthers. Ovary pubescent to half-way up the style. Fruit globose, 25 in. long, quite covered with the saccate base of sepals; outer wings membranous linear-rounded; nerves 10 to 12, 2 in. long, 25 in. wide, inner wings oblong-linear over 1 in. long. *Hab.* Forests, Singapore, not rare. Flowers in November; Garden Jungle; Kranji, etc. *Distrib.* Tenasserim.

(12) *S. Ridleyana* King, *l.c.* 115; *Ann. Bot. Gard. Calc.* v. (2), 153, *pl.* 185B.

A tree 60 to 80 ft. tall, glabrous except the inflorescence. Leaves small ovate-lanceolate acuminate, base round, shortly narrowed at tip; nerves 9 to 10 pairs, slender, inconspicuous; nervules few, some parallel, others broken up, no distinct reticulations, thinly sub-coriaceous, 2·5 to 4 in. long, 1·1 to 2 in. wide; petioles 4 to 5 in. long, wrinkled. Panicles 1·5 to 2 in. long, axillary with few branches, stellate-pubescent. Flowers few, 2 in. wide, pedicelled. Sepals oblong blunt, tomentose. Petals oblong blunt, half puberulous. Stamens 15; filaments dilate below; anthers

short ovate; awns longer. Ovary ovoid-conic, glabrous below, tomentose above. Fruit ovoid apiculate tomentose, outer wings linear-oblong, sub-spathulate, widest at tip narrowing gradually downwards, membranous, 5-nerved, 2.25 in. long, .4 in. wide, inner ones 1.5 in. long narrower. *Hab.* Forests, Pahang Lipis and Bentong (Foxworthy). Perak, Thaiping Hills 500 to 800 ft. altitude (Kunstler).

I have never seen good specimens of this tree.

(13) **S. Maxwelliana** King, l.c. 114.

Tree 60 to 80 ft. tall. Stem 10 to 15 in. through, almost glabrous. Leaves small, coriaceous ovate-lanceolate acuminate, often bluntly caudate, shining above, base slightly unequal and very shortly cuneate; nerves 6 to 7 pairs inconspicuous above slender, raised beneath; nervules very numerous, rather irregularly parallel, invisible (upper surface minutely reticulate, dotted), smooth beneath, 3 to 4 in. long, 1.3 to 1.5 in. wide; petioles .4 in. long. Panicles axillary, slender, 4 in. long with branches .25 in. long, stellate-puberulous. Flowers pedicelled. Sepals unequal oblong blunt, pubescent. Petals oblong, bases concave tomentose outside. Stamens 10?; filaments short, broad; anthers elongate; awns as long. Fruit globular tomentose, free from wing bases, outer wings oblong blunt, narrowed downwards, pubescent at least when young, 7-nerved, 1.5 in. long, .4 in. wide, inner ones similar, but only .5 in. long with 5 nerves. *Hab.* Rare. Open jungle. Perak, Thaiping Hills, 500 to 800 ft. altitude (Kunstler). Penang, Ayer Hitam (Haniff).

This differs from *S. Ridleyana* in the thicker leaves with different venation and the long slender stellate tomentose panicles.

Allied to this is a plant represented by a specimen collected by Good-enough at Ayer Panas in Malacca, No. 1290, and called Chingal. The small ovate-elliptic caudate blunt leaves are more stiffly coriaceous with fine inconspicuous nerves about 4 pairs, faint, very lax, reticulations short, panicles pubescent; young fruit entirely sparsely tomentose, the smaller wings more than half as large as the longer ones. It is probably a distinct species, but the specimen is insufficient for identification.

(14) **S. materialis** Ridl. *Agric. Bull. Straits* ix. 183.

A big tree. Leaves ovate or oblong-ovate, shortly acute acuminate, base broad round, occasionally cordate, glabrous stiffly coriaceous, above smooth pale, beneath silvery-scaly; nerves obscure above, elevate beneath, decurrent on the ribbed midrib 10 to 12 pairs, 5 in. long, 3 in. wide (young leaves 9 in. long, 5 in. wide); petioles scaly scurfy or glabrescent, 1 in. long. Panicles axillary and terminal, 3 to 6 in. long with 6 to 10 branches, .5 in. long, bearing 8 to 10 nearly sessile secund flowers; whole panicle white-mealy. Bracts ovate very small caducous. Sepals ovate, round, .05 in. long, white silky. Petals linear .5 in. long, narrow, base ciliate, glabrous inside, silky velvety outside, slightly imbricate,

not contort. Stamens 20, in 3 rows; filaments linear-oblong narrowed above; anthers ellipsoid, hair-like awns with several bristles. Ovary conic; stylopodium distinct, all velvety hairy. Fruit ovoid-conic silky, .5 in. long; outer wings linear-oblong, red pubescent, 2 in. long, .25 to .5 in. wide, base narrowed, dilated upwards; nerves 7, nervules transverse conspicuous, inner wings 1 in. long, .25 in. wide. *Hab.* Forests. Johor, Penyabong (Foxworthy). Pahang, Kwala Rumpin; Baloh, Rumpin (Foxworthy). *Native name*: Balau betul.

The original plant, called Balau by the Malays, was *Parinarium oblongifolium*, then abundant on the Rumpin River, as this got scarce from timber-cutting the name was transferred to the *Shorea*. The timber is highly valued, but inferior to the original Balau.

(15) *S. pauciflora* King, l.c. 116; Brandis, *Journ. Linn. Soc.* xxxi. 98.

A big tree 90 to 100 ft. tall. Leaves oblong to elliptic acuminate, base round or very shortly cuneate, sub-coriaceous; midrib and nerves prominent, 9 to 11 pairs, scabrous with stellate hairs (also occurring on the young twigs), 4 to 5 in. long, 1.8 to 2.5 in. wide; petioles minutely stellate-hairy, 6 to 7 in. long. Panicles about 4 in. long, pubescent and scurfy. Branches 1 in. long with few sessile flowers, secund, very shortly pedicelled and .4 in. long. Bracts very small, ovate silky, caducous. Sepals ovate, silky-tomentose. Petals .15 in. long, broad elliptic blunt, silky outside, yellow. Stamens 15 in 3 rows; anthers all awned with awns twice as long and minutely hairy. Ovary tomentose above, glabrous below; style much longer. Fruit small globose, wings linear blunt not narrowed below, long ones 3 in. long, .3 in. wide, 8-nerved, shorter ones similar 2.5 in. long. *Hab.* Local in forests, Penang Hill at 1500 ft. altitude (Curtis).

var. *Singaporensis* Ridl. Leaves smaller, shorter and broader, 3 to 4 in. long. Singapore, Garden Jungle. Johor, Pinerong (Cantley).

(16) *S. Kunstleri* King, l.c. 116; *Ann. Bot. Gard. Calc.* v. (2), 154, pl. 186.

Tree 80 to 100 ft. tall. Branchlets pubescent. Leaves coriaceous, elliptic, abruptly acuminate, base rounded glabrous; nerves 8 pairs, curved, prominent beneath, 4 to 5 in. long, 2 to 2.4 in. wide; petioles .5 in. long. Panicles axillary and terminal, 4 to 6 in. long, scurfy puberulous. Flowers .5 in. long, sub-sessile, 4 or 5 on the branchlets, secund, muddy brownish yellow with a reddish tinge. Sepals ovate acute tomentose. Petals narrow linear-oblong, silky outside. Stamens 15; filaments as long as anthers; awns curved, much longer. Ovary elongate conic puberulous. Fruit hemispheric tapering to a cone, tomentose; outer wings membranous reticulate oblong blunt, 9-nerved, 3.5 in.

long, .7 in. wide, inner ones linear 2 in. long. *Hab.* Perak, Thaiping Hills (Kunstler).

(17) *S. gibbosa* Brandis, *Journ. Linn. Soc.* xxxi. 99.

A big tree 100 ft. tall. Main branches dilated and flattened at the base; branchlets wrinkled. Leaves sub-membranous glabrous, ovate acuminate, base blunt; nerves 7 or 8 pairs, slender; nervules and reticulations wide few, 3 to 4 in. long, 1.25 to 2 in. wide; petioles .5 in. long. Panicles lax, 2 to 3 in. long of 6 or 7 distant branches .5 in. long, scurfy. Flowers shortly pedicelled, cream white. Sepals ovate blunt, white-tomentose. Petals much longer, linear-oblong blunt, pubescent outside. Stamens 10, 5 inner ones with gibbous filaments, 5 outer ones not gibbous; awns filiform, three times as long as the anther. Ovary puberulous. Fruit cylindric-conic, apiculate, .75 in. long, much longer than the short sepal-cup, outer wings thin oblong-spathulate blunt, 6-nerved pubescent, 2.5 in. long, .3 in. wide, inner ones 2 in. long; nerves inconspicuous, all yellowish green. *Hab.* Very rare. A single tree in Tanglin, Singapore, near the Gardens.

The fruit closely resembles that of *S. dryobalanoides* Dyer, of Borneo, but the flowers and leaves are quite different.

(18) *S. bracteolata* Dyer, in *Hook. fil. F.B.I.* i. 305; *King, l.c.* 117.

A tree rising to 150 ft. tall and 15 to 20 ft. through. Branchlets minutely mealy puberulous. Leaves coriaceous, elliptic-oblong, shortly acuminate, base round or emarginate, above glabrous, beneath mealy-puberulous, becoming glabrous; nerves 12 to 16 pairs prominent, 4 to 6 in. long, 1.6 to 2.5 in. wide; petioles .45 to .6 in. long. Panicles axillary, 2.5 to 6 in. long, glabrous, numerous. Flowers .65 in. long, pedicelled with 2 elliptic blunt 3-nerved deciduous bracts .35 in. long. Sepals lanceolate blunt tomentose. Petals ovate-lanceolate blunt, half mealy, cream white, rose pink at base, withering yellow, fragrant. Stamens 15 in 2 rows; anthers yellow, twice as long as the filaments; awns very long, subulate. Fruit ovoid beaked, .6 in. long, free from calyx, glabrous; outer wings oblong obtuse, narrowed slightly at base, thinly coriaceous, red; nerves 10, 3.5 in. long, .6 in. wide, inner ones 2 in. long, .2 in. wide, linear. *Hab.* Forests. Malacca (Maingay); Selandor (Good-enough); Ayer Panas (Burkill). Pahang, Bentong, Bukit Gabing and Kwala Lipis (Foxworthy). Negri Sembilan, Tampin; Senawang (Burkill). Dindings. Penang, Waterfall (Curtis). *Distrib.* Sumatra. *Native names:* Chengah; Chengoh; Meranti Ketapak; Meranti Pa'am; Langgang Pa'am; Langgang Batu; Pinang Baik; Semah; Temah.

(19) *S. ciliata* King, *l.c.* 118; *Ann. Bot. Gard. Calc.* v. (2), 154, *pl.* 187A.

A tree 40 to 50 ft. tall. Branchlets dark hoary pubescent. Leaves coriaceous lanceolate or oblong-lanceolate acuminate, base

cuneate, glabrous, minutely reticulate and whitish beneath; nerves 8 or 9 pairs ascending; nervules very numerous, close parallel, 3 to 3·5 in. long, ·8 to 1·8 in. wide; petioles ·75 to ·9 in. long. Panicles numerous, many-flowered, hoary. Flowers nearly ·5 in. long. Sepals ovate tomentose. Petals 3 times as long, narrow oblong, blunt, outside silky at base, hoary above. Stamens 30; awns with 3 to 5 cilia. Ovary ovoid tomentose-silky; style glabrous. Fruit ovoid, shortly beaked silky, ·5 in. long, longer than sepal bases, outer wings 3 large, spathulate oblong, narrowed downwards, 7-nerved, 2 in. long, ·3 in. wide at tip, inner ones 1 in. long, 1 in. wide, linear, all rather thin and strongly reticulate. *Hab.* Rare and local. Penang Hill at 2000 ft. altitude (Curtis).

(20) **S. alba** Ridl. *Journ. Roy. As. Soc. S. Br.* 82, p. 171.

Tree 100 ft. tall, 4 ft. through, glabrous except the inflorescence. Leaves lanceolate caudate-acuminate blunt, base shortly narrowed, coriaceous, very finely reticulate above; nerves and midrib sunk above, slender prominent beneath; nervules numerous parallel undulate, reticulations invisible below, 3·25 in. long, 1·5 in. wide; petioles ·5 in. long. Panicles terminal and axillary, 2·5 in. long, white-mealy. Branches ·5 in. long. Flowers very shortly pedicelled, white, ·25 in. wide. Sepals ovate sub-acute, white-tomentose. Petals ovate blunt, woolly on both sides, slightly contort. Stamens about 30, inner whorl with short, broad filaments shorter than the oblong bifid anthers; awns longer densely ciliate. Ovary conic tomentose to the style base; style rather short, glabrous. Fruit unknown. *Hab.* Very rare. Penang, Batu Feringhi, near the Ice-works (Curtis).

(21) **S. barbata** Brandis, *Journ. Linn. Soc.* xxxi. 81.

A big tree 120 to 160 ft. tall. Branchlets dark grey transversely ringed. Leaves ovate-lanceolate acuminate, base round or very shortly cuneate, above glabrous minutely reticulate, beneath minutely pubescent; nerves 6 pairs fine, inconspicuous above, nervules beneath parallel, 3 to 3·5 in. long, 1·1 to 1·75 in. wide; petioles ·5 in. long. Panicles elongate axillary and terminal, 4 to 6 in. long. Branches short distant, ·5 in. long, stellate-hairy. Flowers sessile silky-tomentose, small. Sepals ovate obtuse. Petals tomentose outside. Stamens 20 to 30; anthers bearded at both ends; awns shorter than anthers, bearded. Pistil tomentose; style glabrous. Fruit globose beaked, ·25 in. long; outer wings elliptic-oblong rounded, 1·2 in. long, ·6 in. wide, inner wings ·75 in. long. *Hab.* Malacca, Batang Malacca (Goodenough). Negri Sembilan (Burn-Murdoch); Pasoh and Bukit Panjang (Foxworthy). Pahang, Rumpin River (Henbrey). *Native names*: Resak; Resak Hitam. *Use*: The timber is highly valued.

(22) **S. utilis** King, *l.c.* 119.

A vast tree, glabrous except inflorescence. Branchlets dark coloured. Leaves coriaceous shining, ovate-lanceolate caudate-

acuminate or shortly acuminate, base slightly cuneate; nerves 7 pairs, prominent beneath or not, 2·5 to 3 in. long, ·9 to 1·2 in. wide; petioles ·4 in. long. Panicles axillary stellate-tomentose, 3 in. long. Branches distant, very short. Flowers sub-sessile, under ·2 in. long. Sepals ovate-orbicular blunt, tomentose. Petals broadly oblong blunt, silky both sides. Stamens 20; filaments slightly dilate; awns of all anthers ciliate. Ovary tomentose. Fruit ovoid apiculate, silky; outer wings oblong, tip rounded, 5-nerved, 1·25 in. long and ·4 in. broad, much reticulate, inner ones much smaller. *Hab.* Penang and Province Wellesley at 500 ft. altitude, Telok Bahang (Curtis). *Native name*: Dammar Laut no. satu (No. 1). One of the most valuable timbers in the Malay Peninsula.

(23) *S. collina* Ridl. *Agric. Bull. Straits* ix. 182.

A big tree with black branchlets. Leaves oblong, shortly cuspidate, base rounded; nerves 10 pairs elevated beneath, reticulations conspicuous, 5 in. long, 2 in. wide; petioles stout 1·25 in. long. Panicles lax, 3 in. long; rachis stellate-hairy. Flowers shortly pedicelled. Sepals orbicular-ovate, white-silky. Petals oblong-linear, blunt, ·5 in. long, white-silky outside. Stamens 20, outer ones, filament broad oblong; anthers elliptic; awns with 2 or 3 cilia, inner ones base broad oblong, narrowed above into a filament as long as the anther, which has an awn ending in 2 cilia. Ovary silky; style short. *Hab.* Pahang on the east coast (Sanger-Davies). *Native name*: Balau bukit.

(24) *S. costata* King, *l.c.* 119.

A tree 60 to 100 ft. tall, 4 ft. through. Branchlets scurfy. Leaves coriaceous, oblong obtuse, base broad or sub-cuneate, glabrous; nerves 11 to 13 pairs, oblique distinct, transverse nervules distinct with reticulations between, 3 to 4·25 in. long, 1·2 to 1·5 in. wide; petioles ·8 to 1 in. long. Panicles axillary and terminal, 1·5 to 2·5 in. long, scurfy-puberulous. Branches short, few-flowered. Sepals broad ovate, tomentose. Petals nearly ovate, white silky on both sides. Stamens 20; filaments dilated, longer than anthers, in the inner row awns short glabrous, in outer rows longer and ciliate. Ovary tomentose. Fruit ovoid apiculate, puberulous, ·75 in. long; outer wings narrow oblong obtuse, narrowed to base, 7-nerved, 2·75 in. long, ·45 in. wide, the inner ones 1·5 in. long, ·25 in. wide. *Hab.* Penang. Government Hill (Curtis) and Batu Feringhi. *Native name*: Dammar Laut.

(25) *S. crassifolia* Ridl.

Tree. Leaves stiffly coriaceous, glabrous, broadly oblong, base broad round, tip sub-acute; nerves prominent both sides 17 pairs sub-horizontal, nervules transverse with very small reticulations conspicuous both sides, 4·5 to 5·25 in. long, 3 in. wide; petioles ·75 in. long. Flowers unknown. Panicle in fruit puberulous. Branches few, 6 in. long. Fruit globose glabrous as long as the

sepal-cup, base narrowed, 1 in. long, .75 in. through; sepal-bases broad round adnate to fruit, outer wings linear-oblong, 4 in. long, .6 in. wide, not narrowed at the base, red; nerves 14, slender; nervules short, branching freely, inner wings narrow linear 3 in. long, .25 in. wide. *Hab.* Pahang, Kwantan Kubang Baloh (Foxworthy). *Native name*: Meranti Terbak.

(26) *S. lævis* Ridl.

Big tree, nearly glabrous. Leaves pale or reddish beneath when young, adult leaves ovate-lanceolate acuminate, base round, thinly coriaceous, quite glabrous; nerves faint, hardly elevate, 8 to 10 pairs; nervules and reticulations invisible, surface beneath smooth, minutely dotted, 2.5 to 4 in. long, 1.1 to 1.25 in. wide; petioles .5 in. long, rather slender. Flowers unknown. Fruit oblong-conic white silky, twice as long as the sepal-cup, .5 in. long; sepals glabrous, outer wings sub-spathulate, base narrowed above the sepaline cup, above gradually dilate, tip rounded 1 in. long, nearly .5 in. wide at the top, inner wings very short, linear blunt, .3 in. long, narrow. *Hab.* Forests, Pahang, Sungei Luar, Bentong (Foxworthy). Negri Sembilan, Serting (Foxworthy, Burn-Murdoch). *Native names*: Kumus; Jarmang; Bohot. *Use*: Good timber, Dammar of inferior quality, yellowish white.

An account of the timber and Damar of the Kumus based on specimens sent from Senaling by Mr. Moorhouse was published by me in *Agric. Bull. Straits*, iv. 63. I identified the plant with *S. ciliata*, but noted certain differences; additional specimens make it clear, I think, that the species is distinct from *ciliata*, but no flowers have as yet been collected.

(27) *S. globifera* Ridl.

Branchlets scurfy-pubescent. Leaves thinly coriaceous, elliptic, shortly acute acuminate, base rounded or blunt, above smooth, beneath nerves elevate 14 pairs, midrib elevate, all with the numerous transverse nervules sprinkled with stellate hair tufts, 2 in. long, .8 to 1 in. wide; petioles .12 in. long, pubescent. Flowers unknown. Fruit globose not longer than the sepal-cup, .2 in. long, glabrous; outer wings linear-oblong, blunt, 3 to 3.5 in. long, .3 in. wide; nerves fine, 8 or 9, transverse nervules fine much-branched and reticulate, inner pair 1.5 in. long, .25 in. wide. *Hab.* Pahang, Kwala Lipis, Sungei Cheka and Bentong (Foxworthy). *Native names*: Meranti Pipit, Meranti Pasir, Meranti Lebah.

DOUBTFUL SPECIES

S. furfuracea Miq. *Fl. Ind. Bat. Supp.* 488; Brandis, *Journ. Linn. Soc.* xxxi. 98. *S. eximia* Scheffer, *Nat. Tijdschr. Ned. Ind.* xxxi. 349. *S. sublacunosa* Scheff, *l.c.* 350.

This is a seedling of one of the common species described above. It occurs as a low plant with thin leaves 6 in. long, conspicuous nerves and nervules and persistent ovate stipules, and is very

hairy, and usually infested with large galls. The flowering and fruiting specimens which have been referred to this from the Philippines and elsewhere (Brandis, etc.) have nothing to do with it. It is quite possible that it is the seedling of *Dipterocarpus crinitus*.

S. longisperma Roxb. *Fl. Ind.* ii. 618.

"Nut sub-cylindric. A native of Prince of Wales' Island." This is the whole of Roxburgh's description. It is not possible to guess what he referred to, but it was probably not a *Shorea*.

6. PACHYCHLAMYS, Dyer.

Trees with large coriaceous leaves drying brown. Panicles axillary and terminal, velvety. Flowers sessile; sepals and petals as in *Shorea*. Stamens 15 in 3 rows, inner row longer with no awns, 2 outer with awns. Ovary conical. Fruit ovoid, large, pericarp woody; sepals much thickened, woody, outer 3 forming linear-oblong wings about as long as the fruit or shorter (rarely fully developed as in *Shorea*). Species about 5, chiefly Bornean.

Usually referred to a section of *Shorea* and connected with it by *P. Ghysbertiana*. The closely allied *P. Beccariana* Dyer gives the important fat, Minyak Tengkawang.

Leaves quite glabrous, dry black	(1) P. Thiseltoni
Leaves thick with stellate hairs on nerves	(2) P. Hemsleyana

(1) **P. Thiseltoni** Ridl. *Shorea Thiseltoni* King, *l.c.* 122; *Ann. Bot. Gard. Calc.* v. (2), 155, *pl.* 188. (Fig. 22 e, p. 212.)

A tree 60 to 80 ft. tall. Leaves coriaceous, oblong acuminate to elliptic-oblong, base round sub-cordate, midrib sunk above, prominent beneath; nerves 8 to 12 pairs, hairy when young, glabrous when old, nervules faint numerous, transverse, reticulations minute, drying blackish, 6 to 8 in. long, 2.5 to 3.5 in. wide; petioles .75 in. long. Panicle terminal, 6 in. long, mealy of 5 or 6 branches, longest 6 in. long. Branchlets numerous, .75 in. long each bearing 10 sessile flowers. Sepals lanceolate ovate; hairy white. Petals oblong, the outer half in bud hairy .25 in. long. Stamens 15, outermost rows 2 short; filaments filiform or rather thick, inner row twice as long, filaments narrowed upwards from a broad base; anthers small, cells separate by connective which terminates in a very short subulate appendage. Ovary oblong, thickly hairy; style slender. Fruit ovoid apiculate tomentose. 1.75 in. long, .6 in. through; pericarp woody, outer wings linear-oblong 1 to 2 in. long, inner wings short, triangular acuminate 12.5. *Hab.* Forests, Pahang, Ulu Rumpin (Foxworthy). Perak, Kinta River and Thaiping Hills (Kunstler). Dindings, Pengkalan Bharu (Foxworthy). Penang, Batu Feringhi (Curtis). *Distrib.* Sumatra. *Native names* : Tampaya mas; Bunga Merpak.

(2) **P. Hemsleyanus** *Ridl.* *Balanocarpus Hemsleyanus* *King*, *l. c.* 134; *Ann. Bot. Gard. Calc.* v. (2), 160, *pl.* 193; *Brandis*, *l. c.* 109, *pl.* 3, *fig.* 27.

Tree 40 to 60 ft. tall. Branchlets stout, black rough. Leaves stiffly coriaceous, elliptic-oblong, slightly narrowed, rounded at base, glabrous above, scabrid beneath from stellate hairy tubercles, abundant on midrib and nerves 18 to 20 pairs, oblique, 7 to 12 in. long, 3.25 in. to 5 in. wide; petioles thick rugose .75 in. long. Panicles 3 to 7 in. long, densely stellate pubescent. Flowers .5 in. long, crowded, rich pink, outside silvery. Sepals sub-equal, broadly ovate acute, tomentose. Petals twice as long elliptic obtuse oblique, partly silky outside. Stamens 15; filaments dilate; awns longer than anthers. Fruit ovoid apiculate tomentose, 1.25 to 1.75 in. long, .75 in. to 1 in. through; sepals sub-equal, 1 to 1.25 in. long, forming a woody cup. *Hab.* Forests. Perak, Thaiping (Kunstler). Province Wellesley, Sungei daun; Tasek Gelugur (Curtis). Penang, Batu Feringhi. *Native name*: Meranti Balau. *Use*: Timber valuable.

7. PARASHOREA, Kurz.

Big trees with coriaceous leaves. Panicles numerous, many-flowered. Flowers small. Sepals on a broad receptacle almost valvate. Stamens 15; anthers linear; anther-cells unequal, 2 posterior beaked, connective prolonged. Ovary hairy. Fruit tomentose; wings 5 nearly equal not enclosing the fruit. Species 3, Burma, Malay islands.

(1) **P. stellata** *Kurz*, *Journ. As. Soc. Beng.* xxxix. 66; *Pierre*, *For. Flor. Cochinchine*, 14, *t.* 224. *Shorea stellata* *Dyer*, in *Hook. fil. F.B.I.* i. 304; *King*, *l. c.* 120; *Brandis*, *l. c.* 104, *pl.* 2, *figs.* 11 and 12.

Tree 100 to 150 ft. tall, 4 to 5 ft. through. Leaves ovate-lanceolate, base rounded glabrous; nerves 8 to 11 pairs, prominent beneath, 4 to 5.5 in. long, 1.75 to 2.25 in. wide; petioles .7 to .9 in. long. Panicles 4 to 6 in. long, very numerous, stellate pubescent. Flowers .25 in. across velvety pale yellow. Sepals ovate-oblong, tomentose. Petals broadly ovate blunt, pubescent outside. Stamens bimucronate, the connective also mucronate. Ovary tomentose; style short. Fruit ovoid apiculate; wings linear oblong much narrowed at the base and free from the fruit, 5-nerved, 4.5 in. long, .6 in. wide. *Hab.* Dense jungle. Perak, Gunong Pondok (Kunstler). *Distrib.* Burma.

8. HOPEA, Roxb.

Big or vast trees resinous, with transparent resin. Stipules small. Flowers small in panicked unilateral racemes. Sepals 2, external, 3 internal, imbricate. Petals silky or tomentose on the part exposed in bud only, contort, narrow, yellow, red or white.

Stamens 15, rarely 10; anthers ovate; cells equal, connective prolonged into a fine awn. Ovary 3-celled, cells 2-ovuled; style cylindric. Fruit surrounded by the 5 enlarged sepals, free to base, 2 outer wings long linear, 3 inner ones not longer than fruit, connate in a cup at base, closely appressed to the small nut. Species about 35, Indo-Malaya.

The timber of *Hopeas*, known as Merawan, is light red and rather soft. The Dammar (Dammar Mata Kuching) is clear and transparent, as it is in *Balanocarpus*.

i. EU-HOPEA. Leaf-nerves 8 to 18 pairs. Inflorescence usually silky.

Leaves large, stiff coriaceous, ovate; nerves 8 pairs; flowers glabrous

(1) *H. nutans*

Leaves small, thin; nerves 10 to 18 pairs distinct prominent; flowers where known white silky

(2) *H. nervosa*

Leaves 4 to 5 in. long; fruit-wings 4 in. long

(3) *H. Curtisii*

Leaves 3 in. long; fruit-wings 2.5 in. long oblanceolate

(4) *H. globosa*

Leaves thin, 3 in. long; fruit-wings linear-oblong.

Leaves stiff, ovate, 2.5 in. long; nerves 8 pairs, faint

(5) *H. albescens*

Leaves stiff ovate; nerves 10 pairs; fruit-wings elliptic broad, 1.5 by .5 in. long

(6) *H. Lowii*

Leaves lanceolate, cuspidate; nerves 6 pairs

(7) *H. multiflora*

ii. DRYOBALANOIDES. Leaves stiff; nerves faint very numerous, parallel. Inflorescence glabrous.

Leaves oblong-lanceolate, base shortly narrowed

(8) *H. micrantha*

Leaves elliptic-lanceolate, base cuneate

(9) *H. Pierrei*

Leaves broad ovate, base round, very smooth and stiff

(10) *H. Mengerawan*

Leaves small; branches, nerves on back, and inflorescence pubescent

(11) *H. pubescens*

(1) *H. nutans* Ridl.

Branches moderately stout, black glabrous. Leaves ovate-elliptic stiffly coriaceous, glabrous base round broad, smooth above; nerves elevate beneath about 8 pairs ascending; nervules horizontal inconspicuous beneath, reticulations invisible, 5 in. long, 3.5 in. wide; petioles .5 in. long. Panicle of 2 or 3 branches, 2 in. long pubescent, fascicled in the axils. Flowers small, few, sessile, nodding, glabrous. Sepals 2 outer oblong coriaceous, 3 inner ovate, shorter and thinner. Petals oblong truncate, toothed at the tip with 1 long and 2 short teeth. Stamens 15, very short; awns longer than the anthers. Ovary conic, glabrous; style short. Fruit globose, glabrous, .25 in. long with a short point, outer wings oblong; nerves 10, 2.25 in. long, .5 in. wide, inner wings ovate, free to base, shorter than fruit. *Hab.* Forests, Pahang, Kwantan (E. J. Hanbury, flowers). Ulu Rumpin (Foxworthy, fruit). *Native names* : Giam (not the Giam of Sumatra); Bunga Merpak.

I have little doubt that the fruiting specimen belongs to the same species as the flowering one, as it agrees in foliage. The fruit very closely resembles

that of *H. globosa*, only known from Wray's specimens, but his foliage is totally different.

(2) ***H. nervosa* King, l.c. 124.**

A tree 50 to 70 ft. tall, glabrous. Leaves coriaceous, oblong to elliptic-oblong, shortly acuminate, base rounded or slightly cuneate; nerves 16 to 18 pairs prominent beneath, 3·5 to 5 in. long, 1·5 to 2·25 in. wide; petioles ·5 to ·75 in. long. Flowers unknown. Fruit ovoid-rounded, apiculate, glabrous black, ·5 in. long; wings oblong-lanceolate, narrowed to the base, obtuse sometimes spathulate, base concave, thickened; nerves 10, 4 to 4·5 in. long, ·6 to ·75 in. wide, the 3 inner sepals ovate obtuse shorter than the fruit, not adherent to it. *Hab.* Perak, Thaiping Hills 500 to 800 ft. altitude (Kunstler).

(3) ***H. Curtisii* King, l.c. 124; Ann. Bot. Gard. Calc. v. (2), 155, pl. 187B. (Fig. 22 a, p. 212.)**

A tree 50 to 70 ft. tall. Young branches sub-glabrous. Leaves coriaceous, ovate to ovate-oblong acuminate, blunt, base rounded or sub-cuneate, glabrous on both sides; nerves 10 to 13 pairs, stellate-pubescent to glabrous and prominent beneath, 3·5 to 4·5 in. long, 1·75 to 2·5 in. wide; petioles pubescent when young ·4 in. long. Panicles axillary and terminal, few-flowered, puberulous. Flowers ·2 in. long. Sepals broad ovate blunt, tomentose outside, inner 2 smaller and more glabrous. Petals oblong falcate, blunt, partially tomentose outside. Stamens 10; awns longer than anthers. Ovary ovate, puberulous at tip. Fruit ovoid apiculate, ·3 in. long; outer wings narrow oblong, 5-nerved, reticulate, narrowed slightly at base, base rounded, concave, 1·75 to 2·5 in. long, ·35 to ·6 in. wide, 3 inner wings as long as the fruit. *Hab.* Dense forest. Perak, bank of Kinta River (Kunstler); Kwala Kangsa (Foxworthy). Penang, Waterfall (Curtis). *Native name*: Chengal Pasir.

(4) ***H. globosa* Brandis, Journ. Linn. Soc. xxxi. 61.**

A big tree glabrous except the young fruit. Leaves sub-membranaceous, elliptic acuminate, base rounded; nerves 6 pairs, inconspicuous above, elevate beneath, transverse nervules conspicuous beneath, 3·5 in. long, 1·5 in. wide; petioles ·25 in. long. Flowers unknown. Fruit globose, ·25 in. long, outer wings not enclosing fruit slightly imbricate linear-oblong, tip round, base narrowed with 9 to 14 faintly marked nerves, base pubescent, 2 to 2·75 in. long, ·6 in. wide, inner wings rounded ·25 in. long. *Hab.* Pahang, Bentong (Foxworthy). Perak at Gapis (Wray). Selangor, Rantau Panjang (Ridley). *Native name*: Damar Mata Kuching.

Suspiciously like *H. Lowii* Brandis, the type specimens (Wray's) are very poor.

(5) ***H. albescens* Ridl. Journ. Roy. As. Soc. S. Br. 73, p. 142.**

Leaves coriaceous ovate to elliptic acuminate, apex blunt

base round glabrous; nerves 8 pairs, very slender, almost invisible above, 2·75 to 3 in. long, 1·25 in. wide; petioles 4 in. long. Panicles axillary and terminal, 3 to 4 in. long. Flowers sub-secund, white, tomentose, shortly pedicelled. Sepals lanceolate-ovate obtuse. Petals 2 in. long not much longer than sepals, oblong broad blunt pubescent outside. Stamens 15; filament elongate, triangular; anthers elliptic; awns very fine, hair-like as long as the anthers. Ovary pubescent; style short. *Hab.* Pahang at Raub (Burn-Murdoch). *Native name*: Merawan.

(6) **H. Lowii** Brandis, *Journ. Linn. Soc.* xxxi. 63.

A big tree about 60 ft. tall, glabrous except the pubescent young shoots and inflorescence. Leaves thinly coriaceous, but rather stiff, ovate blunt acuminate; nerves 10 pairs elevate beneath, nervules transverse, parallel, 3·5 in. long, 2·25 in. wide; petioles 5 in. long, rather thick, scurfy. Panicles terminal and axillary, scurfy-tomentose, 3 in. long, with short branches, 5 in. long. Flowers small sessile, secund, 25 in. wide. Sepals tomentose, ovate blunt. Petals linear, half glabrous, 1 in. long, edge at tip crisped. Stamens 10; filaments shorter than anther, oblong; awn as long or longer. Ovary hairy; style glabrous. Fruit ovoid not apiculate, glabrous, 25 in. long; outer wings oblong, broadest in the middle, tip round, base narrowed; nerves 8, fine, 1·75 to 2 in. long, 5 in. wide; inner wings oblong rounded at tip half as long as fruit. *Hab.* Woods in the lowlands. Singapore, Chua Chu Kang. Muar (Curtis). Pahang, Lipis and Rumpin (Foxworthy). Negri Sembilan, Batang Benar (Foxworthy). Penang, Waterfall (Curtis). *Distrib.* Sumatra, Borneo.

(7) **H. multiflora** Brandis, *Journ. Linn. Soc.* xxxi. 60. *Doona multiflora* Burck, *Ann. Jard. Buitenz.* vi. 234.

A tree glabrous except the flowers. Leaves coriaceous, ovate-lanceolate with a long blunt cusp 5 in. long, base narrowed; nerves 5 pairs, 3 in. long, 1 in. wide; petioles 25 in. long. Panicles axillary, 1 in. long. Flowers small, 1 in. long in unilateral racemes, tomentose; pedicels short. Sepals ovate sub-acute. Petals linear pubescent. Stamens 15, base broad; awns 2 or 3 times as long as the anthers. Fruit unknown. *Hab.* Penang, Government Hill at 1000 ft. altitude (Curtis). *Distrib.* Sumatra.

(8) **H. micrantha** Hook. *fl. Trans. Linn. Soc.* xxiii. 160; *King, l.c.* 124.

A tree 60 to 80 ft. tall. Branchlets black, pubescent. Leaves coriaceous, oblong-lanceolate to ovate-lanceolate bluntly caudate-acuminate, base slightly cuneate or broad, glabrous except midrib, occasionally pubescent; nerves about 10, indistinct, secondaries nearly as prominent, 2·5 to 3 in. long, 1·5 to 1·75 in. wide; petioles 25 to 4 in. long. Panicles axillary and terminal, glabrous. Flowers 15 in. long. Sepals sub-equal, green, ovate round, black-resinous, glabrous. Petals twice as long crimson. Stamens 15;

awn long. Ovary glabrous with hairy ring at base. Fruit ovoid apiculate, .3 in. long, outer wings oblanceolate obtuse, narrowed to base, reticulate, 7-nerved, 1.75 to 2 in. long, .2 to .25 in. broad, inner ones as long as fruit. *Hab.* Common in forests. Johor at Pinerong (Cantley). Malacca (Maingay); Sungei Hudang (Goodenough). Dindings, Pengkalan Bharu (Foxworthy). Perak, Thaiping (Kunstler). Penang, Government Hill at 1200 ft. altitude (Curtis). *Distrib.* Borneo. *Native name* : Merawan Kunyit.

(9) **H. Pierrei** Hance, *Journ. Bot.* 1877, p. 329; Brandis, *Journ. Linn. Soc.* xxxi. 67, pl. 11, fig. 10. Hancea *Pierrei* Pierre, *Fl. For. Cochinchine*, 16, t. 248. *Hopea intermedia* King, *l.c.* 126.

A tree 60 to 80 or more ft. tall, 8 to 12 in. or more through, glabrous except a very slight puberulousness on the inflorescence. Leaves bluntly ovate cuspidate, base round or slightly cuneate, rather stiffly coriaceous; nerves about 10 pairs very fine, visible beneath and occasionally above, 2.5 in. long, 1.1 in. wide; petioles .2 to .25 in. long. Flowers very small in unilateral panicles, 1 in. long. Branches .25 to .5 in. long. Flowers secund, pendent, glabrous, .18 in. long. Sepals ovate, drying black. Petals silky outside, red. Stamens 15; awns twice as long as the anthers. Ovary glabrous or nearly so, as is stylopodium. Fruit ovoid-conic acuminate, .2 to .3 in. long; outer wings linear-oblong, blunt, narrowed to base; nerves slender 7 to 8, reticulations prominent, 1 in. long, .25 in. wide, base thickened, concave, inner wings much shorter than fruit, ovate. *Hab.* Forests. Singapore, Garden Jungle. Malacca, Sungei Hudang (Goodenough); Ayer Panas (Kinsey). Perak, Thaiping Hills (Kunstler). Penang, Muka Head (Curtis). *Distrib.* Borneo, Cambodia. *Native name* : Jangkang.

I am quite unable to see any valid difference between *H. Pierrei* and *H. intermedia* King, though Brandis keeps them separate. The fruit in the Perak plant is very small and the wings very narrow, but *Dipterocarps* do differ in this point frequently. Brandis refers the Singapore plant and a plant collected by Curtis at Sungei Penang to *H. Griffithii* Kurz, and a variety of this var. *pedicellata*. This species has lanceolate leaves narrowed at both ends, instead of being round at the base. It is a native of Mergui. The Singapore plant is clearly *H. Pierrei*. The Sungei Penang plant collected by Curtis differs in having many more nerves to the leaf, the secondary nerves, invisible in *Pierrei*, are visible in this specimen and the leaves are more oblong, the panicle is stouter, the petals narrower and longer. It is not at all like *H. Griffithii*. It is just possible that it is a hybrid between *H. Pierrei* and *H. micrantha*. King refers it to *H. micrantha*, which is certainly near to it.

(10) **H. Mengarawan** Miq. *Fl. Ind. Bat. Supp.* 492; Burck, *Ann. Jard. Buitenz.* vi. 240.

A big tree 60 to 100 ft. tall, 2 to 3 ft. through, glabrous except inflorescence. Leaves bluntly acuminate, ovate to ovate-lanceolate, 2.5 to 4 in. long, 2 in. broad or less; nerves very fine and numerous, almost invisible on the smooth upper surface, secondaries nearly as conspicuous; petioles .5 in. long. Flowers pendulous in panicked

racemes; panicles .6 to 1 in. long, racemes .25 in. long. Sepals black resinous, ovate obtuse. Petals linear obtuse. Fruit .25 in. long, ovoid-conic, outer wings oblong linear blunt, narrowed to base, 1.5 in. long, .25 in. wide, inner sepals ovate truncate, tightly clasping the nut and shorter than it. *Hab.* Common in forests. Singapore, Bukit Timah, etc. Johor, Pinerong (Cantley). Negri Sembilan, Pasoh (Foxworthy). Perak at Goping (Kunstler). *Distrib.* Sumatra. *Native names:* Merawan; Mengarawan or Pengerawang.

(11) **H. pubescens** Ridl.

Tree. Branches, petioles and inflorescence thickly pubescent velvety. Leaves elliptic-ovate, caudate, tip blunt, base rounded or shortly cuneate, coriaceous glabrous above except the sunk midrib in young leaves fringed with hairs, midrib beneath pubescent; nerves hardly visible, numerous and close, 1 in. long, .5 in. wide; petioles .15 in. long pubescent. Panicles numerous axillary pubescent .5 in. long with 4 or 5 short branches. Flowers .05 in. long, pendent. Calyx glabrous. Sepals lanceolate. Petals little longer, oblong silky, especially on edge. Stamens minute; anthers globose with a very fine awn on the top. Ovary conic glabrous; style slender, no stylopodium. *Hab.* Pahang, Lubok Layang and Bukit Putus, Temerloh (Foxworthy); Sungei Benchah, Lipis (Foxworthy). *Native name:* Merawan or Penggawan Bunga.

9. **COTYLELOBIUM**, Pierre.

Trees. Leaves coriaceous with inarching nerves. Panicles axillary and terminal. Sepals tomentose sub-equal, lanceolate. Petals short. Stamens 15 in 2 unequal rows; filaments very short; anthers linear hairy, prolonged connective subulate or conic. Ovary hemispheric pilose. Style long, subulate. Fruit globose; outer wings 2, spathulate much narrowed at base, inner ones ovate acute not half as long, all free to base. Species 4 or 5, Malay Peninsula, Borneo and Siam.

Very near *Synaptea*, but the habit different, the leaves stiffly coriaceous oblong with fine close nerves.

(1) **C. flavum** Pierre, *Fl. For. Cochinchine* 16, t. 256a; Brandis, *l.c.* 115, *pl.* iii. *figs.* 22-24.

A big tree. Branchlets under side of leaves and petioles densely dotted with minute stellate hairs. Leaves stiffly coriaceous, elliptic-lanceolate acuminate, base rounded; nerves numerous, very indistinct inarching within the edge, 3 to 3.5 in. long, 1.5 in. wide; petioles .25 in. long. Panicles terminal and axillary, grey tomentose. Sepals lanceolate acute. Petals little longer .5 in. long, glabrous; anthers linear hairy, connective-appendage short, filaments short. Ovary tomentose. Fruit globular tomentose, .25 in. long; outer wings 2, spathulate linear-oblong, base narrowed

2 in. long, 3 inner ones .75 in. long. *Hab.* Rare. Singapore at Sungei Morai (Ridley). *Distrib.* Borneo. *Native name*: Rassak.

10. SYNAPTEA, Griffith.

Medium to large trees. Leaves thin coriaceous with conspicuous nerves. Flowers small in axillary and terminal panicles, white or yellow. Sepals free to base. Petals not contort. Stamens 15 in 2 unequal series; anthers oblong, valves unequal, connective shortly prolonged to a cylindric or conic point. Ovary 3-celled; style short. Fruit nut small; sepals free to base, 2 large linear oblong and 2 ovate as long as nut. Species about 12, Indo-Malaya.

Leaves large oblong; panicles short, dense, red furfuraceous; sepals in fruit very unequal.

Leaves 4 in. long; flowers .45 in. long; petioles long, slender, glabrous; branches glabrous .

(1) **S. Maingayi**

Leaves 4 in. long; flowers .4 in. long; petioles short with branches tomentose .

(2) **S. Dyeri**

Leaves 3 in. long; flowers .25 in. long .

(3) **S. Lowii**

Leaves 4 in. long; flowers .45 in. long in lax panicles, tomentose .

(4) **S. lancaviensis**

Leaves narrow oblong 9 to 10 in. long by 2 in. wide

(5) **S. nitens**

Leaves elliptic-lanceolate cuspidate; inner sepals long cuspidate .

(6) **S. cuspidata**

Leaves 3 in. long; panicles lax mostly terminal.

Leaves lanceolate long-acuminate; wings of fruit 3 in. long .

(7) **S. perakensis**

Leaves elliptic, shortly acuminate; wings of fruit 2 in. oblong .

(8) **S. faginea**

Leaves elliptic-lanceolate; wings 2 in. long, .75 in. wide, oblanceolate .

(9) **S. cinerea**

Leaves elliptic-lanceolate; panicles very lax .

(10) **S. reticulata**

(1) **S. Maingayi** *Ridl.* *Vatica Maingayi* *Dyer, F.B.I.* i. 302; *King, l.c.* 104.

A big tree. Branchlets, inflorescence, flowers and young fruit thickly red-tomentose. Leaves thinly coriaceous, glabrous (drying red brown) oblong or oblong-obovate, shortly acute, base rounded or slightly narrowed; nerves slender, 9 to 12 pairs, curved upwards, slightly elevate, 3 to 4.5 in. long, 1 to 1.75 in. wide; petioles .6 to 1.5 in. long. Panicles dense, 1 to 1.25 in. long, numerous axillary. Flowers .45 in. long. Sepals lanceolate sub-acute. Petals linear-oblong. Ovary tomentose. Fruit globose, .25 in. through, free from the calyx, large wings linear-oblong, sub-acute, 5-nerved, 2 in. long, .35 to .5 in. wide, 3 small ones ovate sub-acuminate, .25 in. long. *Hab.* Forests. Johor, Pinerong (Cantley). Malacca (Maingay). Dindings, Gunong Melintang (Foxworthy). *Native name*: Maralang.

(2) **S. Dyeri** *Pierre, Fl. For. Cochinchine, t.* 241. *Vatica Dyeri* *King, l.c.* 106.

Tree 80 to 130 ft. tall, 2 to 3 ft. through. Young branches, panicles and calyx brown-tomentose, flocculent with stellate hairs.

Leaves membranous, broad elliptic or elliptic-oblong sub-acute, base rounded, glabrous; nerves 11 to 13 pairs, rather prominent, reticulate beneath, 3·5 to 7 in. long, 1·6 to 1·3 in. wide; petioles 35 to 5 in. long, tomentose. Panicles cymose, 1·5 to 3 in. long. Flowers 4 in. long. Sepals unequal 2 larger oblong-obtuse, 3 smaller lanceolate acuminate, velvety light brown. Petals broad elliptic obtuse, glabrous except edge, twice as long as sepals, bright yellow. Stamens blunt apiculate. Ovary pubescent. Fruit conic, 2 large wings oblanceolate oblong, 5-nerved, 1·25 in. long, 25 in. wide, 3 smaller sepals one-fourth of length lanceolate. *Hab.* Rare. Singapore (White). Perak; open jungle, Gunong Bubu range (Kunstler). *Distrib.* Cambodia.

(3) **S. Lowii** Ridl. *Vatica Lowii* King, *l.c.* 103; *Ann. Bot. Gard. Calc.* v. (2), 150, *pl.* 182B; *Brandis, l.c.* 131.

Tree 60 to 80 ft. tall, 18 to 24 in. through. Branchlets, petioles inflorescence, calyx rusty-tomentose. Leaves coriaceous oblong sub-acute, base rounded, glabrous except midrib above; nerves 13 to 15 pairs, 2·5 to 3·5 in. long, 1 to 1·5 in. wide; petioles 3 to 4 in. long. Panicles short, crowded, many-flowered, 75 to 1·5 in. long. Flowers 25 in. long, white or green. Sepals lanceolate acuminate, tomentose. Petals narrow oblong obtuse, glabrous. Stamens unequal-sided. Ovary tomentose. Fruit globose, 25 in. through, rufous-scurfy, free from calyx, large wings narrow oblong hardly narrowed at the base, 5-nerved, 2·75 in. to 3 in. long, 6 in. wide, 3 smaller wings lanceolate obtuse. *Hab.* Rocky hills, 800 to 1200 ft. altitude. Perak, Larut Hills (Kunstler). Dindings, Segari, Melintang (Foxworthy). *Native name*: Resak Hitam.

(4) **S. lancaviensis** Ridl. *Vatica lancaviensis* Ridl. *Journ. Roy. As. Soc. S. Br.* 54, p. 27.

Tree. Leaves elliptic to elliptic-lanceolate blunt, base cuneate, coriaceous; nerves 8 pairs, prominent beneath, 3 to 5 in. long, 1·5 to 2 in. wide; petioles 5 in. long. Panicles axillary and terminal, 4 to 6 in. long stellate tomentose. Sepals ovate-triangular, blunt tomentose. Petals spirally twisted oblong blunt, half the back stellate-tomentose. Stamens 15, sub-sessile, connective a short blunt point longer than filament. Ovary hairy; stigma capitate. *Hab.* Lankawi, Kwah (Curtis).

I have not seen the fruit of this, so it may be a *Vatica*.

(5) **S. nitens** Ridl. *Vatica nitens* King, *l.c.* 104; *Ann. Bot. Gard. Calc.* v. (2), 150, *pl.* 182A.

Tree 40 to 50 ft. tall. Branchlets and petioles scurfy-papillose. Leaves coriaceous, narrow oblong acuminate, narrowed at rounded base, above glabrous (drying brown), beneath scurfy on midrib and 18 to 20 pairs of nerves, prominent, finely reticulate, 9 to 10 in. long, 2 in. wide; petioles 5 in. long. Flowers unknown. Fruit globular with persistent style, reticulate, 5 in. through, adnate to

calyx for half its length; large wings oblong, tip rounded, 5-nerved, glabrous, 3 in. long, '8 to '9 in. wide; 3 short wings ovate acuminate, strongly 5-nerved. *Hab.* Penang, Telok Bahang (Curtis).

(6) *S. cuspidata* Ridl. *Journ. Roy. As. Soc. S. Br.* 82, p. 172.

Tree. Branches and petioles scurfy. Leaves elliptic-lanceolate, long-cuspidate blunt, base narrowed coriaceous, finely reticulate; nerves elevate beneath, 11 pairs, 5 in. long, 1'75 in. wide; petioles 1'5 in. long. Flowers unknown. Fruit ellipsoid, scurfy, '5 in. long, larger wings linear-oblong 3 in. long, '36 in. wide; nerves 5, free nearly to base, smaller ones '75 in. long, cuspidate. *Hab.* Dindings (Ridley's collector). *Native name*: Rêsak.

This is evidently allied closely to *S. perakensis*, but the petioles are very much longer and the smaller sepals in fruit have very long narrow points.

(7) *S. perakensis* Ridl. *Vatica perakensis* King, *l.c.* 103; *Ann. Bot. Gard. Calc.* v. (2), 149, *pl.* 181; *Brandis, l.c.* 132, *pl.* 3, *figs.* 18, 19.

Tree 60 to 80 ft. tall, 15 to 20 in. through. Branchlets slender, scurfy stellate-pubescent. Leaves thinly coriaceous, oblong-lanceolate or oblanceolate acuminate to caudate-acuminate, base cuneate, glabrous, finely reticulate, midrib above puberulous; nerves 10 to 12 pairs prominent beneath, 2'5 to 5 in. long, '8 to 1'3 in. wide; petioles '25 to 1'5 in. long. Panicles axillary and extra-axillary, 1 to 2 in. long, slender, minutely tomentose. Flowers '4 in. long, pale yellow. Sepals lanceolate blunt, grey, tomentose. Petals twice as long, quite glabrous. Ovary minutely tomentose. Fruit '3 to '5 in. through, quite free, globose tomentose, 2 long wings oblong-lanceolate, narrow at base, 5-nerved, 2'5 in. long, 5 in. wide, small wings lanceolate acuminate. *Hab.* Forests. Perak, Thaiping Waterfall (Wray, Kunstler). Pangkor (Curtis). Common.

(8) *S. faginea* Pierre, *Fl. For. Cochinchine*, t. 242. *Vatica faginea* Dyer, *F.B.I.* i. 301; King, *l.c.* 105. *Vatica Curtisii* King, *l.c.* 105; *Ann. Bot. Gard. Calc.* v. (2), 151, *pl.* 102B.

A tree 20 to 70 ft. tall, 1'5 to 2 ft. through. Young branches slender, ashy-tomentose. Leaves coriaceous, oblong or elliptic acuminate blunt, glabrous; nerves 9 to 13 pairs, finely reticulate on both sides, 3 to 5 in. long, 1 to 2 in. wide. Panicles 2'5 to 3 in. long, tomentose. Flowers '5 in. long, dark red. Sepals densely tomentose, connate half-way, lanceolate, slightly unequal, spreading. Petals oblong blunt, glabrous except edge. Pistil tomentose. Fruit globular adherent to calyx for half its length; 2 large wings narrow oblong blunt, 5-nerved, 2 to 2'5 in. long, '5 to '7 in. wide; the three smaller ones sub-spathulate unequal, less than '5 in. long. *Hab.* Hilly jungle, rather scarce. Selangor, Weld's Hill, Kwala Lumpur (Foxworthy). Perak, Larut (Kunstler). Dindings, Pangkor (Curtis). Penang (Wallich, *Shorea pinangiana*, *Hopea faginea* No. 963); Waterfall (Curtis). *Distrib.* Tenasserim, Cochin-China.

(9) **S. cinerea** Ridl. *Vatica cinerea* King, l.c. 104; *Ann. Bot. Gard. Calc.* v. (2), p. 150, pl. 183A.

Small tree 30 to 40 ft. tall. Branchlets scurfy. Leaves thinly coriaceous ovate-oblong to ovate-lanceolate sub-acute, base rounded or sub-cuneate, finely reticulate, both sides glabrous; nerves 6 to 8, faint, 2·25 to 3·5 in. long, .75 to 1·5 in. wide; petioles .3 to .5 in. long. Panicles scurfy, 1·25 to 2 in. long, few-flowered. Flowers .45 in. long. Sepals sub-equal lanceolate sub-acute, tomentose. Petals oblong-lanceolate half pubescent outside. Fruit globular, attached half-way to calyx; large wings red oblanceolate rounded; nerves 5, 2 in. long, .5 in. wide, small wings lanceolate obtuse, .25 in. long. *Hab.* Lankawi island at Kwah (Curtis). Pulau Adang (Ridley).

(10) **S. reticulata** Ridl. *Vatica reticulata* King, l.c. 106.

Tree 60 to 80 ft. tall, 1·5 to 2 ft. through, glabrous except inflorescence. Leaves coriaceous elliptic-lanceolate to ovate-lanceolate acuminate at both ends blunt, base cuneate; nerves 8 to 9 pairs, conspicuously laxly finely reticulate both sides, 2·5 to 3·5 in. long, 1 to 1·25 in. wide; petioles .4 in. long. Panicles lax, slender, 2 to 3 in. long, puberulous; pedicels .25 in. long. Sepals unequal lanceolate blunt, pubescent on both sides. Corolla dull dark blue (*fide* Kunstler probably claret colour). Ovary pubescent, hemispherical ridged. Young fruit, wings linear-oblong, smaller ones half as long. *Hab.* Dense jungles on hills 1500 to 2000 ft. altitude. Perak, Larut (Kunstler). Corolla, stamens and ripe fruit not seen.

11. VATICA, Linn.

Medium or tall but not vast trees. Leaves coriaceous, often rather small. Panicles axillary. Flowers as in *Synaptea*. Sepals equal or nearly so in fruit ovate or oblong, little or not longer than the sub-globose fruit. Species 10, Indo-Malaya. This genus differs only in the fruit from *Synaptea*.

Sepals in fruit ovate or oblong, covering fruit . (1) **V. Kunstleri**

Sepals usually much shorter than fruit, thin.

Fruit small crustaceous; sepals spreading little longer than fruit; leaves small (2) **V. pallida**

Fruit globose, corky; sepals much shorter; leaves large (3) **V. Scortechinii**

Fruit unknown.

Panicles scurfy tomentose; stipules 0 (4) **V. Kelsalli**

Panicles thin glabrous; stipules large ovate (5) **V. stipulata**

(1) **V. Kunstleri** Ridl. *Retinodendron Kunstleri* King, l.c. 129; *Ann. Bot. Gard. Calc.* v. (2), 157, pl. 189B.

Shrub 6 to 10 ft. tall to a tree of 30 ft. high. Leaves thinly coriaceous elliptic-oblong to oblong-lanceolate or oblanceolate, sub-acute to acuminate, base cuneate above glabrous; nerves pubescent beneath, glabrous, 7 to 9 pairs, prominent beneath, 2·25 to 4·5 in. long, 1·25 to 1·75 in. wide; petioles .25 to .4 in.

long. Racemes axillary 1 to 1.5 in. long, scurfy. Flowers .4 in. long, waxy yellow. Sepals very short ovate puberulous. Petals green, oblong-elliptic oblique blunt. Fruit globular with a long curved beak, .25 in. through; wings equal oblong-obtuse, thickly membranous, glabrous, 3-nerved, 1.3 in. long, 1.3 in. wide, covering the fruit. *Hab.* Low wet ground in open jungle. Perak, Larut (Kunstler); Tapa (Wray).

(2) **V. pallida** Dyer, in *Hook. fil. F.B.I.* i. 302. *Retinodendron pallidum* King, *l.c.* 128.

Small tree about 30 ft. tall. Branches long and slender, glabrous. Leaves thinly coriaceous, lanceolate acuminate caudate, base cuneate; nerves 8 to 9 pairs, thin, reticulations not conspicuous, 4.5 to 5.5 in. long, 1.5 to 2 in. wide; petioles .15 to .25 in. long, wrinkled. Panicles 3 to 6 in. long. Branches slender puberulous. Flowers yellowish white; pedicels .25 in. long. Sepals .1 in. long, lanceolate connate for a quarter of length, puberulous. Petals linear-oblong obtuse puberulous scurfy on the back much twisted in bud .4 in. long. Stamens, anthers ovate, connective-appendage very short; filaments very short. Ovary pubescent. Fruit spherical, .25 in. through. Sepals membranous linear-oblong, very much shorter. *Hab.* Stony jungle, Penang Hill. Common from the Waterfall to 800 ft. altitude (all collectors).

(3) **V. Scortechinii** Ridl. *Retinodendron Scortechinii* King, *l.c.* 128; *Ann. Bot. Gard. Calc.* v. (2), 157, *pl.* 190.

Medium to tall tree. Young branches red-pubescent. Leaves coriaceous oblong, tip sub-acute, base narrowed obtuse; nerves 14 to 18 pairs spreading, prominent beneath, 7 to 10 in. long, 2.6 to 3.2 in. wide; petioles .6 to .75 in. long. Panicles crowded at the tip, axillary stellate-rufous-tomentose. Flowers .6 in. long; pedicels .1 in. long. Sepals ovate acute, connate half-way, red-tomentose. Petals oblong obtuse, half woolly outside, much longer. Stamens elliptic 5 inner ones longer. Fruit globose rufous-scurfy, .65 in. long; wings ovate, coriaceous, stiff ribbed much shorter, not reflexed. *Hab.* Rare. River banks. Pahang, Tahan River (Ridley). Perak (Scortechinii).

(4) **V. Kelsalli** Ridl. *Journ. Roy. As. Soc. S. Br.* 54, p. 27.

A tree. Leaves glabrous lanceolate obtuse; nerves 5 pairs conspicuous, finely closely reticulate beneath, 5 in. long, 1.2 in. wide; petioles .5 in. long. Panicles 2 to 3 in. long, scurfy-tomentose. Flowers numerous, white, 1.3 in. long, pedicellate. Sepals lanceolate obtuse, scurfy. Petals little longer blunt, scurfy. Stamens 10; anthers elliptic, prolongation of connective very short rounded. Pistil glabrous; style short, stout. Stigma ovate. Fruit unknown. *Hab.* Johor, Kwala Sembrong (Kelsall).

(5) **V. stipulata** Ridl. *Journ. Roy. As. Soc. S. Br.* 82, p. 172.

Tree? quite glabrous except the flowers. Branchlets slender. Leaves coriaceous lanceolate-acuminate, shortly narrowed at the

base cuneate; nerves very fine, 7 pairs, .4 to .575 in. long, 1.25 to 1.75 in. wide; petioles slender, 1.25 in. long, dilated towards the apex. Stipules ovate-cordate obtuse, .25 to .75 in. long and nearly as wide. Panicles lax, axillary, few-flowered. Flowers distant; pedicels .2 in. long. Sepals short, ovate connate half their length and sparingly inside, scurfy puberulous. Petals 4 times as long, linear-oblong, scurfy on the back, not twisted. Stamens 10; filaments very short; anthers shortly apiculate. Ovary conic pubescent grooved; style columnar. Stigma clavate. Fruit unknown. *Hab.* Very rare. Malacca on Mount Ophir (Hullett 781). A very remarkable plant, quite unlike any other.

12. ISOPTERA, Scheffer.

Tree. Leaves coriaceous. Flowers in axillary and terminal panicles. Calyx-tube very short. Sepals ovate-round, imbricate. Petals linear, twisted. Stamens 30 to 35; anthers ovate; cells divergent at base; connective awned. Ovary 3-celled; cells 2-ovuled. Fruit, 1-seeded; pericarp coriaceous; calyx an open cup with 3 large round spreading lobes and 2 smaller ones. Species 1.

(1) **I. borneensis** Scheff. *Ann. Bot. Jard. Buitenz.* vi. 222; *King, l.c.* 129. (Fig. 22 b, p. 212.)

A large tree, but often flowering quite small. Leaves thinly coriaceous, oblong sub-acute, base rounded, glabrous; nerves 8 or 9 pairs, 4 to 5 in. long, 1.75 to 2 in. wide; petioles .5 in. long. Panicles lax, few-flowered, 4 to 6 in. long, stellate-pubescent. Flowers pedicellate, 1.25 in. across, green. Sepals tomentose. Petals 5 in. long, tomentose. Stamens, filaments dilate at base. Ovary silky. Fruit .25 in. through. Calyx forming a cup with 4 spreading lobes, the outer ones .65 in. long and wide. *Hab.* In forests. Muar at Kepong (Curtis). Pahang, river, woods; Tenjai, Ulu Rumpin (Foxworthy). *Distrib.* Borneo, Banka. *Native name*: Senkawang or Tengkawang. *Use*: Yields the valued vegetable fat, Minyak Tengkawang.

13. BALANOCARPUS, Beddome.

Medium to vast trees. Leaves rather small. Flowers small, secund on paniced racemes. Sepals distinct or connate at base, 2 external to the others. Petals elliptic oblique. Stamens 15 attached to petal-bases in 3 rows or 10 in 2 rows; filaments dilate at base; anthers ovate, awned. Style short. Stigma entire. Fruit oblong or sub-globose; pericarp woody. Calyx forming a 5-lobed cup round the base, free from it, not developing into wings. Species about 12, South India, Malaya. *Use*: Timber highly valued, Chengai. Dammar, very clear and transparent or black.

Stamens 15.

Flowers very small, glabrous and dark coloured when dry.

Fruit small ellipsoid, base only covered by sepals; flowers silky

(1) **B. penangianus**

- Fruit globose-ovoid, half covered by sepals;
flowers glabrous (2) **B. Curtisii**
Fruit unknown; leaves large ovate; flowers
glabrous (3) **B. ovalifolius**
Flowers pubescent.
Flowers small silky, leaves glabrous (4) **B. anomalus**
Flowers small; petals long narrow, glabrescent;
sepal cup with short ovate lobes; leaves
large tomentose beneath (5) **B. pubescens**
Flowers moderately large; petals short, broad
all silky.
Stamens 10.
Fruit conic, glabrous, cup half as long (6) **B. Heimii**
Flowers larger; petals long linear, contort; fruit
elongate large (7) **B. maximus**

(1) **B. penangianus** King, *l.c.* 131; *Ann. Bot. Gard. Calc.* v. (2), 158, *pl.* 191B.

Tree 40 to 70 ft. tall, 8 to 18 in. through, with pendulous branches almost glabrous except inflorescence. Leaves coriaceous, ovate lanceolate or ovate acuminate to caudate, base cuneate; nerves 7 to 8 pairs, inconspicuous above, very slender beneath, 1.75 to 4 in. long, .8 to 1.6 in. wide; petioles .25 to .4 in. long. Panicles hoary-pubescent. Flowers small, brownish yellow, secund 7 to 9 on each branch, pedicelled, .15 to .2 in. long. Sepals sub-equal, broad ovate acute, tomentose. Petals oblong obtuse, twisted. Stamens 15; awns curved, longer than anthers. Fruit ovoid or obovoid, shortly apiculate, striate, .6 in. long, .3 in. through, persistent calyx covering the lower third, glabrous, lobes deltoid acute. *Hab.* Forests, Malacca, Bukit Senggeh (Foxworthy). Penang, Government Hill 1000 to 2000 ft. altitude. Telok Bahang and Muka Head (all collectors). Perak, Thaiping district (Kunstler). *Native names:* Dammar hitam; Singga. *Use:* Produces a black Dammar.

Some specimens in young fruit only, received from Bukit Senggeh, Malacca, under the name of Singga, from Foxworthy, may be this species.

(2) **B. Curtisii** King, *l.c.* 131; *Ann. Bot. Gard. Calc.* v. (2), 158, *pl.* 191A. (Fig. 23 f, p. 213.)

Small tree 20 to 30 ft. tall, 4 to 6 in. through. Branches slender. Leaves membranous; lanceolate caudate obtuse, base shortly cuneate; nerves 8 to 10 pairs faint, secondaries nearly equal, 2 to 2.25 in. long, .75 to 1 in. wide; petioles .1 to .15 in. long. Panicles numerous, .5 in. long, glabrous. Flowers secund, short-pedicelled, .15 in. long. Sepals sub-equal, round-ovate blunt, glabrous, tips sometimes pubescent. Petals dark purple elliptic oblique, acuminate, pubescent outside. Stamens 15; filaments shorter than anthers; awns longer than stamens. Fruit globular apiculate, .25 in. long, more than half covered by the sepals, outer 2 smaller oblong, inner 3 much broader, obovate, truncate. *Hab.* Hill forests. Penang, Waterfall to 500 ft. altitude (Curtis). Perak, Thaiping (Kunstler). *Distrib.* Borneo.

(3) **B. ovalifolius** Ridl. *Journ. F.M.S. Mus.* x. 130.

Tree. Leaves thinly coriaceous, ovate cuspidate, base shortly cuneate; nerves numerous fine inconspicuous, reticulations minute, 3 in. long, 1.5 in. wide; petioles .5 in. long. Panicles lax, 2 in. long, glabrous, rather few-flowered. Sepals imbricate, sub-coriaceous, glabrous, ovate, blunt. Petals twice as long, oblong blunt, pubescent outside, .15 in. long. Stamens 15; awns hair-like longer than the rest of the stamens. Ovary with a glabrous cylindric stylopodium. *Hab.* Penang (Curtis 426); Ayer Hitam (Haniff). *Native name*: Pinang Baik.

Near *B. Curtisii*, but leaves broader and flowers larger; Brandis suggests it is the Bornean *B. latifolius*, but the venation is quite different, and it has a stylopodium.

(4) **B. anomalus** King, *l.c.* 132; Brandis, *l.c.* 109.

Tree nearly glabrous except inflorescence. Leaves coriaceous, ovate acuminate, base sub-cuneate; nerves 6 to 7 pairs, very fine. 2.25 to 2.5 in. long, 1 to 1.3 in. wide; petioles .6 to .7 in. long. Panicles numerous. Flowers pedicelled, .15 in. long; on branchlets .75 in. long of panicle 3 in. long, pubescent. Sepals ovate obtuse tomentose. Petals elliptic blunt, silky outside, twice as long as sepals, spreading. Stamens 15; filaments long, dilated; awns as long as anthers. *Hab.* Lankawi islands (Curtis). *Native name*: Malaut.

(5) **B. pubescens** Ridl.

Tree. Branchlets slender, pubescent. Leaves oblong shortly cuspidate acuminate, base round, coriaceous, above smooth, glabrous except the thickly pubescent midrib, beneath strongly pubescent on the midrib and 11 pairs of elevated nerves, 5 in. long, 2 in. wide; petioles densely pubescent, thick, .15 in. long. Panicles short, axillary, glabrous, few-flowered, 1 in. long. Flowers very small, .2 in. long, sub-sessile. Sepals coriaceous, lanceolate, imbricate, glabrous. Petals much longer, narrowly linear, silky outside, blunt. Stamens not seen. Ovary conic, glabrous with a conic stylopodium. Fruit ellipsoid, nearly 1 in. long. Sepaline cup .5 in. long, black, with 5 short, ovate, blunt broad lobes. The whole fruit covered with a thick coat of resin. *Hab.* Pahang. Tanjong Api, Kwantan (Foxworthy). *Native name*: Merawan Mata Kuching.

(6) **B. Heimii** King, *l.c.* 133. *B. Wrayii* King, *l.c.* 134.

Tree 50 to 60 or more ft. tall. Leaves oblong-lanceolate acuminate, base rounded, coriaceous, glabrous above except the velvety midrib; nerves at base 9 to 10 pairs elevate beneath, velvety pubescent at base, 4 to 6 in. long, 1 to 1.75 in. wide; petioles velvety, .3 to .4 in. long. Panicles axillary and terminal, 4 in. long with about 8 branches, 1 in. long. Flowers sub-second, .3 in. across, shortly pedicelled. Sepals short round, pubescent, edge ciliate. Petals short, glabrous, oblong, tips pubescent only,

blunt not contort. Stamens 15; filaments rather long slender, base broad triangular narrowing to the tip; anthers linear with a short point. Ovary glabrous with a long stylopodium; style long, filiform, long persistent. Fruit cylindric acute, 1·5 in. long, ·5 in. wide; pericarp woody glabrous, dark yellow. Sepals forming a cup ·6 in. deep. *Hab.* Forests. Pahang, Temerloh and Bentong (Foxworthy). Negri Sembilan, Bukit Pergai Triang (Foxworthy). Selangor, Klang at Bukit Cheraka (Foxworthy). Perak, Thaiping district (Kunstler); Kwala Kangsa (Foxworthy); Gapis (Wray). *Native names*: Chengal Penak; Penak Tembaga; Chengal Siput.

King's specimens of this and of *B. Wrayi* are only in fruit, but I have little doubt on carefully comparing the foliage that Foxworthy's flowering specimens belong to the same species. The only difference that I can see between *B. Heimii* and *B. Wrayi* is that in the latter the leaves are smaller and quite glabrous, whereas in *B. Heimii* the petiole and midrib usually are puberulous or pubescent. Wray's specimens are in unripe fruit, and the size of the leaves and amount of pubescence vary in *B. Heimii*.

(7) **B. maximus** King, *l.c.* 133; *Ann. Bot. Gard. Calc.* v. (2), 159, *pl.* 192.

Vast tree 100 ft. tall, glabrous except inflorescence. Leaves thinly coriaceous, oblong or elliptic-oblong sub-acute, base rounded; nerves 7 to 9 pairs, 5 to 7 in. long, 2 to 2·5 in. wide; petioles ·5 to ·6 in. long. Panicles tomentose, 6 in. long. Flowers sub-sessile ·6 to ·7 in. long, light yellow, calyx cream colour. Sepals ovate, outer 2 tomentose. Petals much longer, narrow oblong, tip erose, pubescent outside and on tip outside. Stamens 10; awn deflexed. Fruit cylindrical acute; pericarp woody, 1·75 to 2·25 in. long, ·6 to ·7 in. through. Sepals forming a toothed cup at base ·5 in. long. *Hab.* Dense forests. Johor, Gunong Pulai. Pahang, Kwala Lipis at Sungei Benchah (Foxworthy). Perak, Batang Padang district (Kunstler). *Native name*: Chengal Penak. *Use*: Timber highly valuable for building boats and for sleepers. Dammar much valued, being quite transparent, for varnish, etc.

14. **PACHYNOCARPUS**, Hook. fil.

Small-sized to medium trees. Leaves coriaceous, rather thin elliptic or oblong, reticulate. Panicles terminal or axillary, lax. Calyx of 5 sepals, connate at base, small mealy. Petals much longer, often mealy on the back. Stamens 10 to 15 in 2 rows, very short; anthers elliptic; connective prolonged into a short point. Ovary often sunk in calyx-tube; style short, thick. Stigma oblong or sub-globose. Fruit corky brown, the persistent sepals forming short corky processes or lobes attached to the nut, and occasionally forming a cup almost covering the nut. Species about 10, Siam, Malay Peninsula and islands to New Guinea.

Calyx almost covering the nut in fruit.

Calyx cupular, not lobed.

Leaves oblong; nerves hardly elevate

(1) **P. umbonatus**

Leaves nearly obovate, very stiff; nerves very prominent

(2) *P. Stapfianus*

Calyx cupular of 5 corky ribs grooved down the back

(3) *P. verrucosus*

Calyx-lobes much shorter than the oval fruit

(4) *P. Wallichii*

Calyx-lobes very short, corky, recurved; fruit long, conic

(5) *P. Ridleyanus*

(1) *P. umbonatus* Hook. fil. *Trans. Linn. Soc.* xxiii. 159, *t.* 22.

Small tree 20 to 30 ft. tall. Leaves stiff, coriaceous elliptic to elliptic-lanceolate, smooth above, reticulate beneath; nerves 7 to 8 pairs, elevate beneath, 4 to 5 in. long, 1 to 2 in. wide; petioles .5 in. long. Panicle 4 in. long or more, mealy; pedicels slender. Calyx mealy, lobes lanceolate acute. Petals .4 in. long, linear-oblong, blunt, fleshy, white. Stamens 10; anthers broad, elliptic, apiculate. Ovary adnate to calyx-tube; style stout. Stigma large, globose. Fruit 1 in. long and as wide ovoid, entirely covered with the thick rough corky sepals adnate to the nut for more than three-quarters of its length, cup obscurely lobed at the top. *Hab.* Forests, stream-edges. Singapore. Malacca (Maingay). Perak, Larut (Kunstler). Penang, Telok Bahang (Curtis). Lankawi islands, Sungei Batu Asap (Haniff). *Distrib.* Borneo.

(2) *P. Stapfianus* King, *l.c.* 136.

A tree 80 to 100 ft. tall. Branchlets stout. Leaves stiffly coriaceous, broadly elliptic or obovate-elliptic, beneath scurfy on the nerves; nerves 10 to 13 pairs, oblique prominent, 5 to 8 in. long, 2.75 to 4.5 in. wide; petioles .65 to 1 in. long. Flowers unknown. Fruit on a woody raceme 2 to 3 in. long, globular apiculate, 1.25 in. through almost completely covered with the 5-lobed woody rugose calyx, dark mouse colour speckled with dark brown. *Hab.* Pahang, Kluang Terbang (Barnes). Selangor, Bangi station (Foxworthy). Perak, Goping (Kunstler).

This is certainly closely allied to *P. umbonatus* Hook. fil, but the foliage is much thicker and the nerves much more prominent.

(3) *P. verrucosus* Ridl. *Vatica verrucosa* Burck, *Ann. Jard. Buitenz.* vi. 232, *t.* 3 fig. 5.

Tree. Branchlets rather stout scurfy. Leaves thin coriaceous, oblong, shortly blunt acuminate, base cuneate; nerves 10 or more pairs slightly elevate beneath, reticulations conspicuous both sides, 6.5 in. long, 2.5 in. wide; petioles .5 in. long. Panicles in upper axils and terminal, 2 in. long, scurfy. Sepals broadly triangular and connate less than half-way, as long as the style, scurfy. Petals .5 in. long, linear-oblong, glaucescent outside, but not mealy. Stamens 10; anthers elliptic. Ovary connate with the calyx-tube nearly to tip; style short thick. Stigma oblong. Fruit sub-globose, brown corky, .75 in. long and wide, the calyx covering the nut except the tip in the form of a 5-lobed cup, the lobes rounded on the back and at the tip, and grooved down the

back. *Hab.* Penang at 1000 ft. altitude, on the Sungei Pinang road (Curtis). *Distrib.* Borneo.

(4) **P. Wallichii** King, *l.c.* 135. *P. ruminatus* Brandis, *Journ. Linn. Soc.* xxi. 136. *Vatica Wallichii* Dyer, *Journ. Bot.* 1874, p. 154. *Vatica ruminata* Burck, *Ann. Jard. Buitenz.* vi. 227, t. 29, fig. 4.

Tree 30 to 60 ft. tall. Leaves coriaceous, elliptic, bluntly short acuminate, base blunt or shortly narrowed; nerves about 6 pairs slightly elevate beneath, reticulations prominent, 3·5 to 5 in. long, 1·75 to 2·5 in. wide; petioles ·25 to ·5 in. long. Panicle spreading, 3 in. long and a little wider; pedicels mealy puberulous. Sepals connate at base, lobes deltoid, recurved, mealy. Petals linear-oblong blunt, fleshy, ·25 in. long, white, mealy on the back. Stamens 10; anthers elliptic, shortly apiculate. Ovary free from calyx; style stout. Stigma globose. Fruit ovoid-globose, corky light brown, ·75 in. long and thick with 3 grooves from the top to base, persistent sepals forming a short star-like mass of 5 rounded lobes at the base. *Hab.* Forests. Pahang, Baloh, Kwantan (Foxworthy). Selangor, Kelambu, Klang (Foxworthy). Perak, Larut and Goping (Kunstler). Penang (Wallich, Curtis). *Distrib.* Sumatra, Borneo. *Native name* : Resak Larus.

(5) **P. Ridleyanus** Brandis, *l.c.* Pl. 240 sub *Vatica*. *Vatica ovalifolia* Ridl. *Journ. Roy. As. Soc. S. Br.* 54, p. 26.

A tree 80 ft. tall or more. Leaves ovate to oblong acuminate narrowed to the base, glabrous; nerves 6 pairs ascending elevate, reticulations conspicuous beneath, 4 to 5 in. long, 1·5 to 2 in. wide; petioles ·25 in. long. Panicles 1·5 to 4 in. long, woody in fruit, puberulous and slender when young. Sepals lanceolate connate half-way mealy pubescent, as are pedicels. Petals ·4 in. long yellow, linear-oblong blunt, backs scurfy-puberulous. Stamens 15 in 2 rows, outer ones with short, broad filaments; anthers longer, connective forming a short conic point, inner row with longer filaments. Ovary sunk, pubescent; style short, thick. Fruit conic 2 in. or more long, ·75 in. through at base, dark brown corky and papillose, the persistent sepals 5 short up-curved processes, ·2 in. long. *Hab.* Forests. Singapore, Garden Jungle; Changi. Pahang, Minchali, Rumpin (Foxworthy). Province Wellesley, Nibong Tebal. *Native name* : Resak Larus.

ORDER XXI. ANCISTROCLADACEÆ.

Glabrous climbing shrubs. Branchlets hooked. Leaves in terminal tufts, coriaceous, entire, exstipulate. Flowers small in terminal or axillary panicles. Calyx-tube short, adnate to the base of the ovary in flower, larger and adnate to the fruit when ripe; lobes 5, developed into unequal wings in fruit. Petals 5,

red or purple. Stamens 5 or 10, sub-perigynous. Ovary 1-celled inferior, 1-ovuled; style sub-globose. Stigmas 3, truncate. Seed sub-globose, albuminous ruminant. Genus 1. Species about 10, tropical Asia, 1 West African. Formerly referred to *Dipterocarpaceæ*.

1. ANCISTROCLADUS, Wall.

(1) **A. pinangianus** Wall. *Cat.* 1054; *Dyer, in Hook. fl. F.B.I.* i. 300. *A. extensus* var. *pinangianus* King, *Journ. As. Soc. Beng.* lxii. (2), 137.



FIG. 25.—*Ancistrocladus pinangianus*.

A climber forming a bush on the ground or ascending trees, with black branches. Leaves coriaceous elliptic-lanceolate decurrent to base, obtuse, 6 to 9 in. long, 2 to 3 in. wide. Panicles very slender, branching 5 to 6 in. long. Flowers 1 in. long, dark red. Fruit .25 in. long; wings very unequal, largest sub-spathulate, oblong obtuse, 2 in. long, .5 in. wide, brown. *Hab.* Very common on sandhills near the sea, more rarely inland. Singapore, Changi. Malacca. Pahang, Pekan. Dindings, Lumut. Perak, Thaiping. Penang (Porter in *Herb. Wallich* 1054); Bukit Penang

at 1000 ft. altitude (Curtis). Lankawi isles; Setul, heath. *Distrib.* Siam, Cochin-China, Bangka, Sumatra. *Native names*: Lidah Sapi (Ox tongue); Akar Julong hitam (Black caterpillar creeper).

ORDER XXII. BIXACEÆ.

Trees or shrubs. Leaves alternate. Flowers regular, bisexual. Sepals 4 to 5, deciduous. Petals large 5. Stamens indefinite on a disc. Ovary 3- to 5-celled; style simple; ovules many, parietal. Capsule 2- to 5-valved. Seeds arillate or woolly. Species 20, chiefly S. American.

Bush; flowers pink or white; capsule bristly, seeds
with a red covering

1. BIXA

Shrub; flowers yellow; capsule smooth, seeds woolly

2. COCHLOSPERMUM

1. BIXA, Linn.

(1) **B. Orellana**, L.

The Arnotto; Kasumbah of Malays is a bush with large pink flowers and a soft prickly capsule with small seeds covered with a red powdery aril. It is occasionally to be seen in native gardens and may establish itself outside. It is a native of S. America and the red aril is used as a colouring matter.

2. COCHLOSPERMUM, Kth.

Trees or shrubs. Leaves digitately divided. Flowers large, bisexual. Sepals 5, deciduous. Petals 5, large, contort in bud. Stamens indefinite on a disc; anther-cells with pores or short slits. Ovary globose, 3- to 5-celled; style simple; ovules many on 3- to 5-parietal placentas. Stigma toothed. Capsule 3- to 5-valved; endocarp membranous. Seeds cochleate, testa hard, woolly. Species 12, Africa, S. America, Australia. The genus is often put in an order by itself, *Cochlospermaceæ*, and is probably allied to *Malvaceæ*.

(1) **C. gossypinum** DC. *Prodr.* i. 527; *Hook. fil. F.B.I.* i. 190; *Wight in Hook. Bot. Misc.* ii. 357; *Suppl. t.* 18.

A soft-wooded shrub about 10 ft. tall. Leaves palmate 5-lobed, hairy on the back, lobes acuminate, crenulate, blades 6 in. across each way or more; petioles 6 in. long. Flowers large, yellow, 4 in. across. Sepals 7 in. long, silky. Petals rounded obovate. Pod pear-shaped brown, 4 in. long, 3 in. through. *Hab.* Malacca (Griffith); Penang in cultivated ground and in and round the town.

Certainly introduced from India, but more or less established in Penang and very conspicuous.

ORDER XXIII. MALVACEÆ.

Herbs, shrubs or trees, often hairy or in *Durioneæ* in parts covered by umbrella-shaped scales. Leaves alternate, simple, lobed, or rarely compound (*Bombaceæ*). Stipules free. An epicalyx below the flower of 3 or more bracts free or connate. Flowers axillary or terminal solitary, fascicled or cymose, regular, often large and showy. Sepals 5. Petals 5, twisted-imbricate in bud. Stamens indefinite; filaments connate in a tube; anthers often reniform 1-celled. Ovary 2, many-celled of 2 to 5 or more carpels round a central axis; ovules 1 or more in each cell; styles connate at base or altogether. Fruit of separate cocci, or capsular loculicidal, often large and woody. Seed reniform or ovoid, sometimes woolly (*Bombax*), sometimes with pulpy aril (*Durio*). Genera 60. Species 700, whole world (King, *Journ. As. Soc. Beng.* lxii. 38).

Besides the plants described below, there are in cultivation *Gossypium braziliense* Macfad, a bush cotton with short-stapled wool which was formerly half wild in Muar and can occasionally be seen in native gardens (*Native name* : Kapas), and *Eriodendron anfractuosum* DC. The Kapok, a tall tree with horizontal spreading branches, often to be seen in villages. The origin is probably South India.

Staminal tube entire long, shortly divided at tip only.

Carpels ripe separating from axis, follicular dehiscing,
low shrubs.

Styles as many as carpels.

Ovules solitary 1. SIDA

Ovules 2 to more.

Seeds 2 in a carpel, separated by a partition 2. WISSADULA

Seeds 2 or more, not separate 3. ABUTILON

Styles twice as many as carpels; follicles indehiscent 4. URENA

Fruit capsular; carpels connate; herbs, shrubs or trees; flowers large

Calyx toothed; stigmas spreading 5. HIBISCUS

Calyx truncate; stigmas united. Tree 6. THESPESIA

Staminal tube short divided into bundles of stamens; fruit capsular. Trees.

Leaves digitate compound; seeds woolly 7. BOMBAX

Leaves entire, scaly coriaceous; fruit woody muricate; seeds arillate (*Durioneæ*).

Calyx campanulate; flowers large or medium.

Flowers large; leaves scaly; anthers reniform or oblong 8. DURIO

Flowers small, scaly; anthers opening by a pore, globose 9. BOSCHIA

Flowers medium; calyx dilate at base, forming a cushion-shaped ring 10. NEESIA

Calyx 5-pouched at base; flowers very small 11. CÆLOSTEGIA

1. SIDA, Linn.

Herbs or undershrubs. Leaves entire or lobed. Bracteoles 0. Sepals 5, connate at base. Petals 5, connate at base and adnate to stamen tube. Stamen-tube dividing into numerous filaments. Carpels 5 or more, whorled, with as many styles, when ripe separating from axis, convergent beaked or 2-awned. Seed 1. Species about 80, mostly weeds of cultivation and waste ground.

Leaves cordate-ovate, serrate 1·5 to 2 in. long, thin	(1) S. mysorensis
Leaves ovate-cordate serrate ½ to 1 in. long	(2) S. veronicaefolia
Leaves ovate obscurely cordate crenate thick woolly	(3) S. cordifolia
Leaves oblanceolate or rhomboid	(4) S. rhombifolia
Leaves linear lanceolate	(5) S. carpinifolia

(1) **S. mysorensis** W. and A. *Prod.* i. 59; *Masters, in Hook. fil. F.B.I.* i. 322.

Erect herb, 1 to 2 ft. tall covered with sticky hairs. Leaves cordate-ovate acuminate, coarsely serrate-crenate, 1·5 to 2·5 in. long; petioles half as long. Stipules linear. Flowers less than ½ in. across, in few-flowered axillary racemose cymes. Sepals ovate acuminate. Corolla yellow. *Hab.* Roadsides. Not common. Pahang at Temerloh. Perak, Kwala Kangsa (Wray). *Distrib.* India and Java.

(2) **S. veronicaefolia** Lam. *Encyc.* i. 5. *S. humilis*, Cav. *Diss. v.* 277; *Masters, l.c.* i. 322.

A slender trailing herb. Leaves ovate acute base cordate, serrate, sparsely hairy, ½ to 1 in. long, 15 to 75 in. wide; petioles ½ in. long. Flowers solitary axillary; pedicels slender articulate, 75 in. long. Calyx 2 in. long, campanulate, with short acute lobes. Corolla yellow twice as long, 25 in. wide. Carpels 5, bicuspidate hairy. *Hab.* Dry open spots in the north; Perlis, Juttra, Kanga (Ridley). *Distrib.* Tropical Africa, India and America.

(3) **S. cordifolia** Linn. *Sp. Pl.* 961; *Masters, l.c.* i. 324.

A softly hairy undershrub 2 to 3 ft. tall. Leaves oblong or ovate-cordate crenate, 175 to 2 in. long, 125 to 15 in. wide; petioles 1 in. long, spreading hairy. Stipules linear, very narrow, 25 in. long. Flowers axillary, solitary or cymose, 6 in. across, yellow. Calyx-lobes sub-triangular. Carpels sub-glabrous with 2 strong erect awns. *Hab.* Sandy open places. Malacca (Griffith); Singapore. Pahang, Pekan. Lankawi at Kwah. Kelantan near Kota Bharu; Kwala Kelantan. *Distrib.* Whole world. *Native name:* Kelulut putih.

(4) **S. rhombifolia** Linn. *Sp. Pl.* 961; *Masters, l.c.* i. 323; *King, l.c.* 41.

Erect undershrub 2 to 3 ft. tall, glabrous to hoary, pubescent. Leaves oblanceolate to obovate or rhomboid, edges serrate to crenate, beneath white hoary, 5 to 2·5 in. long, 2 to 1 in. wide;

petioles '1 to '2 in. long. Stipules setaceous, longer than petioles. Flowers '5 in. across, ochre yellow, axillary, solitary; peduncles slender, '5 to '75 in. long. Calyx-lobes ovate obtuse. Carpels smooth or pubescent, awnless or awned. *Hab.* A common and variable plant on seashores and in waste ground all over the tropics.

var. *rhomboidea* Roxb. *Hort. Beng.* 50 (sp.), tall slender plant. Leaves hoary beneath or nearly glabrous. Common in villages.

var. *retusa* Linn. (sp.), more condensed and woody. Leaves '25 to 5 in. long, obovate cuneate coarsely toothed, more hoary than the preceding. *Hab.* Common on seashores. *Native names:* Poko Lidah Ular (Snake's tongue); Bunga Padang; Seliguri or Senda Guri Padang.

(5) *S. carpinifolia* Linn. *f. Supp.* 307; *Masters, l.c.* i. 323; *King, l.c.* 40. *S. acuta* Cav. *Diss.* i. 15, t. 2, f. 3.

An undershrub 2 to 3 ft. tall, glabrous or nearly so. Leaves linear-lanceolate acute serrate, 2 to 3 in. long, '25 to '35 in. wide; petioles '1 to '2 in. long. Stipules lanceolate subulate, longer than petiole. Flowers solitary, axillary, '5 in. across; pedicels '25 to '5 in. long, jointed. Sepals lanceolate subulate. Corolla yellow. Carpels glabrous, shorter than the sepals. *Hab.* Weed in waste ground. Common all over the peninsula. *Distrib.* Tropics generally. *Native names:* Poko Lidah Ular; Ketumbar hutan; Kelulut Putih; Sada Turi; Telor Belangkas.

2. WISSADULA, Medik.

Undershrub with entire or palmate leaves. Inflorescence lax paniced. Bracteoles 0. Calyx 5; sepals connate below. Petals 5, connate at base, adherent to stamens. Staminal tube divided at apex into numerous filaments. Styles as many as ovary-cells. Carpels 5, beaked, many-seeded, dehiscent. Seeds 1 to 3 in each cell. Species 5 or 6, tropical American, African, and 1 Asiatic.

(1) *W. zeylanica* Medik, *Malv.* 25. *Abutilon hastatum* Ridl. *Trans. Linn. Soc.* iii. 279.

Shrub 2 to 3 ft. tall. Leaves deltoid, long-acuminate, base entire or cordate, glabrous above, red-pubescent beneath, 2 to 3 in. long, 1 to 1'5 in. wide across base; petioles '5 to 1 in. long. Flowers small, '25 in. across, white, in a long lax panicle. Sepals ovate acute, green, pubescent. Petals shorter. Stamens about 17, tube short. Carpels 5, pubescent, '25 in. long, awned. Seeds 2 in each cell, pyriform, black-pubescent. *Hab.* Dry open places. Pahang, east coast Kwala Berar, Pahang River. Perlis, Juttra; Chupeng, common. *Distrib.* India and Siam, Ceylon, Java, Sumatra.

3. ABUTILON, Gaertn.

Herbs or undershrubs usually downy. Leaves angled or palmate-lobed. Inflorescence axillary or terminal. Calyx of 5

valvate sepals connate at base. Petals free above, connate at base, adnate to stamen-tube. Stamen-tube divided at the apex into filaments. Carpels 5 to 8. Styles as many. Ripe carpels separating from the axis, 1- or more-seeded. Seeds reniform. Species 70, all tropics.

(1) **A. indicum** Don, *Gen. Syst.* i. 504; *Masters, in Hook. fil. F.B.I.* i. 326; *King, l.c.* 42.

Shrub, annual or perennial, 1 to 4 ft. tall. Leaves broadly cordate, irregularly coarsely toothed, minutely pubescent on both sides, paler beneath, 1 to 3·5 in. long and as wide; petioles 1 to 2 in. long. Flowers 1 in. across, axillary solitary. Peduncles 1·5 in. long. Sepals ovate acute, silky-edged, hairy 2·5 in. long. Carpels 15 to 20, truncate or shortly awned, rough hairy, forming a head 1 in. across, black. Seeds dark brown, hairy. *Hab.* Waste ground, common. Singapore, Pahang at Pekan, Malacca, Selangor, Penang. *Distrib.* Warm parts of Africa, Asia and Australia. *Native names* : Kambong lobo; Bunga Kisar; Malbar.

4. URENA, L.

Undershrubs, more or less hairy. Leaves hairy with stellate hairs, angled or lobed. Flowers medium to large, pink. Epicalyx 5-lobed adnate to the 5-fid calyx, sometimes coherent at base. Petals 5, connate at base and adnate to stamen-tube. Stamen-tube truncate or minutely toothed; anthers nearly sessile. Ovary 5-celled, cells 1-ovuled; stigmatic branches 10; stigmas capitate. Ripe carpels covered with hooked bristles or smooth, indehiscent separating from axis when ripe. Species 4 or 5, 1 cosmopolitan.

Carpels armed with hooked bristles	.	.	.	.	(1) U. lobata
Carpels smooth; flowers large	.	.	.	.	(2) U. rigida

(1) **U. lobata** Linn. *Spec.* 974; *Masters, l.c.* i. 329; *King, l.c.* 43.

Undershrub, 1 to 3 or 4 ft. tall, more or less hairy. Leaves, lower rounded to reniform, more or less cordate, apex acute, with 5 to 7 short broad lobes, 1 to 2 in. long, 1 to 2·5 in. wide, upper leaves narrower or smaller, ovate to linear-lanceolate; petioles 1·5 to 2 in. long. Flowers solitary or several together on short pedicels, 1 to 2 in. across, pink, fugacious. Sepals lanceolate, 2 in. long. Carpels tomentose and covered with hooked spines. *Hab.* Waste ground and open spaces, roadsides, etc. Whole peninsula and all the tropics.

var. *sinuata* Miq. *Fl. Ind. Bat.* i. (2), 149; *King, l.c.*

Leaves deeply 5-lobed, lobes narrowed at the base, serrate. It is common especially near the sea, but grows with the common form. *Native names* : Poko Kelulut; Perpulut; Pepulut; Pulut-Pulut. *Use* : Leaves dried as an adulterant of patchouli leaves.

var. *tomentosa*, *U. tomentosa*, *Bl. Bijdr.* 65.

A tall strict plant 8 ft. tall, very grey-tomentose. Leaves elliptic densely woolly with stellate hairs, thicker in texture, margins denticulate, apex rounded, base narrowed 1 to 2 in. long, .5 to .75 in. wide; nerves and reticulations strongly elevate beneath, inarching. Flowers numerous on the ends of the branches, subsessile. *Hab.* Setul heaths. *Distrib.* Java, Sumatra.

(2) **U. rigida** *Wall. Cat.* 1929 (*partly*); *Masters, l.c.* i. 330. *Decaschistia pulchella* *Ridl. Journ. Roy. As. Soc. S. Br.* 59, p. 76.

A shrub 1 to 2 ft. tall, branched, sprinkled with stellate hairs. Leaves ovate or orbicular blunt, base broad, serrate; nerves 8, 1 in. long and as wide; petioles slender, 1 in. long. Flowers numerous, nearly sessile in axils of reduced leaves at end of stem. Epicalyx campanulate, with 5 linear lobes. Sepals linear acuminate, hairy. Corolla 2 in. across, crimson; petals spathulate, apex rounded. Capsule .1 in. long, hairy. *Hab.* Rare; heaths, Setul. Malacca (Griffith). There are specimens of this beautiful plant in Herb. Kew, labelled "Malacca, white, Griffith," probably wrongly localized. *Distrib.* Tenasserim, Siam, Cambodia, Borneo.

5. HIBISCUS, L.

Herbs, shrubs or trees. Leaves entire or palmately lobed. Inflorescence axillary. Epicalyx of 5 or more lobes, free or connate at the base. Calyx 5-toothed or 5-lobed, valvate. Petals 5, adnate at base to the staminal-tube. Staminal-tube truncate or 5-toothed; filaments numerous; anthers reniform 1-celled. Ovary 5-celled, cells 3- or more-ovuled. Styles 5, connate below. Stigmas capitate or spathulate. Capsule loculicidally 5-valved, sometimes with false partitions. Seeds glabrous, hairy or woolly. Species about 150, tropics of the whole world.

Cultivated species of *Hibiscus* are also *H. esculentus* Linn. Kachang Bendi or Kachang Lindir, also known as Lady's Fingers. A tall herb with pale creamy yellow flowers and glabrous pods used as a vegetable.

H. rosa-sinensis L'nn. The garden *Hibiscus*, Bunga Raya. Cultivated as a garden shrub, together with *H. schizopetalus*, Hook f., of Zanzibar, with contort petals and a long stamen tube. Many varieties and hybrids of these two are in cultivation. The leaves are used for blackening shoes, hence the popular name "Shoe-flower," the flowers for colouring sweetmeats and preserves, and as a demulcent in venereal disease. The bark contains a good fibre.

H. mutabilis L'nn., with white flowers turning pink, is also a common cultivated shrub from China and *H. syriacus* Linn. with violet flowers. Both species usually with double flowers.

Herbaceous or shrubby plants.

Tall erect herb; flowers large; calyx spathaceous, deciduous . . . (1) **H. Abelmoschus**

Scandent, thorny shrubby plant; flowers 2 in. wide; calyx persistent; epicalyx lobes distinct . . . (2) **H. surattensis**

Trees with large entire leaves ovate cordate.

Bracteoles as long as calyx.

Leaves hairy, tomentose beneath; stalks rough, hairy . . . (3) **H. macrophyllus**

Bracteoles cup shorter than calyx.

Leaves glabrous above, pubescent beneath . . . (4) **H. tiliaceus**

Leaves glabrous, scabrid . . . (5) **H. floccosus**

(1) **H. Abelmoschus** Linn. *Sp. Pl.* 980; *King, l.c.* 44.

Erect bristly herb 3 to 5 ft. tall. Leaves 3- to 5-lobed, lobes oblong to linear serrate acute, 3 to 5 in. long; petioles longer. Flowers 3 in. across, yellow with maroon crimson eye. Epicalyx-lobes 8 to 12 linear, .75 in. long. Capsule lanceolate acute, hairy, 2 in. long. Seeds reniform musky. *Hab.* A weed usually appearing sporadically in cultivated ground. Singapore, casual; Malacca (Griffith). Perak, Telok Anson (Kunstler). *Distrib.* Tropics. *Native names* : Kapas Hantu; Kapas hutan; the Musk-seed.

(2) **H. surattensis** Linn. *Sp. Pl.* 979; *King, l.c.* 45.

Scrambling spiny shrub. Leaves 3- to 5-lobed, serrate sparsely pilose, 1.5 to 3 in. across; petioles longer. Flowers 2 to 2.5 in. wide, yellow, centre purple. Bracts of epicalyx 10 to 12 linear, tip spatulate. Capsule membranous. Carpels ovate with long acute point, 1 in. long. *Hab.* In hedges near civilization, but probably wild in the northern parts; Singapore, Tanglin. Malacca. Perak, Teluk Anson (Kunstler). Tringganu (Yapp). Setul. Kelantan, hedges near Kota Bharu. *Native name* : Asam Susor.

(3) **H. macrophyllus** Roxb. *Hort. Beng.* 51; *Masters, in Hook. fil. F.B.I.* i. 387; *Wall. Pl. As. Rav.* i. 44, t. 51.

A big tree 60 to 80 ft. tall. All parts covered with soft tomentum, the young branches, petioles, pedicels, bracteole and calyx bearing tufts of long yellow hairs. Leaves cordate-orbicular, apex abruptly acuminate, edges entire, 7- to 9-nerved palmately, 7 to 12 in. long and as wide; petioles 7 to 12 in. long. Flowers in terminal cymes; pedicels 1 to 2 in. long. Epicalyx lobes long, linear-lanceolate half as long as calyx. Sepals lanceolate, keeled 1 in. long. Corolla 4 in. across, yellow with a maroon central spot, withering purplish. Fruit hairy, shorter than the calyx. Seeds reniform, edges densely long red-hairy. *Hab.* In woods and borders of forests. Common. Malacca, Bukit Panchur; Pahang by the Pahang and Tahan rivers. Negri Sembilan, Kwala Pedas. Selangor, Sungei Buloh (Foxworthy). Province Wellesley, Tasek Gelugur. Perak, Ulu Kerling (Kunstler). *Distrib.* Siam, Cochin-China. *Native name* : Tutok. *Use* : A good fibre from the bast used for ropes.

In the Malay Peninsula form the epicalyx is shorter and the sepals broader, and both less hairy than in the Indian one.

(4) **H. tiliaceus** Linn. *Sp. Pl.* 976; *Masters, l.c.* i. 343. *Paritium tiliaceum* Juss. *St. Hil. Fl. Bras. Med.* i. 156; *Wight, l.c. t.* 7.

Usually a low stout spreading tree. Leaves sub-coriaceous, broadly cordate, ovate or orbicular cuspidate, glabrous above, grey-pubescent beneath, 3 to 5 in. long, 3 to 6 in. wide; nerves palmate, 7 to 9; petioles 1·5 to 2·5 in. long. Flowers solitary or in cymes, 2- to 3-flowered, axillary; peduncle ·75 to 1 in. long. Epicalyx short, lobes short, ovate acute. Sepals lanceolate-triangular sub-acute, ·5 in. long, keeled pubescent. Corolla 4 in. across, yellow, centre crimson purple. Fruit about as long as calyx, ovoid hairy. Seeds obovate-reniform. *Hab.* Usually near the sea, on the sea beach very common, occasionally far up rivers, but inland frequently planted by natives to form a hedge. When grown in forest it attains a height of 60 ft. or more. Whole peninsula on both coasts. *Distrib.* Tropical Asia, Africa and South America. *Native names:* Baru; Waru (Javanese); Ambaru; Baru Laut; Dedap Laut. *Use:* The wood valued for gun-stocks, the bast as a fibre.

(5) **H. floccosus** *Masters, l.c.* i. 343; *King, l.c.* 46.

A big tree 60 to 80 ft. tall. Branchlets, petioles, peduncles, epicalyx and calyx covered with yellow pustules. Leaves sub-coriaceous, ovate, obscurely angled, slightly or not cordate; nerves 7 pairs, entire or sub-denticulate, sparsely stellate, pubescent, glabrescent when old, 3 to 6 in. long and as wide; petioles 1 to 2 in. long. Flowers few, in terminal racemes; peduncle stout, ·75 to 1·5 in. long. Epicalyx a shortly lobed cup ·25 in. long, lobes broad, ovate. Calyx 1·5 in. long, tubular, lobes ·5 in. long. Corolla 4 in. long; petals stellate-hairy outside, slightly hairy within, spathulate, yellow, base maroon, withering purple. Staminal-tube pubescent, yellow. Stigma deep brown. Capsule obovoid truncate, shorter than calyx, stellate-pubescent, pustular. *Hab.* Borders of woods, open country, less common than *H. macrophyllus*; Malacca, Mt. Ophir in the base woods. Pahang, Tahan woods. Temerloh (Foxworthy). Perak, Gunong Malacca; Batu Gajah (Kunstler); Grit; Kelantan, Kwala Aring (Yapp). *Native names:* Kapas-Kapas; Petutu; Unchang; Bebaru.

6. THESPESIA, Corr.

Tree. Leaves ovate acute. Flowers axillary. Epicalyx of 5 to 8 lobes or absent. Calyx cup-shaped, truncate. Corolla large. Staminal-tube 5-toothed at tip. Ovary 4- to 5-celled; style club-shaped entire or 5-toothed. Capsule loculicidal or hardly dehiscent. Seeds tomentose. Species about 6, Madagascar, tropical Asia and Australasia.

(1) **T. populnea** *Corr. Ann. Mus.* ix. 290; *Masters, in Hook. fil. F.B.I.* i. 345; *Wight, Ic. t.* 8; *King, l.c.* 47.

Tree 20 to 30 ft. tall. Leaves sub-coriaceous, glabrous, cordate acuminate, palmately 7-nerved, 4·5 to 6 in. long, 3 to 4 in. across; petioles 2·5 in. long. Young parts scaly. Flowers 3 to 4 in. across, solitary; peduncle thick 1 in. long. Calyx ·5 in. long. Corolla yellow with a maroon spot at base, withering purplish. Capsule 1 to 1·5 in. long, sub-globose, scaly. Seeds 1 to 3 in each cell, reniform. *Hab.* Common on sea-coasts. Singapore, Johor, Malacca, Dindings. *Distrib.* Tropics generally. *Native names* : Buah Keras Laut; Baru.

7. BOMBAX, Linn.

Trees often thorny. Leaves digitate, deciduous; peduncles axillary or terminal, 1-flowered. Flowers appearing before the leaves. Epicalyx 0. Calyx coriaceous, cup-shaped truncate or lobed. Petals obovate or oblong, red or yellow, large. Stamens in 5 bundles; filaments numerous; anthers reniform, 1-celled. Ovary 5-celled; style clavate. Stigmas 5. Capsule long, loculicidally 5-valved, valves coriaceous, woody. Seeds silky or woolly. Species 10, tropics generally, chiefly S. American.

Big tree.

Petals 3 in. long, linear oblong, tomentose . . . (1) **B. larutensis**

Smaller tree.

Petals 2 in. oblong acute, slightly tomentose
inside (2) **B. insularis**

(1) **B. larutensis** *Ridl.* *B. insigne*, var. *larutensis* *Prain, MSS.*

A big tree, thorny, about 80 ft. tall. Leaves 5- to 7-foliate; leaflets lanceolate acuminate, base much narrowed, 4 to 12 in. long, 1·5 to 3·5 in. wide; nerves about 12 pairs; petioles 4 to 24 in. long; petiolules winged to the base in young trees, not winged ·5 in. long in adult. Flowers yellow or pale green. Calyx thickly coriaceous, 1·1 in. long, 1·25 in. wide, lobes rounded, short. Petals 3 in. long, ·25 in. wide, linear-oblong, woolly tomentose on both sides. Stamens numerous 2 in. long. Ovary glabrous. Capsule 6 in. long. Seeds ovoid-globose ·2 in. long, wool dense white. *Hab.* Forests up to 1000 ft. altitude. Rare. Negri Sembilan, Tampin Hill. Selangor, near Ulu Gombak. Perak, Kamuning; near Jor; Relau Tujur (Wray).

(2) **B. insularis** *Ridl.*

Small tree 20 to 30 ft. tall. Leaflets elliptic lanceolate acuminate shortly at tip, long narrowed to base, 4·5 in. long, 1·5 in. wide; petioles 5 in. long. Calyx cup-shaped, coriaceous, 1·5 in. long, lobes broad rounded, glabrous. Petals broad, oblong acute 2 in. long, 1·75 in. wide, densely tomentose outside, less so within except at the base, where it is densely long-silky. Stamens 3 in. long,

very numerous. Capsule 4·5 in. long, valves 1·5 in. long. *Hab.* Rocks close to the sea. Penang, Balik Pulau (Haniff). Lankawi, Terutau (Curtis). Adang group, Pulau Adang.

8. DURIO, Linn.

Trees, often large. Leaves entire coriaceous, scaly beneath (except in *D. Oxleyanus*); the scales occurring also on young parts and inflorescence are peltate, umbrella-shaped. Flowers in cymes on the trunk or thick branches. Bracts 2, connate at the base, large. Calyx campanulate, coriaceous, scaly; sepals usually distinct or connate at base. Petals longer, red or white, 5 or 4 spathulate oblong. Staminal tube of 5 or 4 phalanges opposite petals, these broken up above into filaments bearing one (*D. Oxleyanus*) or several 1-celled sinuous anthers in a head. Ovary scaly, 4- to 5-celled; styles connate tomentose. Stigmas capitate; ovules many 2-seriate in each cell. Fruit very large, coriaceous sub-globose or oblong, loculicidally dehiscent, spiny, green or brown. Seeds large, testa thin, aril creamy white or pink covering the seed. Species about 12, Malayan.

Flowers white.

- | | |
|--------------------------------------------------------------------------------------------|-----------------------------|
| Leaves elliptic; nerves fine; flowers 2 in. long, fruit covered with acute cones | (1) <i>D. zibethinus</i> |
| Leaves elliptic; nerves fine; flowers 3 in. long; fruit with spines | (2) <i>D. malaccensis</i> |
| Leaves oblong, small; flowers 2 in. long | (3) <i>D. Lowianus</i> |
| Leaves oblong 2·25 by 1 in., coriaceous; flowers 2 in. long | (4) <i>D. lanceolatus</i> |
| Leaves oblong 12 by 3 in., coriaceous; nerves conspicuous; flowers 3 in. long | (5) <i>D. Singaporensis</i> |
| Leaves elliptic-oblong, strongly nerved pubescent beneath, not scaly | (6) <i>D. Oxleyanus</i> |
| Leaves very large, over 12 by 5 in. with very large scales; flowers large | (7) <i>D. macrophyllus</i> |

Flowers pink.

- | | |
|---------------------------------------------------------------------------------------------|---------------------------|
| Leaves narrow, lanceolate, 3 by 8 in., acuminate; flowers 2 in. long; fruit spiny | (8) <i>D. pinangianus</i> |
| Leaves elliptic, long cuspidate, 7 by 2·5 in.; flowers 1·5 in. long | (9) <i>D. Wrayi</i> |

(1) *D. zibethinus* Linn. *Syst. Nat. ed.* xiii. 581; *Masters, in Hook. fil. F.B.I.* i. 351; *Beccari, Malesia*, iii. 330, *t.* xii. *f.* 1-5; xxxvi. *f.* 1-12.

The Durian is not indigenous to the peninsula, but is cultivated everywhere. It attains a height of 100 ft. The leaves elliptic-oblong, abruptly acuminate, base rounded, 4·5 to 6 in. long, 1·5 to 1·8 in. wide. Flowers 2 in. long, cream-colour, in rather long cymes from the lower side of boughs, in old leaf axils. Stamen bundles united at base only. Fruit 8 to 12 in. long, light brown or green, with stout conical thorns. Seeds 1·5 in. long, buff colour, covered with white pulpy arillus. Only known in cultivation. It varies very little. I have seen trees of which all the flowers

appeared to be male, the female parts abortive. A very small fruited variety with only one carpel and one seed occurs, and a large form with an increase of carpellary whorls, the fruit being open at the top and containing a second abortive fruit surrounded by the normal seeds of the outer carpels, "*Durian Gajah*" of the Malays. The species occurs also on the Malay islands, but whence its origin is doubtful.

(2) *D. malaccensis* Planch. in Hook. fil. *F.B.I.* i. 351; Becc. *Malesia*, iii. 237, t. xii. figs. 6 to 8; King, *l.c.* 51; Masters, *Journ. Linn. Soc.* xiv. 501, t. xiv. figs. 17 to 20.

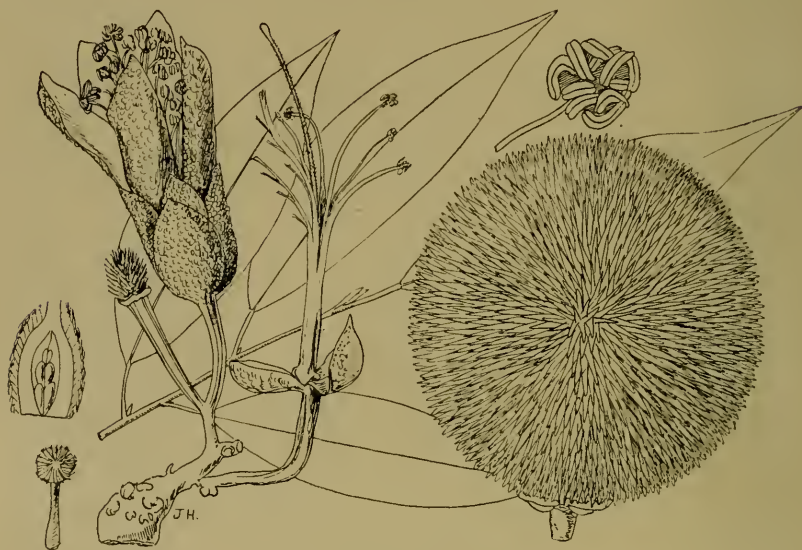


FIG. 26.—*Durio malaccensis*.

A big tree. Leaves elliptic-lanceolate acuminate, acute, base sub-acute or rounded; nerves 20 pairs, slender, visible on both surfaces, thinly coriaceous, above smooth, beneath covered with peltate scales, 5·5 to 7 in. long, 1·5 to 1·8 in. wide; petioles thick, ½ in. long, scaly. Peduncles ½ to 1 in. long, angled bearing 2 to 3 flowers on 1 in. pedicels. Flowers white, 2·5 in. long. Bracts 2, ovate, 1 in. long, acute. Sepals 5, ovate-oblong, scaly, 1 in. long. Petals linear-oblong, 2·5 in. long, ½ in. wide, pubescent with scattered scales outside. Stamens forming a tube, branching into 5 phalanges of several compound filaments free above and bearing a cluster of anthers, shorter than the petals. Style densely woolly. Fruit green with numerous processes. *Hab.* Forests. Malacca, Batu Tiga (Derry, Griffith). Negri Sembilan, Triang Forest

(Foxworthy). Perak, Larut (Barnard); Kwala Kangsar (Foxworthy). *Native name*: Durian Api.

(3) **D. Lowianus** *Scort. King, l.c.* 51.

A tree 50 to 60 ft. tall. Young branches, petioles, and lower side of midrib covered with rather large scales, under-side of leaf with smaller ones. Leaf narrow oblong-elliptic, shortly acuminate, base rounded, thinly coriaceous, glabrous above; nerves 14 to 18 pairs, faint, horizontal, upper surface finely reticulate, 4·5 to 5·5 in. long, 1·5 to 2 in. wide; petioles ·5 in. long. Inflorescence on branches of short-branched cymes, 3 in. long and as much across. Pedicels ·5 to ·75 in. long, scaly. Flowers 2 in. across. Bracts 2 or 3·5 in. across, ovate connate. Calyx campanulate, ·75 in. long, teeth 3, broad blunt shallow, covered with large scales. Petals 5, oblanceolate pubescent outside, glabrous inside, 1·25 in. long. Stamens in 5 phalanges dividing near the base into 8, sub-dividing at the tip into several short filaments with a single anther. Ovary ovoid, scaly; style pubescent. *Hab.* Perak (Scortechini). Kedah, Yan (Haniff).

(5) **D. lanceolatus** *Masters, Journ. Linn. Soc.* xiv. 499.

Branches rather slender. Leaves oblong to lanceolate acute, base rounded, coriaceous; midrib depressed above, very prominent beneath; nerves invisible; scales rather large, 3·5 in. long, 1 in. wide; petioles ·25 to ·3 in. long. Flowers in short clusters on the branches, the scales on bracts and flower-buds large; pedicels often branched, thick, 1 in. long. Flowers small, 2 in. long. Stamens tubular only at base. *Hab.* Hill forests. Selangor, Sempang mines, Semangkok Pass.

The tree was only in bud when I found it, but it closely resembles *D. lanceolatus* Mast., of Borneo, though the nervation is more inconspicuous than in the type.

(5) **D. Singaporensis** *Ridl. Journ. Roy. As. Soc. S. Br.* 73, p. 143.

Large tree. Leaves oblong obtuse or sub-acute, base blunt, rounded, coriaceous glabrous above; midrib channelled, beneath scaly, raw sienna colour; nerves very numerous, very inconspicuous above and not very distinct beneath, 7 to 9 in. long, 2·5 to 3 in. wide; petioles ·25 in. long thick, angled. Flowers in clusters of 2 or 3 on the trunk; peduncles short; pedicels ·5 in. long 4-angled with 2 lanceolate bracts at base, all scaly. Bracts (floral), large ovate acute, 1 in. long and as wide. Sepals oblong, 2 in. long, acute, scaly cinnamon colour. Petals linear-oblong, 1·5 in. long, outside scaly with fringed scales, cinnamon outside, within pubescent, white. Stamens and pistil as in *malaccensis*. Fruit globose spiny green. *Hab.* Forests in the south, Singapore, Bukit Timah; Selitar. Johor, town and Mt. Austen.

(6) **D. Oxleyanus** *Griff. Notulæ*, iv. 531; *Masters, in Hook. fil. F.B.I.* i. 351; *Journ. Linn. Soc.* xiv. 501, t. xvi. 13 to 16.

Tree. Branchlets, petioles, midrib and inflorescence only scaly.

Leaves elliptic-oblong rounded at both ends, glabrous above, pubescent beneath; nerves 15 to 18 pairs, prominent beneath, 3·5 to 5 in. long, 1·5 to 2 in. wide; petioles ·5 in. long. Flowers 1 in. across, crowded in cymes on the branches. Bracts 2, ovate pubescent. Calyx cup-shaped, mouth with 4 shallow blunt teeth, scaly outside. Petals 4, oblanceolate or spatulate, ·5 in. long. Stamens 20, 5 free, alternating with 5 phalanges of 3 each; anthers solitary shorter than the petals. Ovary hairy, not scaly. *Hab.* Malacca (Griffith); Merlimau. Selangor, Sungei Buloh (Foxworthy). *Native names*: Durian daun; Kuripal.

(7) **D. macrophyllus** Ridl. *D. testitudinarum* var. *macrophylla* King, l.c. 53.

Tree 50 to 60 ft. tall, 15 to 24 in. through. Leaves oblong shortly acuminate, base rounded, 13 to 15 in. long, 4·5 to 5·5 in. wide, above smooth, beneath densely covered with large fimbriate scales; petioles 1 in. long. Flowers on the trunk in cymes about 3 in. long of 4 or 5 flowers; pedicels and peduncles angled. Floral bracts 2, ovate acute, 1·25 in. long. Sepals wide and saccate at base, 1·5 in. long, outside covered with large scales fimbriate at edges. Petals waxy white. Petals 2·5 in. long, ·4 in. wide, outside covered with stellate hairs and a few peltate scales with fimbriate edges along the centre, inside glabrous. Staminal column stout, 3 in. long; anthers several in a head on the compound filaments. *Hab.* Forests. Malacca, Hulu Belankan (Goodenough). Perak, Gunong Pondok (Kunstler). Maxwell's Hill. Dindings, Lumut (Curtis). *Native name*: Durian Tana.

(8) **D. pinangianus** Ridl. *D. testitudinarum* var. *pinangiana* Becc. *Malesia*, iii. 246; King, l.c. 55.

Tree of large size. Leaves lanceolate, long acuminate, base rounded; nerves numerous fine very inconspicuous, smooth above, covered with small scales beneath, 5 to 6 in. long, 1·5 to 1·75 in. across; petioles ·5 in. long. Flowers crowded in cymes on the trunk. Bracts ovate-lanceolate obtuse, covered with large scales 1·25 in. long. Sepals 1·5 in. long, broad lanceolate. Petals pink or pinkish white, backs darker, oblong pointed, 2·25 in. long, inside glabrous, outside covered with stellate hairs and a few fimbriate scales. Stamens as long. Style crimson, tomentose. Fruit globose large, with numerous close set long cylindric processes. Aril of seed pink, tasteless. *Hab.* Forests. Penang, West Hill at 2000 ft. altitude. Perak, Gunong Keledang. *Native name*: Durian Burong.

(9) **D. Wrayi** King, l.c. 53.

A large tree. Young branches scaly. Leaves elliptic caudate, base rounded, glabrous above covered with thin scales beneath; nerves 10 to 12 pairs, 5·5 to 8·5 in. long, 2 to 2·5 in. wide; petioles ·75 in. long. Flowers on the branches 2 in. long, rose pink; pedicels 1 in. long. Bracts 3 ovate connate. Calyx cup-shaped, teeth 5, rather deep, sub-acute, outside covered with large scales. Petals

1·5 in. long, oblanceolate-spathulate, clawed, pubescent on both sides. Stamens in 5 phalanges united at base only, each dividing into 5 or 6 processes bearing 8 reniform anthers. Ovary scaly. *Hab.* Upper Perak (Wray). Selangor, Bukit Hitam (Kelsall). Kedah at Yan (Ridley). Perhaps only a form of *D. pinangianus*.

9. BOSCHIA, Korth.

Trees. Leaves entire scaly beneath. Flowers small, axillary. Calyx deeply 4- to 5-cleft. Petals linear-ligulate. Stamens many, some free, some coherent, outer ones abortive; anthers globose opening by a terminal pore. Ovary 3- to 5-celled; ovules 1 or more in each cell. Fruit 3- to 5-valved, muricate. Seeds few ovoid, arils half covering them. Species 4 or 5, Malayan.

B. Griffithii Masters, in *Hook. fil. F.B.I.* i. 352; *Journ. Linn. Soc.* xiv. *pl.* xv. *figs.* 29 to 39; *King, l.c.* 55.

A slender tree 30 to 60 ft. tall. Leaves oblong or elliptic, shortly abruptly acuminate, base round; nerves 8 to 11 pairs, beneath grey 5 to 6 in. long, 1·5 to 2·25 in. wide; petioles 4 to 6 in. long. Flowers 75 in. across, solitary or in 2- to 3-flowered cymes axillary, yellowish white. Bracts 2, ovate scaly blunt. Sepals 4, ovate pubescent, scaly outside. Petals 4 to 8, twice as long, linear or spathulate. Ovary ovoid scaly. Capsule oblong fusiform, scarlet, covered with short spines 1·75 in. long. Seeds 3 to 6, black, 5 in. to 1 in. long, aril half-way. *Hab.* Forests whole peninsula, from Singapore to Kedah. *Common.* *Distrib.* Sumatra. *Native names:* Durian-Durian, hence Dendurian and Daun Durian; Durian Hadji; Dada Ruan.

10. NEESIA, Bl.

Trees. Leaves entire, not scaly; stipules leafy; cymes from the axils of fallen leaves scaly. Bracteoles 3, connate into a cup, covered with scales. Calyx ventricose conical above, opening by a circular orifice at the top, finally dilating and cushion-shaped. Petals 5, free, imbricate. Stamens numerous; filaments more or less united; anthers 2-celled. Ovary oblong, 5-celled. Style short; ovules numerous, biseriate. Fruit large, ovoid woody, muricate, dehiscing part way loculicidally. Seed small; aril small waxy. Species 7, Malayan.

(1) **N. synandra** Masters, in *Hook. fil. F.B.I.* i. 352; *King, l.c.* 56.

A tall straight tree 60 to 70 ft. or more tall. Branches stout. Leaves at the ends of branches, coriaceous, oblong-elliptic to obovate-elliptic, tip rounded emarginate, base sub-cordate, above glabrous, beneath pubescent; nerves 13 to 22 pairs, elevated beneath, 7 to 16 in. long, 3·5 to 8 in. wide; petioles 1·5 to 3 in. long. Cymes 1·5 long, 8- to 12-flowered on the main branches

below the leaves; pedicels short scaly. Flowers 6 in. long, creamy white. Calyx pubescent within, scaly outside, eventually forming a cushion 5 in. across. Petals ovate-lanceolate, glabrous. Ovary pilose. Fruit 6 to 8 in. long, 4 to 5 in. through, ovoid-conic, 5-angled, blue grey, covered with pyramidal spines, dehiscent for about two-thirds of its length, lined internally with pungent yellow hair. Seed 5 in. long, ovoid-oblong, flattened, shining brown or black; aril small, waxy orange-colour, tasteless. *Hab.* Forests, not rare. Singapore, Bukit Timah; Kranji. Pahang, Tahan woods. Malacca (Griffith). Perak, Gopong (Kunstler). Penang, Penara Bukit; Penang Hill, half-way up (Maingay).

11. *CÆLOSTEGIA*, Benth.

Tall trees. Leaves scaly beneath. Inflorescence cymose, scaly. Flowers small, hardly 25 in. across, on the old wood. Bracts connate into a cup. Calyx-tube constricted, gibbous above and constricted above to 5 connivent lobes. Petals 5 inserted in the apex of the calyx tube. Stamens numerous; filaments short thick; anthers globose 3- to 4-celled. Ovary globular 5-celled; style short. Stigma discoid large. Fruit globose, woody muricate outside, dehiscent. Seeds small with a small aril. Species 3, Malayan.

(1) *C. Griffithii* Benth. and Hook. *fil. Gen. Plant.* i. 213; *Masters, in Hook. fil. F.B.I.* i. 353; *Journ. Linn. Soc.* xiv. 505, t. xvi. figs. 43 to 50; *King, l.c.* 57.

A big tree 80 ft. or more tall. Leaves oval acuminate, base rounded, above glabrous, beneath scaly; nerves 8 pairs, 2.4 to 3.75 in. long, 1.25 to 1.6 in. wide; petioles 5 to 7.5 in. long. Cymose racemes on axils of fallen leaves 2 in. long. Flowers 25 in. long, scaly. Bract a 3-lobed cup. Calyx brownish. Petals triangular acute, connivent fleshy, dark pink. Ovary densely scaly. Fruit globose about 5 in. through, black outside and densely spiny with short spines, inside orange colour, dehiscent one-third of its length. Seed 5 in. long, mahogany brown, aril triangular, yellowish brown. *Hab.* Not rare in forests. Singapore, Garden Jungle; Bukit Timah. Pahang, Tahan woods. Malacca, Selendor (Cantley). Perak (Scortechini, Kunstler). Negri Sembilan, Senawang (Foxworthy). *Native names:* Punggai; Ha-ha. *Use:* Bark used in tanning fishing-nets.

ORDER XXIV. STERCULIACEÆ.

Trees, shrubs (or herbs). Young parts usually stellate-tomentose. Leaves alternate, simple, often lobed. Inflorescence axillary, rarely terminal, cymose or paniced. Flowers regular, unisexual. Sepals 5, often connate. Petals 5 or 0. Stamens in a column or

tube many, or rarely few free; anthers in heads, or a single ring on the top of the column, or along the edge of a cup or tube; anther-cells 2. Ovaries 2 to 5, free, rarely 1; ovules many or few attached to inner angles of ovaries; styles as many as ovaries, free or nearly so. Fruit capsular or dry indehiscent. Tropics and subtropics generally. Species 500 or more.

i. STERCULIÆ. Trees often large; flowers unisexual; petals none; stamen-column with anthers on the apex, clustered or in a ring.

Calyx small, lobes tailed; follicles coriaceous, red; seeds 2 or more, black pendulous on edges

1. STERCULIA

Calyx small, lobes lanceolate; follicles very large membranous, green, 1 seed at base of each

2. SCAPHIUM

Calyx campanulate; follicles membranous, opening before ripe; seeds 2 in each

3. PTEROCYMBIUM

Calyx long tubular; follicles membranous

4. ERYTHROPSIS

Fruit of thick samaras with falcate wings

5. TARRIETIA

Fruit woody, indehiscent, keeled

6. HERITIERA

ii. HELICTERÆ. Shrubs or medium trees; flowers bisexual; petals deciduous; stamen column bearing a cup edged with anthers and staminodes, 5 to 15.

Shrub; flowers pink, capsule membranous inflated

7. KLEINHOVIA

Shrub; flowers purple or white; capsule woody not inflated; seed not winged

8. HELICTERES

Trees; flowers large, white; capsule woody, large; seed winged

9. PTEROSPERMUM

iii. DOMBEYÆ. Flowers bisexual; petals persistent; anthers 10 to 20 on the tip of a cup on the column.

Herb; petals red

10. PENTAPETES

iv. HERMANNIÆ. Flowers bisexual; stamens 5; staminodes o.

Shrubby herb or shrub; capsule 5-celled; flowers pinkish

11. MELOCHIA

Shrubby; flowers yellow; capsule 1-celled, 1-seeded

12. WALTHERIA

v. BYTTNERIÆ. Petals clawed; filaments in a tube with anthers at top.

Stamens 1 row in groups between staminodes; petals clawed; shrub; capsule large bristly

13. ABROMA

Stamens in 1 row, solitary between staminodes; petals clawed with 2 lateral lobes and a long appendage; climbers

14. BYTTNERIA

vi. LEPTONYCHIÆ. Petals not clawed.

Petals linear, simple; stamens 5; staminodes 5; tree; capsule bristly

15. COMMERSONIA

Stamens in several series; capsule not bristly; tree

16. LEPTONYCHIA

Stamens in 1 circle, 6, connate in a cup at base

17. LEPTONYCHIOPSIS

Stamens in a funnel-shaped tube; anthers 5

18. PENICULIFERA

1. STERCULIA, Linn.

Trees or shrubs. Leaves entire or lobed or digitate-compound. Inflorescence paniced or racemose, axillary. Flowers male with few bisexual or female. Calyx tubular, lobes acuminate or tailed,

pink or green, small 4- to 5-lobed. Petals 0. Staminal column with a head of sessile anthers at the top. Carpels 5, distinct on a gynophore, when ripe follicular coriaceous spreading, dehiscing, on one side, scarlet. Seeds oblong pendent from edge, black. Species about 200, all tropics.

- Leaves large 6- to 7-lobed, digitate (1) *S. foetida*
 Leaves simple, large orbicular 12 in. long tomentose beneath (2) *S. macrophylla*
 Leaves quite glabrous, simple.
 Inflorescence racemose (rarely a few short branchlets).
 Leaves elliptic; flowers pedicelled; shrub (3) *S. lævis*
 Leaves oblong cuspidate; flowers sub-sessile (4) *S. hyposticta*
 Leaves oblong-linear (5) *S. elongata*
 Flowers paniced. Trees.
 Leaves oblong-lanceolate, acute both ends (6) *S. parvifolia*
 Leaves obovate round at both ends; panicles much branched (7) *S. lancaviensis*
 Leaves elliptic-obovate, base broad blunt; ovaries 3, villous; stamens 7 (8) *S. Kunstleri*
 Ovaries 5, scaly; stamens 10 (9) *S. parviflora*
 Leaves scurfy at back, 4 in. long (10) *S. Scortechinii*
 Leaves hairy on back, strongly reticulate red-hairy; carpels ovate (11) *S. rubiginosa*
 Leaves red scurfy on midrib and nerves.
 Leaves large; carpels long-beaked (12) *S. rostrata*
 Leaves large; carpels short, not beaked (13) *S. brachycarpa*
 Whole plant densely long red-hairy (14) *S. hispidissima*
 Leaves tomentose beneath; nervules not conspicuously elevate.
 Leaves oblong-lanceolate, densely tomentose, base narrowed (15) *S. angustifolia*
 Leaves oblong-obovate, thinly tomentose, base broad (16) *S. javanica*
 Leaves small, oblong, pale beneath (17) *S. bicolor*

(1) *S. foetida* Linn. *Sp. Pl.* 1008; *Wight, Ic. t.* 181, 364; *Masters, in Hook. fil. F.B.I.* i. 354.

A big tree about 80 ft. tall. Branches whorled. Leaves digitate; leaflets 7 to 9, elliptic-lanceolate, 6 in. long, 2 in. wide, pubescent when young, glabrous when adult; petioles 8 in. long. Panicles erect, many-flowered, appearing with the young leaves. Calyx dull orange or red, .5 to .7 in. across, lobes oblong-lanceolate villous within. Anthers 12 to 15. Carpels 5, when ripe large woody, boat-shaped, beaked, glabrous. Seeds 10 to 15, black smooth. *Hab.* In villages, probably introduced only. Province Wellesley, Bukit Juru. Perlis, at Kanga. *Distrib.* East Africa, India, Moluccas, N. Australia. *Native name:* Kelompang. *Use:* Seeds eaten.

(2) *S. macrophylla* Vent. *Hort. Malm.* ii. 91 (*in note*); *Br. Benn. Pl. Jav. Rar.* 230; *Masters, l.c.* i. 356; *King, Journ. As. Soc. Beng. l.c.* 63.

A large tree about 60 to 120 ft. tall. Young branches thick,

hairy. Leaves coriaceous, ovate or ovate-round entire, base cordate, above minutely pubescent, beneath sub-tomentose, midrib and 6 to 8 pairs of nerves rufous-villous, transverse; nervules distinct, 8 to 16 in. long, 6 to 12 in. wide; petioles 3·6 to 6 in. long softly hairy. Panicles 6 to 8 in. long, axillary much-branched; branches slender pubescent. Calyx 1·5 in. across, campanulate, stellate-hairy, 5-lobed; lobes triangular, shorter than the tube. Follicles 3 to 5, leathery-woody, 2·25 in. long and wide, shortly stalked, pink to crimson, pubescent outside. Seeds oblong black, 75 in. long. *Hab.* A common tree in forests at low altitudes. Singapore, Johor, Pahang, Malacca, Selangor, Perak and Penang. *Distrib.* Java. *Native name:* Milian.

(3) *S. lævis* Wall. *Cat.* 1138; *Masters, l.c.* i. 357; *Pierre, Fl. For. Cochinchine, t.* 192, *figs.* 1 to 7; *King, l.c.* 63. *S. coccinea* Jack, *Mal. Misc.* i. 286 (*not of Roxburgh*).

A shrub about 6 ft. tall. Leaves membranous obovate-oblong or obovate, shortly bluntly acuminate, base acute, glabrous; nerves 6 to 9 pairs, 4·5 to 9 in. long, 2 to 3 in. wide; petioles 1·1 to 2·5 in. long. Panicles short, few-flowered axillary pendulous pubescent. Calyx 5 in. long, green or whitish yellow, tips of lobes green, pubescent, tube urceolate, lobes longer linear-oblong sub-acute. Male flowers, staminal column short, glabrous, brown; anthers 10, sessile at the top, pollen brilliant orange colour. Hermaphrodite flowers, gynophore short. Ovaries 5 pubescent, boat-shaped, with 10 sessile anthers outside at the base. Stigmas 5, cylindric recurved. Follicles 3 to 5 coriaceous narrow oblong, puberulous, 2 in. long, 1·5 in. wide, scarlet. Seeds 3 or 4 on each side, blue black. Very common over the whole peninsula from Singapore to Penang, Kelantan and Pulau Adang isles, in forests, at low levels. There are two forms, (a) *latifolia* with broad leaves about 3 in. across and (b) *angustifolia* with narrow long leaves 2 in. across. *Distrib.* Tenasserim, Borneo. *Native name:* Chempaka Janggi.

(4) *S. hyposticta* Miq. *Fl. Ind. Bat. Supp.* 399; *King, l.c.* 64.

A shrub 3 to 6 ft. tall, glabrous except the inflorescence. Leaves membranous, oblong, or oblong-lanceolate abruptly caudate acuminate, base rounded, often emarginate; nerves 3 to 5 pairs, inarching from margin, prominent beneath, 3·5 in. long, 1·5 to 2·25 in. wide; petioles 1 to 1·5 in. long. Racemes solitary axillary, 6 in. long pubescent and hairy. Calyx-tube campanulate, 25 in. long, densely pubescent outside, lobes shorter than tube, linear glandular-pilose within, white. Male flowers; column short; anthers sessile. Female flowers, gynophore short; ovaries 4 ovoid tomentose; anthers sessile. Style simple, villous. Stigma large, lobes 4 oblong ovoid. Carpels 2 or 3 leathery red narrow oblong 2 to 2·25 in. long, 65 in. wide pubescent outside. Seeds 4, oblong pointed, black. *Hab.* In dense forests. Pahang, Kwantan (Durnford). Perak, Gunong Batu Putih (Wray); Larut Hills (Kunstler),

Chankat Mentri (Kloss); Gunong Bintang (Kloss). Tringganu, Bundi (Rostado). *Distrib.* Cochín-China, Nicobars, Sumatra.

(5) *S. elongata* Ridl. *Journ. Roy. As. Soc. S. Br.* 54, p. 28.

Shrub about 10 ft. tall. Leaves oblong-linear acuminate obtuse, margins often undulate, glabrous sub-coriaceous, 6 to 12 in. long, 2 in. wide; nerves distinct beneath 18 to 26, meeting in loops far from the margin; petioles .5 to 1.5 in. long. Raceme 6 in. long, rachis hairy. Flowers about 14; pedicels .5 in. long. Calyx pubescent, tube campanulate .2 in. long, lobes linear hairy connivent .3 in. long. Staminal-column shorter than the tube; anthers 8. Follicles 5, elliptic-ovate cuspidate 2 in. long, 1 in. wide, red, pubescent outside. Seeds 4 in each carpel, sub-globose. *Hab.* In forests, local. Singapore, Bukit Timah, etc. Malacca, Bukit Kanding (Cantley).

(6) *S. parvifolia* Wall. *Cat.* 1123; *Masters, l.c.* i. 356; *King, l.c.* 64.

A tree 20 to 30 ft. tall, glabrous. Leaves membranous, oblong-lanceolate acuminate blunt, base acute or rounded; nerves 6 to 8 pairs, prominent beneath, 4 to 6.5 in. long, 1 to 1.75 in. wide; petioles 1 to 1.75 in. long; racemes axillary solitary, 2 in. long, few-flowered, glabrous. Calyx less than .5 in. long, glabrous outside, puberulous inside pink, lobes greyish, tube broad cylindric, lobes linear-lanceolate as long. Male flowers, staminal column short; anthers 12. Female, ovaries 5 ovate pubescent; styles united recurved, white-hairy. Stigmas clavate. Follicles 3 to 5 oblong, 1 to 1.25 in. long, .6 in. wide. Seeds 2, ovoid, black. *Hab.* Hill woods. Selangor, Weld's Hill; Kwala Lumpur (Foxworthy). Perak, Thaiping Waterfall (Wray). Penang, Government Hill (Curtis, Wallich). *Native name*: Unting-Unting.

(7) *S. lancaviensis* Ridl. *Journ. Roy. As. Soc. S. Br.* 54, p. 29.

Small tree, deciduous. Leaves grey when dry, obovate, tip rounded, glabrous; nerves 5 pairs, 3.5 in. long, 1.5 in. wide; petioles .25 to .5 in. long. Panicles lax, much-branched, 1 to 1.5 in. long, pubescent, produced after the fall of the leaves. Male flowers campanulate, .12 in. long, lobes lanceolate-linear blunt, edges hairy. Stamens 6, column as long as tube. Female flowers campanulate .2 in. long, lobes ovate, very short, scabrid pubescent inside with 12 raised veins; anthers 5. Lankawi Islands, Kwah and Terutau (Curtis).

Really allied to *S. bicolor*, but glabrous.

(8) *S. Kunstleri* King, *l.c.* 65.

Glabrous tree 30 to 50 ft. tall, 1.5 to 2 ft. through. Leaves thinly coriaceous, bright green mottled yellow, broadly ovate to oblong or narrowly elliptic, tip rounded, blunt or shortly abruptly acuminate, base rounded or blunt; nerves 7 to 9 pairs, 4 to 9 in. long, 2 to 4.5 in. wide; petioles .75 to 2.75 in. long, slender.

Panicles solitary axillary 3 in. long, flocculent tomentose, base nude, lateral branches numerous, short. Calyx '3 to '35 in. long, urceolate, tube stellate tomentose outside, creamy white, base tinged light red, lobes shorter than tube, linear-lanceolate, villous inside, tomentose outside. Male flowers, stamen-column short with 5 anthers. Female flowers, ovaries 3, villous with a ring of yellow at base. Stigmas fleshy, clavate bent on themselves. Follicles 2 or 3, woody, peach-coloured to carmine, oblong, base rounded, tip acute, tomentose outside, 3 to 3'5 in. long, 1'25 to 1'5 in. wide. Seeds narrow, ovoid nearly 1 in. long. *Hab.* In dense jungle; Perak, Goping (Kunstler). *Distrib.* Sumatra.

(9) **S. parviflora** Roxb. *Hort. Beng.* 50; *King, l.c.* 66. *S. Maingayi* Masters, *l.c.* i. 359; *Pierre, Fl. For. Cochinchine, t.* 188A.

A big tree 50 to 60 ft. tall and 18 in. through. Leaves membranous, ovate or obovate-oblong, shortly bluntly acuminate, base rounded and slightly cordate, glabrous, midrib and 7 or 8 pairs of nerves prominent, stellate-pubescent when young, 4 to 10 in. long, 2 to 5'5 in. wide; petioles tomentose, 1 to 4 in. long. Panicles red-tomentose, slender, 5 to 6 in. long. Branches distant, short, '5 in. long. Calyx '2 in. long, tube urceolate, lobes linear-lanceolate, nearly as long, pink, tomentose outside, glabrous within. Male flowers, staminal column with 10 sessile ovate anthers. Female flowers, ovaries 5, scaly with a ring of anthers at base. Stigmas united into a 5-lobed disc of 5 recurved stigmas. Follicles 1 to 5, thickly coriaceous bright red to orange, pubescent or glabrescent, oblong, short-beaked, 2'5 to 3'5 in. long, 1'25 to 1'5 in. wide. Seeds black '6 in. long. *Hab.* Common in woods in the low country, Singapore, Pahang, Malacca, Perak and Panang. *Distrib.* Burma, Sylhet, Cochin-China. *Native names:* Kadampang; Rongga Jantan.

(10) **S. Scortechinii** King, *l.c.* 67.

A tall tree. Leaves thinly coriaceous, oblong, slightly obovate, tip rounded, abruptly short acuminate blunt, base narrowed rounded minutely cordate, above glabrous, beneath minutely gland-dotted; midrib and nerves 4 or 5 pairs, stellate pubescent, 2 nerves rising straight from the base, 2 to 5 to 3'5 in. long, 1'25 to 1'65 in. wide; petioles '65 to 1 in. long, pulverulent. Panicles raceme-like, axillary solitary, tomentose, 2 in. long. Calyx campanulate, divided nearly to base into 5 ovate lobes, pubescent tomentose on both sides. Male flowers with 10 anthers on the column. Females, ovary 3-celled obliquely ovoid, pubescent, scaly; ovules 3 to 4 in each cell; styles connate, pubescent. Stigmas 3, ovoid. Fruit unknown. *Hab.* Perak, locality unknown (Scortechinii).

(11) **S. rubiginosa** Vent, *Hort. Malmaison, ii.* 91; *Masters, l.c.* i. 358; *Pierre, Fl. For. Cochinchine, t.* 194B. *S. angustifolia* Jack. *Mal. Misc.* i. 21 (not of Roxburgh). *S. Jackiana* Wall. *Cat.* 1134.

A tree about 20 to 30 ft. tall. Leaves membranous, obovate-oblong, shortly abruptly acuminate, base narrowed acute, rounded or cordate above glabrous, beneath stellate-pubescent; midrib and 7 to 10 pairs elevated nerves more hairy, 4·5 to 7·5 rarely to 12 in. long, 2 to 3, rarely 6 in. across; petioles 1·3 to 1·5 in. long, rufous-tomentose. Panicles solitary, axillary pendent 3 to 6 in. long, rufous-tomentose. Male flowers yellow with pink hairs and 5 dark red blotches at the base inside, widely campanulate, lobes

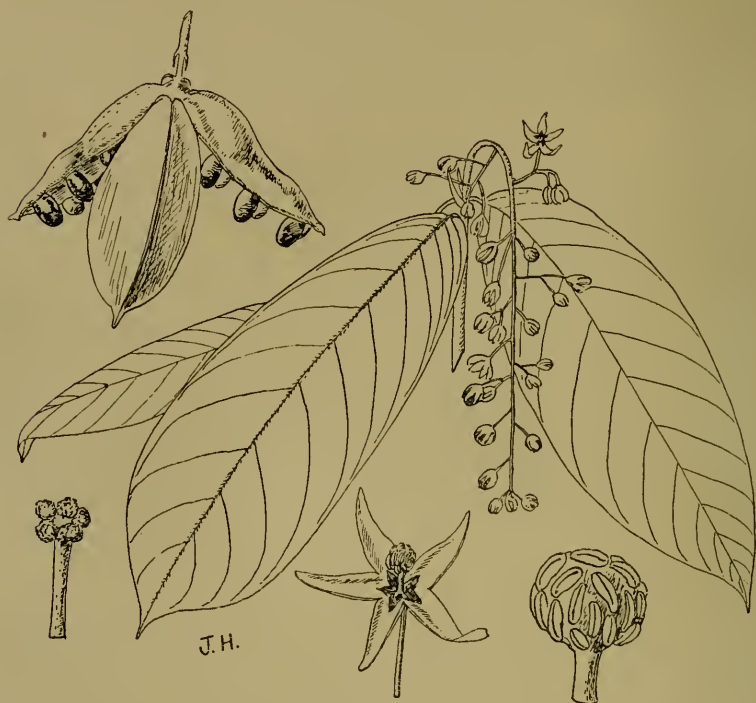


FIG. 27.—*Sterculia rubiginosa*.

linear-lanceolate. Staminal column longer than the tube; anthers 10, yellow. Female flowers on different sprays of the same tree, lobes of calyx lanceolate, free nearly to the base, hairy with pink and white hairs, except at the base where are 5 pink spots. Gynophore short with 10 anthers at base of pistil. Ovary villous; styles united. Stigmas 3 or 5, all greenish white. Follicles 5, coriaceous, oblong, shortly beaked, 2 in. long, 1 in. wide, pubescent outside, crimson scarlet. Seed ellipsoid, blue black. *Hab.* Common in woods in open country, whole peninsula from Singapore

to Penang. *Distrib.* Cochinchina, Burma, Java and Sumatra. *Native names:* Dudanak; Saburu; Sakelat; Unting-Unting Besar.

var. *ensifolia* Ridl. *S. ensifolia* Masters, in Hook. *fl. F.B.I.* i. 359; *King, l.c.* 70.

A shrub 8 to 12 ft. tall, or even shorter. Leaves narrow lanceolate, or oblanceolate acuminate, 6 to 10 in. long, 1.5 in. to 2.5 in. wide. Flowers .75 in. long in simple pendulous racemes, 1 ft. or more long. *Hab.* In dense forests, usually at some altitude up to 3000 ft. Dindings, Gunong Tungul. Perak; Thaiping Hills. Province Wellesley, Kubang Ulu (Curtis). Penang, near the Waterfall and Moniot's Road.

(12) *S. rostrata* Ridl. *Journ. F.M.S. Mus.* iv. 7.

A small tree about 20 ft. tall. Leaves obovate-oblong, acute with a short cusp, base rounded; nerves 12 pairs, elevate beneath, 8 in. long, 3 in. wide, dull green above, glabrous with a few hairs on midrib and nerves, beneath yellowish; nerves hairy; petioles 2 in. long, hairy. Panicle 6 in. long. Branches few short hairy. Male flowers .1 in. long red, lobes lanceolate not tailed, tips connate, tube campanulate very short; anthers 5. Follicles 4, elongate-lanceolate acuminate stalked 4 in. long with a long terete curved beak as long, 2 in. across. Seeds 6 in a follicle, .5 in. long. *Hab.* Pahang at Telom, on the river-bank, rare (Ridley).

(13) *S. brachycarpa* Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 63.

Tree 50 to 60 ft. tall, 8 to 12 in. through. Leaves elliptic or obovate-elliptic, abruptly acuminate, chartaceous, base rounded or shortly cuneate glabrous except nerves beneath; nerves 9 pairs elevate beneath, as are the conspicuous reticulations, all sprinkled with stellate hairs; midrib prominent, red-stellate-hairy, 6 to 11 in. long, 3 to 5.5 in. wide; petioles 1.5 to 2 in. long, red-hairy. Racemes 3 to 3.5 in. long, slender densely red-hairy. Flowers remote; pedicels .25 in. long. Sepals .2 in. long, broad lanceolate acuminate blunt, densely hairy. Stamen-column half as long and as wide. Seed oblong. *Hab.* Hill forests at 3000 ft. altitude. Selangor. Sempang mines (Ridley). Perak, Batang Padang district (Kunstler).

(14) *S. hispidissima* Ridl. *Journ. Roy. As. Soc. S. Br.* 54, p. 30.

Shoots roughly red-hairy. Leaves elliptic or oblong, base broad, truncate, shortly cordate, tip cuspidate, membranous above covered with scattered pale hairs, with stellate tufts on nerves and reticulations, beneath more thickly covered with stellate hairs and long rough hairs; midrib densely tomentose with stellate hairs and long hairs mixed; nerves 7 to 10 pairs, 4 to 6 in. long, 2 to 3 in. wide. Panicles numerous crowded at the ends of the branches, 6 to 8 in. long, densely rough-hairy. Branches 1 in. long. Male flowers, .3 in. long, tube campanulate, lobes as long, linear, ciliate. Staminal column as long as tube; anthers 8. Female flowers and fruit unknown. *Hab.* Rare, Selangor, at Ulu

Gombak (Burn-Murdoch) and in Cantley's herbarium with no locality.

(15) **S. angustifolia** Roxb. *Hort. Beng.* 50; *Pierre, Fl. For. Cochinchine*, t. 190; *King, l.c.* 68. *S. Balanghas* var. *mollis*, *Masters, l.c.* i. 358.

A tree 30 to 40 ft. tall. Branchlets velvety rusty-tomentose. Leaves membranous oblong rarely obovate-lanceolate acuminate or acute, narrowed to the rounded base, above glabrous, beneath densely red-tomentose, 4 to 7 in. long, 1.25 to 2.25 in. wide; petioles .6 to 1.1 in. long, red-tomentose. Panicles crowded at the ends of the branches, solitary axillary lax, drooping red-tomentose, 2 to 6 in. long. Calyx .2 in. wide, hairy except the inside of the tube, dark red, lobes linear-lanceolate, longer than tube. Male flowers, staminal column as long as tube with 10 sessile anthers. Female with 5 ovaries and 10 sessile anthers at base. Style short. Stigmas longer recurved. Follicles 4 to 5, ovate-oblong, beak short curved, 2.75 in. long, 1.35 in. wide, velvety tomentose outside. *Hab.* High up on limestone rocks, rare. Perak at Gunong Pondok (Kunstler). *Distrib.* Burma.

(16) **S. javanica** Br. *Benn. Pl. Jav. Rar.* 230. *S. pubescens* *Masters, l.c.* i. 357.

A large tree. Leaves elliptic-oblong or ovate, shortly acuminate blunt, base rounded peltate, coriaceous, above glabrous, beneath tomentose-hairy; nerves 9 pairs, 5 to 6 in. long, 2.25 to 2.75 in. wide; petioles rufous-hairy, 1 in. long. Panicles lax with short branches, 6 in. long. Branches 1 in. long or less slender, tomentose. Flowers numerous small, .1 in. long on short pedicels. Calyx-tube very short, lobes 5, lanceolate blunt red-tomentose outside, white-tomentose inside. Staminal-column very small as long as the tube; anthers minute. Female flowers much larger, .2 in. long, campanulate hairy outside, glabrous within, lobes lanceolate sub-acute. Carpels pyriform, quite glabrous, 2 in. long, shortly cuspidate. *Hab.* Not common, Johor Road to Gunong Pulai. Malacca (Maingay). Penang, Waterfall (Curtis). Lankawi, Terutau (Curtis). *Distrib.* Java and Sumatra.

The panicles are often entirely male, but in female panicles there are usually a small number of male flowers intermixed.

(17) **S. bicolor** *Masters, l.c.* i. 359; *King, l.c.* 67.

Tree 40 to 60 ft. tall. Leaves on branch-ends membranous obovate-oblong acute, narrowed to the rounded base, above glabrous, beneath whitish, densely minutely tomentose; midrib and 16 to 18 pairs nerves tomentose, 2.5 to 3 in. long, 1.2 to 1.4 in. wide. Panicles 2 to 3 in. long slender tomentose. Branches .5 in. long. Calyx tube ovoid-oblong, widely campanulate, .3 in. long, lobes as long as tube linear. Staminal column with 12 anthers. Female flowers and follicles unknown. *Hab.* Rare, Malacca (Maingay). Perak at Thaiping (Wray).

2. SCAPHIUM, Endl.

Large trees with coriaceous leaves and panicles of small unisexual flowers, usually tomentose. Calyx tubular, often very short. Staminal column stalk short or long; anthers in a globose head 10 to 30, narrow. Female flowers, ovaries 3 to 5; style short. Carpels very large, thin, membranous, green boat-shaped, with a single ellipsoid seed at the base. Species 4, Martaban, Malay Peninsula and Borneo.

Leaves broad, ovate-cordate (1) *S. linearicarpum*

Leaves oblong, base entire.

Panicles densely tomentose; stamen-head subsessile glabrous (2) *S. affine*

Panicle sub-glabrous; stamen-head stalked woolly (3) *S. longiflorum*

S. linearicarpum Ridl. *Journ. Roy. As. Soc. S. Br.* 73, p. 144. *Sterculia linearicarpa* Masters, in *Hook. fil. F.B.I.* i. 360; *King, l.c.* 740.

Tree 60 to 80 ft. tall, with large leaf-scars on the branches. Leaves coriaceous ovate-orbicular cordate, obtuse or rounded at tip; nerves 7 pairs strongly elevate, pubescent beneath, reticulations conspicuous, 6 to 14 in. long, 5 to 14 in. wide; petioles 6 in. long or less. Panicles rather lax, ferruginous, 7 to 8 in. long. Bracts oblong, red-tomentose. Flowers very small on tomentose pedicels 1 in. long. Calyx tube 1 in. long, lobes a little longer, ovate acute, tomentose outside. Stamen-column shorter than calyx-tube, glabrous; anthers 10, cuneate 2-celled. Ovaries 3 free. Follicles 2, boat-shaped acuminate, densely yellow-woolly, 3.2 in. long, acuminate, on yellow woolly pedicels .5 in. long. Seed 1. *Hab.* Malacca (Maingay); Perak (Scortechini, Kunstler).

(2) ***S. affine*** Ridl. *Journ. Roy. As. Soc. S. Br.* 73, p. 144. *Sterculia affinis* Masters, *l.c.* i. 361. *S. scaphigera* King, *Journ. As. Soc. Beng. l.c.* 75 (partly) not of Wallich.

Tree 60 to 80 ft. tall. Leaves coriaceous glabrous, oblong or oblong-ovate obtuse shortly acuminate, base rounded (lobed when young); nerves elevate beneath, 6 pairs, reticulations conspicuous, 5 to 7 in. long, 2.2 to 3.2 in. wide; petioles 3 to 3.5 in. long, thickened at apex. Panicles axillary 6 to 7 in. long, red-tomentose. Branches numerous 2.5 in. long. Flowers numerous, green, very small. Bracts ovate, woolly. Calyx 1 in. long, tube very short, lobes 4, ovate, minutely scurfy, as long as the tube. Anther head nearly sessile, with a very short glabrous stalk; anthers 12, minute, glabrous. Follicles 1 to 5 on pubescent stalks .5 in. long, green membranous 6 to 8 in. long, glabrous. Seed 1, ovoid brown, .5 to 1 in. long. *Hab.* Not rare in the forests in south of the peninsula. Singapore, Garden Jungle. Malacca (Griffith). Sungei Hudang and Merlimau. Pahang, Kota Glanggi (Ridley). *Native names:* Kembang Semangkok (lit. Fill Cup); S'ilayer. *Use:*

The seed, immersed in water for a night, exudes a gum, containing Bassorin, to such an extent as to fill a small cup. This, mixed with sugar-candy, is eaten as a stomachic, and is very pleasant and wholesome.

(3) **S. longiflorum** Ridl. *Journ. Roy. As. Soc. S. Br.* 73, p. 143.

Tree. Leaves coriaceous, elliptic-rounded, shortly acuminate blunt, beneath sometimes glaucous; nerves strongly elevate, 7 pairs, reticulations large, distinct beneath, 4·5 to 6 in. long, 2·8 to 3 in. wide; petioles 2 to 2·1 in. long. Panicles 6 in. long, sparingly red-tomentose compact, much-branched. Flowers numerous, glabrous; pedicels 1 in. long. Calyx 3 in. long, tube cylindric 2 in. long, lobes ovate. Stamen-column longer densely woolly, stamens 8, backs woolly. Fruit unknown. *Hab.* Forests. Perak (Scortechini); Waterfall Hill (Wray); Gunong Bubu (Kunstler).

Differs from *S. affine* Masters in the less woolly panicle, much longer flowers and long woolly stalk to the head of stamens; the leaves are smaller and more coriaceous.

3. PTEROCYMBIUM, Benn.

Trees. Leaves entire or lobed. Flowers unisexual. Calyx campanulate. Male, staminal column tall with 8 or 10 sessile anthers in a ring. Female, with abortive anthers, otherwise as in male, and 5, rarely 6 pistils on the tip of a column, sessile, distinct. Styles as many, slightly cohering. Stigmas recurved. Carpels 4 to 6 foliaceous, boat-shaped, unequally bilobed, opening before they are ripe, on short pedicels on a gynophore as long as the enlarged persistent calyx. Seed at base 1. Species 2, Burma, Nicobars, Malaya.

Leaves ovate acuminate sometimes lobed, cordate.

Calyx campanulate (1) **P. javanicum**

Leaves oblong-elliptic, base round not cordate.

Calyx tubular (2) **P. tubulatum**

(1) **P. javanicum** R. Br. *Benn. Pl. Jav. Rar.* 219, t. 45. *Sterculia campanulata* Wall., *MSS.*; *King, l.c.* 76.

Tree 50 to 70 ft. tall, 15 to 20 in. through, leafless in flower. Leaves ovate or oblong-ovate acute or acuminate, glabrous above pubescent or hairy on the nerves beneath or quite glabrous, base cordate or rounded, 4 to 7 in. long, 4 in. wide; petioles 1·5 to 4·2 in. long. Panicles 1 to 3 in. long in flower, enlarging very much in fruit. Calyx 5 in. long, glabrous, campanulate, lobes broad lanceolate, 2 in. long, 1 in. wide, tube as long, coriaceous green, edges velvety. Stamen-column as long as the sepals; anthers linear curved. Follicles membranous 3 to 6 on a gynophore as long as the enlarged sepals, with pedicels pubescent, 5 in. long, boat-shaped, 2 to 3 in. long, with 2 lobes, the lower broad, rounded, the upper

one linear obtuse, 4 in. wide, glabrous. Seed 4 in. long, ellipsoid. *Hab.* Open forests by creeks or open woodland. Perak, Gunong Bubu (Kunstler). Perlis, near Kanga. *Distrib.* Burma, Nicobars, Java, Philippines. *Native names:* Kluet; Kulunot.

(2) ***P. tubulatum* Ridl.** *Sterculia tubulata* Masters, in Hook fil. *F.B.I.* i. 362; *King, l.c.* 76.

A tree. Leaves thinly coriaceous, elliptic-oblong apiculate, base rounded or truncate, glabrous except midrib and nerves 5 to 7 pairs, minutely rusty-tomentose, 4 in. long, 1.75 in. wide; petioles .75 in. long. Panicles terminal 6 in. long, glabrous, many-flowered. Calyx .5 in. long glabrous, tube cylindric .25 in. long, mouth expanded, lobes 5, ovate-lanceolate. Stamen-column pilose; anthers in a ring. Ovaries 5. Follicles 5, 2 to 3 in. long, 1 in. wide, on tomentose stalks much resembling those of *P. javanicum*. *Hab.* Very rare in forests, Malacca (Maingay).

4. ERYTHROPSIS, Endl.

Trees, deciduous when in flower. Leaves shallowly or deeply lobed. Flowers showy, red-orange in racemes or panicles. Calyx funnel-shaped about 1 in. or more long, shortly 5-toothed. Petals 0. Staminal-tube as long as calyx or longer; anthers about 20, sessile 1-celled. Ovaries 5, flask-shaped. Follicles membranous, stipitate, 2-seeded. Species 2, India and Malay Peninsula.

(1) ***E. fulgens* Ridl.** *Sterculia fulgens* Wall. *Cat.* 1135; *Masters, l.c.* 360; *King, l.c.* 72.

A tree 30 to 70 ft. tall. Leaves caducous, thinly coriaceous, cordate round with 5 acuminate lobes, glabrous above, stellate-pubescent beneath, palmately 7-nerved; nerves prominent beneath, 15 to 18 in. long and wide; petioles 15 to 20 in. long, puberulous. Flowers produced when the tree is leafless in racemes or panicles 3 to 4 in. long. Calyx 1.25 in. long, funnel-shaped with 5 triangular teeth, orange scurfy, inside puberulous. Staminal-tube longer, tomentose; anthers sessile, 20, oblong, 1-celled, surrounding 5 flask-shaped ovaries. *Hab.* In forests; Perak, Temengo. Selangor, Kwala Lumpur. Penang Hill; abundant and very conspicuous when in flower.

5. TARRIETIA, Bl.

Tall or gigantic trees. Leaves coriaceous, simple or digitate. Flowers small, unisexual, paniced. Calyx tubular, small, 5-toothed. Petals 0. Staminal-column short, with a ring of 10 to 15 densely clustered anthers; cells parallel. Ovary of 3 to 5 carpels opposite the sepals; styles short, filiform; cells 1-ovuled. Fruit of large spreading samaras; wings long falcate. Seeds oblong. Species 5 to 6, Malaya, Cochin-China and Australia.

Leaves compound digitate.

Under-surface stellate tomentose . . . (1) **T. perakensis**

Under-surface deciduously simple hairy . . . (2) **T. Curtisii**

Leaves simple, ovate-oblong, large stiff coriaceous.

Fruit glabrous; leaves ovate . . . (3) **T. simplicifolia**

Fruit tomentose; leaves oblong . . . (4) **T. Kunstleri**

Leaves unifoliate, oblong; petiolule jointed on petiole, small rather thin, coriaceous . . . (5) **T. unifoliolata**

(1) **T. perakensis** *King, Journ. As. Soc. Beng. l.c. 77.*

Tree 30 to 60 ft. tall, 1·5 to 2 ft. through. Young parts, petioles, petiolules, under-surface of leaves when young and inflorescence covered with a rusty tomentum. Leaves digitate, of 5 or 6 leaflets obovate to elliptic, shortly abruptly acuminate, base narrowed; nerves 10 to 14 pairs, prominent beneath; middle leaflet 4·5 to 5·5 in. long, 2 to 3 in. wide, lower ones 2 to 3·5 in. long, 1·25 to 1·5 in. wide; petiolules ·5 to 1 in. long; petioles ·3 to 4·5 in. long. Panicles cymose axillary, crowded at the tips of the branches, red-tomentose. Flowers ·15 in. long; pedicels slender, dark red. Calyx-tube tomentose outside, dark red-pubescent inside. Staminal column less than half as long. Female rather larger with no stamens, 5 ovoid glabrous ovaries. Fruit ovoid compressed, 1·25 to 1·5 in. long, 1·15 in. through, glabrous; wing falcate, 2 in. long, ·5 in. wide, glabrous. *Hab.* Rocky woods, Perak, Thaiping Hills (Kunstler).

(2) **T. Curtisii** *King, l.c. 77.*

Tree 20 to 30 ft. tall. Young parts, petiolules, petioles and under-side of leaves covered with rusty stellate tomentum. Leaves digitate; leaflets 5 to 6; middle leaflets obovate to elliptic, apex sub-acute, base narrowed, 3·5 to 4·5 in. long, 2·25 to 2·5 in. wide, lower ones 1·5 to 1·25 in. long, ·8 to 1·5 in. wide; nerves in leaflets 9 to 10 pairs, prominent beneath; petiolules ·5 to ·75 in. long; petioles 2 to 2·5 in. long. Panicles dense, very floriferous, densely tomentose, 4 to 4·5 in. long. Flowers ·12 in. long, dark red; pedicels as long. Calyx campanulate, lobes acute. Fruit obovoid, compressed, 1 in. long, ·75 in. through, glabrous; wing narrow falcate ribbed, 1·3 in. long, ·2 in. wide. *Hab.* Forests. Penang, Government Hill; Moniots Road; Muka head (Curtis).

(3) **T. simplicifolia** *Masters, in Hook. fil. F.B.I. i. 302; King, l.c. 78.*

A gigantic buttressed tree over 100 ft. tall. Leaves simple, glabrous coriaceous, elliptic or obovate, apex truncate or shortly cuspidate, base narrowed, beneath puberulous; nerves strongly elevate, 16 to 20 pairs, 4·5 to 7 in. long, 3 to 4·5 in. wide; petioles 2 to 3 in. long, thickened at tip. Panicles axillary, many-flowered, 1·5 to 3 in. long. Flowers ·1 in. long; pedicels shorter. Calyx-tube campanulate, minutely tomentose outside, puberulous within. Staminal-column short. Fruit glabrous. *Hab.* Singapore, Dalvey Road. Malacca (Griffith, Maingay). Negri Sembilan, Kopis (Kinsey).

(4) **T. Kunstleri** King, *l.c.* 79.

Tree 70 to 100 ft. tall, 2 to 3 ft. through. Young parts, petioles and peduncles minutely stellate-pubescent. Leaves elliptic to obovate-oblong blunt mucronate, base rounded, slightly narrowed, above smooth shining, below pale stellate-puberulous beneath on midrib and 7 to 10 pairs of nerves. Fruits 1 or 2, on a stout stellate hairy peduncle, ovoid, 1 in. long with an oblique spatulate wing, 1 in. long, .6 in. wide, puberulous. *Hab.* Dense forests, rare. Perak, Gunong Bubu, 500 to 800 ft. altitude (Kunstler).

(5) **T. unifoliolata** Ridl. *Journ. Roy. As. Soc. S. Br.* 82, p. 173.

Tall tree. Leaves unifoliate; petioles slender, 1 in. long; petiolule jointed on the swollen top of the petiole, .25 in. long; blade elliptic sub-acute, base blunt, slightly narrowed, often inequilateral; nerves slender faint, about 18, 2.25 to 3.5 in. long, 1 to 1.5 in. wide, glabrous, coriaceous. Panicle about 4 in. long, pubescent. Flowers numerous, .08 in. long. Calyx-tube longer than 5 short ovate lobes, pubescent. Staminal-column very short, head globose. Carpels 5. *Hab.* Malacca (Derry). *Native name:* Kamuning hutan. *Use:* For timber and medicine.

This is very near *T. javanica* Bl., but that has the leaves always trifoliate and larger, while all the leaves on this one specimen are solitary and jointed on the petiole.

6. **HERITIERA**, Aiton.

Trees short and stout or vast. Leaves coriaceous, simple, scaly beneath. Flowers small, pinkish, in axillary panicles. Calyx 5 (rarely 4- to 6-toothed). Petals 0. Anthers in a ring at the top of the column; cells 2 parallel. Ovaries 5 or 6, nearly free; style short. Stigmas thick. Carpels large, woody, keeled (or winged). Species 6 or 7, tropics of Old World to Australia.

Short low-branched tidal tree.

Fruit ovoid keeled (1) **H. littoralis**

Tall straight forest tree branched at top only.

Fruit obovoid, winged (2) **H. elata**

(1) **H. littoralis** Dryand. *DC. Prodr.* i. 484; *Masters, l.c.* i. 363; *King, l.c.* 79.

A low much-branched stout tree. Bark flaking. Leaves oblong or elliptic, tip rounded or acute, base rounded, dark green above, silvery beneath; nerves 7 to 9 pairs, slightly prominent beneath, 5 to 7 in. long, 2 to 3.5 in. across; petioles stout .5 in. long. Stipules lanceolate. Panicles 3 in. long, lax axillary, scurfy. Flowers .2 in. long. Calyx campanulate, 5-toothed scurfy pink as long as the pedicel. Fruit 1.5 in. long woody, compressed, ovoid, keeled, glabrous, shining. *Hab.* Common in mangroves all over the peninsula. *Distrib.* Tropics of Old World. *Native names:* Dungen; Peler Kambing; Atun Laut; Bayur Laut; *Use:* The

wood is very hard and compact, but rarely tall enough for beams. Used for firewood.

(2) **H. elata** *Ridl. Journ. Roy. As. Soc. S. Br.* 50, p. 112.

Gigantic tree 100 ft. tall, 2 ft. through, with large buttresses and grey flaky bark. Leaves elliptic obtuse, base rounded or truncate, 4 in. long, 2·75 in. wide, coppery scaly beneath; nerves 5 pairs, elevate above, inconspicuous beneath; petioles ·25 to ·5 in. long. Panicles in axils of fallen leaves, 4 to 5 in. long, densely stellate-hairy. Flowers pink. Calyx campanulate, shortly 5-lobed, ·5 in. long, stellate, hairy. Staminal column slender, much shorter; anthers 5. Fruit on short woody peduncles, obovate, brown with a sub-triangular blunt wing 1·5 in. long; wing ·5 in. long. Seed oblong. *Hab.* Forests. Singapore, Botanic Gardens Jungle.

7. KLEINHOVIA, Linn.

A medium to small tree. Leaves ovate, often cordate. Panicle lax, terminal. Bracts small. Sepals 5, much longer than the petals, linear-lanceolate, deciduous. Petals 5, unequal, upper ovate saccate, middle pair concave obliquely oblanceolate, lower flat with convolute edges. Stamens 20, in 5 fascicles of 3 each, 5 solitary free, often reduced to filaments between the fascicles; filaments all joined below into a hairy cylindric tube; anthers 4-celled. Ovary on a long gynophore, 5-lobed, 5-celled. Capsule turbinate-pyriform, membranous, inflated. Seeds 1 or 2 in each cell, tubercled. Species 1, Old World tropics.

(1) **K. Hospita** *Linn. Sp. Pl.* 1365; *Masters, in Hook. fil. F.B.I.* i. 364; *Pierre, Fl. For. Cochinchine, t.* 177; *King, l.c.* 80.

A shrub or small tree 20 or more ft. tall. Leaves ovate-round acuminate 2·5 to 5 in. long; petioles 1·5 to 2·5 in. long. Panicle 6 to 12 in. long. Flowers ·4 in. long, pink. *Hab.* Banks of streams and open country, local, not common. Singapore (Wallich, Kunstler). Johor, Pulau Aor (Feilding). Malacca (Griffith). Perak, Kwala Dipang (Curtis); Kwala Kangsa; Chenderiang (Kunstler).

8. HELICTERES, Linn.

Shrubs, rarely trees, more or less stellate-pubescent. Leaves simple. Flowers pink or white, solitary or fascicled, axillary. Calyx tubular, 5-fid often irregular. Petals 5, clawed, unequal or equal, claws often auriculate. Staminal-column 5-lobed or toothed; anthers 2-celled; staminodes below the top of the column 5. Ovary on the gynophore at the top of the column, 5-lobed, 5-celled; styles subulate, thickened at tips; ovules many. Follicles woody, spirally twisted or straight. Seeds tubercled. Species about 30, tropics of both worlds.

- | | |
|-----------------------------------------------------|----------------------------|
| Fruit spirally twisted | (1) <i>H. Isora</i> |
| Fruit not twisted. | |
| Leaves ovate, or ovate-lanceolate oblique | (2) <i>H. hirsuta</i> |
| Leaves ovate-cordate, lobed, toothed | (3) <i>H. viscida</i> |
| Leaves lanceolate not oblique | (4) <i>H. angustifolia</i> |

(1) *H. Isora* Linn. *Sp. Pl.* 1366; *Masters, l.c.* i. 365; *Pierre, Fl. For. Cochinchine, t.* 208, *figs.* 12 to 25; *King, l.c.* 81.

A shrub or treelet. Leaves ovate-round oblique, abruptly acuminate rounded, edges serrate, dentate, sometimes lobed, base cordate or rounded, rarely acute, 5- to 7-nerved, above glabrous minutely hispid, beneath pubescent or tomentose, 2 to 4 in. long, 1·25 to 3 in. wide; petioles 3 in. long, tomentose. Stipules linear 3 in. long. Flowers red solitary, or in few-flowered cymes, 1·25 in. long. Calyx narrow, campanulate 2-lipped, 5-toothed, tomentose. Petals reflexed, lower 2 shorter and broader than upper. Staminal-column longer, curved with 10 to 12 long ovate anthers and within 5 bifid staminodes. Ovary grooved, tomentose, ovoid. Fruit cylindric, twisted, 1·5 in. long, 4 in. through, terminated by the styles, pubescent. *Hab.* Rare in open country. Pahang, Rumpin River (Evans). Perak, Larut (Kunstler). Province Wellesley near the coast (Curtis); Penang, highlands (Curtis). *Use:* The fruit sold as a drug in the shops under the name of Chabei Pintal.

(2) *H. hirsuta* Lour. *Fl. Cochinchine*, 648; *Bl. Bijdr.* 80; *King, l.c.* 191; *Pierre, l.c. t.* 208, *figs.* 1 to 11.

A velvety tomentose shrub 4 to 8 ft. tall. Leaves ovate or rhomboid, sub-oblique acuminate serrate, base rounded, above scabrid-pubescent, midribs and nerves and undersurface tomentose; nerves 4 or 5 pairs, 3·5 to 6 in. long, 1·75 to 2·5 in. wide; petioles 4 in. long, tomentose. Cymes scorpioid, few-flowered, 1 in. long. Flowers 75 in. long, purple or dull pink. Calyx campanulate-cylindric, stellate-tomentose, 5-toothed. Petals linear sub-spathulate, 2 rather broader than the others with small horn-like appendages about the middle. Staminal-column as long. Fruit cylindric acuminate, not twisted, densely covered with long villous, stellate-pilose soft prickles, 1·2 in. long, 35 in. wide. *Hab.* Open country, common. Malacca, Malaka Pindah. Selangor, Kwala Kubu. Perak, Ipoh; Temengo. Penang (Porter, *Wall. Cat.* 1183), Kedah Yan. Lankawi, Perlis, and Pulau Rawei. (A wiry form with smaller leaves.) *Distrib.* India; Malaya; China.

(3) *H. viscida* Bl. *Bijdr.* 79; *Pierre, l.c.* 209, *fig.* A.

A bush up to 6 ft. tall, pubescent. Leaves ovate base cordate, apex long-cuspidate, margin sub-lobed with long acute teeth 3·5 in. long, 2·5 in. wide; nerves 3 from base with 2 pairs on the midrib, sparsely hairy above, more so on the nerves and very hairy beneath; petioles 1 in. long or less. Cymes axillary, usually short. Calyx densely stellate-woolly, with 5 narrow acuminate teeth, 1 in. long. Petals glabrous 5 in. long, spathulate rounded with short or long

lateral processes. Staminal-tube longer than the petals. Capsule cylindric, sub-acute or blunt, 1·5 in. long, ·5 in. through, densely covered with grey hairy bristles. *Hab.* Open country. Pahang, Kwala Tembeling and Temerloh. Kelantan, Kwala Lebir. *Distrib.* Indo-China; Java; Tenasserim.

Easily recognised by the strongly toothed, almost tri-lobed, nearly sessile leaves.

(4) **H. angustifolia** *Linn. Sp. Pl.* 963; *King, l.c.* 82.

A shrub 2 ft. or more tall, pubescent, except the upper side of the leaves quite glabrous. Leaves pale beneath, lanceolate or oblong-lanceolate obtuse or oblong-truncate mucronulate entire, base narrow, 3-nerved; lateral nerves 5 or 6 pairs, 1·5 to 2·5 in. long, ·4 to ·5 in. wide; petioles ·2 in. long. Cymes axillary few-flowered about ·3 in. long. Flowers ·4 to ·5 in. long, violet pink or white. Calyx densely tomentose 2-lipped, mouth expanded, teeth 5 triangular acute. Petals linear-sub-spathulate with 2 or 3 horned appendages. Staminal column shorter. Ovary tomentose. Fruit ovoid-cylindric, straight ·75 in. long, ·4 in. wide, densely stellate-villous. *Hab.* Open country, sandy or rocky spots. Johor, Minyak Buku, Kwala Pahat. Adang group. Pulau Rawei. Setul heaths (flowers white). *Distrib.* Malay islands, China and India. var. *obtusata* *King, l.c.* is a form with broader truncate leaves. It occurs in Pulau Rawei and on Setul Heath.

9. PTEROSPERMUM, Schreb.

Trees (or shrubs) scaly or stellate-tomentose. Leaves coriaceous oblique, simple or lobed. Inflorescence axillary or terminal. Bracts entire or laciniate. Calyx of 5 valvate coriaceous more or less connate sepals. Petals 5, imbricate, white. Staminal-column short with 3 apiculate anthers, and 5 ligulate staminodes. Ovary within the top of the column, 3- or 4-celled; ovules many in each cell; style entire. Stigma furrowed. Capsule woody or coriaceous, terete or angled, 5-valved. Seeds winged above in 2 rows. Species about 18, Asiatic.

Big tree; flowers 6 in. long (1) **P. diversifolium**

Slender tall trees; flowers 2 in. long.

Sepals pubescent inside; capsule 3 to 4 in. long . . . (2) **P. Blumeianum**

Sepals silky inside; capsule 1·5 in. long . . . (3) **P. Jackianum**

(1) **P. diversifolium** *Bl. Bijdr.* 88; *Masters, in Hook. fil. F.B.I.* i. 367; *Pierre, Fl. For. Cochinchine, t.* 179; *King, l.c.* 84.

A tree 60 to 100 ft. tall, 15 to 24 in. through. Young branches, petioles, under-side of leaves, sepals and the fruit covered with a minute tawny tomentum, with many stellate hairs. Leaves coriaceous, peltate and lobed on young shoots, ovate-oblong to rounded-elliptic, tip broad blunt, with an abrupt triangular point, edges sinuous, base cordate, above shining; nerves 8 to 10 pairs, 6 to 9 in. long, 3·5 to 6 in. wide; petioles 1 to 1·25 or 2 in. long.

Stipules small, linear. Flowers white, 6 to 7 in. long, solitary or in 3- or 4-flowered axillary cymes; pedicels .2 in. long. Sepals coriaceous, linear blunt. Petals membranous, linear glabrous, little longer. Staminal tube 2 in. long; fertile anthers 10. Staminodes 5, pubescent. Ovary fusiform, tomentose; style less than 2 in. long. Stigma fusiform. Capsule woody oblong, acutely 5-angled, 4 to 5 in. long, 1.5 to 2 in. through. Seeds flattened, 1.5 to 2 in. long. *Hab.* Forests, not very common. Singapore, Pulau Ubin. Malacca; Batu Tiga; Panchur. Negri Sembilan, Bukit Kandang. Selangor, Kwala Lumpur. Perak, Goping (Kunstler). *Distrib.* Java, Philippines, Cochin-China. *Native name*: Bayur jantan.

(2) **P. Blumeianum** Korth. *Ned. Kruidk. Arch.* ii. 311; *King, l.c.* 84.

A tall but not stout tree 40 to 50 ft. high. Branches covered with red hairs, eventually blackish. Leaves thinly coriaceous, inequilateral, oblong-ovate or lanceolate-oblong acuminate, base broad unequally cordate, above light green, shining beneath tawny-tomentose, with stellate hairs inter-mixed; nerves 7 to 9 pairs, 3 to 5.5 in. long, 1.35 to 2 in. wide; petioles .15 in. long. Stipules subulate-lanceolate. Flowers 2 in. long, solitary or in 2- or 3-flowered cymes, axillary or pseudoterminal; pedicels .5 in. long. Sepals coriaceous linear acute, stellate-pubescent outside, pubescent inside. Petals obliquely oblong-lanceolate or sub-spathulate, shorter, white. Staminal-tube .5 in. long; anthers 10; staminodes 5. Ovary ovoid, villous; style shorter than tube. Capsule oblong woody, 5-angled, narrowed at base, glabrous when ripe, 3 to 4 in. long, 1.5 in. through. Seeds 1.5 in. long. *Hab.* Common in forests. Singapore, Bukit Timah, etc. Johor, Sungei Biku (Down). Selangor, Sungei Buluh (Burkill). Perak, Larut Hills. Penang, Balik Pulau. Lankawi at Kwah. *Distrib.* Burma, Assam, Java, Sumatra, Borneo. *Native name*: Bayur.

(3) **P. Jackianum** Wall. *Cat.* 1164; *Masters, l.c.* i. 367.

A tree. Branches covered with white tomentum, with rufous stellate hairs. Leaves sub-coriaceous, oblong or elliptic-oblong, slightly inequilateral, edge entire or sinuate towards the tip, base sub-acute or truncate, minutely cordate, not auricled, glabrous above except midrib and nerves, below pale buff minutely tomentose with rusty stellate hairs; nerves 10 to 12 pairs, 4 to 5.5 in. long, 1.5 to 2.2 in. wide; petioles .25 in. long. Flower 2 in. long, solitary axillary; pedicels .1 in. long, tomentose. Sepals linear-lanceolate, tomentose outside. Petals shorter, white, oblanceolate, scaly puberulous outside. Staminal-tube .25 in. long; anthers 12; staminodes 5. Ovary fusiform; style longer than the stamens. Capsule shortly stalked, ovoid terete, acute, 1.5 in. long, 1 in. through, covered with flat, scaly hairs. *Hab.* Hill forests. Penang, Bukit Erskine (Curtis, Phillips). *Distrib.* Tenasserim, S. Siam.

10. PENTAPETES, L.

Herb. Leaves hastate-lanceolate. Flowers axillary. Bracts 3, subulate. Sepals 5, lanceolate, connate at base. Petals 5, bright red. Stamens 20, connate at base, 15 fertile in 5 groups of 3, alternating with 5 staminodes, nearly as long as the petals; anthers 2-celled, extrorse. Ovary sessile, 5-celled; cells many, ovuled; style entire, twisted and thickened upwards, 5 minute stigmas. Capsule 5-valved. Seeds 8 to 12 bi-seriate in each cell; not winged. Species 1, tropical Asia.

(1) *P. phoenicea* Linn. *Sp. Pl.* 698; *Masters, in Hook. fl. F.B.I.* i. 371.

An annual 2 to 4 ft. tall sparsely hairy or glabrescent. Leaves 3 to 5 in. long, narrow, .25 to .5 in. wide, serrate acuminate, base truncate or hastate; nerves 20 pairs; petioles .25 to .5 in. long; pedicels .25 in. long, bristly hairy as is the calyx, .3 in. long, lobes lanceolate acute. Petals obovate rounded .5 in. long. Staminodes sub-spathulate. Ovary bristly. Capsule oblong truncate, .5 in. long, bristly, shorter than the enlarged sepals. *Hab.* Perlis, fields at Kanga, certainly wild. *Distrib.* India, China, Java, Philippines.

Often cultivated for its beautiful but fugacious flowers, and occasionally occurring as an escape elsewhere. For one or two years it thus established itself by the Tanglin post office in Singapore.

11. MELOCHIA, L.

Herbs or shrubs, more or less tomentose. Leaves simple. Flowers in clusters or panicles. Sepals 5, connate below. Petals 5, obovate clawed. Stamens 5, opposite the petals, connate below in a tube. Ovary sessile, 5-celled, cells 2-ovuled; styles 5, free or connate at base. Capsule loculicidally 5-valved. Species about 50, tropics generally.

Wiry herb; flowers in terminal and axillary heads . . . (1) *M. corchorifolia*
Shrub or treelet; cymes large, lax paniced . . . (2) *M. velutina*

(1) *M. corchorifolia* Linn. *Sp. Pl.* 675; *Masters, l.c.* i. 374; *King, l.c.* 87.

A slender pubescent shrubby plant about 2 ft. tall with tough bark. Leaves membranous ovate to lanceolate or oblong acute, serrate or lobed, base rounded, truncate or sub-hastate, 5-nerved, 1.5 to 2.5 in. long, .5 to 1 in. wide; petioles .4 to 1 in. long. Flowers .2 in. across, in dense terminal heads with many villous bracts intermixed. Sepals lanceolate acuminate. Petals obovate, pink with a yellow base. Stamens opposite the petals, connate below in a tube. Ovary villous; styles glabrous. Capsule globose, brown, pubescent, longer than the calyx. *Hab.* Common in waste ground all over the peninsula. *Distrib.* Tropics generally. *Native name:* Lumah Ketam.

(2) **M. velutina** *Bedd. Fl. Sylvat. t. 5; Masters, l.c. i. 374; King, l.c. 88.*

A large shrub or almost a tree. Young parts pubescent. Leaves ovate cordate or truncate acute serrate, sprinkled with tufted hairs above, more densely pubescent hairy beneath 4·5 to 5 in. long, 3·5 in. wide; petioles 2·5 in. long, pubescent. Panicles axillary pubescent about 4 in. long. Flowers small, pink with yellow centre, crowded at branch tips, ·25 in. across. Calyx pale woolly, campanulate, 5-lobed half-way, lobes broad acute. Petals twice as long, oblong. Ovary 5-celled, 5-styled. Capsule oblong, 5-angled, bristly, ·5 in. long. Seeds solitary, winged. *Hab.* Open country, especially in rocky sandy spots. Pahang. Temerloh (Foxworthy). Selangor, Ginting Bidai; Negri Sembilan, Bukit Tangga Pass (Ridley). Perak, Kwala Kangsa (Kunstler). Lankawi. Perlis, Kanga. *Distrib.* India, Malay Archipelago. *Native names* : Tampu; Singa.

12. WALTHERIA, Linn.

Shrubby plants. Leaves usually dentate. Stipules narrow. Flowers small yellow, in axillary and terminal clusters. Sepals 5, connate in an obconic tube with free points. Petals 5, oblong-spathulate, clawed. Stamens 5, connate in a tube at base. Ovary sessile, 1-celled; ovules 2; style excentric. Stigma clubbed, penicillate. Capsule 2-valved. Seed 1. Species about 20, mostly American.

Erect, twiggy; leaves oblong 2 by ·75 in. long . . . (1) **W. indica**
Prostrate; leaves ovate-oblong ·5 in. long . . . (2) **W. arenaria**

(1) **W. indica** *Linn. Sp. Pl. 673; Hook. fil. F.B.I. i. 374.*

Shrub 3 ft. tall, softly tomentose. Leaves oblong blunt, 2 to 3 in. long, ·5 in. wide, edge dentate; nerves prominent; petioles ·5 in. long. Heads of flowers ·5 in. through; peduncle ·3 in. long. Bracts lanceolate, densely hairy. Sepals lanceolate. Corolla yellow, ·25 in. long. *Hab.* Sea-shore; rare. Malacca, Pulau Besar (Griffith and Maingay). *Distrib.* Tropics generally.

(2) **W. arenaria** *Ridl. Journ. F.M.S. Mus. x. 130.*

Wiry prostrate creeping plant. Branches slender tomentose, about 2 ft long. Leaves ovate-elliptic serrate; nerves 3 or 4 pairs, elevate, ·5 to ·75 in. long, ·25 to ·3 in. wide; petioles ·25 in. long. Flower heads ·3 in. wide, sessile axillary and terminal. Bracts linear villous. Sepals in an obconic villous tube, lobes subulate. Corolla ·2 in. wide, yellow. Capsule ·1 in. long. *Hab.* Sandhills by the sea, local. Kelantan, sandy coast at Kwala Kelantan, abundant (Ridley).

13. ABROMA, Jacq.

Shrub. Leaves cordate ovate-oblong, serrate. Peduncles extra-axillary, few-flowered. Sepals 5 lanceolate, connate near the base.

Petals 5, dark brownish purple, base concave, limb spoon-shaped, rounded. Staminal-cup of 5 fertile filaments opposite the petals, 2-antheriferous; anthers bilobed, lobes divergent. Staminodes longer, obtuse. Ovary sessile, pyramidal 5-lobed; styles 5; cells many-ovuled. Capsule membranous, large 5-angled, 5-winged, truncate above septicidally 5-valved; valves villous on edges. Seeds numerous. Species 2 or 3, tropical Asia.

(1) **A. augusta** Linn. *fil. Supp.* 341; *Masters, l.c.* 375; *King, l.c.* i. 89.

Shrub about 6 ft. tall. Leaves herbaceous, 5- to 7-nerved, 3·5 to 6 in. long, 3 to 5 in. wide; petioles 1·75 to 2·5 in. long, upper leaves smaller. Stipules linear. Flowers pendulous, 2 in. long; peduncles 1·5 in. long, nodding. Sepals 1 in. long, lanceolate, light green. Petals longer, 5 in. long, 2·5 in. wide. Capsule 1·5 to 2 in. wide. *Hab.* Thickets, often near limestone rocks in open ground, Pahang, on Pahang river. Selangor, Bukit Kutu; Batu caves. Perak, Ulu Temengo (Ridley). *Distrib.* India, China, Malay islands, Australia.

14. BYTTNERIA, Linn.

(2) Climbing shrubs (or herbs). Leaves various. Flowers small, in axillary much-branched cymes. Sepals 5, slightly connate near the base. Petals 5, clawed concave inflexed, with 2 small side lobes, and a long terminal linear or lanceolate appendage. Staminal-tube with 5 broad truncate or emarginate teeth, and between them 5 2-celled extrorse anthers. Ovary sessile, 5-celled; cells bi-ovulate; style 5-fid. Capsule globose, spiny, septicidally 5-valved; cells 1-seeded. About 50 species, mostly tropical American, a few Asiatic and African.

Leaves not cordate.

Plant glabrous.

Leaves coriaceous, elliptic, 7 to 8 in. long, 3 in. wide, 3-nerved

(1) **B. Maingayi**

Leaves thinly coriaceous, elliptic, 4 to 5 in. long, 2 in. wide, not 3-nerved

(2) **B. brevipes**

Leaves thin, lanceolate-acuminate, not 3-nerved

(3) **B. Curtisii**

Stems and leaves pubescent or velvety.

Leaves ovate-elliptic, with stellate hairs both sides

(4) **B. Jackiana**

Leaves elliptic, base broad, glabrous above except midrib, hairy (not stellate on nerves beneath)

(5) **B. elliptica**

Leaves ovate cordate thin

(6) **B. elegans**

Excluded. **B. UNCINATA** *Masters, in Hook. fil. F.B.I. i. 377; King, l.c. 91*, which is a species of *Mallotus* (*Euphorbiaceæ*).

(1) **B. Maingayi** *Masters, l.c. 377; King, l.c. 91.*

Stout, woody climber, glabrous. Leaves sub-coriaceous elliptic to oblong, shortly blunt-acuminate, base rounded; 3 bold and 2 smaller nerves; lateral nerves 2 or 3 pairs, 7 to 8 in. long, 3 to 3·5 in. wide; petioles 1·2 in. long. Umbels in panicles of 6 to 8, peduncles 1 in. long; pedicels 2·5 in. long. Sepals 2·5 in. long,

ovate-lanceolate. Petals white. Stamens yellow, bases crimson, pinkish inside. Ovary crimson. Stigma white. Capsule globose, 1·25 in. through, green with red ribs, spiny. *Hab.* Common on borders of woods, Singapore, Garden Jungle; Bukit Timah. Muar, Sungei Pauh; Malacca, Ayer Panas; Bukit Bruang (Curtis). Negri Sembilan, Tampin Waterfall. Perak, Waterloo (Curtis). *Native names:* Akar Kachubong (from the resemblance of the fruit to that of *Datura*); Akar Batu.

(2) **B. brevipes** *Ridl. Journ. Roy. As. Soc. S. Br.* 73, p. 144.

A glabrous woody climber. Leaves coriaceous, elliptic obtuse, base narrowed truncate; nerves 5 pairs, conspicuous on both surfaces, inarching, reticulations conspicuous, 4·5 in. long, 2 in. wide; petioles ·2 in. long. Cymes numerous, slender, 1 in. long; pedicels very slender, minutely pubescent. Sepals lanceolate acuminate, ·3 in. long. Petals about as long, base obcuneate with two short points at the upper angles, apex caudate. Staminal-tube broad, cylindric; anthers small oblong. Ovary small conic, glabrous, bluntly 5-angled, scabrid. *Hab.* Edges of forests, rare. Dindings at Simpiti (Ridley).

(3) **B. Curtisii** *Oliv. Hook. Ic. Pl. t.* 1761; *King, l.c.* 90.

A slender woody climber, 10 to 15 ft. long. Young parts puberulous. Leaves linear-lanceolate or oblanceolate-oblong rarely ovate-oblong acuminate, narrowed to the minutely cordate base, 5-nerved, lateral nerves numerous, glabrous except for tufts of stellate hairs in the axils of the nerves, 2·5 to 7 in. long, ·5 to 2 in. wide; petioles ·25 in. long, pubescent. Cymes 2 to 4 in axillary fascicles. Flowers 3 to 7; peduncles 1 in. long; pedicels ·25 in. long. Flowers ·45 in. across. Sepals ovate-lanceolate acuminate. Petals strap-shaped, lateral lobes 2, broad, inflexed, sub-terminal appendage long cylindric, curved. Capsule globular, 1 in. through, pubescent with numerous straight bristles. Penang, West Hill, Telok Bahang (Curtis). Perak, Ayer Larut (Wray). *Native name:* Penedu.

(4) **B. Jackiana** *Wall. Roxb. Fl. Ind. (ed. Carey)* ii. 386; *Masters, l.c.* 376; *King, l.c.* 92.

Stout woody climber. Young branches minutely rusty, tomentose. Leaves elliptic acuminate; base 3-nerved, rounded, sometimes cordate, upper surface sparsely hispid, beneath rufous hispid-tomentose; lateral nerves 3 or 4 pairs, 3·5 to 6 in. long, 2 to 3·75 in. wide; petioles ·4 to 1 in. long, tomentose. Umbels solitary or 3 or 4 together, few-flowered; peduncles ·25 to 1 in. long; pedicels ·35 in. long. Sepals linear-subulate, hispid, ·4 in. long. Petals white, sub-rotund, lobed, terminal appendage cylindric as long as petals. Capsule globose, 1 in. through, black spiny. *Hab.* In woods. Negri Sembilan, Gunong Angsi. Selangor, Batu Tiga. Perak, Goping (Kunstler); Dindings, Lumut. Province Wellesley, Sungei Daun; Penang (Jack, Wallich); Government Hill (Curtis).

The leaves vary very much in size, shape and length of petioles in different specimens; those specimens taken from ends of branches are much smaller in these parts than on the lower part of stem.

(5) **B. elliptica** *Masters, l.c. 377; King, l.c. 91.*

Softly hairy climbing shrub. Leaves sub-membranous, oblong shortly blunt-acuminate, base blunt truncate, broad, 3-nerved; lateral nerves 3 pairs with numerous smaller parallel ones all inarching within margin, reticulations elevate conspicuous, above sparsely (midrib densely) hairy, edges and nerves beneath hairy, 4·5 to 5·5 in. long, 2·5 in. wide; petioles densely hairy, 1·5 in. long. Cymes umbellate numerous, pubescent, 1 in. long; pedicels ½ in. long. Flowers 1·2 in. across. Bracts small, linear. Sepals lanceolate, hairy. Petals shorter. *Hab.* Malacca (Maingay); very rare.

A very distinct plant with thin 3-nerved broad-based leaves.

(6) **B. elegans** *Ridl. Journ. Roy. As. Soc. S. Br. 57, p. 25.*

Long slender climber. Young parts pubescent. Leaves ovate-cordate bluntly acuminate, above glabrous, beneath hairy on the nerves, 4 in. long, 3 in. wide or less; petioles pubescent, 4 in. long. Panicles solitary or in pairs; peduncles slender, ½ to 1 in. long. Flowers small numerous, red and yellow in numerous small pubescent cymes. Bracts lanceolate pubescent. Sepals lanceolate acute, pubescent on both sides. Petals shorter, linear, tip 3-lobed, lateral lobes incurved rounded, midlobe rounded with 4 small teeth; appendage linear obtuse, curved. Capsule globose, ¾ in. through, spines ½ in. long. *Hab.* Climbing on bushes in islands and on banks of rivers. Pahang, Kwala Tembeling; Perak, Kwala Kenering and Temengo (Ridley).

15. COMMERSONIA, Forsk.

Trees (or shrubs). Leaves simple, oblique. Inflorescence cymose, terminal, axillary or leaf-opposed. Calyx 5-cleft. Petals 5, concave at the base, with a long strap-shaped appendage at the tip. Fertile stamens 5, opposite the petals; anthers sub-globose, 2-celled. Staminodes 5, opposite sepals, lanceolate. Carpels 5, connate opposite sepals. Styles connate; ovules 2 to 6. Capsule loculicidally 5-valved, densely covered with bristly hairs. Seeds ascending, strophiolate, albuminous. About 8 species, Malaya, Australia.

(1) **C. platyphylla** *Andr. Bot. Rep. t. 603 (note); Masters, l.c. i. 378; King, l.c. 93. C. echinata Bl. Bijdr. 86; Andr. Bot. Rep. t. 519 (not of Forster).*

Tree about 20 ft. tall. Branchlets tomentose. Leaves membranous, ovate acuminate dentate-serrate, base cordate, above stellate hairy, beneath softly hoary tomentose, 5 to 8 in. long, 3 to 4·5 in. wide; petioles ½ to ¾ in. long. Stipules scarious

lobed. Cymes corymbose, tomentose 2 in. long and wide. Flowers white, .2 to .35 in. across. Calyx pubescent, lobes free nearly to base, ovate-lanceolate. Petals as long, narrower, base concave, appendages narrow oblong. Capsule glabrous, .4 to .5 in. across, densely covered with grey soft bristles. *Hab.* Common in secondary jungle from Singapore to Penang. *Distrib.* Siam (Trang) and Malay islands to the Philippines. *Native names:* Durian Tupai (Squirrel's Durian); Chenara; Angkot-Angkot Besih.

16. LEPTONYCHIA, Turcz.

Trees or shrubs. Leaves simple entire. Flowers in small axillary cymes. Sepals 5, valvate united near base. Petals 5, valvate, orbicular concave. Staminal-column tubular below, filamentiferous on the top, outer series of 5 to 10 ligulate; staminodes opposite petals, middle row of 10 stamens, innermost row of 5, short fleshy staminodes opposite sepals. Ovary 3- to 4-celled; styles connate. Stigmas capitellate. Capsules 2- or 3-celled. Seeds black with yellow aril. Species 3 to 4, Indo-Malaya, Africa.

(1) *L. glabra* Turcz. in *Mosc. Bull.* 1858, p. 222; *Masters*, in *Hook. fil. F.B.I.* i. 379; *King*, l.c. 94.

A shrub or small tree about 20 ft. tall, glabrous except the flowers. Leaves dark green thin, ovate-oblong to oblong-lanceolate, abruptly acuminate, base narrowed or rounded, 3-nerved; nerves lateral, 4 to 7 pairs, 4 to 8 in. long, 1.6 to 3 in. wide; petioles .4 to .5 in. wide. Flowers green, .25 in. wide. Sepals ovate-lanceolate, pubescent both sides. Petals one-fourth as large, broad truncate, villous. Stamens 10 in 5 fascicles of 2 each, nearly as long as sepals. Staminodes 10 to 20, outer 5 to 15 filiform as long as stamens or shorter, inner 5 short, subulate. Ovary obovate, 4-celled, hairy at tip. Capsule coriaceous, .5 in. long, black when dry. Seed 1, oblong, black with an orange-coloured thin aril. *Hab.* Common in hill woods about 500 to 4200 ft. altitude; Johor, Gunong Pulai. Pahang River. Malacca, Selandor. Selangor, Kwala Lumpur. Dindings, Pangkor. Perak: Waterfall Hill; Hermitage Hill. Province Wellesley, Permatang Bertam, Penang Hill. Kedah, Kedah Peak at 3000 ft. altitude. *Distrib.* Burma, Malay islands. *Native names:* Tingao; Cherimai Burong.

var. *Mastersiana* King, l.c. 204. *L. acuminata* Masters, l.c. 379.

Young branches, midribs and petioles puberulous. Flowers .5 in. wide, buds acute. Sepals 3-veined; outer staminodes 5 to 15, often pubescent. Ovary oblong-ovoid, villous, 3-celled; style glabrous. *Hab.* This variety seems to be commonest at higher altitudes; Selangor, Semangkok Pass; Batu Caves; Menuang Gasing (Kloss); Perak, Larut (Kunstler); Gunong Kerbau (Robinson); Gunong Batu putih (Wray). *Distrib.* Burma, Sumatra, Borneo.

17. LEPTONYCHIPSIS, Ridl.

Tree, puberulous. Leaves alternate, chartaceous. Stipules small, linear. Racemes axillary, short. Flowers few small. Sepals 3, linear-oblong. Petals 3. Stamens 6; filaments filiform, connate at base in a cup; anthers sub-hastate, blunt; staminodes linear alternating with stamens. Ovary hairy, 3-celled, cells 2 or more ovuled, superposed. Species 1.

(1) **L. parviflora** Ridl. *Journ. Roy. As. Soc. S. Br.* 82, p. 174.

Leaves oblong-elliptic cuspidate, base round or blunt; nerves elevate beneath, slightly puberulous, 4 to 6·7 in. long, 2 to 3 in. wide; petioles puberulous, ½ in. long. Raceme 1 in. long, hairy. Flowers ½ in. long. Sepals puberulous outside, linear-oblong, blunt. Stamens as long. *Hab.* Very rare in forests; Johor, Gunong Pulai (Ridley).

18. PENICULIFERA, Ridl.

Tree. Leaves alternate distant, oblong-lanceolate. Flowers in short axillary fascicles. Sepals 5, free to base, oblong pubescent. Petals 5, as long, linear-spathulate, hairy on inner surface. Stamens in a funnel-shaped hairy tube; anthers at top 5, very small alternating with slender cylindric processes, anthers at base of tube 5, much larger, sessile. Species 1.

(1) **P. penangensis** Ridl. *l.c.* 173.

Apparently a tree. Leaves glabrous chartaceous, cuspidate acuminate, base round; nerves slender 8 pairs, ¼ to ⅙ in. long, 1·5 in. wide; petioles ½ in. long. Flowers about 12 in a fascicle; peduncle ⅓ in. long; pedicels shorter, all pubescent. Sepals 1 in. long, imbricate, pubescent. Petals as long, spathulate, tip round, long-hairy on inner face, rather thick. Staminal tube as long, hairy. *Hab.* Penang, Government Hill at 1200 ft. altitude (Curtis).

ORDER XXV. TILIACEÆ.

Trees, shrubs or herbs. Leaves alternate, rarely opposite, simple or lobed. Stipules free, usually caducous. Flowers cymose, or paniced, or racemose, regular, bisexual. Sepals 3 to 5, valvate. Petals as many. Stamens numerous, on a torus free or 5-adelphous; filaments filiform; anthers 2-celled. Ovary free, 2- to 10-celled; styles columnar or divided. Stigmas distinct, rarely confluent. Ovules attached to the inner angle of the ovary-cell, if few pendulous from the apex or ascending from base, if many in 2 ranks. Fruit dehiscent or indehiscent, sometimes 1-celled by abortion. Seed 1 to many, no aril, testa leathery, coriaceous or pilose; albumen fleshy or rarely wanting. About 400 species, chiefly tropical.

Petals entire; anthers globose or oblong.

Sepals combined into a cup.

Staminodes 5; carpels 2-valved 1. BROWNLOWIA

Staminodes 5; carpels indehiscent, combined,
winged 2. PENTACE

Staminodes 0.
Calyx lobes accrescent, coloured 3. SCHOUTENIA

Calyx lobes not accrescent.
Fruit 3-valved winged 4. BERRYA

Sepals distinct, free.
Trees or shrubs; fruit drupaceous 5. GREWIA

Wiry herbs or small shrubs; fruit dry, of 3 to 5
cocci, prickly 6. TRIUMFETTA

Herbs or undershrubs; fruit a 3- to 5-celled
capsule 7. CORCHORUS

Trees; capsule 3-winged of 3 to 5 cocci 8. COLUMBIA

Tree; capsule large; seed with marginal hairs 9. TRICHOSPERMUM

Petals 4 entire.

Anthers linear; fruit 4-valved, spiny; tree 10. SLOANEA

Petals fimbriate (rarely entire); anthers linear open-
ing by a terminal pore, often with an apical
awn or hair tuft; trees 11. ELÆOCARPUS

1. BROWNLOWIA, Roxb.

Trees or shrubs with stellate or scaly pubescence. Leaves entire, 3- to 5-nerved. Flowers numerous, small, in large terminal or axillary panicles. Calyx bell-shaped, irregularly 3- to 5-fid. Petals 5, englandular, usually pink. Stamens free on a raised torus; staminodes 5, petaloid or linear opposite petals. Ovaries 5, 2-ovuled; styles subulate, coherent. Carpels free, 2-ovuled, 1-seeded. Species 9, tropical Asia.

Leaves not peltate, lanceolate, base narrow round . . . (1) **B. lanceolata**

Leaves not peltate broad elliptic, base broad
cordate (2) **B. kleinhovioidea**

Leaves peltate hairy beneath (3) **B. Scortechinii**

Leaves sub-peltate, glabrous very large; panicles
large (4) **B. macrophylla**

Leaves scaly beneath, ovate-cordate (5) **B. Riedelii**

(1) **B. lanceolata** Benth. *Journ. Linn. Soc. v. Supp.* ii. 57; *Masters, in Hook. fil. F.B.I.* i. 381; *King, l.c.* 99.

A shrub 4 to 6 ft. tall. Young parts scaly. Leaves coriaceous lanceolate or oblong-lanceolate acuminate, base blunt, above glabrous, dark green, beneath minutely yellowish white-scaly; nerves 6 to 8 pairs, not prominent, 4.5 to 6 in. long, 1.5 to 1.75 in. wide; petioles .25 to .4 in. long. Panicles axillary or terminal, 1 to 3 in. long, few-flowered. Calyx .2 in. long, scaly, lobes lanceolate. Petals longer, oblong blunt, base shortly clawed, pink. Ovary 3- to 5-lobed, pubescent. Fruit carpels distinct, globose, compressed on inner surface, scaly and pubescent, .5 in. across. Seed 1. *Hab.* Common in tidal rivers often in dense masses; Singapore, Gelang. Johor, Tebrau River. Malacca (Griffith);

Selangor, Langat. *Distrib.* Bengal, Moulmein, Philippines. *Native name*: Durian Laut.

(2) **B. kleinhovioidea** *King, l.c.* 97.

Tree 40 to 50 ft. tall, 18 to 24 in. through. Branchlets hairy. Leaves coriaceous, elliptic to elliptic-rounded, tip blunt, base more or less cordate, above sparsely scaly, beneath minutely hairy; nerves basal 4 to 6, lateral 3 pairs; transverse nervules distinct, 5 to 7 in. long, 3.5 to 4.5 in. wide; petioles 2.5 to 3 in. long, pubescent. Panicles terminal, rarely axillary, 9 to 15 in. long, few-branched. Flowers clustered, .25 in. long; pedicels half the length. Calyx widely bell-shaped, teeth 5 acute triangular, tomentose outside. Petals longer oblong blunt pink, narrowed to the long claw. Ovaries 3 to 5, sub-globose, pubescent; styles subulate coherent. *Hab.* Rare, dense rocky jungle, Perak, Gunong Bubu, 600 to 1000 ft. altitude (Kunstler).

(3) **B. Scortechinii** *King, l.c.* 98.

A small slender tree with stout branches. Leaves ovate-elliptic rounded peltate, tips sub-acute, edges sub-undulate, base round or sub-emarginate, above glabrous, beneath minutely hairy; nerves 9 radiating from the petiole attached to leaf, 2.5 to 3 in. from edge, laterals from midrib 4 pairs, prominent beneath as are transverse nervules, 10 to 15 in. long, 5.5 to 7 in. wide; petioles 7 to 9 in. long thickened at both ends. Panicle terminal, 6 to 12 in. long and 6 in. across, or smaller clustered panicles 6 to 10 together; branches puberulous. Flowers 6 in. long, crowded. Calyx narrow bell-shaped, teeth half as long, lanceolate tomentose scaly. Petals longer, narrow obovate, much narrowed to the claw. Staminodes linear. Ovaries 5, ovoid, stellate-pubescent; styles subulate, tips bent. *Hab.* Perak; no locality (Scortechini).

(4) **B. macrophylla** *King, l.c.* 99.

Tree 30 to 40 ft. tall. Stout branched. Young parts red-pubescent. Leaves very coriaceous, round, or in older branches elliptic, tip rounded or shortly apiculate, edges sub-undulate, base emarginate, all glabrous; nerves 7 to 9, basal, 2 pairs lateral, prominent on both surfaces; nervules transverse, much elevate; round leaves 11 to 17 in. long, 10 to 14 in. wide; elliptic leaves 6 to 10 in. long, 3.5 to 5.5 in. wide; petioles 2.25 to 4.5 in. long. Panicle large, terminal as long or longer than leaves; branches stout, scurfy rusty. Bracts linear nearly 1 in. long persistent. Flowers .65 in. long, apple-blossom pink; peduncles short. Calyx wide cylindric-campanulate, teeth acute, half as long tomentose, scurfy. Petals oblong blunt narrowed to base hardly clawed. Ovaries 3 to 5, narrow ovoid ridged, scaly; styles conjoined. Fruit sub-globose, minutely hairy, .75 in. through. *Hab.* Perak, Larut (Kunstler); Batu Togoh (Wray).

(5) **B. Riedelii** *Hemsl. Voy. Bot. Challenger* i. (3), *Moluccas* 128. *B. lepidota* *Warb. Bot. Jahrb.* xviii. (1894), p. 200.

Tree. Leaves coriaceous ovate acute, base emarginate or cordate shortly peltate, above glabrous, beneath densely scaly, tip blunt; nerves about 5 pairs, slender elevate beneath; nervules very fine, 4·5 to 9 in. long, 2·8 to 6 in. wide; petioles slender, 1·9 to 2·5 in. long. Panicle terminal shorter than leaves, lax few-flowered, scurfy, 5 to 10 in. long. Flowers 2 in. long; pedicels scaly, 2 in. long. Calyx wide campanulate, scaly, lobes nearly half as long, acute. Petals pink, oblong blunt, slightly narrowed at base, not clawed. Styles subulate longer than the stamens. *Hab.* Tidal swamps in the south; Singapore, Kranji. Pahang, Pianggu, Endau (Evans). Pulau Tioman (Burkill). *Distrib.* Moluccas, Wetter Island, New Guinea.

The leaves of the Singapore plant are much smaller than those of the Moluccan plant.

2. PENTACE, Hassk.

Trees, often vast. Leaves entire, coriaceous, lower surface pale with scaly hairs. Flowers numerous, white in terminal panicles. Calyx bell-shaped, 5-lobed. Petals 5, glabrous, longer. Stamens numerous on a low torus; staminodes 5, opposite sepals. Ovary 5-celled, cells 2-ovuled; styles united, rarely free. Fruit dry, indehiscent, 3- to 10-winged, 1-celled, 1-seeded. Seed albuminous. Species 18, 2 Burmese, 4 Malay islands, 12 Malay Peninsula.

- Leaves pinnate-nerved; ovary 3-ridged; fruit 3-winged (1) *P. triptera*
- Leaves trinerved, *i. e.* 2 lowest nerves rising from base.
 - Nerves from midrib 6 to 7 pairs (2) *P. Hookeriana*
 - Nerves from midrib 2 pairs.
 - Leaves pubescent, small (3) *P. hirtula*
 - Leaves glabrous oblong.
 - Leaves sub-obtuse; ovary not ridged (4) *P. floribunda*
 - Leaves elliptic; ovary 10 ridged (5) *P. perakensis*
 - Leaves elliptic or ovate, abrupt acuminate (6) *P. eximia*
 - Leaves glabrous ovate.
 - Flowers very small (7) *P. Kunstleri*
 - Flowers 25 25 in. wide (8) *P. Curtisii*
 - Leaves glabrous, oblong to lanceolate; side nerves from midrib faint or invisible.
 - Leaves 3 in. long, ovate; ovary 5-ridged (9) *P. strychnoidea*
 - Leaves 9 in. long, oblong; petioles 15 in. long; ovary 10-ridged (10) *P. Scortechinii*
 - Leaves 8 in. long, lanceolate; petiole 75 in. long; shrub (11) *P. acuta*
 - Leaves 5-nerved from base, 7 to 14 in. long (12) *P. macrophylla*

(1) *P. triptera* Masters, in *Hook. fil. F.B.I.* i. 382; *King, l.c.* 100.

A very large tree 60 to 80 ft. tall. Branchlets pubescent. Leaves ovate to round-ovate or ovate-oblong, sub-acute, sub-coriaceous, base rounded, above glabrous, beneath scaly; nerves basal, 1 to 2 pairs lateral, 5 to 7 pairs, 4 to 5 in. long, 2 to 2·75 in. wide; petioles 6 to 12 in. long, pubescent. Panicles terminal and

axillary 6 to 8 in. long, much-branched, softly stellate-tomentose. Flowers nearly $\frac{1}{2}$ in. long, white; pedicels short. Calyx longer, teeth 5, lanceolate, tomentose. Petals spathulate-oblong obtuse. Stamens pentadelphous; staminodes subulate shorter than stamens. Ovary 3-winged, tomentose; style filiform, glabrous, bent at tip. Fruit oblong, $\frac{1}{6}$ in. long with 3 membranous wings, $\frac{1}{5}$ in. broad,



FIG. 28.—*Pentace triptera*.

pink. *Hab.* Forests; rarely flowering. Singapore; common. Bukit Timah; Selitar, etc. Johor, Pengerang. Malacca (Griffith); Negri Sembilan, Bukit Tampin. Perak, Larut (Kunstler). *Native names*: Medang Serai; Sepa Petri; Kabal Ayam; Balong Ayam.

(2) *P. Hookeriana* King, l.c. 101.

A tree 30 to 40 ft. tall, 12 in. through. Branchlets glabrous. Leaves elliptic-oblong sub-ovate acute, base narrowed, unequal,

glabrous; nerves 6 pairs, prominent beneath, 5 to 7 in. long, 2 to 2.75 in. wide; petioles .25 in. long. Panicles terminal and axillary, 2.5 to 5 in. long, scurfy-tomentose. Flowers crowded .2 in. long, yellow; pedicels short. Calyx bell-shaped, cut half-way down into 3 or 4 triangular sub-acute teeth, scaly-tomentose. Petals narrowly obovate. Stamens 15 in 5 bundles, shorter; staminodes thick, orbicular. Ovary depressed-globose, obscurely 5-lobed, 5-celled, densely pubescent. *Hab.* Perak, banks of Kinta River (Kunstler).

(3) *P. hirtula* Ridl.

Tree. Branchlets, petiole and midrib hairy. Leaves obovate or oblong, tip blunt or shortly apiculate, margin minutely undulate, coriaceous, 3.5 to 4 in. long, 1.6 to 2 in. wide; nerves basal, 1 pair, lateral 2 pairs, elevate; nervules very slender; petioles 1 in. long. Panicle lax, thickly stellate-hairy, terminal, 3 to 4 in. long, 1.5 to 2 in. wide. Flowers .1 in. long, on pedicels nearly as long. Calyx campanulate with 5 triangular teeth half the length, tomentose. Petals narrow oblanceolate obtuse with a long narrow claw. Stamens in 5 bundles of about 10 each, oblanceolate; staminodes linear. Ovary globose, silky, obscurely 5-lobed; style glabrous. Fruit .5 in. long and as wide, rounded-oblong, wings 10 semi-elliptic .2 in. long. *Hab.* Penang, Penara Bukit (Curtis).

(4) *P. floribunda* King, l.c. 102.

Tree 40 to 50 ft. tall, 5 to 20 in. through. Branchlets stellate, pubescent. Leaves elliptic-oblong, sometimes rounded, tip bluntly apiculate, base rounded, slightly narrowed, coriaceous, dull green, glabrous above, ashy beneath, basal nerves 1 to 2 pairs, laterals 2 to 3 pairs, prominent beneath, 5 to 6.5 in. long, 2.5 to 3.75 in. wide; petioles 1 to 2 in. long. Panicles axillary and terminal stellate-pubescent, many-branched. Flowers very numerous, .1 in. long, pale yellowish white. Calyx rotate, cut half-way into triangular acute teeth, tomentose. Petals broad oblanceolate, blunt, base narrowed. Stamens 5-adelphous. Ovary globose, tomentose not ridged, 5-celled. *Hab.* Rocky jungle, 500 to 1000 ft. altitude. Perak, Gunong Pondok; Gunong Bubu base (Kunstler).

(5) *P. perakensis* King, l.c. 101.

Tree 30 to 40 ft. tall. Leaves ovate elliptic bluntly acuminate, base rounded or sub-cuneate, above glabrous; nerves 5 pairs, 5 to 6 in. long, 2.5 to 3 in. wide; petioles .75 to 1 in. long, stout. Panicle terminal 4 to 5 in. long, less than 2 in. wide, few-flowered. Flowers .1 in. long. Calyx rotate scaly, teeth triangular spreading. Petals ovate, narrowed to a short claw. Stamens 30, 5-delphous; staminodes lanceolate as long as filaments. Ovary globose 10-ridged, hairy, 5-celled; style as long. *Hab.* Forests, below 500 ft. altitude. Perak, Larut (Kunstler).

(6) *P. eximia* King, l.c. 103.

A tree 50 to 70 ft. tall. Branchlets glabrous. Leaves ovate-

elliptic to ovate-rounded, abruptly blunt acuminate, base rounded or shortly narrowed, coriaceous, pale beneath; basal nerves 1 pair, laterals 1 pair, elevate beneath, 4 to 5.5 in. long, 2 to 4 in. wide; petioles .75 to 1.1 in. long. Panicles terminal, 3.5 to 5 in. long, tomentose much-branched. Flowers numerous .1 in. long. Calyx scaly, teeth triangular. Petals cuneate blunt, narrowed to a broad claw. Stamens 25, in groups of 5; staminodes lanceolate. Ovary sub-globular, 10-ridged, scaly pubescent, 5-celled with 5 false partitions; styles 10, shorter than stamens. Fruit 5 in. long with 8 semi-elliptic wings, .1 to .15 in. wide, scaly. *Hab.* Hill forests. Negri Sembilan, Bukit Tumiang (Cantley); Perak, Larut 500 to 800 ft. altitude (Kunstler). *Native name*: Medang Lusa.

(7) *P. Kunstleri* King, *l.c.* 101.

Tree 30 to 40 ft. tall, 5 to 7 in. through. Branchlets glabrous. Leaves broadly ovate shortly broad acuminate, base rounded, above glabrous, beneath silvery grey; nerves 3 to 4 pairs, 4.5 to 6 in. long, 2.5 to 3.5 in. wide; petioles .75 to 1 in. long, stout, tip thickened. Panicles terminal, 3.5 to 6 in. long, puberulous, much-branched. Flowers numerous, .15 in. long, white. Calyx tubular bell-shaped, minutely stellate, hairy and scaly, teeth triangular acute. Petals spathulate long-clawed. Stamens in 5 bundles; staminodes linear-lanceolate as long as filaments. Ovary depressed-globose, bluntly 5-angled, scaly-pubescent, 5-celled; style glabrous. *Hab.* Perak, Larut Hills (Kunstler).

(8) *P. Curtisii* King, *l.c.* 103.

A tall tree. Branchlets minutely scaly. Leaves ovate-elliptic with short blunt point, base rounded, coriaceous, ashy beneath; basal nerves 2 pairs, lateral 2 to 3 pairs, 3.25 to 5.5 in. long, 2.25 to 2.75 in. wide; petioles .75 to 1 in. long, rather slender. Panicles 4.5 to 6 in. long, sparsely tomentose. Branches few. Flowers numerous, white, .15 in. long. Calyx widely bell-shaped, tomentose, teeth broadly triangular blunt. Petals oblanceolate or obovate-obtuse, base narrowed. Stamens 5-adelphous. Staminodes lanceolate acuminate. Ovary turbinate with 8 or 9 blunt ridges, scaly-pubescent. Fruit rounded, .5 in. long with 8 semi-elliptic wings .2 in. wide. *Hab.* Forests on Penang Hill, Waterfall valley and Balik Pulau (Curtis).

(9) *P. strychnoidea* King, *l.c.* 105.

Tree 60 to 80 ft. tall, 1.5 to 2 ft. through. Branchlets slender, glabrous. Leaves ovate-elliptic or ovate-oblong acuminate, base rounded or narrowed, above glabrous, pale beneath, strongly 3-nerved, 3 to 4 in. long, 1.75 to 2.25 in. wide; petioles .75 in. long. Panicles terminal 3 to 6 in. long, minutely scaly-puberulous. Flowers .2 in. long, white with a reddish tinge. Calyx cup-shaped tomentose, teeth triangular acute, 5, half as long. Petals oblanceolate, yellow, narrowed to base. Stamens of 5 bundles of about 20 each; staminodes linear-lanceolate. Ovary ovoid-globose,

5-ridged, tomentose. *Hab.* Open jungle, rocky hills, 500 to 1000 ft. altitude. Perak, Larut (Kunstler).

(10) **P. Scortechinii** King, *l.c.* 104.

Tree. Branchlets glabrous. Leaves elliptic-oblong caudate-acuminate, base cuneate, glabrous concolorous coriaceous, basal nerves 1 pair, strongly elevate, laterals 1 to 2 pairs, inconspicuous, 7 to 9 in. long, 2.75 to 3.5 in. wide; petioles thick, .5 in. long. Panicles terminal and axillary slender, 3.5 to 4 in. long; branches short. Calyx widely tubular-campanulate, scurfy-tomentose, teeth 5, small triangular. Petals obovate obtuse, much narrowed to the base. Stamens in 5 bundles of 15 each; staminodes lanceolate, half as long. Ovary ovoid, 5-ridged, scaly. *Hab.* Perak (Scortechinii). No locality given.

(11) **P. acuta** Ridl.

Straggling shrub. Leaves lanceolate-acuminate, base narrowed, blunt, thinly coriaceous; basal nerves 1 pair, laterals 2 to 3 pairs; nervules horizontal, above glabrous, beneath sparingly scurfy and scaly, 7 to 8 in. long, 2.8 to 3.4 in. wide; petiole 1 in. long, stout. Panicle terminal scurfy, 3.5 in. long; branches short. Flowers rather numerous, crowded, buds conic, acute. Calyx scurfy-tomentose, campanulate, lobes acuminate, narrow, half the length. Petals oblong obtuse, narrowed to the base, .2 in. long. Stamens in 5 bundles of about 20 each; staminodes linear obtuse as long as the filaments. Ovary globose, silky-hairy, hardly lobed; style taller than stamens. Fruit oblong, .7 in. long, .4 in. across, with 10 low scaly wings, .15 in. long. *Hab.* Dindings. Pangkor, Telok Sera (Curtis 1626).

(12) **P. macrophylla** King, *l.c.* 102.

Tree 20 to 30 ft. tall. Branchlets glabrous. Leaves ovate elliptic to round, shortly blunt-acuminate, base rounded above, glabrous; basal nerves 2 pairs, laterals 3 or 4 pairs, prominent beneath, 7 to 14 in. long, 5 to 12 in. wide; petioles 2.5 to 3 in. long. Panicles terminal and axillary, pubescent-scurfy. Flowers .15 in. long and .2 in. wide. Calyx rotate, teeth lanceolate acute two-thirds its length. Petals oblanceolate obtuse. Staminodes linear. Stamens in 5 bundles of 15 each. Ovary ovoid, scaly-pubescent, 5-angled. Fruit .75 in. long with 10 semi-elliptic wings, scaly, .4 in. wide. *Hab.* Forests at bases of hills, Perak, Waterfall Hill, Thaiping (Wray, Kunstler, Scortechinii).

3. SCHOUTENIA, Korth.

Trees with alternate, simple leaves. Flowers axillary solitary or in terminal panicles. Calyx bell-shaped, 5-lobed, lobes accrescent, coloured. Petals linear or o. Stamens membranous, free, sometimes on a short gynophore. Ovary sessile or stalked, 3- or 5-celled, cells 2-ovuled from base of axile placentas; style filiform. Stigmas 3 to 5. Capsule crustaceous, dehiscing irregularly,

1-celled, 1- to 2-seeded. Seeds globose, testa leathery, albumen o. Five species, Malay and Cambodian.

Flowers paniced or solitary.

Calyx very accrescent, deeply lobed (1) **S. Mastersii**

Calyx slightly accrescent not deeply lobed (2) **S. Kunstleri**

Flowers in axillary clusters (3) **S. glomerata**

(1) **S. Mastersii** King, *l.c.* 106. Chartacalyx accrescens *Masters, l.c. i.* 382.

A tree 50 to 80 ft. tall, 8 to 10 in. through. Leaves thinly coriaceous above glabrous, glossy green, beneath light brown tomentose, ovate-lanceolate acuminate, base rounded; nerves prominent beneath, 5 pairs, .75 to 3.25 in. long, .4 to 1.1 in. wide; petioles less than .1 in. long. Flowers solitary axillary or in terminal leafy panicles; pedicels .35 to .75 in. long, lengthening with age, tomentose. Calyx membranous, pink-veined, widely campanulate, .35 in. wide with 5 teeth; in fruit rotate flat, 5-angled, 1.5 to 2 in. across, pubescent outside, glabrous within. Petals o; filaments slender. Ovary globose, silky-tomentose. *Hab.* Jungle; Malacca (Maingay). Negri Sembilan. Bukit Tumiang (Cantley). Perak, Larut Hills (Kunstler). Penang, Government Hill (Curtis). *Distrib.* Borneo. *Native name:* Banitan merah.

(2) **S. Kunstleri** King, *l.c.* 107.

Tree 60 to 70 ft. tall. Stem deeply corrugated, 18 to 24 in. through. Leaves thinly coriaceous, obovate-oblong or oblanceolate acute, edge waved, slightly narrowed to the round base, above shining, bright green, beneath greyish silver; basal nerves 3 to 5, laterals 5 pairs; nervules elevated, 6 in. long, 2.75 in. wide; petioles .25 in. long. Flowers pale yellow dotted all over rusty colour. Calyx campanulate, membranous yellow (when adult brown) hairy .5 to .75 in. long, cut to the base in 4 ovate lobes. Petals o. Ovary sub-globose, tomentose; style longer than stamens. *Hab.* Dense jungle. Pahang, Sungei Cheka, Kwala Lipis (Foxworthy); Perak, Larut Hills 300 to 800 ft. altitude (Kunstler); Ulu Tupai (Wray). *Native name:* Chenral Ayer.

(3) **S. glomerata** King, *l.c.* 107.

A tree 40 to 60 ft. tall. Branchlets pubescent. Leaves membranous glabrous, elliptic-oblong acute or acuminate, edges waved, base rounded; nerves 3, radiating from base; nervules elevated, parallel, inarching within margin, 10 to 15 in. long, 3.5 to 5.5 in. wide; petioles .25 in. long. Flowers .25 in. long, in round dense cymes, 1 to 1.5 in. across, axillary; pedicels tomentose. Calyx campanulate rufous-tomentose, teeth broadly triangular. Petals o. Ovary ovoid-globose. Fruit depressed-globose, .75 in. diameter, stellate-tomentose, covered at the base only by the calyx. *Hab.* Johore, Gunong Pantai (Kunstler). *Distrib.* Tongkah; S. Siam.

4. BERRYA, Roxb.

Trees. Leaves alternate ovate acuminate cordate 5- to 7-nerved. Panicles large many-flowered, axillary and terminal. Calyx campanulate, 3- to 5-lobed. Petals 5, spatulate, white. Stamens many on a torus. Ovary 3- or 4-lobed. Fruit 3- or 4-valved, each valve with a large wing. Seed hairy. Species 4, Indo-Malayan.

(1) *B. Ammonilla* Roxb. *Hort. Beng.* 42; *Masters, in Hook. fil. F.B.I.* i. 383; *Wight Ill. t.* 34.

Tree 25 to 30 ft. tall. Bark rough. Leaves glabrous 5 to 6 in. long, 4.5 in. wide; petioles 1 in. long. Panicle 4 to 6 in. long. Flowers .5 in. across. Calyx and pedicel tomentose. Petals blunt. Fruit wings 1.75 in. long, .5 in. wide, oblong, rounded at tip, pubescent villous at base. *Hab.* Lankawi Isles, Telok Sinn (Haniff). *Distrib.* India; Ceylon.

5. GREWIA, Linn.

Trees or shrubs, one climbing, more or less stellate pubescent. Leaves entire often tri-nerved, generally pubescent or hairy, subcoriaceous. Flowers small to medium, paniced or few, axillary, greenish white with conspicuous bracts. Sepals distinct. Petals 5, shorter than the sepals (occasionally absent). Stamens many on a torus; no staminodes. Ovary 2- to 4-celled, 2- to many-ovuled; style subulate. Stigma lobed. Drupe fleshy or pulpy, ovoid or pear-shaped, often yellow or red when pulpy. Pyrenes 1 to 4, 1- or 2-seeded. Species about 100, tropical Africa and Asia.

Climber; flowers axillary and terminal; drupe
green

(1) *G. umbellata*

Trees; flowers in terminal panicles; drupe fleshy
green

(2) *G. paniculata*

Trees; flowers terminal or axillary; drupe pulpy
red or orange.

Leaves hairy on back.

Leaves large, oblong round, rigid; flowers
tomentose

(3) *G. latifolia*

Leaves large but thin; flowers hairy

(4) *G. fibrocarpa*

Leaves oblong-lanceolate acuminate thin;
flowers velvety

(5) *G. omphacarpa*

Leaves long lanceolate 10 by 4 in.; bracts
conspicuous

(6) *G. erythrocarpa*

Leaves glabrous or scurfy on back rigid;
globose, scurfy

(7) *G. globulifera*

Leaves glabrous.

Basal nerves not more conspicuous than the
others.

Flowers velvety leaves 6 in. long

(8) *G. antidesmæfolia*

Flowers tomentose; leaves much smaller

(9) *G. Miqueliana*

Basal nerves very strongly developed

(10) *G. florida*

(1) **G. umbellata** Roxb. *Hort. Beng.* 42; *Masters, in Hook. fil. F.B.I.* i. 385; *King, l.c.* 109.

A climbing shrub 50 or more feet long all stellate-puberulous. Leaves oblong-ovate or elliptic, serrate, bluntly acuminate, base rounded, above glabrous, beneath pale; nerves 4 pairs, 3 to 4·5 in. long, 1·5 to 2 in. wide; petioles ·25 in. long. Umbels paniced, axillary or terminal 6- to 8-flowered. Flowers ·75 in. long, yellowish white. Sepals ribbed tomentose, linear-oblong, reflexed in flower. Petals as long or shorter, oblong from the back of an orbicular hairy concave claw. Stamens connate at base in a silky tube. Torus long, tomentose. Fruit globular, green; pyrene 2- to 4-celled; cells 1-seeded; endocarp bony. *Hab.* Common in secondary growth, from Singapore, Malacca, Pahang, Perak, Penang. *Distrib.* Siam, Borneo. *Native names:* Akar Chenderai; Akar Sekapu; Akar Kapialu; Akar Sempelas Lida Kuching.

(2) **G. paniculata** Roxb. *Fl. Ind.* ii. 591; *Masters, l.c.* i. 393; *King, l.c.* 110.

A bushy tree 20 to 40 ft. tall, 2 ft. through. Branchlets tomentose. Leaves coriaceous, cuneate-obovate to elliptic, blunt acuminate, edges serrate dentate, base rounded; nerves from base 5 or 6 pairs, above sparsely pubescent, midrib and nerves tomentose, beneath stellate-tomentose; nervules horizontal, elevate beneath, 3 to 6 in. long, 1·5 to 2·75 in. wide; petioles ·25 in. long, tomentose. Stipules glabrous lanceolate. Panicles 2·25 to 3·5 in. long, terminal or axillary tomentose; bracteoles linear. Flowers ·25 in. long. Sepals obovate, base rounded, tomentose outside, pilose inside. Petals shorter, yellowish white, oblong blunt, claw concave, hirsute outside. Torus cup-shaped, edge tomentose. Ovary ovoid, stellate-tomentose 4-celled. Fruit obovoid, green hard, minutely pubescent; pyrene 1-celled, 1-seeded; endocarp stony. *Hab.* Open country, common, but absent from Singapore. Malacca. Selangor, Rantau Panjang; Kuala Lumpur. Perak, Plus River (Wray). Pahang, Sungei Jelai (Machado); Penang. *Distrib.* India and Indo-China. *Native name:* Chenderai Hutan.

(3) **G. latifolia** Masters, *l.c.* i. 392; *King, l.c.* 112.

A shrubby tree 20 to 40 ft. tall. Branchlets tomentose. Leaves coriaceous, broad, elliptic shortly acuminate, base narrowed, blunt, above glabrous except midrib, beneath stellate-pubescent; nerves 6 to 9 pairs, strongly elevate, as are the transverse nervules, 6 to 9 in. long, 3·5 to 4·5 in. wide; petioles ·5 to ·75 in. long, tomentose. Panicles terminal or axillary tomentose, 1·5 to 4 in. long, few-flowered; bracteoles ovate-lanceolate. Flowers ·25 in. long; pedicels shorter. Sepals oblong, tomentose both sides. Petals shorter, oblong acute, claw hirsute, longer than the limb. Torus cup-shaped, edge hairy. Ovary depressed-globose. Drupe obovoid ·75 in. long and ·5 in. wide; pericarp sparsely pubescent, yellow, at length glabrous; mesocarp fibrous and pulpy; pyrene single,

1-celled. *Hab.* Woods in low country. Singapore (Maingay), Changi; Bukit Timah; Garden Jungle. Malacca (Griffith). Selangor, Kwala Lumpur (Mhd. Hashim). Perak, Goping (Kunstler). *Native names:* Damak Damak Buloh; Tajam Damak.

(4) **G. fibrocarpa** Masters, *l.c.* i. 391.

Tree 40 to 50 ft. tall, 8 or 12 in. through. Branches velvety. Leaves chartaceous, above glabrous, beneath hairy or tomentose, oblong to lanceolate-oblong, shortly acuminate, base blunt; nerves 6 or 7 pairs, elevate beneath hairy; nervules elevate, 6 to 9 in. long, 3 in. wide; petioles thick velvety 15 in. long. Panicle axillary, terminal, velvety, 1 to 2 in. long. Bracts and sepals velvety. Bracts lanceolate-acuminate 16 in. long. Sepals linear oblong. Petals half as long. Fruit pear-shaped, deep yellow velvety 75 in. long, 5 in. through. *Hab.* Forests, Johor. Pulau Tioman and Pulau Tinggi (Burkill). Malacca, Ayer Panas (Maingay). Selangor, Weld's Hill (Cubitt). Perak, Thaiping. Waterfall (Wray, Kunstler). Goping; a very hairy form (Kunstler); Penang Hill 1200 ft. altitude (Curtis).

(5) **G. omphacarpa** Miq. *Fl. Ind. Bat.* i. (2), 204.

A shrub about 6 ft. tall or small tree 30 ft. tall. Branches tomentose. Leaves rather thin, pendulous, lanceolate-oblong long-acuminate deep green, base rounded or blunt, midrib above hairy, beneath hairy all over; nerves 8 pairs, 7 to 8 in. long, 2 to 2.5 in. wide; petioles 25 in. long, hairy. Panicles axillary and terminal, 3 in. long, hairy. Sepals linear-oblong. Petals shorter, dilate at base, yellow. Ovary ovoid tomentose. Fruit flattened obovate ellipsoid, orange, pubescent, 1.25 in. long; pericarp thin pulp acid, apricot-coloured; pyrene 1. *Hab.* Woods in low country, rare. Singapore, Garden Jungle. *Distrib.* Borneo and Banca.

I believe this to be the plant intended by Korthals as his *Omphacarpus hirsutus*, but his figure in the *Kruidkund*, t. 42, is rather poor and the leaves are shown rounder than in our plant.

(6) **G. erythrocarpa** Ridl. *Journ. Roy. As. Soc. S. Br.* 82, p. 174.

Small tree 12 to 14 ft. tall. Branches hairy. Leaves lanceolate acuminate or acute, base round, sometimes obscurely cordate, inequilateral, hairy beneath; nerves 10 pairs, basal pair long; nervules transverse, conspicuous, 8 to 10 in. long, 2.1 to 4 in. wide; petioles 25 in. long, densely hairy. Panicles 3 to 5 in. long, pendent from uppermost axils densely hairy. Bracts lanceolate acuminate, 2 in. long. Sepals linear-oblong, white, tomentose. Petals white, reflexed. Disc lobed, yellow. Ovary tomentose. Fruit pear-shaped scarlet, about 1 in. long, pulpy. *Hab.* Mountain forests; Selangor, Sempang mines. Perak, Thaiping Waterfall (Wray).

(7) *G. globulifera* Masters, *l.c.* i. 391.

Large or small tree. Branchlets velvety. Leaves coriaceous broad elliptic, shortly acuminate, base round, glabrous except midrib above velvety, and nerves beneath sparsely scabrous-hairy; nerves 7 pairs, elevate beneath as are the transverse nervules, 9 in. long, 4 in. wide; petioles 5 in. long, velvety or sub-glabrous. Panicles terminal 4 to 5 in. long; rachis, pedicels, bracts and sepals scurfy. Buds globose. Sepals linear-oblong 16 in. long. Petals notched, dilate at base. Drupe 1 in. long, tomentose, obovoid. *Hab.* Forests, Singapore, Tanglin. Malacca (Maingay, Griffith, Hervey). Perak (Wray and Scortechini). Penang, Penara Bukit (Curtis). *Native name*: Bunga Menamak.

(8) *G. antidesmæfolia* King, *l.c.* 113.

A tree 12 to 40 ft. tall or more, 6 to 8 in. through. Branchlets glabrous. Leaves membranous, when adult glabrous, elliptic-oblong acutely acuminate, entire, base cuneate or rounded; nerves 6 to 7 pairs, prominent beneath 4.5 to 8 in. long, 1.5 to 2.75 in. wide; petioles 4 to 6 in. long. Panicles pedunculate, axillary and terminal, 2 to 4 in. long; branches short, ashy-tomentose. Flowers 25 in. long. Sepals elliptic-obovate, tomentose outside, pubescent yellow inside. Petals much shorter, oblong, blunt, claw broad, thickened pilose. Torus cylindric, yellow, glabrous with hairy mouth. Ovary ovoid-globose, pilose, later glabrescent. Fruit pyriform, 3-angled narrowed to a pseudo-stalk orange red, .75 in. long, about .35 in. through; pericarp glabrous; pyrenes 3; endocarp bony, 1-seeded.

var. *b. hirsula* King, *l.c.* Branchlets, leaves beneath, and ovary tomentose. *Hab.* Hill forests. Selangor, Ulu Selangor (Kunstler). Perak, Ulu Bubong (Kunstler (var. *b*). Perak, Larut Hills (Kunstler) (var. *a*), Goping.

It is possible that var. *b* is a distinct species.

(9) *G. Miqueliana* Kurz, *Flora* 1872, p. 398; King, *l.c.* 113.

Tree 30 to 40 ft. tall, 8 to 15 in. through. Branchlets at first scaly. Leaves thinly coriaceous, glabrous, ovate-lanceolate to lanceolate shortly acuminate, entire, base cuneate; nerves 5 pairs slender, 2 to 5 in. long, 1 to 1.75 in. wide; petioles 2 to 3 in. long, tomentose. Panicles axillary and terminal lax, few-flowered, sparsely scaly and puberulous, 1 to 2 in. long. Flowers 3 in. long. Sepals oblanceolate acute, minutely tomentose. Petals shorter, linear acute, with a thickened tomentose claw. Torus cylindric, edges villous. Ovary globose-ovoid, tomentose. Drupe pyriform .75 in. long and .5 in. across, glabrous; mesocarp fibrous; pyrenes 2, each 1-celled. *Hab.* Johor, Ulu Kahang, Bukit Murdom (Lake and Kelsall). Malacca, Merlimau. Perak, Larut Hills; Waterfall (Kunstler). Dindings (Curtis) at Lumut. *Native names*: Poko Malabu; Chenderai Paya.

(10) **G. florida** *Miq. Fl. Ind. Bat. Supp.* 405. *G. laurifolia* *Masters, l.c.* i. 392; *King, Journ. As. Soc. Beng. l.c.* 114.

A tree 20 to 30 ft. tall. Leaves thinly coriaceous, glabrous, oblong-lanceolate to lanceolate-acuminate or acute, base rounded, trinerved from base with 1 pair of nerves alternate from midrib above, reticulations invisible 4 to 6 in. long, 1·5 to 2·5 in. wide; petioles ·5 to ·7 in. long. Panicles terminal and axillary, 1·5 to 4 in. long, lax puberulous, few-flowered. Flowers ·2 in. long. Sepals ovate concave, tomentose on both sides. Petals shorter, oblong (sometimes absent). Torus cup-shaped, rim hairy. Ovary globose, sub-glabrous, 4-celled; style thick. Drupe ovoid ·5 in. long, glabrous, fleshy. Pyrene 1- to 3-celled, usually 1-seeded. *Hab.* Open hilly jungle. Pahang Kwantu. Malacca (Griffith, Maingay); Bukit Panchur (Derry); Merlimau (Cantley). Perak, Gunong Bubu Range (Kunstler). Penang Hill, Balik Pulau; the Spout; Pondok Durian (Curtis). *Distrib.* Sumatra. *Native names*: Medang Salusul; Jejuwai; Damak Damak Ayer.

6. TRIUMFETTA, Linn.

Slender shrublets or herbs, more or less stellate-hairy. Leaves serrate or dentate, simple or lobed. Flowers in dense axillary cymes, bright yellow small. Sepals 5, oblong concave. Petals 5. Stamens 5 to 35, on a fleshy-lobed glandular torus. Ovary 2- to 5-celled; cells 2-ovuled; style filiform. Stigma 5-toothed. Fruit globose or oblong, spiny or bristly, indehiscent or 3- to 6-valved. Seed 1 or 2 in each cell, albuminous. Species about 10, tropics generally.

Erect tall shrublets.

Glabrescent; fruit very small indehiscent, spines short

(1) **T. rhomboidea**

Stem villous; leaves hairy; fruit larger, dehiscent, spines long-bristly, hooked

(2) **T. pilosa**

Stem and leaf backs velvety hairy; fruit tomentose, spines straight, bristly

(3) **T. pseudo-cana**

Prostrate, leaves lobed or simple, toothed.

Petals ·2 in. long; fruit ·2 in. through

(4) **T. grandidens**

Petals ·4 in. long; fruit ·5 in. through

(5) **T. subpalmata**

(1) **T. rhomboidea** *Jacq. Enum. Pl. Carib.* 22; *DC. Prod.* i. 507; *Masters, l.c.* i. 395; *Wight Ic. t.* 320; *King, l.c.* 116.

A shrubby annual, glabrous or pubescent, erect, branched with long internodes. Leaves very variable, often lobed, usually rhomboid, lanceolate or obovate, glabrous above or pubescent, sometimes tomentose beneath, often trilobed, serrate or dentate, 1 to 3 in. long, ·25 to 1·5 in. wide. Flowers 4 to 6 axillary on short peduncles. Sepals apiculate. Petals bright yellow, oblong. Fruit ·2 in. across, globose, tomentose, with short hooked glabrous or

hispid spines, indelhiscent. *Hab.* Common weed on waste ground, from Singapore to Setul. *Distrib.* India, Malay islands, China, Africa, etc. *Native name*: Champadang.

(2) **T. pilosa** Roth, *Nov. Sp.* 233; King, *l.c.* 116.

Erect shrubby annual about 3 or 4 ft. tall, branched, villous. Leaves hairy, ovate or ovate-lanceolate acuminate, coarsely serrate, 2 to 4·5 in. long, 1 to 1·75 in. wide; petioles ·5 to 1 in. long. Stipules lanceolate subulate. Peduncles many-flowered, short. Calyx ·25 in. long, hairy. Petals spathulate-oblong nearly as long, bright yellow. Fruit globose, dehiscent ·25 in. through, villous and densely spinous with long ·3 in. hooked bristly spines, glabrous at the tip. *Hab.* Open sandy spots, not common. Pahang near Pekan. Perak, Ulu Bubong, open bamboo jungle (Kunstler); Temengo. *Distrib.* India, Ceylon, Burma.

(3) **T. pseudo-cana** Sprague and Craib, *Kew Bulletin*, 1911, p. 23. *T. cana* Masters, *l.c.* i. 396, not of Blume.

Erect shrublet, little branched, 2 or 3 ft. tall. Stems and back of leaves velvety hairy. Leaves ovate to lanceolate above, lower ones often rhomboid lobed, serrate above sparsely hairy, 1·5 to 2·5 in. long, 1 to 1·5 in. wide, terminal ones much smaller and narrower; petioles ·7 in. long, tomentose. Flowers crowded, yellow, ·2 in. long. Calyx velvety, lobes narrow. Petals as long. Fruit globose tomentose, ·5 in. across; spines straight, bristly. *Hab.* Waste ground, not common. Singapore (Thomson); Pahang, Pekan. Perak, Sungei Ryah; Goping and Kota Bharu (Kunstler). Ipoh. *Distrib.* India.

(4) **T. grandidens** Hance, *Journ. Bot.* 1877, p. 329. *T. dunalis* O. Kunze, *Rev. Gen.* 85.

Prostrate shrublet. Young parts sparsely hairy. Leaves sub-coriaceous, oblanceolate, simple or trilobed, coarsely toothed; nerves elevate beneath, sparsely hairy, ·6 in. long, ·2 in. wide, trilobed ·4 in. across; petioles ·1 in. long or shorter. Flowers in pairs or threes, sessile on a short peduncle, yellow. Calyx scurfy-pubescent. Petals oblong ·2 in. long. Fruit globose, spiny, ·2 in. through, spines nearly ·1 in. long, straight. *Hab.* On sandy shores of the east coast. Pahang, Kwala Pahang; Rumpin River. Singora (Gwynne Vaughan). Tringganu, Bundi (Rostado). *Distrib.* Cochin-China.

(5) **T. subpalmata** Sol. *Hemsl. Journ. Bot.* 1890, p. 2, *pl.* 293.

Woody prostrate shrub, sparsely tufted with stellate hairs. Leaves sub-coriaceous stiff, deeply 3- to 5-lobed, rounded toothed, ·7 in. long, ·5 in. wide, scabrid above, hairy beneath; petioles ·3 in. long, hairy. Flowers 2 or 3 in axillary and terminal cymes or racemes. Pedicels ·2 in. long, hairy. Sepals linear, sparsely hairy. Petals little longer ·4 in. long, yellow. Fruit globose, ·5 in. through, stiffly spiny, glabrous. *Hab.* Seashores in sand. Johor, Pulau Tioman (Burkill). Kelantan, Kwala Kelantan

(Ridley). *Distrib.* Cochin-China, Java, Borneo, Cocos, Philippines and islands off Queensland.

EXCLUDED SPECIES

T. annua *Linn. Mant.* p. 73, is given as a weed from Perak by King, *l.c.* 117. The only specimens of King's I have seen so labelled were *T. pilosa*.

7. CORCHORUS, Linn.

Herbs or shrublets more or less stellate-pubescent. Peduncles axillary 1- to 2-flowered. Flowers small, yellow. Sepals 4 or 5. Petals 4 or 5. Stamens free, indefinite or twice as many as petals on a short torus. Ovary 2- to 6-celled; style short. Stigma cup-shaped. Capsule elongate-cylindric angled, or sub-globose, 2- to 5-valved. Seeds numerous, albuminous. Species 35, tropics generally.

Capsule globose	(1) C. capsularis
cylindric, smooth	(2) C. tridens
cylindric, 10-ridged	(3) C. olitorius
cylindric, 6-winged	(4) C. acutangulus

(1) **C. capsularis** *Linn. Sp. Pl.* 746; *Wight Ic. t.* 311; *Masters, in Hook. fl. F.B.I.* i. 397; *King, l.c.* 117.

Annual, shrubby, erect little branched 2 to 4 ft. tall, glabrous. Leaves lanceolate acuminate, coarsely serrate, base rounded with 2 subulate appendages, 2 to 4 in. long, .75 to 1.5 in. wide; petioles .5 in. long. Stipules linear-subulate. Flowers in small axillary clusters, yellow, .1 in. long. Capsule globose truncate, ridged and wrinkled, .5 in. long, .3 in. wide, on short stout .1-in. peduncles, 5-celled. *Hab.* Weed in waste ground, never cultivated, as King suggests. Perak, Ulu Bubong in open bamboo jungle (Kunstler); Perlis at Kanga. *Distrib.* India.

(2) **C. tridens** *Linn. Mant.* 366; *Masters, l.c.* i. 398.

Shrubby herb, little branched about 2 ft. tall, nearly glabrous. Leaves glabrous, oblong-lanceolate sub-acuminate, base rounded, bluntly serrate, with 2 setaceous processes at base; nerves 6 slender, 1.5 to 4.5 in. long, .5 to 1 in. across; petioles slender .4 in. long. Flowers .1 in. long, yellow. Capsule cylindric, 1.7 in. long, less than .1 in. thick, with 3 short recurved points at tip, no ridges or wings. *Hab.* Rocks by the sea or in dry open country. Johor, Minyak Buku, Batu Pahat. Province Wellesley, Permatang Bertam. *Distrib.* India, Australia.

(3) **C. olitorius** *Linn. Sp. Pl.* 746; *Masters, l.c.* i. 397; *King, l.c.* 118.

Shrubby annual 2 ft. or more tall, nearly glabrous. Leaves ovate-lanceolate serrate, base rounded with 2 subulate appendages, 2 to 4 in. long, .75 to 2 in. wide; petioles .75 to 1.5 in. long. Stipules linear. Flowers yellow. Capsule cylindric, 10-ribbed, 5-celled,

2 in. long. *Hab.* Occasional weed never cultivated. The jute. Selangor, Bukit Kutu (Ridley).

(4) **C. acutangulus** *Lam. Dict.* ii. 104; *Wight Ic.* t. 739; *Masters, l.c.* i. 398; *King, l.c.* 118.

A herbaceous or slightly woody plant, prostrate or erect branched, nearly glabrous, stem with a line of pubescence running up it. Leaves ovate to ovate-lanceolate acute or acuminate, serrate, base rounded, .5 to 3 in. long, .2 to 1.7 in. wide, herbaceous; petioles .1 to 1 in. long. Stipules long, subulate. Flowers .2 in. long, yellow, in axillary pairs. Capsule 1 to 1.5 in. long, cylindric, 6-winged with 3 terminal beaks, 3-celled. *Hab.* Open ground and rocks by the sea very variable. Singapore, Chan Chu Kang. Johor, Gunong Pantai base (Kunstler). Pahang, Tembeling River sand-banks, a dwarf form; Pulau Jellam, Pahang River. Selangor, Port Swettenham. Perlis, Tebing Tinggi; Penang, Telok Bahang (Curtis). *Distrib.* India, Australia, Africa, West Indies. *Native name*: Rumpot Baya Roaza.

8. COLUMBIA, DC.

Trees often hairy or pubescent. Leaves alternate, lanceolate often serrate, base usually obliquely bilobed. Flowers in terminal panicles, bracteate. Sepals 5, lanceolate or oblong. Petals shorter or about as long. Stamens numerous. Fruit a winged capsule, wings 2 to 4. Species about 5, Malaya, India, Annam, China.

Leaves lanceolate, long-acuminate, base unequal, grey

beneath (1) **C. serratifolia**

Leaves broad ovate, base unequal (2) **C. integrifolia**

Leaves small, oblong or elliptic, acuminate, sub-glabrous, base nearly equal, nor cordate.

Wings of fruit 2 (3) **C. diptera**

Wings of fruit 4 (4) **C. Curtisii**

(1) **C. serratifolia** *DC. Prod.* i. 512.

Tree. Branches villous. Leaves lanceolate acuminate, serrate towards tip, base unequally bilobed, glabrous above; nerves hairy or pubescent, beneath minutely velvety grey, .10 in. long, 3 in. wide or less; petioles .25 in. long. Panicles 6 in. or more long, 2 to 4 in. wide. Flowers numerous about .5 in. across; pedicels .2 in. long. Bracts whorled, obcuneate, deeply cleft into laciniae. Sepals lanceolate acute, white-pubescent outside. Petals shorter, nearly glabrous, oblanceolate thin, orange yellow speckled red. Capsule obovoid, 4-winged, wings narrow, ribbed transversely .5 in. long and wide. *Hab.* Johor, Penyabong (Foxworthy); Pahang, Pulau Tioman, Juara Bay (Burkill); Piangu, Endau (Evans). *Distrib.* Borneo, Celebes, Philippines.

(2) **C. integrifolia** *Ridl. Journ. Roy. As. Soc. S. Br.* 57, p. 26.

Tree 30 ft. tall. Branchlets stellate-hairy. Leaves oblong, shortly acuminate, base unequally lobed, 1 lobe .5 in. longer than

the other; nerves 2 on one side, 1 on the other; nervules prominent beneath, edge entire spinulose, above, stellate-hairy, beneath velvety, .6 in. long, 3 in. wide; petioles .5 in. long. Panicle terminal spreading, 7 in. long, velvety-grey; cymes compact. Bracts ovate boat-shaped, blunt. Flowers .5 in. long, white. Sepals linear-oblong, blunt, hairy. Petals lanceolate oblong, sub-acute, as long. Torus low, silky. Style hairy. *Hab.* Limestone rocks. Perak at Lenggong (Ridley).

(3) **C. diptera** Ridl. *Journ. Roy. As. Soc. S. Br.* 59, p. 78.

Deciduous tree about 40 ft. tall. Young parts pubescent. Leaves lanceolate long acuminate, base nearly equilateral rounded, grey pubescent beneath when young, adult more coriaceous, nearly glabrous; nerves 5 pairs elevate beneath; nervules horizontal, scabrid, midrib pubescent, 4 in. long, 1 in. wide; petioles .25 in. long, slender. Inflorescence secund. Flowers unknown. Fruit 2-winged, top retuse, base broad, glabrous, striate, wings rounded .5 in. long, .75 in. wide. Ovary 2-celled, 2-seeded. *Hab.* Open country. Perlis at Besih Hangat (Ridley).

(4) **C. Curtisii** Ridl. *Journ. Roy. As. Soc. S. Br.* 59, p. 80.

Tree. Leaves lanceolate, base cuneate, slightly unequal, edges entire sparsely pubescent above, beneath more densely grey pubescent; nerves 4 pairs, 3 in. long, 1 in. across; petioles .25 in. long. Inflorescence terminal, pubescent. Fruit 3-winged, wings oblong, rounded, striate pubescent, .75 in. across, apex retuse, base cuneate. *Hab.* Lankawi, small islands (Curtis).

Allied to *C. merguensis* Planch., but with smaller leaves. I have seen no flowers.

9. TRICHOSPERMUM, Bl.

Trees with stellate puberulous leaves. Flowers in axillary and umbellate cymes or panicles. Sepals 5, valvate. Petals 5, with basal scale. Stamens numerous, free, on an annular sub-crenate villous-edged disc; anthers short, broad versatile with sub-orbicular connective. Ovary 2-celled; ovules numerous, placentas axile; style short. Stigma expanded, papillose. Capsule orbicular-reniform, compressed, loculicidally 2-valved. Seeds many, lenticular with marginally villous aril; albumen fleshy. Species 3, Malayan and Polynesian.

Capsule transversely elliptic not keeled (1) **T. Kurzii**
 Capsule inversely cymbiform keeled (2) **T. cymbiforme**

(1) **T. Kurzii** King, *l.c.* 119. *Bixagrewia nicobarica* Kurz, *Journ. Bot.* 1875, p. 325, t. 169.

Tree 40 to 100 ft. tall, 15 to 20 in. through. Leaves membranous, ovate-elliptic, acuminate, serrate-crenate, base rounded, sub-truncate, sub-cordate; nerves 5 pairs, 4 to 6 in. long, 2 to 3 in. wide; petioles .5 in. long. Panicles long-peduncled. Flowers .4 in. long, light brown outside, green within. Sepals oblong, acute,

stellate-tomentose. Petals similar in size and shape, scale at base fleshy, a transverse belt of hairs above. Stamens green. Ovary villous. Capsule 75 in. long and little wider, apex emarginate; base slightly narrowed not straight, edges not keeled; pericarp leathery villous, dark, inside white. Seeds numerous. *Hab.* Forests; Malacca, Sungei Hudang. Sungei Ujong. Seremban (Cantley). Selangor, Ginting Bidai. Perak, Batang Padang district (Kunstler); Tapa; Waterfall, Thaiping (Wray). *Distrib.* Nicobars. *Native name*: Kasumbar Putih.

(2) ***T. cymbiforme*** *Sprague, Kew Bulletin in ed.*

Tree 30 to 40 ft. tall (60 to 100 ft. fide Kunstler), glabrous except inflorescence, petioles and young leaves. Leaves oblong shortly cuspidate, base truncate or shortly cordate, edge faintly serrulate at base, distinctly on top and cusp; nerves 3 pairs, one pair from base, 6 in. long, 2 in. wide; petioles 25 in. long, pubescent. Flowers axillary crowded, not seen developed. Bracts lanceolate thick blunt, 2 in. long. Fruit panicles 4 in. long, including the peduncle 15 in. long and glabrescent, upper branches and pedicels 75 in. long, velvety. Capsule hairy transversely cymbiform, base straight, above rounded with a short point 1 in. wide, 5 in. deep, keeled on the outer edges. Seeds numerous long-hairy. *Hab.* Hill forests, Perak, Larut (Kunstler). Penang, Paya Terobong (Curtis); Bukit Tawan (Haniff). *Distrib.* Sumatra.

This species, of which full specimens have not been obtained, differs from *T. Kurzii* in the smaller leaves, and the fruit in the shape of a reversed boat, the valves being distinctly keeled on the edges, while those of *T. Kurzii* meet exactly on the edge and are not prolonged into a keel. Better specimens of this tree are much wanted.

10. SLOANEA, L.

Trees. Leaves simple. Flowers in few-flowered, lax cymes, rather large. Sepals 4, valvate, coriaceous. Petals 4, oblong, entire. Stamens very numerous, pilose. Ovary 4-celled sunk in a disc; ovules numerous. Fruit, a capsule (woody and spiny), or woody velvety, 4-valved with 1 to 2 arillate seeds. Species 60, most S. American, but some Indo-China, China and Malaya.

(1) ***S. javanica*** *Ridl.* *Phenicosperma javanica* *Miq. Ann. Mus. Bot. Lugd. Bat.* ii. 68, *pl.* 3.

Big tree. Leaves ovate-oblong, blunt pointed, base round, glabrous; nerves 8 pairs, 4.5 in. long, 3 in. wide; petioles 1 in. long. Peduncles 1.75 in. long, with 3 flowers on pedicels an inch long. Sepals ovate velvety, 3 in. long. Petals velvety, more acuminate. Capsule oblong obovoid, 4-angled, 3 in. long, 1.5 in. through, not spiny bright red. Seeds pendulous, black, ellipsoid, 1 in. long, almost covered with a red aril. Very rare. Fruit described from Miquel. *Hab.* Woods near sea; Singapore, Kranji (Ridley). *Distrib.* Java.

11. ELÆOCARPUS, L.

Trees, or in high mountains, shrubs. Flowers usually bisexual, in axillary racemes white. Sepals 5, distinct. Petals 5, usually lacinate at tip, from the outside of a cushion-shaped torus often 5-lobed, or of 5 glands. Stamens usually many, never less than 10, more or less aggregate into groups within the torus, alternating with the lobes of the torus; anthers linear, opening by a terminal pore. Ovary 2- to 5-celled, cells 2- to many-ovuled; style columnar. Drupe with one bony stone, 3- to 5- or 1-celled. Seeds pendulous, 1 in each cell, albuminous. Species 50, Indo-Malaya, a few Polynesia, Australia, and New Zealand.

Malay name generally, Mendong, often accidentally Medang, which properly means *Laurinea*.

- i. GANITRUS. Ovary and drupe 5-celled (except a variety of No. 3).
Leaves glabrescent.
Leaves lanceolate; flowers .5 in. long; drupe
globose blue, stone tubercled (1) *E. Ganitrus*
Leaves elliptic ovate; flowers .1 in. long;
drupe globose, green stone smooth (2) *E. parvifolius*
Leaves tomentose beneath.
Fruit globose; stipules conspicuous (3) *E. stipularis*
- ii. EU-ELÆOCARPUS. Ovary 3-celled; longer cell of anthers bearded
with a tuft of hairs.
Leaves glabrescent; nerves faintly puberulous.
Leaves ovate, stiff, strong-nerved (4) *E. Wrayi*
Leaves lanceolate, thin; nerves fine (5) *E. salicifolius*
Leaves elliptic-ovate, coriaceous 4 to 7 in. by
2.5 to 4.5 in.; flowers .5 in. wide (6) *E. robustus*
Leaves elliptic, very stiff, 4 by 2 in.; racemes 3
in. long; flowers .25 in. wide (7) *E. floribundus*
Leaves glabrous entirely.
Racemes very long, many flowered; leaves
large (8) *E. nitidus*
Racemes short; leaves small rigid coriaceous (9) *E. acmosepalus*
- iii. MONOCERA. Outer cell of anther awned; ovary 2-celled; drupe
1-celled, 1-seeded.
Leaves broad, elliptic, 5 in. long or more;
racemes axillary, 3 to 4 in. long. (10) *E. petiolatus*
Leaves oblong; flowers in erect panicle, 9 in.
long or more, terminal (11) *E. paniculatus*
Leaves elliptic, short, blunt acuminate, 3 in.
long; flowers .5 in. wide (12) *E. Griffithii*
Leaves elliptic lanceolate, long, acuminate, 3 in.
long; flowers .24 in. wide (13) *E. Hullettii*
Leaves obovate serrate, 3 in. long; flowers
many .25 in. long; sepals and peduncles silky (14) *E. pedunculatus*
Leaves obovate serrate, 3 in. long; flowers
many .25 in. wide; sepals and petals glabrous (15) *E. Barnardii*
Leaves obovate, 5 by 3.5 in. long, decurrent;
flowers .4 in. wide (16) *E. Kunstleri*
Leaves obovate, 5 by 2 in.; petioles 1 in. long;
flowers few, .75 in. wide (17) *E. obtusus*
Leaves oblanceolate, 10 by 4.5 in. long, de-
current; flowers 1 in. wide (18) *E. rugosus*

iv. **ACRONODIA**. Flowers 4-merous; anthers not awned or bearded.

Leaves tomentose beneath, 6 in. long; panicles red-hairy (19) **E. Jackianus**

Leaves sparsely tomentose or only the midrib, 3 in. long; flowers small (20) **E. glabrescens**

Leaves minutely puberulous on nerves; above and beneath; racemes pale, pubescent (21) **E. polystachyus**

Leaves glabrous.

Racemes 2 in. long, glabrous

Leaves elliptic blunt long-acuminate, thin 3 in. long. (22) **E. Mastersii**

Leaves lanceolate, 6 by 1·75 in. (23) **E. eriobotryoides**

Leaves lanceolate acuminate serrate, coriaceous 5 by 1 in. (24) **E. leptomischus**

Racemes 3 in. long, silky.

Leaves oblanceolate blunt coriaceous long-acuminate. (25) **E. reticulatus**

Leaves ovate very coriaceous, strongly reticulate on both sides. (26) **E. reticosus**

(1) **E. Ganitrus** *Roxb. Hort. Beng.* 42; *Masters, in Hook. fil. F.B.I.* i. 400. *E. cyanocarpa* *Maing. in Masters, l.c.* 406.

A big smooth-barked tree, 40 to 50 ft. tall. Leaves submembranous, red when old, lanceolate acute at both ends, minutely serrulate; nerves 10 to 12 pairs, slender, 3·5 to 5·5 in. long, 1·25 to 2·25 in. wide; petioles 3 to 5 in. long. Racemes pubescent from below the leaves, many-flowered, 3·5 in. long. Flowers white, second, 5 in. long on pedicels 4 in. long. Sepals lanceolate acuminate, pubescent. Petals longer, obovate, laciniate for half the length. Torus short, fleshy. Anthers 30 to 35, the longer ones with 1 to 2 hairs at tip. Ovary ovoid-conic, tomentose, 5-celled; ovules 4 in each cell. Drupe globose, 75 to 9 in. through; bright blue with oily pulp, stone 5-grooved, tubercled, 5-celled. *Hab.* Malacca (Maingay). Perak; dense jungle at Goping (Kunstler). Penang, Penara Bukit at 1000 ft. altitude (Curtis). *Distrib.* Assam and Nepal.

Very doubtfully wild here. The seed valued for necklaces.

(2) **E. parvifolius** *Wall. Cat.* 2662 *A. and B.*; *Masters, l.c.* i. 401; *King, l.c.* 123.

Tree 20 to nearly 100 ft. tall. Branchlets pubescent. Leaves membranous, ovate-oblong acuminate blunt, base cuneate, serrate, glabrous except the pubescent mid-rib, brown beneath when dry; nerves 6 pairs, elevate beneath, 2·5 to 4 in. long, 1·1 to 1·4 in. wide; petioles puberulous, slender, 6 to 75 in. long. Racemes from below the leaves, 2·7 in. long, puberulous, silky, buds conic. Flowers 1 in. long. Sepals lanceolate, silky. Petals about as long, cuneiform cut half-way into laciniae. Torus of 5 separate glands, velvety. Stamens 15, shorter than petals; anthers scaberrulous, sometimes with 2 or 3 hairs at tip. Ovary 5-celled, pubescent. Fruit globose or ovoid, green, 75 to 1 in. through, 5-celled, stone rugose. Seeds 2 or 3. *Hab.* Common in open country, and

in high jungle, where it attains a much greater size; Singapore, Changi; Bukit Timah. Johor, Kota Tinggi. Malacca, Ayer Panas (Holmberg); Ulu Chembong (Derry). Negri Sembilan, Bukit Kupayang (Cantley); Perhentian Tinggi. Perak, Thaiping Hills (Kunstler). Penang, Government Hill and Penara Bukit (Curtis). *Distrib.* Borneo. *Native names:* Jambu Kelawar; Jambu Kelat Lawar putih; Medang api; Medang pipit; Mudong Kelawar; Munsaya; Paroh.



FIG. 29.—*Elæocarpus stipularis*.

(3) *E. stipularis* Bl. *Bijdr.* 121; *Masters, l.c.* i. 404; *King, l.c.* 123.

Tree 40 to 60 ft. tall, more or less pubescent all over. Leaves coriaceous, ovate acute or acuminate, base rounded or slightly cuneate, edges entire or very nearly so, above glabrous when adult, beneath tomentose; midrib pubescent on both sides; nerves 9 to 12 pairs, 3.6 to 6.5 in. long, 1.75 to 2.5 in. wide; petioles .5 to .75 in. long. Stipules conspicuous .2 in. long, 3- to 4-lobed, lobes acute, tomentose. Racemes axillary and below leaves

minutely tomentose. Flowers 3 in. across; pedicels as long, tomentose. Sepals lanceolate acute, tomentose, inside pubescent. Petals longer, cuneiform, lobed and laciniate, laciniaæ about 25. Torus of 5 tomentose glands. Stamens 25, half as long as petals; anther-cells unequal, longer ones with a tuft of white hairs at tip. Ovary ovoid-globose, tomentose 3- or 5-celled. Fruit globose or oblong, green, .8 to 1 in. long. Stone 1-seeded. *Hab.* Common in woods in the low country, Singapore, Tanglin, etc. Johor, Kota Tinggi. Malacca, Merlimau (Derry); Pahang, Tanjong Opi, Kuantan (Foxworthy). Selangor, Kwala Lumpur (Curtis). Perak, Larut Hills (Curtis); Tapa (Wray); Negri Sembilan, Bukit Kupayang and Gunong Berumbun (Cantley); Pahang, Kwala Tembeling. Province Wellesley, Tasek gelugur. *Distrib.* Borneo, Sumatra. Java. *Native names:* Darumun Pelandok; Medang Tijo; Paroh; Ungank; Pulau Pipit; Pinang Pergam.

This plant varies somewhat in size of leaves and in the number of cells in the ovary. A large-leaved form, rather more tomentose and apparently with entire lanceolate stipules, is the var. *latifolia* King, l.c. 124, and has been met with at Goping in Perak by Kunstler. A form with 3-celled ovary and oblong fruit occurs with the ordinary form. This is the plant described as *E. Scortechinii* King, l.c. 124, and has been met with in Singapore on Bukit Timah and Bukit Mandai, Dindings at Bruas (Burn-Murdoch) and Perak at Relau Tujur by Wray, and at Ulu Bubong by Kunstler, and Sarawak, Borneo. Merrill, *Journ. Roy. As. Soc. S. Br.* 77, p. 203, separates this species from Blume's *stipularis* under the name of *E. gambir* Becc. apparently on a statement of Koorder's that the plants are different. The Javanese form has a tendency to be less hairy beneath the leaves, but I see no other difference.

(4) **E. Wrayi** King, l.c. 124. *E. monticola* Ridl. *Journ. Linn. Soc.* xxxviii. 305.

A small tree with young parts pubescent. Leaves coriaceous, bluntly acuminate, crenate serrate, base rounded, glabrous when adult, black-dotted on the back; nerves till adult pubescent, 6 to 7 pairs, elevate beneath inarching, reticulations wide, 2.25 to 4.5 in. long, 1.25 to 1.75 in. wide; petioles .75 in. long slender. Racemes usually from below, the leaves about half as long to 4 in. long, tomentose often sub-terminal. Flowers .2 in. across. Sepals lanceolate acute, tomentose, inside pubescent, pinkish brown. Petals glabrous, cuneate, cut into 25 laciniaæ, greenish white. Torus of 5 velvety oblong glands. Stamens 20 to 25, shorter than petals; filaments less than half as long as anthers. Ovary conic, tomentose, 3-celled. Fruit ovoid-globose, 1 to 1.25 in. long, .8 to .9 in. wide, 1-celled. 1-seeded. *Hab.* Mountains, 5000 to 5500 ft. altitude; Perak, Gunong Bubu at 5000 ft. altitude and Gunong Batu Putih (Wray); Pahang, Gunong Tahan (Robinson).

The form *monticola* Ridl. of Gunong Tahan has larger nearly entire leaves, and longer racemes sub-terminal.

(5) **E. salicifolius** King, l.c. 125.

A slender tree 30 ft. tall. Branchlets puberulous. Leaves thinly coriaceous, narrow lanceolate acuminate, base cuneate, upper part serrulate-crenulate, glabrous except the puberulous midrib, nerves 8 pairs, 3 to 3·5 in. long, '7 to '9 in. wide; petioles '5 in. long. Racemes from below and with the leaves; rachis slender, pubescent. Flowers '15 in. across, white, fragrant of almonds; pedicels pubescent, '15 to '2 in. long. Sepals lanceolate tomentose outside cream white. Petals little longer cuneiform with a narrowed claw, divided half-way into 8 fimbriate lobes, pubescent inside. Torus of 5 sub-globose glands, reddish brown. Stamens 25, shorter than petals, cells pointed, upper with a tuft of white hairs. Ovary globose, tomentose, 3-celled. Drupe oblong, green. *Hab.* Woods in the south; not common. Singapore, Bukit Timah; Chanchukang (Kunstler, Ridley). *Native names:* Darumon; Jurumong Padi.

(6) **E. robustus** Roxb. *Fl. Beng.* 42; *Masters, l.c.* i. 402; *Pierre, Fl. For. Cochinchine, t.* 147; *Wight, Ic. t.* 64; *King, l.c.* 126.

Tree 40 to 60 ft. tall. Young parts puberulous. Leaves thinly coriaceous, ovate-lanceolate to ovate-acuminate, base rounded, serrate, glabrous, when young red; nerves 10 to 12 pairs, rather prominent, reticulations conspicuous, fine on back, 3·5 to 9 in. long, 1·75 to 3·5 in. wide; petioles 1 to 2·25 in. long. Racemes from below the leaves 4·5 to 6 in. long, puberulous. Flowers '4 in. wide; pedicels '3 in. long. Sepals lanceolate, pubescent outside, glabrous and keeled inside. Petals broad cuneiform, base acute, cut half-way into 30 laciniae, edges and base hairy. Torus of 5 velvety glands. Stamens 30 to 50. Fruit ovoid-globose, 1 to 1·25 in. long; stone oblong-ovoid, rugose, 3-celled. *Hab.* Open country; Johor, Sungei Kahang (Kelsall), Pahang River, Kwala Pahang. Dindings, Bruas. Penang, Telok Bahang (Curtis); Setul. Lankawi islands (Curtis). *Distrib.* India. *Native names:* Barong; Kunkuman Jantan; Obak; Sito; Sopi.

var. *ovalis* Ridl. Leaves broadly ovate, base rounded, long, acuminate, margin almost entire, quite glabrous, 7 in. long, 4·5 in. wide; petioles 2·5 in. long, rather stout. Flowers '5 in. across. Sepals strongly keeled within. Petals broad, pubescent all over. Selangor at the Sempang mines (Ridley).

(7) **E. floribundus** Blume *Bijdr.* 120; *King, l.c.* 128. *E. serratus* Roxb. *Fl. Ind.* ii. 596. *E. rigida* Ridl. *Journ. Roy. As. Soc. S. Br.* 54, p. 28.

A tree 30 to 40 ft. tall, nearly glabrous. Leaves thinly coriaceous, ovate-elliptic to oblong-lanceolate acuminate blunt, obscurely crenate-serrate or almost completely entire, often pustulate; nerves 5 to 7 pairs; 3 to 5·5 in. long, 1·75 to 2·75 in. wide; petioles rather slender, geniculate at tip, 1 to 1·5 in. long. Racemes

below the leaves, 3 to 4 in. long, many-flowered, glabrous. Flowers 4 in. across, buds conic acute; pedicels .35 in. long. Sepals lanceolate, glabrous, often pustulate, edges only pubescent, midrib prominent. Petals cuneiform-oblong, lobed about a fourth of their length with numerous laciniae, edges pubescent. Torus of 5 tomentose glands. Stamens 30 shorter than petals, cells unequal, the longer tufted with white hairs. Ovary ovoid-globose, tomentose, 3-celled. Fruit 1 in. long, ovoid-elliptic apiculate (when young oblong and long-apiculate); stone narrow ovoid tapering to both ends with 3 vertical grooves and many wrinkles, 3-celled. *Hab.* In forests. Rare. Singapore, Bukit Timah, Negri Sembilan (Kinsey). Perak (Scortechini). *Distrib.* India, Burma, Nicobars.

(8) ***E. nitidus*** Jack, *Mal. Misc.* i. (2), 41; *Wall. Cat.* 2678; *Masters, l.c.* i. 401.

Tree 25 to 60 ft. tall. Branchlets puberulous. Leaves thinly coriaceous, oblong-lanceolate acuminate, crenate-serrulate, base cuneate, brown beneath when dry, glabrous; nerves 10 to 13 pairs inarching at tip, 4.5 to 9 in. long, 1.75 to 2.75 in. wide; petioles 1.25 to 2 in. long rather slender. Racemes axillary or below the leaves, puberulous. Flowers .15 in. long, white; pedicels slender, .3 in. long. Sepals ovate-lanceolate acute, shorter than petals, puberulous, chiefly on base and edges. Petals cuneiform lacinate for half their length, glandular-pubescent. Torus of 5 sub-globular tomentose glands. Stamens 15 to 35; anthers obtuse, awnless. Ovary globose, tomentose, 3-celled. Fruit ovoid or obovoid, green, 1.5 in. long, 1 in. through; stone 3-celled. Seed 1. *Hab.* Woods, Penang (Jack, Curtis).

var. *leptostachyus* King, *l.c.* 127. *E. leptostachyus* Wall. *Cat.* 2672; *Masters, l.c.* 403.

Leaves elliptic-oblong or rounded acute, nearly entire, base rounded, 6 to 9 in. long, 2.75 to 4.5 in. wide; petioles 1 to 1.75 in. long. *Hab.* Dindings, Bruas. Perak, Ulu Bubong (Kunstler); Simpang (Wray). Penang (Wallich).

(9) ***E. acmosepalus***, Stapf MSS. *Ridl. Journ. Roy. As. Soc. S. Br.* 75, p. 8.

Tree. Young parts silky pubescent. Leaves thinly coriaceous, drying brown, glabrous elliptic lanceolate, acute or acuminate, base cuneate, margins entire, slightly thickened; nerves 3 pairs inarching within the margin, elevate beneath, reticulations lax, 3 to 4 in. long, 1.25 in. wide; petioles slender, .75 in. long, geniculate. Racemes slender in upper axils 2.5 in. long, puberulous. Pedicels .3 in. long. Sepals lanceolate-acuminate 5, sparsely hairy or glabrescent, .2 in. long. Petals cuneate fimbriate, edges ciliate, nearly as long. Stamens 20 to 25; filaments glabrous, as long as the anthers, which are awned, awn nearly as long as the anther and tipped with hairs. Torus of 5 rounded tomentose glands grooved on the back. Ovary ovoid, conic, 3-celled, 6-ovuled, silky

pilose; style glabrous at base only. Drupe fusiform acuminate, 1·25 in. long, ·25 in. wide. *Hab.* Johor, Pinerong (Cantley). Pahang, Ulu Rumpin (Watson). *Distrib.* Borneo. *Native names:* Medang darmong; Menkinang.

The fusiform fruit is unique among our species.

(10) ***E. petiolatus*** Wall. *Cat.* 2673; *King, l.c.* 130. *E. integer* Masters, *l.c.* i. 408. *Monocera petiolata* Jack, *Mal. Misc.* i. (5), 43.

Tree 20 or 30 ft. tall, glabrous, terminal. Leaf-buds coated with resin. Leaves deep green, coriaceous elliptic or elliptic-oblong acute or shortly acuminate, edges entire, base rounded; nerves 7 to 8 pairs, reticulations fine numerous, conspicuous when dry, 4·5 to 8 in. long, 2 to 5 in. wide; petioles 1·4 to 3·4 in. long. Racemes glabrous, from below the leaves, 3·5 in. long, many-flowered; buds conic, acute; pedicels ·3 in. long. Sepals lanceolate acute, glabrous except edges. Petals about as long, oblong with 10 to 12 laciniae, bases to laciniae silky, a large fleshy villous gland near the base. Torus a 10-lobed fleshy disc. Stamens 18 to 25, shorter than petals; anthers deep cleft at top with a short recurved awn on outer cell. Ovary glabrous. Fruit elliptic, blunt at both ends, ·4 to ·6 in. long and ·3 in. through, dull dark blue; stone slightly rugose, 1-celled, 1-seeded. *Hab.* Common in lowland woods. Singapore, Garden Jungle; Bukit Timah. Malacca, Merlimau (Derry); Batu Tiga (Holmberg); Pahang Bentong (Foxworthy). Selangor, Kwala Lumpur (Foxworthy). Perak, Chanderiang (Kunstler); Tapa (Wray). Penang (Curtis). *Distrib.* Borneo, Sumatra, Burma, Trang. *Native names:* Mendong Pipelakan; Mendong Tanjong; Paru-Paru; Kayu Sepah; Saban.

(11) ***E. paniculatus*** Wall. *Cat.* 2663; *Masters, l.c.* i. 407; *King, l.c.* 129.

Tree about 30 to 40 ft. tall, 4 to 6 in. through. Leaves thinly coriaceous light green, lanceolate-oblong acuminate, edges entire, base rounded or slightly cuneate, glabrous; nerves 5 to 7 pairs, reticulations very small, distinct beneath, 4·5 to 8 in. wide; petioles ·8 to 2 in. long. Racemes numerous, erect from the upper axils, 6 to 8 in. long; buds silky ovoid acute; pedicels curved, silky ·5 in. long. Sepals ovate acuminate, silky outside ·2 in. long. Petals as long, lanceolate acuminate entire, silky. Torus a shallow silky disc. Stamens 50, nearly sessile; anthers silky, outer cells long-awned. Ovary 2-celled, silky. Fruit ellipsoid, blunt at each end, blue grey, ·4 to ·5 in. long, ·25 to ·35 in. through, stone bony, tuberculate. *Hab.* Common in lowland woods. Singapore, Selitar; Teban. Johor, Kwala Sembrong (Kelsall); Batu Pahat. Malacca, Brisu (Goodenough); Merlimau (Cantley); Pahang. Kwantan (Foxworthy); Selangor, Sempang; Langat River. Perak, Asam Kumbang (Wray). Province Wellesley, Krian. Lankawi islands

(Haniff). *Native names*: Darumon hitam; Mendong Musang; Tingar Belukar; Jambu Arang.

(12) **E. Griffithii** *Masters, l.c.* i. 408; *King, l.c.* 131. *Monocera Griffithii Wight, Ill.* i. 84, *not of Müller*.

Tree 30 to 70 ft. tall, glabrous except inflorescence. Leaves thinly coriaceous, ovate-lanceolate to lanceolate acuminate, edge cartilaginous with shallow mucronate crenulations or sub-entire, base rounded or sub-cuneate; nerves 5 to 6 pairs, forking and inarching within the margin, reticulations minute, distinct, 2.5 to 3.75 in. long, .9 to 1.5 in. wide; petioles .5 to 1 in. long. Racemes from upper axils, rachis and pedicels .6 to 8 in. long, pubescent. Flowers .5 in. across, buds ovoid-conic. Sepals lanceolate acuminate, silky outside. Petals as long, ovate acuminate, tip 2- to 3-toothed with 2 to 3 lateral fimbriæ, outside minutely silky, inside hirsute with a large basal gland, edges below folded in to form with the gland 2 cells. Torus a 10-lobed shallow disc. Stamens 25 to 30, shorter than petals, silky, outer cell awned, awn much shorter than anther. Ovary glabrescent, 2-celled. Drupe ellipsoid, blunt at both ends, .5 in. long, .3 in. through; stone slightly rugose, 1-celled, 1-seeded. *Hab.* Lowland Woods. Singapore, Chan Chu Kang. Johor, Gunong Pulai. Pahang, Pekan. Malacca, Sungai Hudang (Derry). Perak (Wray). Province Wellesley, Nibong Tebal (Curtis). *Distrib.* Tenasserim.

(13) **E. Hullettii** *King, l.c.* 132.

Tree 30 to 40 ft. tall, glabrous except inflorescence. Leaves thinly coriaceous, lanceolate-acuminate, edges sub-cartilaginous, entire or obscurely serrate, base cuneate or rounded; nerves 7 or 8 pairs inarching within the margin, reticulations minute, distinct, 2.5 to 3 in. long, .75 to 1.4 in. wide; petioles .65 to .9 in. long. Racemes axillary, 3 to 3.5 in. long, very slender, 7- to 8-flowered, puberulous. Flowers .3 in. wide spreading; pedicels puberulous, .35 in. long. Sepals linear-lanceolate acuminate pubescent outside. Petals ovate, narrowed to the 10- to 12-fimbriate tip, glabrous outside, villous at the base inside. Torus shallow, 10-lobed, silky. Stamens 20, outer cell of anther with an awn as long as itself. Ovary ovoid pubescent, 2-celled. Drupe ellipsoid blunt at each end, .6 in. long, .35 in. through; stone wrinkled, bony, 1-seeded. *Hab.* Forests. Singapore, Bukit Mandai and Bukit Timah (Hullett). Perak, Thaiping Hills at about 2000 ft. altitude (Curtis); Tapa. Penang (Curtis). *Native name*: Darumon pipit.

(14) **E. pedunculatus** *Wall. Cat.* 2678 *in part*; *Masters, in Hook. fil. F.B.I.* i. 408; *King, l.c.* 132.

Tree 40 to 80 ft. tall, glabrous except inflorescence. Leaves coriaceous, oblanceolate or narrowly elliptic-oblong, blunt, base very cuneate, edge cartilaginous crenate-mucronate; nerves 5 to 7 pairs, inarching far from edge, 3 to 4.5 in. long, 1.25 to 1.8 in. wide; petioles .75 to 1.2 in. long. Racemes axillary or below

leaves 3 to 4 in. long hoary-pubescent. Flowers $\frac{3}{4}$ in. wide, buds ovoid acute. Sepals lanceolate acute, minutely silky outside, midrib thickened. Petals little longer, oblong base expanded, tip broad with 10 to 15 fimbriæ one-fourth of length, silky on both sides at base, within hooded, edges infolded to a large gland at base forming 2 cells. Torus a 10-lobed glabrescent disc. Stamens 15; filaments pubescent, outer cell with recurved awn. Ovary ovoid, glabrous, 2-celled. Drupe ellipsoid, blunt at both ends, $\frac{5}{8}$ in. long, $\frac{3}{8}$ in. through, 1-celled, 1-seeded. *Hab.* Usually a sea-shore tree, but also in forests. Singapore, Sungei Jurong; Loyang; Pulau Tekong; Pulau Bayan. Malacca (Griffith). Perak, Thaiping Hills (Kunstler). Negri Sembilan, Tampin Hill (Robinson). Penang, Government Hill (Curtis). *Native name:* Darumun Padi.

(15) **E. Barnardii** *Burkill, Journ. Roy. As. Soc. S. Br.* 75, p. 42.

Tree. Leaves obovate blunt, glabrous, bluntly serrate; nerves 5 to 6 pairs, 3 to 6 in. long, $\frac{1}{6}$ in. wide; petioles $\frac{1}{2}$ in. long. Racemes 12- to 20-flowered, as long or little longer than leaves scurfy pubescent. Sepals 5, linear-lanceolate $\frac{1}{2}$ in. long. Petals obcuneate, as long, laciniate to middle. Stamens about 20; anthers bearded at tip. Ovary 3-celled, pubescent. Fruit olive-shaped, $\frac{1}{8}$ in. long, deep blue. Seed smooth. *Hab.* Perak. Thaiping (Barnard).

(16) **E. Kunstleri** *King, l.c.* 133.

Tree 50 to 60 ft. tall, $\frac{1}{5}$ to 20 in. through. Branches thickened at the tip, glabrous except inflorescence. Leaves coriaceous, rounded obovate obtuse, sometimes apiculate, base narrowed, edge slightly crenate serrate; nerves 10 pairs inarching within the edge, reticulations distinct on both surfaces, 5 to 8 in. long, $\frac{2}{75}$ in. wide; petioles $\frac{1}{5}$ to $\frac{1}{7}$ in. long. Racemes below the base crowded, slender, $\frac{1}{5}$ in. long, puberulous. Flowers $\frac{1}{4}$ in. across; pedicels $\frac{1}{4}$ in. long. Sepals lanceolate narrow, sub-acute, pubescent on both sides. Petals as long, oblong-obovate obtuse, laciniæ rather broad 6 to 8, silky outside, villous inside. Torus a shallow-toothed cup. Stamens 28 to 30, shorter; outer anther-cell with a recurved awn. Ovary ovoid tomentose, 2-celled. *Hab.* In open jungle, 500 to 800 ft. altitude. Perak, Gunong Bubu (Kunstler).

(17) **E. obtusus** *Bl. Bijdr.* 125; *King, l.c.* 134. *E. monocera* *Cav. Ic. t.* 501; *Masters, l.c.* i. 405.

Small tree 30 or 40 ft. tall. Branchlets pubescent. Leaves coriaceous, oblong-obovate, tip rounded or blunt, gradually narrowed to the acute base, glabrous; nerves 6 to 8 pairs, reticulations very fine, $\frac{4}{5}$ to $\frac{6}{5}$ in. long, $\frac{2}{25}$ to $\frac{2}{75}$ in. wide; petioles $\frac{1}{75}$ to $\frac{1}{11}$ in. long. Racemes axillary among the leaves, puberulous, $\frac{1}{5}$ to $\frac{2}{5}$ in. long, few-flowered. Flowers 1 in. across, buds acute. Sepals oblong-lanceolate acute, minutely pubescent. Petals longer, cuneiform, $\frac{1}{5}$ in. long, $\frac{1}{2}$ in. across, laciniæ short, 8 to 10. Torus a wavy cup. Stamens 30 to 50, shorter than petals; anther with a setaceous

awn as long as itself. Ovary ovoid silky 2-celled. Fruit ovoid-oblong, 1·5 in. long, ·9 in. wide; stone tubercled, 1-celled, 1-seeded. *Hab.* Seashores and open country. Singapore, Bukit Timah; Chua Chu Kang. Johor, Kota Tinggi. Malacca (Griffith); Kerubong; Merlimau (Cantley); Pahang River. Dindings. Perak, Kwala Dipang (Curtis). *Distrib.* Burma, Sumatra, Java, Borneo. *Native names*: Medang Kawan; Medang Paya; Medang Tanah.

(18) **E. rugosus** Roxb. *Hort. Beng.* 42; *Fl. Ind.* ii. 596; *Wight, Ic. t.* 61. *E. apiculatus* Masters, *l.c.* i. 407; *King, l.c.* 135.

A big tree 50 to 100 ft. tall and as much as 3 ft. through. Young parts pubescent. Branchlets thick. Leaves coriaceous, often glabrous all over, obovate to oblanceolate-oblong shortly acuminate or blunt, edge obscurely serrulate crenate, base narrowed blunt; nerves 12 to 14 pairs, prominent beneath inarching within margin, glabrous or densely pubescent, 7 to 10 in. long, 2·5 to 3·75 in. wide; petioles ·3 to 1 in. long. Racemes axillary below the leaves, 2 to 3 in. long, pubescent. Flowers ·9 in. across, pedicels ·2 to ·5 in. long. Sepals oblong-lanceolate, sub-acute, pubescent. Petals longer, cuneiform silky, cut into numerous laciniae about one-fourth of their length. Torus a shallow cup, pubescent. Stamens 30 to 40, half as long as petals; filaments dilate at base, outer anther-cell long-awned. Ovary ovoid tomentose, 2-celled. Drupe oblong-globose, 1·25 in. through, stone woody with large wing-like processes, 1-celled, 1-seeded. *Hab.* High forest up to 2000 ft. altitude. Malacca (Griffith). Perak, Ulu Bubong; Larut Hills (Kunstler). Penang; Government Hill (Wallich, Maingay, Curtis). *Distrib.* India, Chittagong.

var. *singaporensis* Ridl.

A fine tree with obovate obtuse crenate leaves; nerves 6 pairs, 6 in. long, 3 in. wide; racemes 3 in. long, slender. Singapore, Bukit Timah Road (Ridley 5727, 10798).

(19) **E. Jackianus** Wall. *Cat.* 2679; *King, l.c.* 137. *Monocera ferruginea* Jack, *Mal. Misc.* i. (2), 44.

Tree 40 to 100 ft. tall. Young branches red-tomentose. Leaves coriaceous, ovate-oblong to elliptic acuminate acute entire, base rounded or shortly cuneate, above glabrous, beneath red-tomentose; nerves 8 to 10 pairs prominent beneath; nervules distinct, sub-parallel, visible beneath, 4 to 7·5 in. long, 2·5 to 4·5 in. wide; petioles 1·75 to 3 in. long, stout tomentose. Racemes crowded below the leaves, 3 in. long, red-tomentose. Flowers ·2 in. long, often unisexual, pendent; pedicels as long, curved red-tomentose. Sepals 4, lanceolate acute, red-tomentose. Petals 4, little longer, oblong obtuse, 8- to 10-toothed. Stamens about 12, shorter, scaberrulous; anthers pointed, unawned. Ovary ovoid-oblong, glabrous, imperfectly 2-celled. Torus saucer-shaped undulate, hairy. Drupe ovoid-oblong, both ends rounded, blunt. Seed rugose, 1-celled, 1-seeded. *Hab.* Common in woods in the south;

Singapore, Tanglin (Murton). Malacca (Griffith); Hulu Dayong (Derry). Perak, Thaiping Hills; Chanderiang (Kunstler); Penang, Ayer Hitam (Curtis). *Distrib.* Borneo. *Native names:* Jatek-Jatek; Jentek-Jentek.

Easily recognised by its red tomentum. The flowers are often exclusively male.

(20) **E. glabrescens** *Masters, l.c. i. 403; King, Journ. As. Soc. Beng. l.c. 138.*

Tree. Young branches, buds and petioles densely red-tomentose. Leaves coriaceous, ovate to ovate-lanceolate acuminate, edges entire, base rounded above, glabrous except midrib, finely reticulate, beneath rufous-pubescent, but finally glabrous except midrib; reticulations small, conspicuous; nerves 5 to 6 pairs, 2·5 to 3·5 in. long, 1·2 to 1·6 in. wide; petioles 1·25 to 1·75 in. long, glabrescent when old. Racemes 1 to 1·5 in. long, axillary and below the leaves; rachis and pedicels pubescent. Flowers 1·5 in. long; pedicels curved, as long. Sepals 4, ovate-lanceolate, pubescent outside. Petals 4, slightly longer, oblong with 6 to 12 short teeth, pubescent outside. Stamens 10 to 12, shorter; anthers scaberulous obtuse unawned. Ovary ovoid, glabrous. Torus a shallow villous cup. Drupe oblong-obovoid, narrowed to base, 3 in. long, 2 in. wide. *Hab.* Usually in hill forests. Selangor, Kwala Lumpur (Curtis); Gunong Mengkuang Lebah, 5000 ft. altitude (Robinson). Penang, Government Hill (Maingay, Curtis) at 2500 ft. altitude. Kedah Peak (Burkill's collector).

(21) **E. polystachyus** *Wall. Cat. 2671; Masters, l.c. i. 403; King, l.c. 137.*

Small tree 20 to 40 ft. tall. Branchlets silky, rather stout. Leaves coriaceous, lanceolate-elliptic acuminate, base broad rounded, shortly serrulate or nearly entire, glabrous above, midribs and nerves beneath hairy; nerves 7 to 10 pairs, prominent beneath, reticulations very fine on both surfaces, 5·5 to 7·7 in. long, 2·25 to 3·5 in. wide; petioles 2·5 in. long, silky. Racemes from upper axils below the leaves 7 in. long; rachis silky-tomentose. Flowers 2 in. long, nodding ochreous; pedicels curved as long; buds ovoid obtuse. Sepals ovate obtuse, silky outside. Petals elliptic-oblong obtuse, entire or slightly lobed, villous on both sides. Stamens half as long as petals, pubescent; anthers unawned. Torus of 5 thin villous glands. Ovary ovoid villous 2-celled. Drupe oblong, blunt at both ends, 6 in. long, 35 in. through, green, stone minutely rugose, 1-celled, 1-seeded. *Hab.* Woods in the south. Singapore, common, Bukit Timah; Jurong. Johor, Pinerong (Cantley). *Distrib.* Borneo. *Native names:* Derumo; Darumun Babi.

(22) **E. Mastersii** *King, l.c. 140. E. Acronodia Masters, l.c. i. 401, in part.*

Tree 20 to 50 ft. tall. Shoots slightly puberulous, otherwise

glabrous. Leaves thinly coriaceous oblong-lanceolate to ovate-lanceolate acuminate, entire or faintly serrate, base cuneate; nerves 6 to 8 pairs inarching within the edge, 2·75 to 4·5 in. long, ·8 to 1·4 in. wide; petioles ·5 to ·75 in. long. Racemes short, 1 to 2 in. long, few-flowered. Flowers ·2 in. across, white; buds ovoid acute. Sepals 4, ovate-lanceolate sub-acute, puberulous or glabrous. Petals oblanceolate or obcuneate, tip rounded more or less laciniate glabrous. Stamens 8 to 10, shorter; anthers unawned. Torus a shallow wavy disc, pubescent. Ovary ovoid glabrous, 2-celled. Drupe ovoid-oblong, ·35 in. long, ·25 in. wide, blue; stone smooth cartilaginous, 1-celled, 1-seeded. *Hab.* Common in lowland open country and woods. Singapore, Cluny Road (Murton). Johor, Gunong Pulai. Malacca, Mt. Ophir (Maingay), a form with smaller, narrower leaves, with more distinct reticulations. Perak, Ulu Bubong (Kunstler). Kedah, Peak (Lobb). *Distrib.* Borneo. *Native names:* Chemanton Merah; Lempedu Burong; Medang Asam; Nilasor; Medang Suggueh; Medang Perak Payah.

Often unisexual and variable in the shape and cutting of the petals. Mountain forms have much smaller and narrower leaves.

(23) ***E. eriobotryoides*** Ridl. *Journ. F.M.S. Mus.* v. 29.

Leaves coriaceous lanceolate, tip acuminate, base cuneate, edges serrate; nerves 6 pairs, inarching within the margin, slender midrib stout, reticulations wide little elevate, glabrous except the young leaves; which have silvery-silky edges, 5 to 6 in. long, 1·5 to 1·9 in. wide; petioles 1·5 in. long, rather stout. Racemes axillary below leaves numerous, 2 to 2·5 in. long, glabrous. Flowers secund, ·2 in. long, white; buds conic, sub-acute. Sepals 4, lanceolate-acuminate, pubescent. Petals as long, narrow oblong-cuneate, apex fimbriate, base silky, hairy on edge. Stamens shorter, glabrous; filaments short; anthers blunt, not awned, pubescent. Ovary silky. Torus silky. *Hab.* Mountains at 4800 to 5000 ft. altitude. Selangor, Gunong Mengkuang Lebah (Robinson).

(24) ***E. leptomischus*** Ridl. *Journ. F.M.S. Mus.* v. 30.

Leaves ovate-lanceolate acuminate blunt, base cuneate, edges crenulate, coriaceous, glabrous; nerves 7 pairs, reticulations fine elevate beneath, 3 in. long, 1·1 to 1·5 in. wide; petioles slender, geniculate at tip, 1 in. long. Racemes numerous among upper leaves, 2·75 in. long, rachis slender, glabrescent. Flowers numerous, pendent; pedicels silky, ·2 in. long; buds conic, acute. Sepals 4, lanceolate, silky outside. Petals 4, oblong cuneate, tip fimbriate with 12 short laciniae. Stamens, anthers glabrous bifid, lobes unequal; filaments shorter. Ovary glabrescent, ovoid. Torus saucer-shaped silky. *Hab.* Mountains at 4800 to 5000 ft. altitude. Selangor, Gunong Mengkuang Lebah (Robinson).

(25) ***E. reticulatus*** Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 2.
E. punctatus King, *l.c.* 139, *not of Blume.*

Leaves oblanceolate acuminate long narrowed to the base,

edges thickened, serrate, coriaceous, glabrous when adult; nerves faint 7 pairs, reticulations conspicuous, 2·5 in. long, ·75 in. wide; petioles ·25 in. long. Racemes few-flowered, 1 in. long; pedicel ·25 in. long. Sepals 4, linear-oblong obtuse, silky. Petals 4, oblong truncate, shortly laciniate, little longer than sepals silky. Stamens 10; anthers glabrous. Ovary short conic, silky. Torus glabrous. Fruit oblong, ·5 in. long. *Hab.* Mountains; Selangor, Ulu Kali at 3500 ft. altitude (Burn-Murdoch); Perak, Gunong Kerbau, 6600 ft. altitude (Robinson); Ulu Batang Padang (Wray).

var. *cuspidata* Ridl. Leaves with a long acuminate blunt point, ·4 in. long; Selangor, Gunong Mengkuang Lebah (Robinson) at 5000 ft. altitude.

King's *punctatus* is based on Wray's plant, which is not glabrous, but minutely appressed silky on both sides; young leaves from other localities are often more or less hairy silky.

(26) **E. reticosus** Ridl. *Journ. F.M.S. Mus.* vi. 140.

Small tree. Young parts pubescent. Leaves ovate, abruptly acuminate acute, or lanceolate, base rounded faintly crenulate with black dots in the crenulations, stiffly coriaceous, glabrous; young leaves red and pubescent; nerves 7 pairs inarching within the margin, closely finely reticulated on both sides and black dotted beneath, 2 to 4 in. long, 1 to 2 in. wide; petioles ·5 in. long, pubescent. Racemes from lower or middle axils among the leaves 1·5 to 2 in. long, pubescent. Torus white-hairy, disc-shaped. Stamens glabrous. Drupe ellipsoid, ·5 in. long blue black. *Hab.* Mountains, on an open rocky plateau. Pahang, Gunong Tahan on the Padang 5000 ft. altitude (Ridley).

DUBIOUS SPECIES

(1) **E. macrocarpa** Ridl.

Tree. Leaves ovate cuspidate, crenate, glabrous; nerves 9 pairs, prominent beneath, 7 in. long, 3·5 in. wide; petioles 3 in. long. Fruit ovoid, globular, 2 in. through; pericarp woody, 1-celled, 1-seeded. Perak, on Gunong Keledang (Ridley). I was only able to get fruiting specimens of this plant, remarkable for having fruit very greatly larger than any other species. It appears, however, to be certainly an *Elæocarpus*.

ORDER XXVI. GONYSTYLACEÆ.

Trees. Leaves alternate. Flowers bisexual, paniced. Calyx cup-shaped, 5-lobed, coriaceous, hairy inside, corolla of numerous setaceous bifid or trifid petals. Stamens very numerous 30 to 40; filaments short; anthers basifixed. Ovary 4- to 6-celled; ovules 1 in a cell; style filiform. Stigma clubbed. Fruit a woody ovoid or globose; capsule loculicidally dehiscent; pericarp very thick. Seeds 1 or 2, globose or oblong. Genus 1, Malayan, 2 or 3 species.

GONYSTYLUS, Teysm.

(1) **G. Maingayi** Hook. fil. *F.B.I.* i. 200; *Gamble, Journ. As. Soc. Beng.* lxxv. (2), 266.

A tree 30 to 70 ft. tall and 10 to 15 in. through. Leaves deep shining green coriaceous; nerves very close and numerous, oblong to oblong-lanceolate acuminate, base round or cuneate, glabrous, midrib beneath pubescent, 5 to 10 in. long, 2·25 to 3·25 in. wide;



FIG. 30.—*Gonystylus Maingayi*.

petioles thick, '35 in. long. Panicles lax about 8 in. long, wide-spreading densely pubescent woolly; pedicels 3 in. long. Calyx green, 3 in. across, densely velvety. Petals 15 to 20. Stamens cream colour 40. Capsule about 2 in. long with brown rough pericarp '25 in. thick. Seeds large, 1 to 4 globose or oblong. *Hab.* Forests. Singapore, Garden Jungle; Chua Chukang; Bukit Mandai. Malacca (Maingay). Selangor, Rawang (Kloss). Negri Sembilan, Selaru (Foxworthy). Perak, Tapa (Wray); Goping (Scortechini). Penang Hill (Curtis); Balik Pulau.

These plants have been placed in the *Apetalæ*, but have of late been considered to be allied to *Tiliaceæ*. The corolla consists of very narrow linear organs, split at the top and often to near the base, into 2 or 3 lobes. These were formerly considered to be scales, but appear from position and texture to be really petals.

ORDER XXVII. LINEÆ.

Herbs, shrubs or trees. Leaves alternate simple entire or serrate. Inflorescence various. Flowers regular bisexual. Sepals 5 or 6 free or connate at base imbricate. Petals as many imbricate or contort, hypogynous. Stamens 4 to 5 or 10 to 12; filaments united at the base into a ring filiform; anthers versatile. Glands 5 or 0. Ovary entire 3- to 5-celled; styles 3 to 5 free or connate; ovules 1 or 2 inserted in the inner angle of cells, anatropous. Stigma terminal. Fruit a drupe or capsule. Seeds 1 or 2 in each cell. Genera 14, species about 145, whole world (King, *Journ. As. Soc. Beng.* lxii. (2), 189).

Climbing shrubs.

Racemes very short; fruit drupaceous . . . 1. ROUCHERIA

Racemes elongate; fruit capsular . . . 2. SARCOTHECA

Trees.

Petals imbricate; fruit a drupe . . . 3. ERYTHROXYLON

Petals contort; fruit capsular . . . 4. IXONANTHES

1. ROUCHERIA, Planch.

Lianes with revolute woody tendrils. Leaves alternate, entire or serrate. Flowers in axillary sub-sessile spikes fascicled yellow. Sepals 5. Petals 5. Stamens 10, all fertile, connate into a tube below. Ovary 3- to 5-celled; styles 3 to 5. Drupe small red fleshy. Stone 3- to 6-angled. Species 3 or 4, 1 or 2 Malayan, 2 from Guiana.

(1) *R. Griffithiana* Planch. in *Hook, Journ. Bot.* vi. 143; vii. 527; *Hook. fil. F.B.I.* i. 414.

Big climber 3 in. through. Bark white. Leaves lanceolate to elliptic-lanceolate caudate-acuminate crenate-serrate, base cuneate deep green coriaceous; nerves 6 to 8 pairs, 3 to 5 in. long, 1·2 in. wide; petioles 35 to 5 in. long. Flowers 35 in. in clusters of 5 to 8. Petals narrowly oblong, thin. Drupe red 25 in. long, oblong. *Hab.* Common in low country, Singapore, Malacca to Perak and Penang. *Distrib.* Borneo. *Native names:* Ipoh akar putih; Akar Biji; Garam-Garam; Akar Kait putih; Akar Musiang; Bhoi (Sakai). *Use:* in the dart-poison of the Sakais. Flowers fragrant.

2. SARCOTHECA, Bl.

Shrubby climbers. Leaves alternate, entire. Racemes or panicles axillary or terminal, elongate. Flowers pedicelled. Sepals

4 to 5. Petals 5, contort. Stamens 8 to 10 all fertile, connate in a cup below. Ovary 5-celled; styles 5, distinct; ovules 2 in a cell. Capsule globose splitting into 5 at the top. Seed 1 in a cell. Species 2, Malayan.

(1) **S. paniculata** Ridl. *Trans. Linn. Soc.* iii. 282.

Leaves thin elliptic acuminate, base rounded, glabrous; nerves 4 pairs inarching within margin, 4 to 5 in. long, 2·1 in. wide; petioles 3 in. long. Panicle puberulous, slender 1·5 in. long, few-flowered. Flowers 1 in. long, white; pedicels 2 in. long. Sepals 4 connate at base rounded, edges ciliate. Petals 5, linear-oblong blunt. Stamens 8 to 10 in 2 rows unequal; anthers ovate-reniform. Styles 3 to 5. Fruit unknown. *Hab.* Very rare. In forests over streams. Pahang, Tahan River (Ridley).

Dr. Stapf doubts that this belongs to this genus, but it fits fairly with the description of Blume's rare and little known species; however, I have not seen fruit of it.

3. **ERYTHROXYLON**, Linn.

Shrubs or trees glabrous. Leaves alternate, entire. Stipules intra-petiolar. Flowers axillary, small, solitary or fascicled, white (or pink). Sepals 5. Petals 5, imbricate with a double ligule on the inner face. Stamens 10 to 12; filaments united in a tube. Ovary 3-, rarely 4-celled; styles as many free or connate; stigmas capitate; ovule 1, rarely 2 in each cell. Drupe 1-celled, 1-seeded. Species 50, chiefly America.

(1) **E. burmanicum** Griff. *Notulæ* iv. 468; *l.c.* Pl. As. t. 581, fig. 3; *Hook. fil. F.B.I.* i. 415; *King, l.c.* 190.

Shrub to a big tree. Leaves elliptic or obovate coriaceous blunt narrowed to base, glaucous beneath; nerves 8 pairs not more prominent than nervules, 1·75 to 3 in. long, 75 to 1·50 in. wide. Flowers clustered 2 to 4 white; pedicels 25 in. long. Drupe cylindric red 5 in. long; calyx and staminal tube persistent. *Hab.* Open country generally near the sea, common. Singapore, Changi; Seletar. Malacca, Sungei Hudang (Derry); Dindings, Pangkor. Sungei Ujong (Cantley). Pahang, Kwala Pahang; Cherating. *Distrib.* Burma, Tongkah.

The ligule on the petals is a kind of lobed scale attached to the lower part of the petal. *E. coca*, the cocaine shrub of South America, is cultivated to a small extent in the Malay Peninsula.

4. **IXONANTHES**, Jack.

Trees, glabrous. Leaves alternate entire or crenate serrate. Flowers small, green in axillary, cymose dichotomous panicles. Sepals 5 to 6 shortly connate at base. Petals 5 to 6 perigynous contort, persistent hardening round fruit. Stamens 10 to 20 from the outside of a cupular disc. Ovary 5-celled; style simple; ovules 10. Capsule coriaceous or woody, oblong acute or conic

septicidal, 10-celled dehiscing inwards. Seeds winged. Species 3 to 4, China, Malaya.

Leaves obovate or oblong; petals .2 in. long; capsule .7 in. long (1) *I. icosandra*

Leaves coriaceous elliptic not obovate; petals .3 in. long; capsule 1.35 to 1.75 in. long (2) *I. reticulata*



FIG. 31.—*Ixonanthes icosandra*.

(1) *I. icosandra* Jack, *Mal. Misc.* ii. (7), 58; *Hook. fil. F.B.I.* i. 416; *King, l.c.* 191. *I. cuneata* Miq. *Fl. Ind. Bat. Supp.* 484; *Hook. fil. l.c.* 416. *I. obovata* *Hook. fil. l.c.* 417.

Tree 20 to 40 ft. tall. Leaves coriaceous shining green, lanceolate to obovate, top blunt or round, cuneate serrate; nerves 10 to

12 pairs, faint, 2·5 to 5·5 in. long, 1 to 2·5 in. wide; petioles 25 to 5 in. long. Cymes 1 in. long; peduncle 2 to 3 in. long, erect. Flowers green, 2 in. long, numerous. Stamens 12 much longer. Capsule lanceolate to ovoid, glutinous, 5-valved, 7 to 8 in. long. Seeds 10. *Hab.* Woods in low country. Common; variable in form of leaf and size of capsule. Singapore to Penang and Kedah. *Distrib.* Sumatra. *Native names:* Pagar Anak; Pagar Anak merah or hitam or betina; Buah Tui; Sankau Merah. *Use:* Timber for house-building.

var. *obovata* Ridl.; *I. obovata* Hook. fil. l.c. 417. Leaves subcoriaceous obovate, tip round, edge crenate 4 in. long, 2 in. wide. Penang (Lobb); Muka head (Curtis).

(2) *I. reticulata* Jack, l.c. 51; Hook. fil. l.c. 417; King, l.c. 192.

Shrubby to a tree of 20 ft. tall. Leaves stiffly coriaceous, dark green shining, elliptic blunt, base cuneate; nerves 7 to 8 pairs more conspicuous than in the last species, inarching within the margin, 3·5 to 5 in. long, 2 to 2·75 in. wide; petioles 6 to 8 in. long. Cymes shorter, stouter, fewer flowers, 3 in. long. Stamens 10 to 12 long. Capsule 1·35 to 1·75 in. long, oblong woody. *Hab.* In woods less common than the preceding. Singapore (Wallich); Bukit Timah; Tanglin. Malacca, Mt. Ophir at 3000 ft. altitude, a small tree with more coriaceous leaves and larger flowers. Dindings, Bruas. Penang, Telok Bahang (Curtis). Kedah Peak. *Distrib.* Borneo. *Native names:* Jinjagong; Sakit Hudang; Pagar anak.

ORDER XXVIII. MALPIGHIACEÆ.

Trees or shrubs, often climbers. Leaves opposite entire. Inflorescence axillary or terminal. Flowers usually showy, yellow or white, rarely pink often irregular. Calyx 5-partite, imbricate or valvate. Petals 5 usually clawed often fimbriate. Stamens 10 hypogynous or subperigynous equal or 1 or more larger; anthers 2-lobed. Ovary 3-celled; styles 1 to 3; ovules 1 in each cell. Fruit of 1 or more winged samaras (except *Brachylophon*). Species about 600, mostly American.

Climbers.

Style 1, rarely 2; calyx glandular.

Petals equal yellow; fruit of 3 star-shaped samaras

1. TRISTELLATEIA

Petals unequal white, one large pink; fruit winged large

2. HIPTAGE

Styles 3 or 4; calyx not glandular; samaras ovate or orbicular

3. ASPIDOPTERYS

Erect shrubs. Fruit not winged

4. BRACHYLOPHON

1. TRISTELLATEIA, Thouars.

Slender climbers with coriaceous leaves. Flowers terminal racemose yellow. Calyx 5-lobed. Petals clawed. Stamens unequal. Ovary 3-lobed; styles 1 or 2. Carpels 3 star-shaped with 3 to 8 wings, woody. Seed obovoid. Species 8, Africa, Asia, Australia.

(1) *Tr. australasica* A. Rich. Sert. Astrol. 38, t. 15; Hook. fil. F.B.I. i. 418; King, l.c. 193; Bot. Mag. t. 8334.



FIG. 32.—*Tristellateia australasica*.

Glabrous. Leaves elliptic or ovate acute, base cuneate or rounded; nerves 4 to 5 pairs inarching faint, 1.75 to 3.5 in. long. .75 to 1.25 in. wide; petioles .2 in. long. Racemes 6 in. long, few-flowered. Flowers 1 in. wide. Petals oblong. Stamens unequal, outer ones longest at first yellow soon becoming red. Carpels .5 in. across, 5- to 8-winged, wings lanceolate radiating like a star. *Hab.* In tidal swamps. Singapore, Serangoon; Krangi, Johor, Panchur, Johor River. Pahang, Kwala Pahang. Dindings, Lumut

and Pangkor, Raja Hitam (Curtis). *Distrib.* Siam. Malay islands, Australia, Formosa.

This popular climber is often cultivated in Singapore as an ornamental plant.

2. HIPTAGE, Gaertn.

Lianes. Leaves coriaceous. Racemes terminal or axillary often compound. Calyx 5-partite. Petals 5, clawed unequal, white, the odd one pink or yellow. Stamens 10, 1 larger than the others, connate at base. Ovary 3-lobed. Styles 1 or 2, stigmatiferous, others rudimentary. Samaras 1 to 3, 3-winged, wings unequal, leathery. Species about 10, tropical Asia.

Leaves often small; nerves 4 pairs; flowers .35 to

.5 in. across; racemes silky (1) *H. sericea*

Leaves always large; nerves 6 pairs; flowers .75 to

1 in. across; racemes slightly pubescent (2) *H. madablota*

(1) *H. sericea* Hook. *fil. F.B.I.* i. 419; *King, l.c.* 194.

Branches and inflorescence tomentose. Leaves elliptic-oblong acuminate glabrous; nerves 4 pairs, 2 to 6 in. long, .9 to 3 in. wide; petioles .25 in. long. Racemes crowded 2 to 3 in. long. Flowers white .35 to .5 in. across; pedicels .25 to .5 in. long. Petals villous not fimbriate, odd one lobed. Samara lobes oblanceolate, biggest .2 in. long, .4 in. wide, keeled at the base. *Hab.* Borders of woods and river-banks. Singapore, Bukit Mandai; Changi. Johor, Pengerang (Cantley). Pahang, Pulau Chengei, Pahang River. Malacca, Bukit Melana; Selandor (Cantley). Penang, Balik Pulau (Curtis). *Native names* : Akar Dedalu Bukit; A. Kirai; A. Kulupus; A. papina; Sarunchi.

(2) *H. madablota* Gaertn. *Fruct.* ii. 169, *t.* 116; *Hook. fil. F.B.I.* i. 411. *Gaertnera racemosa* Roxb. *Cor. Pl.* i. *t.* 18.

Stout liane. Young parts and inflorescence appressed-silky. Leaves coriaceous shining dark green, ovate-lanceolate or oblong acute or acuminate, base round or cuneate, 4.5 to 6 in. long, 1.5 to 3 in. wide; nerves 4 to 6 pairs; petioles .25 in. long. Racemes 1 to 6 in. long, axillary. Flowers .75 to 1 in. across, white, fragrant. Sepals villous oblong. Petals fimbriate, odd one yellow at base. Samara midlobe elongate oblanceolate narrowed at the base 2 in. long, .5 in. wide. *Hab.* Open country. Pahang, Pekan (Haviland). Selangor, Kwala Lumpur. Perak, Chanderiang (Kunstler). Perlis at Kanga. *Distrib.* India, Siam, China.

This occasionally occurs in and near gardens in the Malay Peninsula, but I do not think it is wild south of Perlis.

3. ASPIDOPTERYS, Juss.

Lianes with terminal and axillary panicles. Flowers small yellow or white. Calyx 5-partite. Petals 5 not clawed entire. Stamens 10, all perfect. Ovary 3-lobed, sides winged; styles 3

glabrous; stigmas capitate. Samaras 1 to 3 orbicular or oblong, thin membranous. Seed oblong. Species 15, tropical Asia.

(1) **A. concava** Juss. in *Archiv. Mus. Hist. Nat.* iii. 509; Hook. fil. *F.B.I.* i. 420; King, l.c. 195. *Hiræa concava* Wall. *Pl. As. Rav.* i. 13.

Stout long liane. Leaves thin ovate-elliptic, shortly acuminate, base blunt, glabrous; nerves 4 to 6 pairs, 3 to 4 in. long, 1.5 to 2.3 in. wide; petioles .5 to .65 in. long. Panicles of peduncled umbels 1.5 in. long, slender; pedicels .2 in. long. Flowers white .2 in. across. Samaras 3 orbicular ovate thin membranous veined 1 in. long and wide, nucleus winged. *Hab.* In forests. Singapore, Bukit Mandai; Selitar. Malacca, Bukit Bruang; Merlimau. Selangor, Kwala Lumpur. Penang, Government Hill to 100 ft. altitude (Curtis). *Distrib.* Tenasserim.

4. BRACHYLOPHON, Oliver.

Erect glabrous shrubs with subcoriaceous leaves and terminal racemes of yellow flowers. Calyx 5-partite. Petals 5 obovate obtuse. Stamens 10 all perfect, alternate shorter; filaments longer than anthers, which open by pores. Ovary 3- to 4-lobed and 3- to 4-celled; styles 3 to 4 slender; ovules 1 in each cell pendulous anatropous. Fruit of 3 cocci keeled along the back, the top produced with a very short wing-like process. Species 1, Malay Peninsula.

(1) **B. Curtisii** Oliv. *l.c. Pl. t.* 1566; King, l.c. 197. *B. Scortechinii* King, l.c. 197.

An erect shrub 3 to 5 ft. or small tree about 20 ft. tall or less. Leaves membranous to coriaceous lanceolate or oblong-lanceolate narrowed to both ends, 7 in. long, 2 to 2.5 in. wide; nerves 7 to 15 pairs; petioles .1 in. long. Racemes elongating to 1 in. or more, with lanceolate acuminate persistent bracts, many-flowered. Pedicels slender 1.2 to 1.5 in. long. Sepals obtuse. Petals .4 in. long. Fruit .4 in. long reticulate. Sepals and filaments persistent. *Hab.* Perak, Sungei Larut (Wray). Penang, Batu Feringhi (Curtis). var. *Hullettii* Ridl. *B. Hullettii* King, l.c. 196.

Leaves more coriaceous finely nerved and conspicuously reticulate. Small tree. *Hab.* Malacca. Mt. Ophir at 3000 ft. altitude in woods on the bank of the stream (Hullett).

ORDER XXIX. OXALIDACEÆ.

Herbs, shrubs or trees. Leaves alternate or whorled, usually pinnate. Stipules 2. Inflorescence axillary umbelled or cymose or racemose, regular or nearly so. Sepals 5. Petals 5 hypogynous, imbricate. Stamens usually 10; filaments more or less connate. Ovary 3- to 5-lobed, 3- to 5-celled; styles 3 to 5 usually

free. Fruit capsular 3- to 5-lobed or a berry. Species about 300, whole world.

Herbaceous or stem slightly woody.

Leaves trifoliate 1. *OXALIS*
Leaves pinnate, many leaflets 2. *BIOPHYTUM*

Trees.

Fruits baccate 3. *AVERRHOA*
Fruits drupaceous 4. *CONNAROPSIS*

Climber.

Fruits dehiscent 5. *DAPANIA*

1. *OXALIS*, Linn.

Herbs (rarely shrubs). Leaves radical or alternate usually trifoliate. Flowers regular, on axillary peduncles. Sepals 5, imbricate. Petals 5 contort; glands of disc none. Stamens 10 all similar. Ovary 5-lobed, 5-celled; styles 5 free; ovules 1 or more in each cell. Capsule dehiscent loculicidally, valves persistent. Seeds numerous small. Species 200, chiefly American.

Creeping herb; flowers small yellow (1) *O. corniculata*
Bulbous plant; flowers large pink (2) *O. corymbosa*
Erect branched plant; flowers small (3) *O. Barrelieri*

(1) *O. corniculata* L. var. *villosa* Hook. *fl. F.B.I.* i. 436; *King, l.c.* 198.

A little creeping hairy herb with trifoliate leaves; leaflets obcordate .2 in. long and wide, hairy; petioles 1 to 1.5 in. long. Sepals obtuse. Petals obcordate. Capsule cylindric tomentose many-seeded .5 in. long. *Hab.* In waste ground by houses. Singapore. Garden weed. Malacca, Residency. Perak. Penang Residency. *Distrib.* Whole world. The pubescent form from India and Java.

(2) *O. corymbosa* DC. *Prod.* i. 696.

A plant with a mass of small tubers and rather large trilobed leaves, the lobes round retuse, 1.5 in. wide; petioles 4.5 in. long, all pubescent. Peduncle hairy 4 to 5 in. tall with an umbel of pink showy flowers 1 in. across. Introduced as an ornamental plant, has run wild on Penang Hill, as it has in many parts of the world; said to be of Mascarene origin.

(3) *O. Barrelieri* Linn. *Sp. Pl. ed.* ii. 624.

An erect often branched slender pubescent herb about 12 in. tall, with small pink and yellow flowers. Occurs as a weed in the Botanic Gardens. Native of West Indies and South America. It occurs also in Java.

2. *BIOPHYTUM*, DC.

Herbs simple or branched with a tuft of pinnate leaves at the top of the half-woody stem. Leaflets opposite oblique oblong truncate. Peduncles terminal with an umbel of small white, pink

or yellow flowers. Sepals 5 lanceolate acute. Petals 5. Stamens 10; filaments free, outer ones smaller. Styles 5. Stigmas notched or bifid. Capsule ovoid or oblong splitting loculicidally into 5 valves. Seeds numerous small. Species about 20, all tropics.

Leaflets 18 to 20 pairs; sides parallel, base and apex

truncate; flowers white . . .

(1) **B. adiantoides**

Leaflets 10 pairs, tip rounded; flowers yellow . . .

(2) **B. sensitivum**

Small plant; leaflets 7 pairs; flowers yellow . . .

(3) **B. Reinwardtii**

(1) **B. adiantoides** Wight in Hook. fil. F.B.I. i. 437; King, l.c. 199.

Stem woody 6 to 8 in. tall, erect pubescent, bearing 15 to 20 or more leaves in a tuft. Leaves 6 to 8 in. long; rachis hairy; leaflets about 23, oblong, top rounded mucronate, base truncate auricled, more or less hairy, 5 in. long, 15 in. wide; peduncles spreading hairy 6 in. long, umbel densely bracteate 1 in. long. Flowers 6 to 12 showy white, with yellow claws to the petals. Capsule oblong. *Hab.* Rocky banks of streams in mountain forests. Pahang, Tahan River; Pahang River. Perak, Plus River (Wray); Temengoh; Kwala Dipang (Curtis). *Distrib.* Mergui, Indo-China. *Native name*: Payong ali (Ali's umbrella).

(2) **B. sensitivum** DC. *Prodr.* i. 690.

Stem glabrous 4 to 6 in. tall. Leaves 22 to 23; rachis hairy; leaflets 10 pairs, lower ones oblong 4 in. long, 1 in. wide, apex rounded, sides curved minutely apiculate, base truncate rounded; peduncles 2.5 to 3 in. long hairy. Flowers yellow 2.5 in. wide; pedicels as long as sepals. Fruit oblong shorter than the hairy lanceolate sepals. *Hab.* Casual weed. Malacca (Griffith). Penang Hill and near the coast (Curtis). *Distrib.* Tropics generally.

(3) **B. Reinwardtii** Walp. *Rep.* i. 476; Hook. fil. F.B.I. i. 437.

Small annual 6 in. tall. Leaves 2.5 in. long; leaflets 25 in. long, oblong with round tips, 7 pairs; rachis hairy; peduncles 1 in. long, slender hairy. Flowers 3 or 4 small bright yellow. Sepals lanceolate acuminate hairy little longer than the fruit. *Hab.* Kelantan. A few plants in a rubber plantation, Chaning on the Kelantan River (Ridley). *Distrib.* Indo-Malaya.

3. AVERRHOA, L.

Trees. Leaves alternate pinnate. Flowers small regular red or pink. Sepals 5 imbricate. Petals 5 contort. Stamens 10 united at the base or 5 without anthers. Ovary 5-lobed, 5-celled; styles 5. Berry oblong acid. Species 3 or 4, probably of South American origin, but 2 cultivated all over the tropics.

(1) **A. Bilimbi** Linn. *Sp. Pl.* 428.

Short stout tree. Leaflets 5 to 17 pairs, oblong to lanceolate pubescent beneath. Flowers in tufts on stem and branches. Fruit green warty about 3 in. long resembling a gherkin. *Native*

name: Bilimbi, not known wild anywhere, but recorded for Goa, with the name Balimba, by Garcia in 1593.

(2) **A. Carambola** *Linn. Sp. Pl.* 428.

Leaflets 2 to 5 pairs ovate, glaucous beneath. Flowers in tufts on branches. Fruit 4 in. long acutely and deeply 4-angled, yellow, acid or sweet. Origin unknown. *Native name*: Kembola.

I have found one or more old trees in abandoned village sites in Pahang at Temerloh.

4. CONNAROPSIS, Planch.

Trees or shrubs. Leaves 1- to 3-foliolate; leaflets coriaceous entire. Flowers small white or lavender in terminal or axillary paniced cymes. Sepals 5 imbricate connate at the base. Petals 5 imbricate. Stamens 10; filaments united at base alternate shorter. Ovary 5-angled, 5-celled; styles subulate 5 more or less united; ovules 2 in each cell. Fruit a berry (5-lobed when dry) 1- to 2-celled, 1- to 2-seeded. Species 5, Malay Peninsula and Borneo.

- | | |
|--------------------------------------------------------------------------------|-----------------------------|
| Leaves trifoliolate | (1) C. Griffithii |
| Leaves simple. | |
| Leaves ovate, glaucous beneath | (2) C. monophylla |
| Leaves lanceolate; panicle erect, 3 in. long | (3) C. glabra |
| Leaves lanceolate, 4·5 in. long; panicle very lax; branches short | (4) C. laxa |
| Leaves oblong, 6 to 12 in. long, stiff; flowers 2 in. long, glabrous | (5) C. macrophylla |
| Leaves oblong 7 in. long, thinner; flowers 1·5 in. long; calyx silky | (6) C. sericea |
| Leaves oblong, 4 in. long; calyx mealy | (7) C. simplicifolia |

(1) **C. Griffithii** *Planch. in F.B.I.* i. 440; *King, l.c.* 200.

Tree. Branchlets glabrous. Leaves trifoliolate; leaflets coriaceous, glabrous, elliptic-lanceolate acuminate, narrowed to base, sub-glaucous beneath; nerves 4 pairs, 2 to 3 in. long, 5 to 1·5 in. wide; petioles 6 in. long; petiolules 2 in. long. Panicles terminal and axillary pubescent dense, 1 in. long to lax, spreading, 4 in. long. Flowers 2 in. long, red. *Hab.* Malacca (Griffith, Maingay).

(2) **C. monophylla** *Planch. in F.B.I.* i. 440; *King, l.c.* 200. (*Fig.* 34, p. 333.)

A medium or small tree 20 to 50 ft. tall. Branchlets pubescent. Leaves 1-foliolate, glaucous beneath, coriaceous, glabrous ovate-acuminate, base rounded or cuneate; nerves 6 pairs, 2 to 3·5 in. long, 8 to 1 in. wide; petioles 6 to 8 in. long. Panicles terminal or axillary, tomentose erect; branches 2 in. long, dense-flowered. Flowers claret colour, 1 in. long, puberulous or glabrescent. Fruit globose, red. *Hab.* Open country; Johor. Malacca, Selangor, Perak, Dindings, Negri Sembilan. *Native names*: Pupoi; Belimbing Besih; B. Bulat; B. Keris or B. Kra; B. Penjuru or B. pipit. *Use*: Fruit eaten, usually cooked.

(3) **C. glabra** *Ridl. Journ. Roy. As. Soc. S. Br.* 75, p. 9.

Tree, glabrous. Leaves simple, thinly coriaceous oblong

acuminate acute, base round; nerves 5 to 6 pairs, reticulations conspicuous beneath not glaucous 4 in. long, 1·6 in. wide; petioles ·5 in. long; petiolules ·2 in. long. Panicles axillary and terminal erect 3·5 to 4·5 in. long lax; branches ·2 to ·3 in. long. Sepals ovate acute. Petals oblong narrowed at base. *Hab.* Perak, Hermitage Hill (Curtis).

(4) *C. laxa* Ridl. *Journ. Roy. As. Soc. S. Br.* 75, p. 9.

Tree 40 to 50 ft. tall. Leaves simple coriaceous lanceolate



FIG. 34.—*Connaropsis monophylla*.

acuminate, base round, 3 to 4·5 in. long, 1·4 to 2 in. wide; nerves 6 pairs slender, reticulations fine conspicuous beneath; petioles ·5 in. long; petiolules ·2 in. long. Panicles slender lax, puberulous, terminal and axillary 2·5 to 6 in. long; branches distant ·2 to ·3 in. long; branchlets crowded at the tip. Sepals oblong obtuse glabrous. Petals cuneate truncate, cherry red. Fruit globose. 2-celled cherry red. *Hab.* Forests. Perak, Thaiping Hills (Curtis, Kunstler).

(5) **C. macrophylla** *King, l.c.* 443.

Shrub or tree. Branchlets stout glabrous. Leaves simple stiff coriaceous oblong sub-acute base rounded, 6 to 12 in. long, 2·5 to 3·65 in. wide; nerves 8 or 9 pairs elevate, reticulations distinct lax beneath; petioles 3 in. long thick. Panicles spike-like axillary or terminal; rachis thick glabrous; branches 1 in. long or less, few-flowered. Flowers deep red, 2 in. long, glabrous very shortly pedicelled. *Hab.* Local in forests. Singapore, Chan Chu Kang. Dindings. Lumut, Pangkor (Curtis). Perak, Goping and Salama (Kunstler); Thaiping. Penang, Pulau Inajah (Curtis).

(6) **C. sericea** *Ridl. Journ. F.M.S. Mus.* x. 131.

Tree. Leaves thin coriaceous oblong sharply acuminate base round; nerves 8 pairs, slender prominent beneath; glaucescent beneath, 7 to 7·5 in. long, 3 in. wide; petioles 75 in. long. Panicles raceme-like from upper axils 12 in. long; branches 25 in. long, puberulous. Sepals ovate blunt silky-tomentose. Petals deep red 1 in. long. Stamens, filaments very slender. Styles separate. *Hab.* Pahang, Piangu, Endau (Evans).

(7) **C. simplicifolia** *Ridl.*

Leaves thin coriaceous simple oblong, base round, over 4 in. long and 2·2 in. wide, midrib elevate beneath; nerves over 7 pairs elevate beneath; petioles 75 in. long. Racemes terminal 2, 4·4 in. long puberulous. Flowers in tufts 3 to 4 together; pedicels 1 in. long, white-mealy. Sepals 5, imbricate, ovate blunt, white-mealy. Petals twice as long, 12 in. long, obovate oblong, clawed, imbricate, apparently dark red. Stamens very short connate at base in a ring. Ovary conic; styles 5. *Hab.* Pahang, Kwantan, Galing (Foxworthy). *Native name:* Belimbing Cherichék.

In the only specimen I have seen the leaves are both imperfect.

5. DAPANIA, Korth.

Woody climbers. Leaves alternate unifoliate; petioles jointed about the middle. Flowers small red in spike-like racemes, axillary or from the old wood. Sepals 5 imbricate connate at base. Petals oblong; stamens 10, bases connate in a cup, above free unequal. Ovary 5-lobed, 5-celled; cells with 1 or 2 ovules. Fruit club-shaped 5-lobed dehiscent into a 5-rayed star with a seed on each ray. Species 4 or 5, Malay Peninsula and Sumatra.

(1) **D. scandens** *Staff, Ic. Pl. t.* 1997; *King, l.c.* 201.

A glabrous liane 50 to 100 ft. long. Leaves coriaceous ovate-elliptic acuminate, base rounded; nerves 4 or 5 pairs, 3 to 5 in. long, 1·25 to 1 in. wide; petioles 1 in. long; petiolules 1 in. long. Racemes puberulous, 1·5 to 2·5 in. long slender. Flowers many crimson often male only 1 to 1·5 in. long; pedicels very short. Sepals obtuse rounded ciliate. Petals oblong narrowed at base twice as long. Stamens alternate long and short; filaments

lanceolate acuminate; anthers ovate. Fruit 3 in. long, 4 in. across after dehiscent. *Hab.* Dense jungle. Perak, Ulu Bubong (Kunstler); Waterloo (Curtis); Tapa; Batang Padang (Wray). *Distrib.* Sumatra.

ORDER XXX. BALSAMINACEÆ.

Herbs usually succulent. Leaves opposite or alternate. Flowers few on axillary or terminal racemes rarely branched. Sepals 3, 2 small, 1 at back petaloid spurred. Petals 3 or 5, outer large, lateral bilobed. Stamens 5; anthers cohering. Ovary oblong 5-celled. Stigma sessile 5-toothed; ovules many. Capsule fleshy loculicidal, valves 5 elastically springing away from the axis or a drupe. Seeds smooth or tubercled. Species 600 or more, tropics of Asia and Africa and North Temperate region.

Lateral sepals connate in pairs; fruit explosive	1. IMPATIENS
Lateral sepals free; fruit drupaceous	2. HYDROCERA

1. IMPATIENS, L.

Succulent herbs. Leaves opposite or whorled or alternate. Flowers axillary or terminal 1 rarely more flowered; peduncles irregular resupinate, blue, white, pink, or yellow. Sepals 3, rarely 5, imbricate, 2 minute or 0, 2 lateral small green, 1 posterior large petaloid spurred. Petals 3 (or 5) anterior large (standard), lateral 2-lobed (wings). Stamens 5; filaments short thick; anthers cohering. Ovary oblong 5-celled; ovules many. Stigma sessile 5-fid. Capsule green pulpy loculicidally dehiscent elastically into 5 valves. Seeds numerous. Species about 600, whole world.

Leaves opposite or whorled; flowers pink; spurred
sepal not funnel-shaped; spur long.

Plant more or less hairy.

Leaves narrow linear-lanceolate, lower ones
sessile

(1) *I. Griffithii*

Leaves lanceolate acuminate, all petiolate.

Spur 1 in. long; leaves not glaucous beneath,
standard orbicular or obovate

(2) *I. Wrayii*

Spur 1 in. long; leaves glaucous beneath,
standard obovate retuse

(3) *I. sarcantha*

Spur 1.5 in. long; leaves lanceolate spinulose
glaucous beneath

(4) *I. polycycla*

Plant glabrous.

Leaves ovate acute

(5) *I. Curtisi*

Leaves lanceolate

(6) *I. exilipes*

Leaves large serrate; flowers large yellow

(7) *I. oncidoides*

Leaves alternate, spurred sepal funnel-shaped with
a short curved spur; flowers not spreading.

Stem thick fleshy 2 to 5 ft. tall; flowers yellow

(9) *I. mirabilis*

Stem fleshy smaller; flowers violet

(10) *I. Vaughani*

Stem slender shrubby; flowers white small.

Leaves ovate; nerves conspicuous . . . (11) **I. Ridleyi**

Leaves ovate-lanceolate; nerves almost invisible . . . (12) **I. cryptoneura**

Stem succulent herbaceous.

Leaves ovate or oblong; flowers large white . . . (13) **I. Scortechinii**

(1) **I. Griffithii** Hook. *fil. Journ. Linn. Soc.* iv. 120; *F.B.I.* i. 445; *King, l.c.* 203.

Herb 1 to 2 ft. tall, slender, puberulous. Leaves opposite petiolate or in whorls of 3 above, sessile linear-lanceolate acute, base acuminate serrate-toothed, beneath glaucous; nerves 6 pairs red sparsely hairy, above hairy all over, 3.5 in. long, .2 to .3 in. wide. Pedicels slender 1 to 1.75 in. long. Flowers 1 in. across rose pink. Sepals ovate-oblong acuminate, spur slender 1.5 in. long. Capsule elliptic swollen in the middle. *Hab.* Damp spots on mountains near water, Malacca, Mt. Ophir, on Gunong Tunduk at 3000 ft. altitude (all collectors). Kedah, Gunong Jerai at 3000 ft. altitude (Lobb). *Native name*: Inai Bukit.

(2) **I. Wrayii** Hook. *fil. Kew Bulletin* 1909, p. 6.

Herb 1 ft. tall, glabrous with young parts often hairy. Leaves opposite or whorled in threes, lanceolate acuminate or ovate or oblong-lanceolate entire or spinulose-serrate, base narrowed, 2.25 to 3 in. long, .5 to .75 in. wide; petioles .2 in. long. Pedicels 1.5 in. long. Flowers rose pink with crimson centre, 1 in. across. Sepals ovate long-cuspidate 3- to 5-nerved, spur 1.1 in. long, slender. Standard orbicular or obovate keeled with a central process. Wings bilobed, basal lobe oblong obtuse, lateral larger obcordate. Capsule ellipsoid. Seed hairy. *Hab.* On rocks in streams. Perak, Batang Padang (Wray).

(3) **I. sarcantha** Hook. *fil. in Ridl. Journ. F.M.S. Mus.* iv. 8.

Herb 4 to 12 in. tall. Stem hairy. Leaves opposite or in whorls of 3 at the top, lanceolate acuminate narrowed at base serrulate-spinulose, above hairy, beneath glaucous; nerves conspicuous 6 pairs hairy, 3 to 4 in. long, .25 to .75 in. wide; petioles .9 in. long. Sepals ovate keeled cuspidate; spur slender 1.2 in. long. Petals standard obovate retuse .5 in. long keeled caudate, wings oblong truncate broadest at the top, all rose pink with a dark eye. Capsule lanceolate blunt 1 in. long. Seed obovate compressed glabrous. *Hab.* Pahang, Telom on rocks in streams (Ridley).

(4) **I. polycycla** Hook. *fil. Journ. Roy. As. Soc. S. Br.* 75, p. 9.

A branched herb with nearly glabrous stem. Leaves in whorls of 2 to 5, lanceolate acuminate narrowed to base serrate-spinulose with scattered long hairs above, glaucous and glabrous beneath; nerves hardly visible, 1 to 1.5 in. long, .4 in. wide; petioles .2 in. long. Peduncles 1.5 to 2 in. long. Flower 1 in. across rose pink. Sepals .2 in. long ovate caudate; spur 1.5 in. long very slender. Capsule ovoid dilate in centre .5 in. long. Seeds pilose. *Hab.*

Perak, on a sand-bank in the Kertai River, Temengoh. A single plant (Ridley).

(5) **I. Curtisii** Hook. fil. *Kew Bulletin* 1909, p. 6.

Large branched glabrous herb. Leaves mostly opposite (a few alternate), ovate acute, narrow at base, their edges minutely serrulate or crenate, glaucous beneath sparsely hairy above and beneath on the midrib and nerves about 8 fine pairs, 2.5 in. long, 1.5 in. wide; petioles slender 2 in. long. Pedicels 1 in. long. Flowers .75 in. wide, pink. Standard cuneate obcordate with a mucro in the notch, wings deeply bilobed, basal lobe obovate retuse mucronate. Capsule .4 in. long gibbous fusiform. Seed obovoid papillose. *Hab.* Wet rocks in forest. Perak, Thaping Hills, abundant at Maxwell's Hill, 3000 ft. altitude (all collectors).

(6) **I. exilipes** Hook. fil. in *Ridl. Journ. Roy. As. Soc. S. Br.* 75, p. 10.

Branched glabrous herb about 2 ft. tall. Leaves opposite in whorls of three, broadly lanceolate acuminate narrowed to base, serrate-spinulose, quite glabrous, glaucous beneath; nerves 6 pairs; 3 to 4.75 in. long, .7 to 1 in. wide; petioles .5 in. long. Pedicels 2 to 3 in. long. Flowers rose pink, 1 in. across. Sepals ovate-oblong cuspidate, spurred one boat-shaped mucronate .4 in. long; spur slender 1.3 in. long. Petals standard obovate cuneate truncate with a short point and a short rounded keel; wings broad, basal lobe oblong retuse, upper petal obovate retuse. Capsule short .6 in. long broad fusiform, beaked. Seed obovoid flattened glabrous. *Hab.* Damp spot by the forest road, Perak, on the road between Tapa and Jor, abundant at one spot (Ridley).

(7) **I. oncioides** Ridl. Hook. fil. *Kew Bulletin*, 1909, p. 11.

Succulent herb 2 to 4 ft. tall. Leaves ovate-lanceolate to ovate acuminate acute, narrowed at base, edge crenulate denticulate, 1.5 to 6 in. long, 1 to 2 in. wide; nerves 18 pairs; petioles 1 to 1.5 in. long. Racemes subterminal with 1 or 2 large yellow flowers occasionally striped Indian red on upper lobes, 1.5 in. across. Sepals ovate cuspidate; spur slender 1.5 in. long. Petals standard ovate keel rounded green; wings very unequally bilobed, lower lobe narrow oblong, upper large hatchet-shaped, shortly bilobed; filaments rather long. Capsule fusiform 1 in. long. Seed flat ovoid glabrous. *Hab.* In damp muddy spots in forests at about 2000 to 4500 ft. altitude. Selangor. Menuang Gasing (Kloss); Gunong Mengkuang Lebah (Robinson); Sempang Mines, Semangkok. Perak, Gunong Kerbau 4500 ft. altitude (Robinson); Telom; Ulu Batang Padang, 4900 ft. altitude (Wray).

The "Golden Balsam" is very distinct from any other species here in its large yellow flowers—a very beautiful plant.

(8) **I. mirabilis** Hook. fil. *Bot. Mag. t.* 7195; *King, l.c.* 203.

Stem fleshy brown dilate at base above, branched, 2 to 5 or

more feet tall, 22 in. through at base. Leaves deciduous, at the apex of branches only, thin obovate or ovate narrowed to base crenate; nerves 13 to 14 pairs, glabrous, 5 to 9 in. long, 3·5 to 4·5 in. wide; petioles 1 to 1·5 in. long. Racemes axillary 8 in. long with 4 or 5 yellow flowers at the top opening singly. Flowers 1·75 in. long, not patent. Sepals lateral, ovate green and yellow, spurred one large funnel-shaped ·6 in. across. Spur shorter incurved. Standard oblong rounded. *Hab.* On limestone cliffs in the north. Lankawi, Terutau (Curtis); Perlis at Kanga.



FIG. 34.—*Impatiens mirabilis*.

(9) **I. Vaughani** Hook. *fil. Kew Bulletin*, 1911, p. 250.

A branched fleshy-stemmed plant about 2 ft. tall. Leaves only at tips alternate ovate or elliptic acuminate entire or crenate, base rounded or cuneate, 8- to 10-nerved, 3·5 to 4 in. long, 2 to 2·25 in. wide; petioles 3 in. long. Flowers 1 in. across, white or violet to deep purple, spur cream colour, on short pedicels. Sepals oblong obliquely cuspidate, spurred one funnel-shaped with a short incurved bifid spur. Petals standard small oblong cuspidate; wings lower lobes rounded shortly stipitate, upper connate rounded oblong. *Hab.* On limestone rocks in the north. Jalor at Biserat

on the Patani River (Gwynne-Vaughan). Perlis at Tebing Tinggi. Setul on rocks (Ridley).

(10) **I. Ridleyi** Hook. *fil. Rec. Bot. Surv. Ind.* iv. 56; *Kew Bulletin*, 1909, p. 9.

Small shrubby plant about 1 ft. tall branched. Leaves alternate ovate acuminate crenate narrowed to base, glabrous 2.25 to 2.5 in. long, 1.25 in. across; petioles slender .5 in. long. Peduncle 1.5 in. long slender. Flowers .75 in. long white with brown spots in mouth, not patent. Sepals lateral ovate to orbicular cuspidate, spurred one funnel-shaped broad .5 in. long; spur curved .2 in. long. Petals, standard oblong retuse cuspidate with a short fleshy keel at base; wings confluent bilobed, lower lobes ovate acuminate curved, upper oblong rounded at tip. Capsule small fusiform. Seed tubercled. *Hab.* Limestone rocks in damp spots. Selangor, Batu Caves (Ridley, Curtis).

(11) **I. cryptoneura** Hook. *fil. Kew Bulletin*, 1909, p. 9.

Shrubby plant branched, about 12 in. tall glabrous. Leaves alternate ovate-lanceolate acuminate serrulate, base acute; nerves 4 or 5 pairs almost invisible; petioles .5 in. long, .5 in. wide. Flowers small sub-globose. Sepals green broad ovate. Spurred one wide cup-shaped with short curved spur. Petals, standard obovate cuspidate, keel with short elevation at base, wings connate, basal lobes long curved lanceolate acuminate, upper ones shorter oblong. *Hab.* Limestone rocks. Perak at Ipoh (Curtis).

(12) **I. Scortechinii** Hook. *fil. Rec. Bot. Surv. Ind.* iv. 56; *Kew Bulletin*, 1909, p. 11.

Succulent herb 1 to 3 ft. tall and stem 1 to 1.5 in. through. Leaves alternate crowded at the tip ovate to oblong acuminate, base narrowed, serrate or serrulate, 2.5 to 7 in. long, 1.25 to 2.5 in. across; petioles 2 in. long. Pedicels solitary or 2 or 3 on a short peduncle .5 in. long or less. Flowers about 1 in. across, white with reddish yellow in the mouth. Sepals oblong-orbicular, spurred, funnel-shaped one large .5 in. long; spur clubbed and curved shorter. Petals, standard obovate-oblong or cuneate, keel slightly thickened; wings connate, lower ones stipitate rounded, upper ones oblong rounded connate. *Hab.* Limestone rocks. Perak. Sungei Siput (Curtis); Gunong Malacca (Kunstler). Lenggong (Ridley). Perlis, Tebing Tinggi.

EXCLUDED SPECIES

I. CHINENSIS L., "*Malacca Griffith*," Hook. *fil. F.B.I. l.c.* 444. Some error. This plant has not been collected in the Peninsula.

I. MACROSEPALA Hook. *fil. Rec. Bot. Surv. Ind.* ix. 56. "*Perak, Ipoh Curtis 3217*." An error of locality. The plant was collected at Kasum, outside our boundary.

I. PELTATA Hook. *fil.* is also a native of the area outside our boundary.

2. HYDROCERA, Bl.

Erect glabrous herbs. Leaves alternate, linear-lanceolate. Flowers in short axillary 1- to 3-flowered racemes. Sepals 5, imbricate coloured, 2 outer flat, posticous shortly spurred. Petals 5, anticus (outer) large, concave. Stamens 5; filaments short; anthers cohering. Ovary 5-celled; ovules 2 to 3 in each cell. Stigmas 5, sessile. Drupe baccate, 5-celled; cells 1-seeded. Seeds curved, corrugate. Species 1.

(1) *H. angustifolia* Bl. *Bijdr.* 241; *Hook. fil. F.B.I.* i. 483.

Erect marsh plant. Stem angled. Leaves narrowed to both ends, serrate, glaucous beneath, 1.5 to 6 in. long, .2 to .3 in. wide. Flowers 1 in. across, crimson pink with yellow and white markings; spur short, curved. Drupe red juicy, globose, .75 in. through. *Hab.* Rice-fields in or near shallow water; local, but sometimes abundant. Malacca (Griffith). Pahang, along Pahang River. Selangor, Telok Gadong; Port Swettenham (Burkill). Penang, Pulau Betong; Balik Pulau. Kelantan, near Kota Bharu; Perlis, Kanga.

var. *latifolia* Ridl.; *H. triflora*, Wight and Arnott, *Prodr.* i. 140.

Leaves 1.5 in. wide. *Hab.* Rare. Malacca (Griffith). *Distrib.* India, the broad-leaved variety; Cochin-China, Siam and Java, the narrow-leaved one. *Native names*: Inai Paya; Tampinah.

ORDER XXXI. RUTACEÆ.

Trees or shrubs (rarely herbs) glandular-resinous. Leaves usually imparipinnate opposite or alternate exstipulate. Flowers in axillary or terminal cymes or panicles bisexual, regular. Calyx 4- to 5-lobed. Petals 4- to 5-valvate or imbricate. Stamens 4 or 5, 8 or 10, rarely more (in *Citrus*); filaments free, hypogynous; anthers 2-celled opening inwards. Disc within stamens lobed, sometimes cylindric. Ovary of 4 or 5 connate or free carpels; ovules usually 2 in a cell; styles as many, free or united. Stigmas terminal. Fruit a capsule, berry or drupe, or of 1 to 4 cocci. Seeds usually solitary in the cells, albumen fleshy or o. Species about 700, whole world (*King, Journ. As. Soc. Beng.* lxii. (2), p. 205).

Triphasia trifoliolata DC. *Prod.* 1536. The lime-berry, a dwarf spiny shrub with flowers .5 in. long and small red berries, probably a native of China, is often cultivated as a hedge plant or for its fruit used, in preserves or for making orange brandy.

Fruit of dehiscent cocci; ovaries partly united.

Leaves opposite; trees or shrubs not thorny.

Stamens 4 or 5.

Seed globose

Seed flat, winged

1. EVODIA

2. TERMINTHODIA

- Stamens 8, 4 perfect, 4 imperfect 3. TETRACIOMIA
 Leaves alternate often thorny; shrubs; seeds
 globose 4. ZANTHOXYLUM
 Fruit indehiscent.
 Trees or shrubs unarmed.
 Trees; petals valvate 4; drupe large 4-celled;
 leaves simple 5. ACRONYCHIA
 Shrubs; leaves 1- to 5-foliate; petals very small
 imbricate; berry small 1 to 3 seeds 6. GLYCOSMIS
 Shrubs; leaves pinnate or simple.
 Leaves hairy; petals valvate; drupe small 7. MICROMELUM
 Leaves glabrous; petals imbricate; drupe
 small 8. CLAUSENA
 Shrubs or trees glabrous.
 Flowers rather large; leaves thinly coriaceous;
 fruit a berry. Leaves 3- to 8-foliate 9. MURRAYA
 Flowers large; leaves pinnate; rachis winged;
 fruit an orange 10. MERRILLIA
 Climbers, spiny; leaves trifoliate 11. LUVUNGA
 Trees, usually spiny; leaves unifoliate; fruit an
 orange.
 Stamens 8 to 10.
 Anthers linear-oblong; disc cylindric 12. PARAMIGNYA
 Anthers ovate-oblong; disc cupular. 13. ATALANTIA
 Stamens 20 to 60 insert round a large cupular
 disc 14. CITRUS
 Tree, spiny; leaves imparipinnate; fruit large
 globose with woody rind 15. FERONIA

1. EVODIA, Forst.

Trees or shrubs. Leaves opposite 3-foliolate, rarely 1-foliolate, entire. Flowers small, white rarely pink, unisexual or bisexual, in paniced axillary cymes. Sepals 4 or 5 imbricate. Petals 4 or 5 valvate or sub-imbricate. Stamens 4 or 5; filaments subulate; anthers oblong. Ovary 4-lobed, 4-celled; ovules 2 in a cell. Fruit of 2 to 4 coriaceous cocci; endocarp horny elastic, splitting along the inner edge. Seeds 1 or 2 in a coccus, testa bony or coriaceous, black shining, albumen fleshy. Species about 25, from Mascarene Islands to tropical Asia and Australia.

Leaves trifoliate.

- Softly tomentose beneath (1) *E. latifolia*
 Glabrous. Leaflets obovate; cymes rather
 large; cocci 2 in. long. (2) *E. malayana*
 Leaflets thin acuminate; bush or small tree (3) *E. glabra*
 Leaflets coriaceous large, tip round; small
 tree (4) *E. robusta*
 Leaflets coriaceous; tall tree 60 to 70 ft. tall (5) *E. macrocarpa*
 Leaves glabrous, coriaceous; cocci 4 in. long (6) *E. pilulifera*
 Leaves glabrous, thin; flowers in globular
 heads (7) *E. pachyphylla*
 Leaflets very coriaceous, pubescent beneath (8) *E. simplicifolia*
 Leaflets unifoliate

(1) *E. latifolia* DC. *Prodr.* i. 724; *Hook. fil. F.B.I.* i. 489; *King, l.c.* 207.

Small tree 20 ft. tall. Branches 4-angled, puberulous. Leaflets 3 obovate or elliptic blunt or shortly acuminate, base cuneate, above glabrous except the tomentose midrib and nerves, beneath softly tomentose; nerves 13 to 18 pairs elevate beneath; leaflets 5 to 9 in. long, 2·5 to 4·5 in. wide; petiolules ·2 to ·4 in. long; petioles puberulous 4 to 6 in. long. Cymes axillary broad 3 to 4 in. across, puberulous on stout 2 in. long peduncles. Flowers white less than ·1 in. long, densely crowded in heads ·2 in. across. Sepals pubescent. Petals glabrous. Stamens not much longer. Cocci 2 to 4 in a flower, ovate blunt, ·1 in. long, glabrous, 1- or 2-seeded. Seeds black shining. *Hab.* In woods common. Johor, Batu Pahat. Malacca, Nyalas (Derry); Selandor (Cantley). Negri Sembilan, Rantau (Cantley). Selangor, Bukit Kayu Kapur. Dindings, Lumut (leaves quite glabrous). Perak, Bujong Malacca; Slim (Cantley); Larut Hills; Tea Gardens. Penang, Moniot's Road (Curtis). *Distrib.* Java. *Native names:* Pauh-Pauh; Leban Pelandok, or Leban Pelandok nasi or jantan; Pauh-Pauh betina; Serapoh Jantan.

There is a thinner-leaved form on Penang Hill and Malacca, resembling *E. accedens* Miq., but with flowers of *E. latifolia* DC. (*Hook. fil. l.c. var.*).

(2) *E. malayana* Ridl.; *E. Roxburghiana* Hook. *fil. F.B.I. l.c.* 488, *partly*; *King, l.c.* 208.

A bush to a small tree 20 ft. tall. Leaves trifoliate, glabrous; leaflets thinly coriaceous, obovate or oblong shortly acuminate; nerves 12 to 18 pairs, sub-horizontal, 2·5 to 6 in. long, 1·25 to 3·25 in. wide; middle leaflet largest; petiolules ·1 to ·2 in. long; petioles 2·3 to 2·5 in. long. Cymes pedunculate, spreading puberulous 2 to 3 in. wide; peduncle 2 to 3 in. long. Flowers white, ·1 in. across; pedicels pubescent. Sepals oblong, blunt. Stamens longer than petals. Cocci 2 to a flower, ovoid acute. Seed 1 or 2, black shining. *Hab.* Open country common in thickets. Singapore, Tanglin; Bukit Timah. Johor, Tanjong Kupang. Pahang, Pekan. Malacca, Brisu; Merlimau. Perak, Chanderiang (Kunstler). Province Wellesley, Permatang Bertam. Kelantan, Kota Bharu. Lankawi, Kesap (Haniff). *Native names:* Kiandang; Mesera jantan; Pauh-Pauh; Pauh-pauh paya; Rudomo; Stengah or Tengah Burong.

I am compelled to give this plant a new name, as *E. Roxburghiana* Hook. *fil.* is a mixture of several species; the name was originally suggested by Benthams in the *Flora of Hongkong* (without any specific diagnosis and no type specimens) for a series of species. The greater part of the plants quoted by Hooker are of an Indian species, much larger, and with different leaves and flowers.

(3) *E. glabra* Bl. *Bijdr.* 245; *Hook. fil. F.B.I.* i. 489; *King, l.c.* 208.

Big tree 40 to 70 ft. tall, 2 to 3 ft. through. Leaves trifoliate;

petioles 2 to 4 in. long; leaflets obovate, top rounded, base narrowed, glabrous or with midrib pubescent; nerves 8 to 9 pairs elevate, 3·5 to 7 in. long, 2·5 in. wide; petiolules not winged ½ in. long. Cymes corymbose puberulous, 4 in. across; peduncle 3 in. long or less. Flowers white. Sepals round ovate. Petals oblong obtuse. Cocci ovoid-globose ½ in. long rugose. *Hab.* Common in woods in the low country. Singapore, Bukit Timah; Tanglin, Selitar. Selangor, Sungei Buloh (Foxworthy). Perak, Ulu Bubong (Kunstler). Penang, Waterfall (Curtis). *Distrib.* Andamans and Nicobars, Java, Sumatra.



FIG. 35.—*Evodia robusta*.

(4) ***E. robusta*** Hook. *fl. F.B.I.* i. 488; King, *l.c.* 209.

A small tree. Branchlets hoary. Leaves trifoliate; leaflets coriaceous oblong, median one obovate obtuse or shortly acuminate blunt; nerves 8 pairs elevate beneath, 7 in. long, 4 in. wide or less; petioles 2 to 2½ in. long; petiolules winged to base or nearly, ½ in. long. Cymes about 3½ in. across, puberulous. Flowers small, white. Sepals ovate pubescent. Petals oblong ovate, acute.

Cocci 2 to 3 rugose. *Hab.* Woods in the south, Singapore (Main-gay); Bukit Timah (Hullett); Chua Chu Kang, etc.

This differs from *E. glabra* Bl. in the less obovate leaves, much shorter petiolules and ovate acute petals.

(5) ***E. macrocarpa*** King, *l.c.* 209; *Ann. Bot. Gard. Calc.* lx. 11, *pl.* 14.

Tree 40 to 50 ft. tall. Leaves trifoliolate; leaflets stiffly coriaceous, glabrous, oblong to elliptic-oblong acute, narrowed to a blunt base; nerves 14 to 18 pairs sub-horizontal, 6 to 12 in. long, 2 to 3 in. wide; petioles 3 to 4 in. long; petiolules .1 to .2 in. long. Cymes axillary pyramidal short peduncled tomentose. Flowers .1 in. long, white densely crowded. Sepals triangular acute, pubescent. Petals puberulous. Cocci 3 or 4 obovate blunt .4 in. long, hairy inside, puberulous outside. Seeds 2. *Hab.* Forests in low country, rare. Perak, Thaiping (Wray, Kunstler); Penang, Government Hill (Abrams).

(6) ***E. pilulifera*** King, *l.c.* 210; *Ann. Bot. Gard. Calc.* lx. 10, *pl.* 13.

Shrub 6 to 15 ft. tall. Leaves trifoliolate; leaflets thinly coriaceous elliptic to oblong shortly acuminate, base narrowed, rounded, glabrous; nerves 9 to 10 pairs oblique inarching far from margin, conspicuous as are the lax reticulations, hairy on both sides, 3.5 to 8 in. long, 1.25 to 2.75 in. wide; petioles 3 to 4.5 in. long hairy; petiolules hairy .15 to .4 in. long. Cymes axillary tomentose; peduncles 2.5 in. long; branches few. Flowers white in dense globose heads, .25 in. across, less than 1 in. long. Sepals ovate acute tomentose. Petals glabrous. Cocci ovoid tomentose outside. Seeds 1. *Hab.* High forests. Local, at 2500 to 3000 ft. altitude. Malacca, Mt. Ophir; Perak, Larut (Kunstler); Telom (Ridley).

(7) ***E. pachyphylla*** King, *l.c.* 210; *Ann. Bot. Gard. Calc.* lx. 12, *pl.* 15.

A shrub, dwarf to a treelet 15 ft. tall. Branches tomentose. Leaves trifoliolate, very variable in size according to altitude; leaflets coriaceous elliptic-obovate or rounded, obtuse narrowed at base, dull light green, pubescent beneath on the midrib and occasionally on the edge, punctate above, 5 to 6 in. long, 3 in. wide; petioles .3 in. long; petiolules .2 in. long, at 5000 ft. altitude, reduced to 2 in. long, 1.5 in. wide, with petioles .5 in. long and petiolules .1 in. long at 7000 ft. altitude. Cymes axillary puberulous; peduncles 1.75 in. long or less; branches few, few-flowered, all tomentose. Flowers white. Sepals ovate tomentose. Petals .2 in. long oblong acute, keel tomentose. Ovary very tomentose. Cocci large .4 in. long, pubescent hairy. Seed 1, black. *Hab.* High mountains 4000 to 7000 ft. altitude; Pahang, Gunong Berumbun; Wray's Camp, Gunong Tahan. Perak, Gunong Bubu, 5000 ft. altitude (Wray); Gunong Kerbau (Robinson, Haniff) at 7000 ft. altitude; Bujong Malacca (a form with acute leaves).

(8) **E. simplicifolia** Ridl. *Journ. Linn. Soc.* xxxviii. 306.

Shrub 7 ft. tall, branched. Leaves 1-foliolate, coriaceous elliptic obtuse, tip sub-crenate, base rounded, glabrous; nerves 16 pairs; nervules and reticulations conspicuous, 3 to 3.75 in. long, 1.75 in. wide; petioles .5 in. long. Panicles in axils of upper leaves. Flowers unknown. Cocci 4, rugose glabrous .5 in. across. *Hab.* Rocky places at 5000 ft. altitude. Pahang, Gunong Tahan (Robinson).

EXCLUDED SPECIES

EVODIA PEDUNCULOSA Hook. *fil. F.B.I.* i. 489. Singapore (Lobb), apparently a *Tetractomia*, the locality very doubtful.

2. **TERMINTHODIA**, Ridl.

Shrubs or small trees. Leaves unifoliolate, alternate or opposite, sub-coriaceous. Flowers small in axillary corymbs. Calyx 4-lobed, lobes rounded. Petals 4, triangular. Disc large, 4-angled glandular. Stamens 4; filaments subulate, short; anthers small. Ovary 4-lobed protruding from disc; style central. Stigma small capitate. Cocci 1 to 3, boat-shaped dehiscing along the inner edge. Seeds 1 or 2 in each coccus flattened and winged, exalbuminous. Species 3, Malayan.

(1) **T. viridiflora** Ridl. *Journ. F.M.S. Mus.* vi. 141.

Shrub 3 or 4 ft. or tree 15 ft. tall. Leaves alternate aromatic, obovate, tip rounded or retuse or acuminate, 2 to 3 in. long, 1.5 to 2 in. wide; petioles .5 in. long. Panicles pubescent axillary, .5 in. across on a 1.5 in. long peduncle. Sepals pubescent. Petals acute, green, .12 in. long, glabrous. Stamens nearly as long; filaments thick subulate. Cocci .25 in. long, boat-shaped. Seeds 2, ovoid or obovate, thin, .12 in. long, tip rounded. *Hab.* Open rocky places at 5000 ft. altitude. Pahang, Gunong Tahan (Ridley).

3. **TETRACOMIA**, Hook. fil.

Trees or shrubs. Leaves opposite 1-foliolate, coriaceous entire, punctate. Flowers small in axillary branched cymes. Calyx 4-partite. Petals 4, triangular-ovate acute persistent valvate. Disc broad 4-angled. Stamens 4 or 8; anthers bilobed dorsifixed. Ovary immersed 4-celled with 4 projecting lobes; styles 4, free at base, connate above. Fruit of 4 coriaceous oblong compressed cocci, 2-seeded hairy; endocarp partly separating. Seeds winged. Species 5 or 6, Malay Peninsula, Borneo.

Leaves 6 to 9 in. long; flowers .25 in. long; cocci .5 in. long

(1) **T. majus**

Leaves 2.5 to 5 in. long; flowers .13 in. long; cocci .25 in. long

(2) **T. Roxburghii**

(1) **T. majus** Hook. fil. *F.B.I.* i. 491; King, *l.c.* 211. Tetramerista paniculata Kurz, *Journ. Bot.* 1875, p. 333.

Tree with stout branches. Leaves very coriaceous, obovate-elliptic blunt; nerves 12 to 16 pairs, 8 to 9 in. long, 3 to 4 in. wide; petioles 2 to 2.25 in. long, thick. Cymes glabrous, 6 to 7 in. long. Flowers .25 in. wide glabrous. Stamens 4, perfect; staminodes minute 4. Cocci .5 in. long, keeled. Seed oblong. *Hab.* Malacca, (Maingay). Only once found and locality not certain.

(2) **T. Roxburghii** Hook. fil. *l.c.* 491; *l.c.* Pl. 1512; King, *l.c.* 212. Melicope tetrandra Roxb. *Fl. Ind.* ii. 257.

Tree 30 to 80 ft. tall, 1.5 to 2 ft. through, glabrous. Branches rather stout. Leaves sub-coriaceous obovate, tip rounded rarely apiculate, long narrowed to base; nerves fine 7 to 9 pairs, 2.5 to 6 in. long, 1.5 to 3 in. wide; petioles .5 to 1 rarely 1.25 in. long. Cymes pubescent above, 3 to 4 in. across spreading, on a peduncle 4 in. long. Flowers .13 in. across, pale yellow or greenish white. Stamens 8, alternate row attached to sepals. Cocci 1 to 3, .25 in. long. Seeds oblong. *Hab.* Forests to 3000 ft. altitude. Singapore (Maingay). Perak, Taiping Hills (Derry, Kunstler). Penang Hill (Curtis). *Native names:* Kertak Hudong; Medang Hudang.

4. ZANTHOXYLUM, L.

Shrubs or trees often prickly. Leaves alternate trifoliate or unequally pinnate. Leaflets entire or crenulate. Flowers small pink, white or green often unisexual. Calyx 3- to 8-fid. Petals 3 to 5. Disc small. Stamens 3 to 5. Ovary of 1 to 5 oblique 1-celled carpels; ovules 2; styles sub-lateral. Fruit of 1 to 5 cocci globose, coriaceous-fleshy 1-seeded dehiscent ventrally; endocarp horny. Seed oblong or globose. Testa bony or crustaceous blue or black. About 80 species, tropics.

Unarmed shrub. Leaves trifoliate; fruit .3 in. through

(1) **Z. ovalifolium**

Rachis thorny; leaves 7- to 9-foliate; fruit .25 in. through

(2) **Z. hirtellum**

Thorny tree. Leaves pinnate; fruit .12 in. through

(3) **Z. myriacanthum**

(1) **Z. ovalifolium** Wight, *Ill.* i. 169; Hook. fil. *l.c.* 492; King, *l.c.* 213.

Shrub or small tree. Branchlets puberulous, unarmed. Leaves 3-foliate; leaflets sub-coriaceous elliptic-oblong, obtuse-pointed, base narrowed, edge crenulate; nerves 10 to 14 pairs, 2 to 5 in. long, 1.2 to 2.5 in. wide; petioles 1.25 to 2.5 in. long; petiolules .2 to .4 in. long. Cymes slender axillary; branches few. Flowers .12 to .2 in. long few, 4- to 5-merous. Coccus 1, sub-globular, pitted, 3 in. through. *Hab.* Singapore (Wallich 7469). Not seen again. *Distrib.* India.

Specimen doubtful. Wallich says the branches are armed, but there are no spines on the specimens and the Indian plant is unarmed.

(2) **Z. hirtellum** Ridl. *Journ. F.M.S. Mus.* x. 131.

Apparently a climber armed with short curved thorns. Branches shortly stiffly hairy. Leaves 6 in. or more long; rachis slender strongly armed; leaflets 7 to 9, coriaceous elliptic, bluntly cuspidate, edge crenulate or undulate; nerves beneath pubescent slender about 8 pairs, above shining glabrous; petiolules 1 in. long or less. Panicles slender lax axillary 2 to 3 together with few flowers about 2 in. long. Flowers 1 in. wide pubescent. Sepals triangular acute. Fruit spikes 3 in. long, pubescent stout with short branches. Coccus flattened, oval pubescent wrinkled, .25 in. long. Seed nearly as long slightly flattened, polished black. *Hab.* Woods, Singapore, Yochukang (Ridley). Pahang, Temerloh. Dindings, Lumut (Curtis).

(3) **Z. myriacanthum** Wall. *Cat.* 1214; *Hook. fil. F.B.I.* i. 496; *King, l.c.* 214.

A tree 20 to 80 ft. tall and 2 to 3 ft. through, very thorny. Leaves deep green, coriaceous 1 to 1.6 ft. long; leaflets 4 to 9 pairs coriaceous ovate or oblong-lanceolate acuminate, entire or minutely crenate; nerves 8 pairs, 3 to 4 in. long, 1.25 to 1.5 in. wide; petioles 3.5 in. long; petiolules 1 in. long. Cymes 6 to 8 in. long, terminal spreading; peduncle 3.5 in. thorny. Flowers .2 in. across, white sub-sessile 4-merous. Cocci usually 2 globose compressed, 1 in. long. *Hab.* Hill woods. Pahang, Telom. Malacca (Maingay); Merlimau (Derry); Perak, Goping (Kunstler); Dindings, Lumut, Penang, Government Hill, 2500 ft. altitude (Curtis, Wallich). *Native names:* Kabu-Kabu Hutan; Membuloh.

The height given is that of Kunstler. I have only seen it very much smaller, about 6 to 8 ft. tall.

5. ACRONYCHIA, Forst.

Tree with opposite or alternate leaves 1-foliolate; leaflets entire. Flowers small, green or white in terminal or axillary corymbs. Petals 4 valvate revolute. Stamens 8 inserted under a thick 8-angled tomentose disc. Ovary within the disc 4-celled; ovules 2 in each cell; style terminal. Fruit a 4-celled drupe. Seeds black. Species about 18, tropical Asia and Australasia.

Flowers in cymes .35 to .75 in. diameter . . . (1) **A. laurifolia**
 Flowers in racemes .15 in. diameter . . . (2) **A. Porteri**

(1) **A. laurifolia** Bl. *Bijdr.* 245; *Hook. fil. F.B.I.* i. 498; *King, l.c.* 214. *A. arborea* Bl. *Bijdr.* 244.

A small tree about 12 to 30 ft. tall. Branchlets puberulous. Leaves sub-opposite thinly coriaceous dark shining green, oblong-elliptic or obovate obtusely acuminate or blunt, base narrowed, glabrous; nerves 14 to 18 pairs looping within the edge, 2 to 6 in. long, 1.1 to 2.4 in. wide; petioles .5 to .75 in. long. Cymes axillary slender 2 in. long with few opposite branches; peduncles 2.5 in. long. Flowers narrow in bud, .35 to .75 in. across when open,

greenish white. Sepals semi-orbicular. Petals linear-oblong villous inside. Drupe globose green like a small orange, 4 in. through (4-angled when dry). *Hab.* Forests in low country. Pahang, Rumpin River. Negri Sembilan, Tampin Hill (Goodenough). Dindings, Lumut and Bruas (Curtis). Penang (Porter); Balik Pulau; Penara Bukit (Curtis). Lankawi, Tasek Enak (Haniff). *Distrib.* Burma, India, Cochin-China, Malay Isles. *Native names*: Mentua Keminiyan; Gambadak; Rejang.

(2) **A. *Porteri*** Hook. fil. *F.B.I.* i. 498; *King*, l.c. 215.

Tree 15 to 70 ft. tall, 15 to 20 in. through. Bark white. Leaves opposite or alternate, coriaceous oblong narrowed to base, acute or acuminate, glabrous; nerves 8 to 10 pairs, 3 to 8 in. long, 1·25 to 3 in. wide; petioles 5 to 75 in. long. Racemes 1 or more from each axil, puberulous, 3 in. long. Flowers scattered 15 in. across. Buds globose; pedicels 15 in. long to 2 in. long in fruit. Sepals triangular acute. Petals ovate-oblong pubescent inside. Drupe, ovoid, dark green 4 in. through, 4-angled when dry. *Hab.* Forests. Singapore, Bukit Timah, Garden Jungle. Malacca (Griffith); Batang Malacca (Derry); Sungei Hudang (Derry). Perak, Thaiping (Kunstler). Penang (Wallich); Government Hill (Maingay, Curtis). *Native names*: Katiak; Bunan Hutan; Melaman.

6. GLYCOSMIS, Correa.

Shrubs or treelets. Leaves 1- to 5-foliolate; leaflets alternate. Flowers small white in axillary rarely terminal panicles. Calyx 4- or 5-partite imbricate. Petals 4- or 5-imbricate. Stamens 8 or 10 surrounding a disc; filaments subulate dilate below; anthers small with an apical gland. Ovary 2- or 5-celled; ovule 1, pendulous in each cell. Berry pulpy, small to as big as a cherry. Seeds 1 to 3 oblong, testa membranous. Species about 20, tropical Asia and Australia.

Flower solitary axillary or sub-terminal panicle;
ovary glabrous; fruit as large as a cherry . . .

Flowers several axillary; ovary glabrous; fruit as
large as a pea.

Leaves simple large, coriaceous narrow elliptic-
lanceolate

Leaves simple, large, thinner, broad elliptic

Leaves 1- to 3-foliolate; panicles spike-like,
glabrous

Leaves 3-foliolate; panicles tomentose, spreading

Leaves 5-foliolate, thin; nerves conspicuous

Leaves 5-foliolate; nerves faint; inflorescence
glabrous

Leaves 5- to 7-foliolate; inflorescence red-tomen-
tose

Leaves 7-foliolate, large quite glabrous; ovary
pilose or tomentose

Leaves large 1·25 to 2·25 in. across

Leaves small 75 to 1·7 in. wide

(1) **G. *macrocarpa***

(2) **G. *crassifolia***

(3) **G. *macrophylla***

(4) **G. *citrifolia***

(5) **G. *rupestris***

(6) **G. *malayana***

(7) **G. *monticola***

(8) **G. *tomentella***

(9) **G. *elata***

(10) **G. *sapindoides***

(11) **G. *puberula***

(1) **G. macrocarpa** *Wight, Ill. i. 109.*

Tree, glabrous. Leaves 1- to 5-foliolate, sub-coriaceous; 1-foliate leaf, with leaflet elliptic-lanceolate acuminate, base shortly narrowed 7·5 in. long, 2·7 in. wide, gland-dotted; nerves about 8 pairs; petioles 1·75 in. long, 3-foliolate leaves 6 in. long, with distant lanceolate leaves acuminate shortly narrowed to base 3 in. long, 7 in. wide; petiolules 1 in. long. Flowers white 2 in. long solitary axillary on a very short peduncle or sub-terminal in dense short panicles 5 in. long; branches angled. Sepals ovate acuminate. Petals oblong acuminate. Stamens, filaments broad and thick. Fruit as big as a cherry 75 in. through punctulate. *Hab.* Perak (no locality given) at 4500 ft. altitude (Wray). *Distrib.* Southern India.

(2) **G. crassifolia** *Ridl. Journ. Roy. As. Soc. S. Br. 75, p. 14.*
G. pentaphylla *var. longifolia* *Hook. fil. F.B.I. i. 500.*

Branches stout, woody. Leaves simple elliptic-lanceolate narrowed to base, bluntly acuminate, very coriaceous, gland-dotted above; nerves fine, 8 or more pairs inconspicuous, 9 in. long, 2·1 in. wide; petioles thick, 5 in. long. Flowers small in very short axillary clusters, very few; rachis and ovate sepals red-tomentose. Petals broad lanceolate, blunt, glabrous. Stamens with a glandular blunt apiculus to anther. Ovary glabrous. Fruit fleshy. *Hab.* Malacca (Maingay). Only once collected.

(3) **G. macrophylla** *Lindl. Wall. Cat. 6377 not of Miquel; Ridl. Journ. Roy. As. Soc. S. Br. 75, p. 13.*

Shrub. Leaves simple thinly coriaceous elliptic, narrowed slightly at base, acuminate; nerves 10 pairs prominent inarching within margin, 8 in. long, 3·5 in. wide, pale beneath; petioles thick, 2 in. to 1 in. long. Panicles terminal 1 to 2 (axillary in upper 2 axils), 2·5 in. long with very short 1 in. long branches. Flowers very small in umbels at the tips of the branches. Ovary conic, glabrous on a large disc. *Hab.* Hill woods; local. Penang (Wallich 6377, Curtis 89).

var. macrorachis *King, l.c. 217 (sub pentaphylla).*

Erect shrub 2 to 4 ft. tall. Leaves elongate lanceolate acuminate 13 in. long, 3·7 in. wide. Panicle 6 in. long; branches scattered distant 2 in. long. Fruit round, white. *Hab.* Penang, Waterfall and Pulau Betong (Curtis 89) in forests.

(4) **G. citrifolia** *Lindl. Hort. Soc. Trans. vi. 72; Ridl. Journ. Roy. As. Soc. S. Br. 75, p. 11.* *Limonia parviflora* *Bot. Mag. t. 2416.*

Short stiff shrub or bush 4 to 8 ft. tall. Leaves 1- to 3-foliate thinly coriaceous elliptic-lanceolate; nerves 12 to 13 pairs, faint, 4·5 in. long, 1·5 in. wide; petioles 1 to 2·5 in. long; petiolules 1 in. long. Panicle glabrous axillary and terminal almost spike-like erect 5 to 2 in. long. Ovary glabrous, globose. Fruit as big as a pea, pale pinkish white. *Hab.* Open country and villages,

local but often abundant, Singapore, Tanglin. Kelantan, Kwala Lebir, Setul (Ridley). *Distrib.* China, Java, Borneo, Philippines and as a garden escape in the West Indies. *Native names* : Nerapih (for one species of *Glycosmis*, Gimlette, Malay Poisons).

(5) ***G. rupestris*** Ridl. *Journ. Roy. As. Soc. S. Br.* 58, p. 81.

A shrub, bark white. Leaves 3-foliate; leaflets broadly lanceolate coriaceous, narrowed to both ends, 1 to 5 in. long, .75 to 2 in. wide; nerves 4 to 5 pairs irregular indistinct; petioles .25 in. long. Panicles .5 in. long. Sepals 4, orbicular. Petals 4, oblong, .12 in. long. Pistil glandular, glabrous. Disc very small. Berry .25 in. long, stalked globose. *Hab.* Limestone rocks, Kedah, Gunong Geriang, Perlis, Kanga. Pulau Adang, Rawei Island (Ridley).

var. *tomentosa* Ridl. *l.c.* Inflorescence red-hairy, Lankawi Pulau Segai; Pulau Adang (Ridley). *Distrib.* Siam, Koh Samui.

This is near *G. puberula* Lindl., hardly differing except in the glabrous ovary.

(6) ***G. malayana*** Ridl. *Journ. Roy. As. Soc. S. Br.* 75, p. 12.

Glabrous shrub. Buds red-tomentose. Leaves thin sub-membranous, 5-foliate; leaflets elliptic, bluntly acuminate, shortly narrowed at the base; nerves impressed above, conspicuously elevate beneath, 5 pairs inarching within margin, gland-dotted above or not, 3.5 to 5.5 in. long, 1 to 2 in. wide; petioles .5 to 1 in. long; petiolules .1 to 2 in. long. Panicles axillary or terminal 2 to 3 in. long; branches spreading 1 in. long, glabrous rarely red-scurfy. Flowers small globose. Sepals orbicular ciliate-edged. Petals small, oblong blunt; filaments broad. Ovary cylindro-conic, glabrous, 5-celled. Fruit globose narrowed at base, white, .2 in. through. *Hab.* In the woods in the low country, our commonest species. Singapore, Chan Chu Kang. Johor, Selangor; Kwala Lumpur. Perak, Larut (Kunstler). Penang (Wallich, Curtis, etc.). Kelantan, Chaning Woods. *Native names* : Buluntoh Burong; Cherit Morai; Pulong.

(7) ***G. monticola*** Ridl. *Journ. Roy. As. Soc. S. Br.* 75, p. 14.

Glabrous. Leaves 5 in. long; leaflets 5, coriaceous, lanceolate acuminate blunt base narrowed cuneate; nerves 6 pairs, faint 3 to 4 in. long, .5 to 1 in. wide; petioles .1 in. very slender; petiolules .1 in. long. Panicle 1 in. long; branches 2 in. long. Flowers very small, globose sessile. Sepals rounded. Petals ovate. Stamens, filaments very short; anthers apiculate. *Hab.* Malacca, Mt. Ophir, Gunong Mering at 3000 ft. altitude (Ridley).

(8) ***G. tomentella*** Ridl. *Journ. Roy. As. Soc. S. Br.* 75, p. 14.

Buds red-pubescent. Leaves 12 in. long; leaflets 5 to 7 elliptic bluntly acuminate, base rounded, thinly coriaceous, not gland-dotted; nerves 6 to 7 pairs conspicuous beneath forming wide arches, scurfy pubescent as are the midrib, petiolules .2 in. long

and petioles .5 in. long. Panicle axillary erect 2.5 in. long, lower branches (few) 1.5 in. long, puberulous. Flowers sessile or subsessile in tufts. Sepals ovate rounded. Petals .1 in. long, oblong obtuse; filaments moderately thick longer. Disc small, cushion-shaped. Ovary flask-shaped, glabrous. *Hab.* Selangor, Menuang Gasing (Kloss).

(9) **G. elata** *Ridl. Journ. F.M.S. Mus.* x. 130.

Shrub 6 to 8 ft. tall. Stem stout. Leaves 18 in. long with 5 leaflets oblong-elliptic, glabrous, pale beneath, base cuneate, tip shortly acuminate; nerves 5 to 7 pairs, freely black-dotted beneath, 7 in. long, 2 in. wide; petiolules .25 in. long. Panicles in lower axils 3 in. long. Flowers numerous .2 in. long, white. Sepals very short ovate acute. Petals oblong, glabrous. Stamens 10, 5 as long as petals, 5 shorter. Ovary flask-shaped, glabrous. Fruit ovoid beaked yellow spotted brown. *Hab.* Damp forests. Kelantan in the Chaning Woods and near Kota Bharu (Ridley).

(10) **G. sapindoides** *Lindl. Wall. Cat.* 6376; *Oliv. Journ. Linn. Soc.* ii. *Supp.* 38; *Hook. fil. F.B.I.* i. 501.

Shrub. Branches stout. Leaflets large 5 to 7, elliptic or oblanceolate narrowed to the base acuminate thinly coriaceous, densely gland-dotted on both surfaces; nerves elevate beneath 6 to 9 pairs invisible above, inarching within the margin, 3.5 to 6 in. long, 1.25 to 2.25 in. wide, the lowest ones smallest; petioles 1.75 to 2.75 in. long, pustular as is the rachis. Panicle short axillary 1.5 in. long, dense. Calyx-lobes ovate acute. Petals oblong .1 in. long obtuse, backs rufous. Ovary flask-shaped red-pilose. Disc small. *Hab.* Penang (Wallich), Waterfall (Ridley).

(11) **G. puberula** *Lindl. Wall. Cat.* 6375; *Hook. fil. F.B.I.* i. 501; *King, l.c.* 218.

Shrub? Branches pustular; buds red-tomentose. Leaves 5 in. long 3-foliate; leaflets sub-coriaceous elliptic acuminate, base narrowed acuminate; nerves faintly elevate about 6 pairs inarching invisible above, 3 to 4.5 in. long, .75 to 1.7 in. wide, densely gland-dotted on both sides; petioles slender 1.4 in. long; petiolules slender .2 in. long. Panicles small; branches few, short, 1 to 1.5 in. long, red-tomentose. Flowers very small. Sepals rounded ovate. Petals small oblong tomentose. Stamens 10; filaments cylindric; anthers glandular on tip and back. Ovary globose, conic red-tomentose. *Hab.* Penang (Wallich); Waterfall (Curtis). Perak (Scortechini), a variety with leaves more coriaceous. *Distrib.* Philippines.

7. MICROMELUM, Bl.

Shrubs or small trees. Leaves imparipinnate. Leaflets alternate oblique, membranous. Flowers small white in corymbose cymes large and terminal. Calyx cupular 3- to 5-toothed. Petals 5, valvate. Stamens 10 inserted round a disc; filaments linear-

subulate, alternate ones shorter. Ovary 5-celled (rarely 2- to 6-celled); ovules 2 in each cell; style 1. Berry pulpy 1- or 2-seeded. Seed oblong. Species 4 to 5, Asia and Polynesia.

Leaflets ovate lanceolate, glabrescent; cymes pubescent

(1) **M. pubescens**

Leaflets lanceolate, base very oblique tomentose; cymes very tomentose

(2) **M. hirsutum**

(1) **M. pubescens** *Bl. Bijdr.* 137; *Hook. fil. F.B.I.* i. 501; *Bedd. Fl. Sylv. Anal. Gen. pl.* vii., fig. 1; *King, l.c.* 218.

Large shrub or treelet. Branchlets and leaf-rachis puberulous but eventually glabrescent. Leaves 6 to 18 in. long; leaflets 9 to 15 alternate lanceolate or ovate-acuminate, edges undulate, base slightly narrowed oblique; nerves 9 to 12 pairs, 1.5 to 3.5 in. long, .5 to 2 in. wide; petioles up to 3 in. long. Cymes 6 to 8 in. across, peduncled, many-flowered. Flowers .25 to .5 in. long, greenish white. Calyx 5-toothed. Ovary pubescent. Berry ovoid to oblong glabrescent orange .3 to .4 in. long. *Hab.* Common in open country. Pahang, Kwala Tembeling; Temerloh. Malacca, Selandor (Cantley). Negri Sembilan, Bukit Tampin; Bukit Kanding (Cantley). Perak, Tanjong Malim; Ulu Bubong (Kunstler). Penang, Tanjong Bunga (Curtis). Perlis near Kanga. *Distrib.* Tropical Asia and Australia. *Native names:* Cherik putih; Kurnan; Saga Kayu; Titimah Betina; Chemama jantan.

(2) **M. hirsutum** *Oliv. Journ. Linn. Soc. v. Supp.* (2), 40; *Hook. fil. F.B.I.* i. 502; *King, l.c.* 219.

Shrub or small tree tomentose. Leaves 6 to 12 in. long; leaflets 9 to 25, lanceolate to oblong-lanceolate, base very oblique, edges obscurely serrate, tomentose beneath; nerves 5 to 10 pairs, 1.5 to 3.5 in. long, .8 to 1.5 in. wide; petioles up to 2 in. long. Cymes very tomentose, lax, 4 to 6 in. across or less. Flowers .25 in. across, white. Calyx deeply 5-lobed. Ovary very villous. Berry orange. *Hab.* Open country, less common than the last, Malacca, Mt. Ophir (Hullett). Perak, Gunong Keledang. Penang (Jack, Porter). Kelantan Kota Bharu (Ridley). *Distrib.* Indo-Malaya. *Native name:* Chemama.

8. CLAUSENA, Burm.

Shrubs or trees. Leaves imparipinnate membranous; leaflets oblique. Flowers small in lax panicles. Calyx 4- or 5-lobed. Petals 4 or 5 imbricate. Stamens 8 or 10 inserted round a tall disc, alternate ones shorter; filaments usually dilate. Ovary stipitate, 4- or 5- (rarely 2- or 3-) celled; ovules 2. Berry pulpy ovoid or oblong. Species 14, tropical Asia, Africa and Australia.

(1) **C. excavata** *Burm. Fl. Ind.* 87; *Hook. fil. F.B.I.* i. 504; *King, l.c.* 220.

Shrub or treelet, odour nauseous. Branches, young leaves and inflorescence pubescent or tomentose. Leaves 6 to 12 in. long;

leaflets 15 to 29 lanceolate acuminate oblique, base narrowed, above glabrous when adult, 1·5 to 3·4 in. long, ½ to 1 in. wide; petioles ½ in. long; petiolules less than ½ in. long. Panicle terminal narrow, lax 4 to 12 in. long; branches spreading. Flowers ½ in. across, 4-merous white; pedicels longer. Buds globose. Stamens 10. Ovary hairy. Fruit smooth oblong, pulpy pale pink translucent ½ in. long. Seed 1 elliptic oblong. *Hab.* Common in open country. Singapore. Tanglin; Pulau Ubin. Malacca, Bukit Bruang; Selangor (Cantley). Selangor. Perak, Goping (Kunstler). Penang, Telok Bahang; Government Hill (Curtis). *Distrib.* Indo-Malaya. *Native names*: Chenama; Cherek hitam. *Use*: The leaves eaten as a potherb by Tamils, and perhaps introduced by them.

9. MURRAYA, Linn.

Shrubs or trees unarmed. Leaves pinnate with alternate petioled leaflets, bases oblique or cuneate. Flowers solitary or in short panicles axillary or terminal. Calyx 5-partite. Petals narrow 5, free imbricate. Stamens 10 on an elongate disc, alternate ones shorter; anthers ovate. Ovary 2- to 5-celled, narrowed into a long style. Stigma capitate. Berry oblong or ovoid 1- to 5-celled, 1- to many-seeded. Seeds flat, glabrous. Species 5, tropical Asia.

(1) *M. exotica* Linn. *Mant.* ii. 563; *Hook. fil. F.B.I.* i. 502; *King, l.c.* 220.

A shrub or small tree. Leaves 4 to 5 in. long, deep shining green 3- to 8-foliate; leaflets thinly coriaceous, ovate to ovate-lanceolate often rhomboid, acuminate tip blunt notched, base cuneate, often slightly oblique, 1 to 2 in. long, 4 to 8 in. wide. Cymes axillary or terminal an inch long, few-flowered. Flowers ½ in. long, white fragrant. Sepals oblong, obtuse. Petals oblong lanceolate. Stamens much shorter. Ovary 2-celled; style long, slender. Stigma capitate. Berry ovoid or globose red, ½ in. long. Seeds 2. *Hab.* Wild on limestone hills, often cultivated in gardens. Selangor, Bukit Kamuning. Perak, Pondok Tanjong (Haron). *Distrib.* India, China, Australia. *Native name*: Kamuning. *Use*: The roots give the beautiful wood used for Kris-handles and sheaths.

10. MERRILLIA, Swingle.

Bush to fair-sized tree. Leaves pinnate with many leaflets on a winged rachis, alternate oblanceolate acuminate inæquilateral membranous. Flowers in short axillary panicles. Sepals ovate acute, connate. Petals linear, long, green. Stamens 10 unequal. Ovary stalked, hairy. Fruit orange-like. Seeds numerous flat, densely villous. Species 1, Malay Peninsula.

(1) **M. Caloxylon** *Swingle*, *Phil. Journ. Sc.* xiii. 337. *Murraya Caloxylon* *Ridl. Journ. Roy. As. Soc. S. Br.* 50, p. 113.

Leaves thin light green, 8 in. long; leaflets 13 on a winged green rachis, base triangular, 3 to 3·5 in. long, 1·5 in. wide. Flowers 1 in. long, light green. Sepals 1 in. long. Petals 1 in. long. Fruit green turning yellow, 4 in. long, 3 in. through, rind ½ in. thick, pulp olive green. Seeds grey. *Hab.* River-banks and in forests. Pahang near Gunong Tahan (Robinson); Bentong (Foxworthy).



FIG. 36.—*Merrillia Caloxylon*.

Perak, Kenering (Robinson), Patani. *Distrib.* S. Siam. *Native name*: Katinga. *Use*: Very highly valued for its ornamental wood of a pale yellow with dark brown streaks.

This plant is intermediate between *Limonia* and *Murraya*, having the disc and style of the latter and the foliage and fruit of *Limonia*. Mr. Swingle has named the genus after Mr. Merrill, a Philippines botanist.

11. LUVUNGA, Ham.

Glabrous lianes with axillary straight or hooked spines. Leaves trifoliolate; leaflets coriaceous, entire. Flowers in axillary fascicled

or paniced racemes, white, fragrant. Calyx cupular, entire or 3- to 5-lobed. Stamens 8 to 10 inserted round a disc. Ovary 2- to 5-celled; ovules 2 in a cell; style stout. Stigma capitate. Berry large, ellipsoid, rind thick. Seeds large, ovoid, 2 or 3. Species 4, Indo-Malayan.

Leaves narrower; nerves conspicuous; stamens

glabrous, connate (1) **L. scandens**

Leaves broader more elliptic; nerves incon-

spicuous; stamens woolly, free (2) **L. eleutheranthera**

(1) **L. scandens** *Ham. Wall. Cat.* 6382; *Hook. fil. F.B.I.* i. 509; *Bot. Mag. t.* 4522; *Pierre, Fl. For. Cochinchine, t.* 188; *King, l.c.* 222.

Big liane. Leaves elliptic narrowed to base or obovate obtuse; nerves fine but conspicuous, 4 to 12 in. long, 1 to 2 in. wide; petiolules 10 in. long; petioles 2 to 5 in. long. Cymes paniced, many-flowered, 1 to 3 in. long. Calyx bluntly 5-lobed. Petals 2 in. long, recurved. Stamens glabrous, united. Berry ellipsoid narrowed slightly at base, dotted. *Hab.* Forests on river-banks and hills. Johor, Kwala Sembrong (Kelsall). Malacca (Griffith, Maingay). Pahang, Pekan. Dindings, Telok Sera. Penang Hill; Pulau Betong (Curtis). *Distrib.* India, Cambodia, Sumatra. *Native name*: Akar Keping.

(2) **L. eleutheranthera** *Dalz. Hook. Kew Journ. Bot.* ii. 258; *F.B.I.* i. 511; *King, l.c.* 222.

Big liane with hooks. Leaflets 4.5 to 8 in. long, 1.2 to 4.5 in. wide, elliptic; nerves fine, inconspicuous, 8 to 12 pairs; petioles 1.25 to 4.5 in. long. Racemes in fascicles 1.25 in. long. Flowers several, white, .5 in. long. Calyx very shortly toothed. Petals not recurved. Stamens free, woolly above. Fruit oblong ellipsoid an inch long, strongly gland-dotted. *Hab.* Dense forest. Singapore, Changi. Pahang. Perak (Wray). *Distrib.* India, Sumatra.

12. PARAMIGNYA, Wight.

Shrub, usually spiny. Leaves 1-foliate, sub-coriaceous. Flowers rather large, white, fragrant, axillary, solitary or fascicled. Calyx cupular. Petals oblong, 4 or 5. Stamens 8 to 10 inserted round a columnar disc; filaments free, linear; anthers linear-oblong. Ovary 3- to 5-celled; ovules 1 or 2 in each cell. Style elongate. Berry ovoid or pear-shaped, triquetrous, resinous glandular. Seeds large, oblong compressed. Species 6, Indo-Malayan.

P. grandiflora Wall. Oliver, *Journ. Linn. Soc. v. Supp.* ii. 42, "Singapore Lobb," is a plant with flowers .75 in. long. It is otherwise only known from Tenasserim. The locality Singapore is probably wrong.

Spines very small (1) **P. Griffithii**

Spines straight 2 in. long; fruit angled (2) **P. longispina**

(1) **P. Griffithii** Hook. fil. *F.B.I.* i. 510.

Shrubs shortly spiny, glabrous or pubescent. Leaflets coriaceous, elliptic or oblong, short blunt acuminate, 3 to 5 in. long. 1·5 to 2·3 in. wide, base rounded. Flowers solitary or fascicled axillary or slender, 3 in. long, white fragrant. Calyx acutely 5-lobed. Petals oblong 3 in. long, blunt. Stamens 10; filaments hairy, longer than the linear-oblong anthers. Ovary 5-celled; ovules 2 in each cell. *Hab.* Singapore (Hullett). Malacca (Griffith). *Distrib.* Burma.

This has been made a variety of the Indian and Chinese *P. citrifolia*, and I doubt if it is specifically distinct.

(2) **P. longispina** Hook. fil. *F.B.I.* i. 511; *King*, l.c. 224.

A low spiny shrub, 75 to 1·5 in. long. Leaves elliptic-oblong, acute or obtuse; nerves indistinct, 2·5 to 4·5 in. long, 1·1 to 1·75 in. wide; petioles 2 in. long. Flowers white, 35 in. long, axillary, solitary or 2 or 3 on a 1 in. long pedicel. Calyx 5-toothed. Petals oblong obtuse. Stamens 10 glabrous, equal; anthers as long as the filaments, apiculate. Ovary on the disc. Fruit ovoid, triquetrous, apiculate, 1·25 to 1·75 in. long, green or brown, resinous, 3- or 4-celled. Seeds compressed, beaked. *Hab.* Common in tidal river mud, but it does not seem to flower often. Singapore, Jurong; Kranji. Malacca (Maingay). Perak (Kunstler). *Distrib.* Burma. *Native name*: Limau Lelang. *Use*: Fruit used in medicine.

13. **ATALANTIA**, Correa.

Shrubs or small trees armed or not. Leaves unifoliate coriaceous. Flowers axillary, fascicled or in short racemes or panicles. Calyx 3- to 5-lobed or irregularly split. Petals 3 to 5 free or adnate to the stamens forming a tube. Stamens 6 to 8, rarely 15 to 20, inserted round a cupular or annular disc; filaments free or connate; anthers ovate-oblong or cordate. Ovary 2 to 4, rarely 3- to 5-celled; ovules 2 or 1 in each cell. Berry globose 1- to 5-celled, 1- to 5-seeded with thick rind. Species about 10, tropical Asia.

Thorny, leaves coriaceous, tip retuse.

Stamens connate (1) **A. monophylla**

Thorny bush; leaves thin cuspidate (2) **A. cuspidata**

Unarmed; leaves thinner, tip blunt.

Stamens free (3) **A. Roxburghiana**

Thorny climber; stems velvety.

Stamens free (4) **A. hispida**

(1) **A. monophylla** Correa, *Ann. du Mus.* vi. 383; Hook fil. *F.B.I.* i. 511; *King*, l.c. 225. *A. floribunda* Wight, *l.c.* t. 1611.

A shrub or treelet about 20 ft. tall, with short sharp spines. Leaves lanceolate to ovate, tip obtuse usually notched, edges entire, base cuneate or rounded, 1·25 to 2·5 in. long, 6 to 1·4 in.

wide; petioles .2 to .3 in. long. Racemes or cymes about 1 in. or less long, puberulous longer than the flowers. Flowers white, .35 to .5 in. long. Calyx irregular lobed, edges scarious. Petals oblong obtuse. Stamens 8 or fewer, bases joined in a tube, tips free. Ovary sessile on an annular disc. Berries globose, green, .6 to .8 in. through. *Hab.* Open country near the sea in the north. Kedah, Pulau Song-Song. Lankawi, Terutau island (Curtis). Perlis, Chupeng. *Distrib.* India. *Native names:* Akar merlimau; Empenai.

(2) **A. cuspidata** *Ridl. Journ. Roy. As. Soc. S. Br.* 82, p. 174.

A prickly bush. Branchlets pubescent, spines short blunt, straight. Leaves ovate-elliptic cuspidate blunt, base round, pubescent on the back thin-textured not coriaceous, midrib sunk above; nerves about 6 pairs very fine, forked at tip, 2 to 3 in. long, .5 in. wide; petioles .2 in. long, pubescent jointed in the middle. Flowers solitary; pedicels .25 in. long. Calyx-lobes round, pubescent. Petals 5 linear-oblong, .4 in. long, white. Stamens linear-oblong, white. Ovary cylindric, hairy; style short, glabrous. Stigma round orbicular. Fruit ovoid blunt, .8 in. long, rind thin. Seeds 2 large, flattened, pulp very little. *Hab.* Malacca, Sungei Hudang (Ridley). Dindings, Lumut (Ridley).

(3) **A. Roxburghiana** *Hook. fil. F.B.I.* i. 513; *King, l.c.* 225. *Sclerostylis Roxburghii* *Wight, Ic. t.* 72.

A shrub unarmed 6 to 10 ft. tall. Leaves dark green thinly coriaceous, elliptic tapering to both ends, blunt not retuse; nerves fine 10 to 14 pairs, 4 to 6 in. long, 1.75 to 2.25 in. wide; petioles .25 in. long. Racemes short, few-flowered. Flowers nearly .5 in. long. Calyx-lobes 4, obtuse. Petals 4, obovate. Stamens 8; anthers oblong-ovoid; filaments free, short. Ovary 2-celled, sessile. Berry globose, .6 to .8 in. through, sparsely pitted, greenish yellow. *Hab.* Open country and limestone hills. Malacca (Griffith); Malacca town; Ayer Panas. Negri Sembilan, Seremban; Tampin (Goodenough). Perak, Goping, limestone hills, to 1000 ft. altitude (Kunstler). Pahang, Kwala Lipis (Machado). *Native name:* Limau Pagar. *Use:* As a fence plant.

(4) **A. hispida** *Guillaumin, in Lecomte Not. Syst.* i. 182.

Slender hairy climbing shrub. Thorns recurved .25 in. long. Leaves alternate thin coriaceous, oblong or oval acuminate, base round much reticulate with large glands beneath, midrib strongly eleviate, 2.5 to 4 in. long, 1.5 to 2 in. wide; petioles .15 in. long. Flowers solitary, axillary. Sepals 5 oblong acute, velvety outside. Petals 5, elliptic slightly velvety outside, .3 in. long. Stamens 10; filaments velvety. Disc forming a cylindric gynophore, velvety. Fruit .25 to .5 in. through, globose or 2- to 5-lobed according to the number of seeds, red. *Hab.* Open country. Kelantan, Tumpat, Kota Bharu (Ridley). *Distrib.* Cochin-China.

14. CITRUS, Linn.

Spiny trees or shrubs. Leaves alternate, unifoliate, coriaceous; petiole often winged. Flowers axillary, fascicled or in cymes, white or pinkish, fragrant. Calyx cupular 3- to 5-lobed. Petals 4 to 8, linear-oblong, imbricate. Stamens 20 to 60 insert round a large cupular disc; filaments connate; anthers oblong. Ovary many-celled; ovules 4 to 8. Berry large, fleshy, many-celled. Seeds with coriaceous or membranous testa. Species about 5, tropical Asia.

Besides the ones mentioned below we have in cultivation the orange *Citrus aurantium*, Linn., the Pumelo *C. Decumana*, Murr.

Petioles broad winged	(1) C. hystrix
Petioles narrow winged	(2) C. medica
Petioles slender non-winged	(3) C. malaccensis

(1) **C. hystrix** DC. *Prod.* i. 539; *Hook. fil. F.B.I.* i. 515.

Tree resembling a pumelo. Spines slender, sharp. Leaf-petioles obovate, large, top broad retuse, base narrowed, 2 to 2·5 in. long, 2 in. across; petioles at base short and thick; leaflets elliptic cuspidate slightly narrowed at base, crenulate, sub-coriaceous to rather thin. Flowers small white. Fruit globose 4 in. through, rind green sometimes tubercled, very thick and pithy, pulp small, pale and acid. *Hab.* Open country. Pahang (Machado). Malacca, Bukit Kedondong (Derry). Perak, Kwala Dipang.

(2) **C. medica** Linn. *Sp. Pl.* 782; *Hook. fil. F.B.I.* i. 514. var. *acida* Hook. *fil. l.c.* 515.

The following cultivated plants may be varieties of the lime.

var. *Limau Kasturi*. Small tree 10 to 12 ft. tall, not armed. Leaves elliptic or oblanceolate to nearly obovate, 75 to 1·75 in. long, 5 to 1 in. wide; petioles not winged, jointed, 2 to 5 in. long. Flowers 4 in. long, solitary. Petals oblong, linear, axillary. Fruit small globose, 1 in. through. *Use*: Used in chutneys and preserves.

var. *Limau hijau*. Leaves oblanceolate narrow at both ends; petioles under 1 in. long. Fruit small globose, green becoming yellow. The common lime.

var. *Limau nipis*. Spiny. Leaves oblong, rounded at both ends, 2·5 in. long, 1·5 in. wide; petioles very short, 1 in. long. Fruit globose, smooth, rind thin.

var. *Limau Nipis Kapas*. Leaves large elliptic as much as 4 in. long, 2 in. wide; petioles jointed at top, 25 in. long. Flowers solitary axillary; pedicels rather long and not broad.

var. *Limau Kadangsa*. Tree not spiny. Leaves lanceolate or oblong, narrow at base, tip blunt rather coriaceous, 2 to 3 in. long, 1 in. wide; petioles winged, narrow oblanceolate, 5 in. long, 2 in. wide. Flowers small, 25 in. long, several in a cyme. Petals

broad, oblong, blunt. Fruit obovoid, tubercled, 1·25 in. long, base narrowed, yellow. *Hab.* Pahang, Temerloh. Perhaps wild.

var. *Limau Perut*. Spiny. Leaf ovate blunt, base round; petioles round or obovate as large or even larger than the leaflet, 1 in. long, ·5 in. across.

var. *Limau Susu*. Spiny. Leaves elliptic-oblong, tip round, base shortly narrowed, 3 in. long, 1·75 in. wide; petioles ·2 in. long. Flowers large, ·5 in. long in sub-terminal cymes of several flowers. Petals broad blunt, oblong. Fruit about 2 in. long, globose beaked, beak thick and blunt, yellow rind thin, pulp abundant, very acid. Only used in washing clothes. A variety from Telok Pinang, Perak, had spines 1 in. long. Leaves ·5 in. long. Fruit lanceolate in outline. Flowers as big as the other form or a little bigger.

(3) **C. malaccensis** Ridl.

Unarmed tree. Leaves mostly 1-foliate, some trifoliate; leaflets sub-coriaceous elliptic or elliptic-lanceolate acuminate blunt, base narrowed; nerves about 14 pairs sunk above, elevate beneath, 7 in. long, 3·5 in. wide; petioles slender, 1·5 in. long, grooved not jointed. Flowers in axillary cymes of 4; pedicels ·25 in. long. Sepals 5 lanceolate acuminate acute, free nearly to base. Petals 5, linear-oblong, slightly dilate upwards, ·5 in. long. Stamens few and free; filaments linear; anthers oblong. Ovary cylindric stalked; style thick. Stigma large capitate. Fruit oblong over 4 in. long and 3 in. through, rind rather thick. Seeds very numerous, obcuneate, apex round base narrowed to an acute point nearly 1 in. long. *Hab.* Malacca, Nyalas (Goodenough); Bukit Sadanen (Derry). *Native name*: Limau Hantu.

I am dubious as to the genus of this plant, it may be a *Limonia*.

15. FERONIA, Gaertn.

A spiny tree. Leaves alternate imparipinnate; leaflets opposite, sessile entire; petioles often winged. Flowers in terminal panicles or racemes. Calyx small, flat 5-toothed. Petals 5 (or 4 to 6). Stamens 10 to 12 inserted round a short disc; filaments dilated, sides and front villous; anthers linear-oblong. Ovary oblong 5- to 6-celled; ovules many in many series on 5 to 6 parietal placentas; style none. Stigma oblong, fusiform. Fruit large, globose, 1-celled, many-seeded, rind woody. Seeds embedded in pulp. Species 1, India and Java.

(1) **F. elephantum** Correa, *Trans. Linn. Soc.* v. 225; *Roxb. Corom. Pl. t.* 141; *Wight, Ic. t.* 15; *Hook. fil. F.B.I.* i. 516.

Tree about 30 ft. tall, deciduous, glabrous. Leaves smelling of aniseed, 3 in. long; leaflets obovate, base cuneate 1 in. long, ·4 in. across. Panicles 1·5 in. long. Flowers ·2 in. across, dull red, unisexual; pedicels pubescent. Fruit 2·5 in. through. *Hab.* Open country, orchards, Perlis at Kanga. *Distrib.* India, Malay Islands.

ORDER XXXII. SIMARUBEÆ.

Trees or shrubs, usually bitter with pinnate, rarely simple leaves, alternate; stipules 0. Inflorescence axillary; racemes paniced or cymose. Flowers usually unisexual and small, regular. Calyx 3- to 5-lobed, valvate or imbricate. Petals 3 to 5 (rarely 0). Disc annular or elongate (rarely 0). Stamens as many or twice as many; filaments free, often with a scale at base; anthers oblong, introrse, dehiscent longitudinally. Ovary free, lobed, 1- to 6-celled; styles 2 to 3 free. Fruit drupaceous, capsular or samaroid of 2 to 6 carpels. Seeds solitary, pendulous, albuminous. Species 130, tropical and sub-tropical regions.

Leaves compound.

- | | |
|-----------------------------------------------------------|---------------|
| Stamens 8 or 10; thorny bush | 1. HARRISONIA |
| Stamens 4; tree; paniculate | 2. PICRASMA |
| Stamens 4; shrub; minute cymes in racemes | 3. BRUCEA |
| Stamens 5; tall shrub; panicles spreading large | 4. EURYCOMA |

Leaves simple.

- | | |
|-------------------------------------------------------------------------------------|-------------|
| Flowers umbelled on long peduncles; fruit large ovate, winged; small tree | 5. SAMADERA |
| Stamens 10; flowers paniced; gigantic tree; fruit like a mango | 6. IRVINGIA |

1. **HARRISONIA**, Brown.

Glabrous spiny shrubs. Leaves unequally pinnate or 1-foliate. Flowers unisexual in bracteate cymes. Calyx small, 4- to 5-fid. Petals 4 to 5, longer. Disc hemispherical. Stamens 8 to 10, dilate at base. Ovary globose or 4- or 5-lobed; ovules solitary; styles connate or free at base. Fruit a small globose berry with 2 or 3 pyrenes. Species 3 to 4, tropics of Old World.

- | | |
|--------------------------------------------------------------------------------|-------------------------|
| Leaves 5- to 9-foliate; rachis winged; flowers terminal
2 in long | (1) H. Bennettii |
| Leaves 3-foliate; rachis not winged; flowers axillary,
1 in. long | (2) H. Brownii |

(1) **H. Bennettii** Hook. f. *Gen. Pl.* i. 314; *F.B.I.* i. 519. *Lasiolepis paucijuga* and *multijuga* Benth. *Pl. Jav. Rar.* 202, t. 42.

Scandent sarmentose shrub, thorny. Leaves 2.5 in. long, 5- to 9-foliate; rachis flattened or winged; leaflets ovate-rhomboid crenate, .75 in. long, .5 to .7 in. wide. Cymes terminal, 2 in. long, 8- to 20-flowered; pedicels 1 in. long, hairy. Calyx small; sepals ovate acute. Petals dull red lanceolate, .2 in. long. Filaments unequal, white slender, scales at base hairy. Styles united, hairy. Fruit of 3 to 5 carpels. *Hab.* Open country. Perlis at Kanga. *Distrib.* Burma, Siam, China, Malay islands.

(2) **H. Brownii** Juss. *Mem. Mus. Par.* xii. 517, 540, t. 28; *King, l.c.* 227.

Shrub, prickly. Leaflets 3, ovate to rhomboid acuminate, serrate, narrowed at base petiolulate; rachis not winged, .6 to

1 in. long, 3 to 6 in. wide. Flowers on axillary tubercles, 1 to 3 in. long, on slender pedicels, 5 to 75 in. long. Sepals small ovate. Petals 1 in. long, lanceolate reflexed. Stamens 8, bases hairy. Fruit pea-shaped, 3- to 1-celled. *Hab.* Perak (Scortechini). I have seen no specimen. *Distrib.* Andamans and Philippines.

2. PICRASMA, Blume.

Trees or shrubs, bitter. Leaves imparipinnate. Flowers small unisexual, in axillary panicles. Calyx small, 4- to 5-toothed. Petals 4- or 5-valvate. Disc thick, entire. Stamens 4 or 5, hairy, no scales. Ovary 3- to 5-partite, free; styles united in middle only. Fruit 1 to 3 fleshy or coriaceous drupes surrounded by the enlarged coriaceous petals. Species 4, Indo-Malaya, China, Japan, America.

(1) **P. javanica** *Blume Bijdr.* 248; *Hook. fil. F.B.I.* i. 520; *King, l.c.* 227; *Benn. Pl. Jav. Rar.* 197, t. 41.

Tree 30 to 60 ft. tall; leaflets 3 to 7, membranous, elliptic to elliptic-lanceolate acuminate entire or (old leaves) undulate, base narrowed or rounded; nerves 4 to 6 pairs, 2 to 3 in. long, 1 to 5 in. wide. Panicles white, 6 in. long (the peduncles 4 in. long). Flowers numerous, crowded at branch ends small, white. Sepals ovate, pubescent, minute. Petals 1 in. long, ovate concave. Stamens 4; filaments pubescent in male, villous in female. Disc woolly. Style single. Drupe 1 to 3, enlarged; petals 3 in. across. *Hab.* Malacca (Maingay). Perak (fide King). *Distrib.* Java.

3. BRUCEA, Mill.

Bitter shrubs. Leaves imparipinnate, large, membranous. Flowers very small in very small cymes racemed on a long rachis. Calyx 4-partite, imbricate. Petals 4, linear, minute. Disc 4-lobed. Stamens 4. Ovary 4-lobed, or of 4 free carpels. Drupes 4, ovoid. Seed 1. Species 6, tropics of Old World.

(1) **B. sumatrana** *Roxb. Fl. Ind.* i. 449; *Hook. fil. F.B.I.* i. 523; *King, l.c.* 228.

Shrub 4 to 6 ft. tall. Branchlets pubescent. Leaflets 9, lanceolate acuminate, coarsely serrate-dentate, base oblique acute softly pubescent; nerves 10 to 12 pairs, 1.5 to 3.5 in. long; whole leaf 10 to 14 in. long; petioles 2.5 to 5 in. long; petiolules 1 in. long. Panicles 2 to 3.5 in. long. Flowers minute, purple, pubescent. Drupes ellipsoid oval black. *Hab.* Open country, widely spread from Singapore to Perlis on both coasts. *Distrib.* Indo-Malaya. *Native names:* Kosam (Chinese); Cherek Jantan; Embalau, or Embalau Padang or Embalau Betina; Hampedu Bruang; Lada Pahit. *Use:* The fruit used for dysentery.

4. EURYCOMA, Jack.

Treellets or tall slender shrubs. Bark and wood bitter. Leaves on the apex of the branches paripinnate; leaflets numerous glabrous

entire. Flowers in lax panicles. Calyx minute, 5-toothed. Petals 5. Disc of 5 glands alternating with 5 stamens. Stamens 5, attached to base of petals. Ovary 5-partite, free; styles 5, cuneate. Stigmas separate. Drupes 3 to 5, stipitate. Seed 1. Species 2, Malayan.

Leaflets acute 3 to 4 in. by $\frac{1}{2}$ to 1 in.; flowers $\frac{1}{2}$ in. long

(1) *E. longifolia*

Leaflets acuminate 2.5 to 5.5 in. by 1.7 in.; flowers $\frac{1}{4}$ in. long

(2) *E. apiculata*



FIG. 37.—*Eurycoma apiculata*.

(1) *E. longifolia* Jack, *Roxb. Fl. Ind. ed. Carey*, ii. 307; *Hook. fil. F.B.I.* i. 521; *King, l.c.* 229.

A slender red-stemmed shrub or treelet about 15 ft. tall often unbranched. Leaves terminal, 18 to 24 in. long; leaflets softly coriaceous, oblong-lanceolate acute, base oblique cuneate, dark green glabrous 3 to 4 in. long, $\frac{1}{2}$ to 1 in. wide. Panicles over 2 ft. long, glandular hairy. Sepals ovate green. Petals ovate-lanceolate, reddish pubescent, $\frac{1}{2}$ in. long. Stamens longer than calyx. Disc-glands bilobed ciliate. Drupes 1 to 5, stipitate ovoid,

·5 in. long, ·25 in. through, yellowish brown. *Hab.* In dry woods, rocky stream banks, etc. Common. Singapore, common, Tanglin; Changi. Johor, Sungei Bau; Mt. Austin. Pahang, Pekan. Malacca, Bukit Bruang, etc. Perak, Ulu Temengoh; Thaiping. Pulau Adang. Penang (Wallich, 8522); Waterfall Hill (Curtis), Setul. *Distrib.* Tavoy, Cambodia, Sumatra, Borneo. *Native names:* Bidara Pahit; Duak; Juak; Tongkat Baginda; Lempedu Pahit. *Use:* The bitter bark used in fever, an excellent bitter.

(2) **E. apiculata** Bennett, in Hook. fil. *F.B.I.* i. 522; King, l.c. 230. (Fig. 37, p. 362.)

Shrub 3 to 8 ft. tall. Leaves 12 to 15 in. long; leaflets oblong-lanceolate abruptly acuminate, base acute hardly oblique, 2·5 to 5·5 in. long, 1 to 1·7 in. wide. Panicles lax 8 to 15 in. long glandular, black pubescent. Branches short. Petals linear, glandular outside, glabrous within, ·4 in. long, reddish brown. Stamens as short as calyx. Disc glands minute entire. Drupe ovoid black with a red dorsal line outside. *Hab.* Dry woods. More of a hill plant than the preceding and commonest in the north. *Distrib.* Selangor, Sempang Mines; Sungei Buluh; Petaling. Perak, Larut Hills (Kunstler); Gunong Kerbau at 4000 ft. altitude (Robinson); Penang, Government Hill. Province Wellesley, Tasek Gelugur. *Native names:* Bidara Pahit; Bidara Putih or merah; Penawar Pahit; Sempedu Pahit.

5. SAMADERA, Gaertn.

Glabrous trees with coriaceous, large, simple leaves. Flowers bisexual in peduncles axillary or terminal umbels. Calyx small, 3- to 5-lobed. Petals much longer, 3 to 5, coriaceous imbricate. Disc large conical. Stamens 8 to 10 with a small scale at base. Carpels 4 to 5, free; style free at base united above. Ovule solitary. Fruit of 1 to 5 large compressed drupes narrowly winged. Species 4, Madagascar, tropical Asia.

(1) **S. indica** Gaertn. *Fruct.* ii. t. 156; *Wight, Ill.* t. 68; *Hook. fil. Ic. Pl.* t. 7; *F.B.I.* i. 519.

A tree 30 to 35 ft. tall or a shrub, stout. Leaves fleshy, coriaceous light green, oblong-elliptic-lanceolate, 8 in. long, 3 in. wide; petioles ·5 in. long, thick. Flowers 20 or more in an umbel; peduncle 5 to 9 in. long; pedicel 5·5 in. long, red. Calyx-lobes rounded ciliate, red. Petals 4, narrowed oblong pubescent, pale green or yellow ·75 in. long. Stamens 8. Fruit oval, flat, 3 in. long, 2 in. wide. *Hab.* Rather rare in tidal swamps, Singapore. Johor, Tanjong Kupang; Kwala Sembrong (Kelsall). *Distrib.* India, Ceylon, Malay islands, Polynesia.

6. IRVINGIA, Hook. fil.

Gigantic, glabrous trees. Leaves coriaceous, entire. Flowers small in axillary panicles. Calyx 4- to 5-partite, imbricate. Petals

4 to 5, imbricate. Disc very large, cushion-shaped. Stamens 10, inserted beneath the disc; filaments slender, long. Ovary conical, 2-celled; style simple; ovules solitary. Drupe large, 1-seeded. Species 4, 3 African and 1 Malayan.

(1) *I. malayana* Oliver *l.c.* Pl. 1247; *Hook. fil. F.B.I.* i. 522; *King, l.c.* 230.

A vast tree over 150 ft. tall with grey bark, large buttresses and a big head of foliage, 80 ft. to first branch. Leaves simple ovate or elliptic coriaceous acute, base rounded; nerves 14 to 16 pairs inconspicuous, 3·5 to 5·5 in. long, 1·75 to 2·4 in. wide; petioles ·6 to ·7 in. long. Panicles axillary and terminal with few spreading branches 2 to 4 in. long. Flowers ·2 in. across. Calyx-lobes ovate blunt. Petals dark green reflexed. Stamens white as long. Ovary conic. Disc large, orange. Fruit ovate flattened 2 in. long, green with orange fibrous pulp resembling a mango. *Hab.* Singapore, Tanglin; Bukit Timah. Malacca, Merlimau (Derry). Selangor, Kwala Lumpur (Foxworthy). *Distrib.* Burma, Siam. *Native names*: Pauh Kijang; Merlang.

ORDER XXXIII. OCHNACEÆ.

Glabrous trees or shrubs. Leaves alternate simple coriaceous. Stipules 2. Inflorescence paniced or umbellate bracteate. Flowers showy green, white, red or yellow. Sepals 4 to 5 free imbricate persistent. Petals 5, rarely 4 to 10, hypogynous imbricate, disc enlarged after flowering rarely 0. Stamens 4, 5, 8, 10, or indefinite, insert on the disc; filaments persistent; anthers sometimes opening with pores. Ovary short 2-celled or elongate and 1- to 10-celled; ovules 1 or 2 in each cell; style simple subulate. Stigmas simple. Fruit indehiscent drupaceous or baccate compound, each drupe 1- to 4-seeded or capsular and 1- to 5-celled. Seed 1 to numerous. Species 160, chiefly American.

TRIBE i. OCHNEÆ. Ovary 2- to 10-celled; ovules 1 in each cell; seed exalbuminous; big shrubs or trees.

Stamens indefinite	.	.	.	.	.	.	1. OCHNA
Stamens 10	.	.	.	.	.	.	2. GOMPHIA
Stamens 4	.	.	.	.	.	.	3. TETRAMERISTA

TRIBE ii. EUTHEMIDEÆ. Shrublets; ovary 5-celled; ovules 2 in each cell; seeds albuminous.

Stamens 5 with 5 staminodes	4. EUTHEMIS
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1. OCHNA, Linn.

Trees or shrubs. Leaves simple serrate 2-stipulate. Flowers large yellow in panicles or umbels. Sepals 5-coloured. Petals 5 or 10; disc very thick especially in fruit, red. Stamens indefinite; anthers longitudinally dehiscing. Ovary 3- to 10-lobed, lobes

1-celled, 1-ovuled. Fruit 3 to 10 black drupes on enlarged red disc. Species 20, tropical Africa and Asia.

(1) *O. grandis* Ridl. *Journ. Roy. As. Soc. S. Br.* 59, p. 83.

A low-branched tree, 20 ft. tall. Leaves deep shining green, elliptic acuminate blunt; nerves horizontal numerous faint, 4 to 5 in. wide, 1.5 to 2 in. long; petioles .12 in. long. Stipules lanceolate. Flowers 2 or 3 in axillary cymes; peduncles .5 in. long; pedicels 1.25 in. long. Sepals oblong .75 in. long. Petals large yellow. Stamens .5 in. long; anthers very small. Disc over .25 in. wide. *Hab.* Heaths, Perlis, Ginting Kabok. *Distrib.* S. Siam.

2. GOMPHTIA, Schreb.

Medium trees or large shrubs. Leaves alternate coriaceous shining 2-stipulate. Flowers yellow, red, or white in axillary or terminal racemes or umbels. Sepals 5 persistent. Petals 5 imbricate. Disc thick lobed. Stamens 10 inserted at base of disc; filaments very short; anthers opening by terminal pores. Ovary deeply 4- to 6-lobed, lobes 1-celled, 1-ovuled; styles connate. Stigma simple. Drupes 5 or fewer on a broad disc. Species 80, chiefly S. American.

- | | |
|-----------------------------------------------------------------|---------------------------|
| Flowers in diffuse panicles, yellow | (1) <i>G. sumatrana</i> |
| Flowers in fascicles of 3, yellow; leaves very narrow | (2) <i>G. microphylla</i> |
| Flowers in corymbs red | (3) <i>G. Hookeri</i> |
| Flowers smaller in umbels, white | (4) <i>G. corymbosa</i> |

(1) *G. sumatrana* Jack, *Mal. Misc.* No. 5, p. 29; *Hook. fil. F.B.I.* i. 525; *King, l.c.* 232.

A tree about 40 ft. tall. Trunk stout. Leaves elliptic-oblong acuminate narrowed to base or rounded, edges serrulate at upper end, main nerves very numerous and free, reticulations as fine intra-marginal nerves conspicuous 1 to 2 pairs, deep shining green 3.5 to 7 in. long, 1.15 to 2.25 in. wide; petioles .15 in. long. Panicles terminal lax spreading 8 in. long; branches distant. Flowers bright or pale yellow, .35 in. across. Sepals ovate narrow. Petals larger oblong retuse. Anthers longer than filaments. Ovaries 5; styles connate. Drupes obovate or reniform. *Hab.* Common in the low country. Singapore, Bukit Timah (Hullett, Wallich). Johor, Kota Tinggi (Feilding); Batu Pahat (Kelsall). Malacca, Bukit Panchur (Derry). Mt. Ophir. Pahang, Tahan River. Dindings (Wallich). Perak, Larut; and Goping (Kunstler). Penang, Government Hill (Curtis). *Distrib.* Sumatra, Borneo. *Native names:* Mata Ketam Batu; Murmagong; Libu; Luis; Siburu; Janggut Keli; Kelat Ampedu Jawa; Kelat Pagar Anak; Mendapor.

(2) *G. microphylla* Ridl. (Fig. 38, p. 366.)

Fair-sized tree. Leaves close set coriaceous narrow lanceolate acute, base narrow, serrulate; nerves invisible, midrib elevate on

both sides, 1·5 to 2·5 in. long, ·5 to ·6 in. wide; petioles ·05 in. long. Flowers in terminal fascicles bright yellow on a peduncle ·1 in. long. Pedicels ·2 in. long. Sepals lanceolate blunt ·2 in. long greenish. Petals oblong obtuse ·2 in. long. Drupe semi-orbicular sub-reniform purple black ·15 in. long. *Hab.* Lankawi, Dayong Bunting (Robinson).

(3) *G. Hookeri* Planch. *Hook. Lond. Journ. Bot.* v. 13; *Hook. fl. F.B.I.* i. 525; *King, l.c.* 233.

A small shrubby tree 60 ft. tall and 10 to 15 in. through. Leaves



FIG. 38.—*Gomphia microphylla*.

entire ovate-oblong or oblong-lanceolate, base rounded, tip blunt or shortly acuminate, stiffly coriaceous; nerves numerous faint, 2·5 to 6 in. long, 1 to 2 in. wide; petioles 1·5 to ·35 in. long. Flowers deep red ·35 in. across, crowded in lateral or terminal clusters with many bracts. Pedicels ·5 to 1 in. long slender. Sepals lanceolate blunt. Petals oblong obtuse as long. Anthers as long as filaments. Carpels subglobose or obovoid ·2 in. through. *Hab.* Sandy woods near the sea. Malacca, Sungei Hudang (Derry). Perak, Larut (Kunstler). *Distrib.* Borneo. *Native names*: Kasi; Tampoi Paya.

(4) **G. corymbosa** Ridl. *Journ. Roy. As. Soc. S. Br.* 54, p. 33.
G. Hookeri var. *corymbosa* King, *l.c.* 233.

Shrub 6 to 8 ft. to a tree of 20 ft. tall. Leaves entire coriaceous oblong or lanceolate subacute dark green, 4·5 in. long, 1 to 1·5 in. wide; petioles ·2 in. long. Umbels on the ends of short branches densely many-flowered, 1 to 2 in. across. Pedicels ·25 to 1 in. long, slender. Flowers ·25 in. across, white. Sepals oblong blunt deflexed. Petals linear narrower. Stamens 6 to 9; anthers longer than filaments. Carpels obovate reniform. *Hab.* Forests in the hills. Easily recognised by its white flowers. Singapore, top of Bukit Timah. Perak, Gopong at 500 to 1000 ft. altitude. Larut Hills to 2000 ft. altitude (Kunstler), Penang Hill (Curtis).

3. TETRAMERISTA, Miq.

Shrubs or trees. Leaves large coriaceous entire. Flowers in axillary racemes with large foliaceous bracts. Sepals 4 persistent. Petals 4 persistent. Stamens 4, filaments dilate at base; anthers dehiscence sutural. Ovary 4-angled. Species, 1 or 2 Malayan.

(1) **T. glabra** Miq. *Fl. Ind. Bat. Supp.* 54; *Benn. in Hook. fil. F.B.I.* i. 526; *King, l.c.* 233.

Glabrous tree 30 to 60 ft. tall. Branches stout. Leaves narrow oblanceolate sub-sessile base sagittate, apex acuminate or rounded; nerves numerous fine not elevate, 5 to 10 in. long, 1·25 to 2·75 in. wide; petioles winged to base. Flowers 1 in. across, in long peduncled racemes. Peduncles 4 in. long stout. Raceme or panicle 2 in. across. Bracts lanceolate persistent blunt ·2 in. long. Sepals oblong obtuse. Petals lanceolate blunt as long. Fruit oblong 1·2 in. long, 1 in. through, fleshy perianth persistent. *Hab.* Woods rarely flowering. Singapore (Wallich, 1055). Johor. Hadji Batu Putih. Pahang, Kwantan (Foxworthy). Malacca (Burn-Murdoch). Perak, Batu Togo (Wray). Dindings, Bruas. Kedah Peak (Low). *Distrib.* Borneo, Sumatra. *Native names* : Ponga; Poonah.

4. EUTHEMIS, Jack.

Glabrous shrublets. Leaves alternate coriaceous simple shining serrulate. Stipules deciduous ciliate. Flowers pink or white in terminal or leaf-opposed racemes or panicles. Sepals 5 imbricate. Petals 5 longer imbricate. Disc small conical. Stamens 5 with alternate staminodes; anthers open by terminal pores. Ovary elongate; style one; stigma small entire. Berry of 5 pyrenes white or red each 1- or 2-seeded. Species about 6, Malaya.

Erect; leaves oblong-lanceolate 3·5 to 8 in. long;
 petals oblong-ovate; fruit globose white, pink
 or red

(1) **E. leucocarpa**

Prostrate ascending; leaves narrow lanceolate 3 to
 4 in. long; petals linear; fruit 5-angled deep
 red

(2) **E. minor**

(1) *E. leucocarpa* Jack, *Mal. Misc.* v. 16; *Hook. Ic. Pl.* 711; *Benn. l.c.* i. 526. *King, l.c.* 234.

Shrublet erect little branched 1 to 6 ft. tall. Leaves oblong-lanceolate tapering to both ends, spinulose serrate dark shining green; nerves very numerous fine, 3·5 to 8 in. long, 1·2 to 2 in. wide; petioles ·5 to 1·5 in. long flat winged. Racemes or panicle 2 to 6 in. tall, with 1 or 2 branches at base. Flowers in pairs ·6 to ·7 in. across white; pedicels ·1 to ·2 in. long remote. Bracts ovate acute. Sepals ciliate ovate obtuse. Petals oblong-ovate. Anthers connivent subsessile. Ovary round white. Berry snow-white, rose or red, globose, top rounded ·2 to ·35 in. through. *Hab.* Sandy woods near the sea and mountains common, a very pretty plant. Singapore, Kranji, Johor, Pengaram. Malacca, Mt. Ophir at top. Pahang, Pekan. Perak, Bujong Malacca (Scortechini); Ulu Bubong 900 ft. altitude and Kinta 2500 to 4000 ft. altitude (Kunstler). *Distrib.* Lingga, Borneo, Banca, *Native names* : Pelawan Beruk; Tambo.

The Bornean *E. robusta* Hook. fil. seems to me merely a larger form of this.

(2) *E. minor* Jack, *Mal. Misc.* v. 18; *Benn. l.c.* i. 526; *King, l.c.* 235; *Ridl. Journ. As. Soc. S. Br.* 54, p. 34.

Small prostrate ascending shrublet. Leaves distant narrow lanceolate minutely serrate hardly spinulose, 3 to 4 in. long, 1·25 in. wide; petioles winged to base ·3 in. long. Panicle slender 6 in. long hardly branched. Flowers remote in pairs. Sepals ovate ciliate green becoming pink, caducous in ripe fruit. Petals small linear-oblong white. Ovary angled green. Berry 5-angled, top flat, dark red. *Hab.* Singapore, Chua Chu Kang in sandy woods by the river. Locally abundant, but I have only seen it here. *Distrib.* Pulau Battam; Bangka.

DUBIOUS

E. elegantissima Wall. Roxb. *Fl. Ind.* (ed. Carey) ii. 305; *E. pulcherrima* Wall. Cat. 2518; *Hook. fil. F.B.I.* i. 527 is not an *Euthemis*. It appears to be a seedling of *Gomphia sumatrana*, and was collected by Wallich in Singapore.

ORDER XXXIV. BURSERACEÆ.

Resinous trees (rarely shrubs). Leaves alternate imparipinnate. Inflorescence racemose or paniculate. Flowers regular small bisexual or unisexual. Calyx 3- to 6-lobed. Petals 3 to 6 free. Disc annular or cupular or absent. Stamens 3 to 6 inserted at the base or margin of the disc; filaments free or connate at base; anthers dorsifixed bilocular. Ovary 2- to 5- (rarely 1-)celled; ovules 2 rarely 1 in each cell; style simple. Stigma entire to 5-lobed. Fruit drupaceous with a hard putamen, rarely pseudo-

capsular dehiscing into 3 lobes, with 3 winged seeds. (*King, Journ. As. Soc. Beng.* lxii. (2), 235.) Species 250, tropics of both worlds.

Perianth pentamerous.

Fruit capsular; seed winged 1. TRIOMMA

Perianth 3- to 6-merous; fruit drupaceous.

Stamens 6; calyx small; drupe large; stone triquetrous stony 2. CANARIUM

Drupe usually small; stone crustaceous ellipsoid 3. SANTIRIA

Stamens 3 or 6; calyx large; drupe oblique globose 4. TRIGONOCHLAMYS

Stamens 3, calyx small; drupe gibbous globose 5. ICICASTER

1. TRIOMMA, Hook. fil.

Tree. Leaves imparipinnate exstipulate. Leaflets few. Flowers bisexual small in terminal panicles. Sepals 5 ovate. Petals 5 ovate little longer. Stamens 5; filaments very short; anthers minute. Ovary ovoid; ovules 2 in each cell. Stigma sessile. Fruit dry dehiscent opening into 3 ovate acuminate woody valves, pyrenes solitary 3-angled with a large sub-orbicular wing. Species 1, Malay Peninsula, Sumatra.

(1) **T. malaccensis** Hook. fil. *Trans. Linn. Soc.* xxiii. 171; *Ic. Pl.* 2824, 2825; *King, l.c.* 236; *Ridl. Journ. Roy. As. Soc. S. Br.* 35, p. 86.

An aromatic resinous tree about 60 ft. tall or more and 2 ft. through with grey flaky bark. Leaves 6 to 10 in. long; leaflets 9 coriaceous oblique elliptic or ovate lanceolate acute or acuminate; nerves 7 pairs, 3.5 to 4 in. long, 1.5 in. wide; petiolules .2 in. long, terminal one .5 in. long. Panicle 3 in. long tomentose much branched. Flowers .2 in. across pedicelled whitish green. Anthers chestnut. Fruit 2.75 in. long, 2.1 in. wide, base broad on a stout 2 in. peduncle. *Hab.* Forests in the south. Singapore, Garden Jungle. Malacca (Maingay). Selangor, Ginting Sempah.

2. CANARIUM, Linn.

Big trees resinous. Leaves imparipinnate alternate. Flowers in terminal or axillary panicles or racemes small, unisexual, males smaller in larger inflorescences, females larger in smaller inflorescences. Bracts conspicuous. Calyx campanulate 3-lobed valvate. Petals 3, usually longer. Stamens 3 or 6 on edge or outside the disc or free, or confluent at base with no disc. Ovary 3-celled, cells 2-ovuled; style various or none. Stigma capitate. Drupe elliptic with hard fleshy outer coat, stone usually triquetrous, very hard, 1- to 3-celled. Species about 90, tropical Asia.

Stamens 3. (1) **C. caudatum**

Stamens 6.

Filaments united in a tube.

Leaves glabrous; flowers large .3 in. long (2) **C. grandiflorum**

Leaves slightly pubescent on nerves, glaucous beneath (3) **C. purpurascens**

- | | |
|----------------------------------------------------------------------------------------|-----------------------------|
| Leaves hairy with stiff hairs | (4) C. pilosum |
| Leaves soft red-tomentose beneath | (5) C. rufum |
| Filaments free. | |
| Leaves glabrous. | |
| Leaves 2 to 3 in. long; flowers few 1·5 in. long | (6) C. parvifolium |
| Leaves 4 in. long; flowers numerous 1 in. long | (7) C. kadondon |
| Leaves 6 in. long; fruit 1·5 in. long | (8) C. nitidum |
| Leaves 10 by 4 in. sub-cordate; fruit 1 in. long | (9) C. subcordatum |
| Leaves more or less hairy beneath. | |
| Leaves faintly puberulous on midrib beneath; leaflets ovate elliptic 8 by 3 in. | (10) C. denticulatum |
| Leaves distinctly hairy beneath; leaflets numerous, crowded linear-oblong 9 by 2 in. | (11) C. hispidum |
| Leaflets about 8 distant, 4 to 5 in. long; flowers very small, crowded in dense heads. | (12) C. rubiginosum |
| Flowers 2·5 in. long in a long lax panicle | (13) C. secundum |

(1) **C. caudatum** King, *l.c.* 240.

Tree 20 to 60 ft. tall, 3 to 7 in. through, glabrous except calyx. Leaves 8 to 13 in. long; leaflets 5 to 7 coriaceous, oblong to ovate, long caudate acuminate, base shortly or rather long narrowed; nerves 7 to 9 pairs inarching distinct, 3 to 6 in. long, 1·5 to 2·25 in. wide; petiolules 4 to 5 in. long, terminal one 1·2 to 1·6 in. long. Male panicles terminal lax 7 in. long; branches few 2 in. long. Flowers few 2 in. long, yellow. Calyx widely campanulate. Stamens 3; anthers oblong shorter than filaments, outside the disc. Drupes ellipsoid narrowed at both ends 2 to 2·5 in. long, greenish yellow 6 in. through. *Hab.* Dense forests below 1000 ft. altitude. Not common. Selangor, Sepang Woods. Perak, Ulu Kerling and Ulu Bubong (Kunstler). *Distrib.* Sumatra.

Peculiar in having only 3 stamens, but the fruit is that of a *Canarium*.

(2) **C. grandiflorum** Benn. in Hook. *fil. F.B.I.* i. 553; King, *l.c.* 242.

A tree. Branchlets stout pubescent. Leaves 9 to 12 in. long acuminate base rounded glabrous above, beneath often pubescent; nerves 10 to 12 pairs 3 to 4 in. long, 1·35 to 1·75 in. wide; petiolules 2 in. long. Male panicle 3 in. long puberulous; branches few long. Flowers few clustered. Calyx campanulate teeth broad blunt pubescent outside. Petals longer oblong thick blunt pubescent outside. Anthers linear longer than filaments, which are dilated and form a tube. Ovary hairy. Female flowers 4 in. long in axillary racemes or short panicles; ovary ovoid hairy. Drupe narrow ellipsoid sub-trigonal; stone 1·35 in. long. *Hab.* Lowland woods. Uncommon. Singapore (Hullett); Jurong Road (Burkill). Malacca (Maingay); Merlimau (Cantley). *Native name:* Kajam Pengali.

(3) **C. purpurascens** Benn. *l.c.* i. 532; King, *l.c.* 245.

Tree 50 to 80 ft. tall, 15 to 20 in. through. Branchlets red puberulous. Leaves 8 to 14 in. long; leaflets 7 to 9 coriaceous

glabrous oblong elliptic gradually acuminate, base rounded or slightly narrowed, edge undulate, beneath glaucous purplish; nerves 10 to 11 pairs, 2·5 to 5·5 in. long; petiolules ·2 to ·25 in. long, terminal one 1 in. long. Stipules rounded cordate ·5 in. long. Male panicles 6 to 18 in. long with scattered branches 2 to 4 in. long. Bracts ovate tomentose large. Calyx tubular tomentose, teeth broad. Petals broad oblong acute, tomentose outside.



FIG. 39.—*Canarium pilosum* var. *hirtellum*.

Stamens 6; anthers oblong longer than filaments, which are connate at base. Disc 0. Ovary glabrous. Female racemes or panicles 2 to 5 in. long; ovary ovoid pubescent; style short and thick. Stigma 3-lobed. Drupe elliptic-ovoid blunt at both ends, 2 in. long, 1·15 in. through, green. *Hab.* Dense jungle in the lowlands. Singapore, Selitar. Malacca (Griffith). Perak, Goping; Batang Padang District (Kunstler). Penang, Telok Bahang and Muka Head (Curtis).

(4) **C. pilosum** Benn. l.c. i. 533; *King, l.c.* 243.

Tree 30 to 60 ft. tall. Branchlets red-pubescent with strigose hairs. Leaves 12 to 18 in. long; leaflets 3 to 7 thinly to rigidly coriaceous serrate oblong-lanceolate to elliptic abruptly acuminate, obscurely crenulate-serrate, base cuneate or rounded, glabrous when adult except midrib and 12 to 13 pairs of nerves hairy, reticulations and nerves prominent beneath, 4·5 to 5·5 in. long, 1·5 to 2·5 in. wide; petiolules 15 to 25 in. long, terminal one 1 in. long. Stipules paired subulate hairy. Male racemes axillary 6 in. long interrupted hairy. Flowers 5 in. long few. Calyx tubular entire tomentose. Petals narrow oblong puberulous on both sides. Anthers 6 linear, half as long as filaments, which are connate into a tube for one-third of their length. Ovary pilose. Drupes oblong-trigonus blunt at both ends, 1·1 in. long, 5 in. through, purplish sparsely hairy on a short thick 2-in. long hairy panicle. *Hab.* Woods. Singapore, Changi. Malacca (Maingay). Selangor, Batu Tiga. *Native name*: Kadondon Krut or Kadondon Hutan.

var. *hirtellum* Ridl. *C. hirtellum* Benn. l.c. i. 534; *King, l.c.* 244; *Hook. fil. Ic. Pl.* 1575. (Fig. 39, p. 371.)

Leaves more distinctly serrate and hairy on the nerves above and over the whole surface beneath. Calyx more distinctly 3-lobed. Fruit dark blue when ripe (Kunstler). *Hab.* Common, up to 1000 ft. altitude in forests in the northern part of the peninsula. Perak, Larut Hills and Goping (Kunstler); Thaiping (Wray); Batang Padang district (Kunstler). Penang, Chalet (Curtis), 1000 ft. altitude (Wallich).

(5) **C. rufum** Benn. l.c. i. 533; *King, l.c.* 244.

Tree 20 to 60 ft. tall. Branchlets, inflorescence; petiolules and underside of leaves tomentose. Leaves 12 to 15 in. long; leaflets 7 to 11 coriaceous elliptic or broadly oblong, shortly abruptly acuminate, base rounded, edge serrate, above glabrous except midrib; nerves 12 to 15 pairs, prominent as are reticulations beneath, 3 to 6 in. long, 2 to 2·75 in. wide, lowest leaflets smaller than uppers; petiolules 3 to 4 in. long, uppermost 1·25 to 1·5 in. long. Male panicles very stout terminal 12 in. long; branches short. Bracts numerous broad ovate blunt. Male flowers 25 in. long. Calyx very coriaceous campanulate, teeth short silky-tomentose on both sides. Petals longer concave-tomentose outside. Stamens 6; anthers linear longer than the filaments which are connate into a short tube outside the disc. Female flowers, panicles shorter; flowers 5 in. long. Petals narrower. Stamens connate one-third their length into a tube. Drupe elliptic smooth green 2·5 to 3 in. long, 1 to 1·3 in. through; stone acutely 3-angled, apex sub-acute. *Hab.* Singapore, Tanglin. Pahang, Bentong (Foxworthy). Malacca, Bukit Batu Serdang (Derry). Dindings, Lumut. Perak, Goping and Larut (Kunstler); Selama (Wray). *Native*

names: Kadondong Bulan; Kerat Tulonjok; Kerat Telampok; Sangol or Sungol Hutan; Kedondong Pasir.

(6) **C. parvifolium** *Benn. l.c. i. 536; King, l.c. 241.*

A large tree. Branchlets slender glabrous except inflorescence. Leaves 6 to 12 in. long; leaflets 5 to 9 coriaceous oblong-lanceolate or elliptic acuminate acute, base rounded or slightly narrowed; nerves 7 to 8 pairs invisible above, faint below, 2 to 3 in. long, .8 to 1 in. wide; petiolules .2 in. long, terminal one .35 in. long. Panicles terminal slender, 2 to 3.5 in. long; branches few. Flowers .2 in. long. Calyx campanulate entire or obscurely 3-lobed. Petals much longer elliptic obtuse puberulous all over. Stamens 6 as long; anthers oblong shorter than filaments slightly united at base, disc annular. *Hab.* Rare in forests. Singapore, Bukit Timah. Malacca (Maingay, Griffith); Selendor (Goodenough). Perak, Batang Padang (Kunstler).

(7) **C. kadondon** *Benn. l.c. i. 535; King, l.c. 247.*

Tree 40 to 50 ft. tall, 6 to 8 in. through glabrous. Leaves 6 to 12 in. long; leaflets 7 to 9 elliptic-oblong entire coriaceous shining reticulate, blunt acuminate, base rounded or cuneate; nerves 6 to 9 pairs, 2.5 to 5 in. long, 1 to 2.25 in. wide; petiolules .35 to .5 in. long. Panicles terminal axillary; branches short or spreading corymbose puberulous 3 to 7 in. long. Buds globular .15 in. long pale green. Calyx cup-shaped pilose outside, teeth short. Petals round ferruginous-pilose outside. Stamens 6; anthers ovate as long as filaments free. Disc broad lobed. Ovary glabrous. Drupe ellipsoid-ovoid narrowed at tip, 1.15 in. long, .4 in. through, plum-colour. *Hab.* Woods, common. Singapore, Bukit Timah; Garden Jungle; Changi. Pahang, Temerloh. Malacca, Bukit Naning (Cantley); Bukit Minyak (Goodenough). Perak, Bernam River and Thaiping (Kunstler). Penang, Muka Head (Curtis); Telok Bahang (Fox). *Native names:* Kadondon Hutan; Kadondon Mata Hari; Mesiput; Kadondon Krut.

(8) **C. nitidum** *Benn. l.c. i. 532; King, l.c. 251.*

A tree 20 to 30 ft. tall, nearly entirely glabrous. Leaves 7 to 12 in. long; leaflets 7 to 9 coriaceous shining oblong shortly acuminate entire, base round or narrow; nerves 7 to 9 pairs, 3.5 to 6.5 in. long, 1.2 to 1.8 in. wide; petiolules .4 to .6 in. long. Panicles lax spreading puberulous 8 in. long; branchlets .25 in. long. Pedicels as long as calyx. Flowers .5 in. long. Calyx cup-shaped entire puberulous then glabrous. Petals oblong three times as long. Stamens 6; filaments connate at base only. Drupe oval glaucous green, 1.5 in. long, .11 in. through. *Hab.* Woods and open country in coast district, Singapore, Changi; Bukit Timah, common. Malacca, Bukit Bruang (Goodenough). Negri Sembilan, Tampin (Burkill). Perak, Chanderiang and Goping (Kunstler). *Native names:* Cana Hutan; Kedondong hutan; Kedondong Krut.

(9) **C. subcordatum** Ridl. *Journ. Roy. As. Soc. S. Br.* 82, p. 175.

Bark grey. Leaflets many crowded ovate-lanceolate acutely acuminate, base broad round, stiffly coriaceous; nerves about 30 pairs slender sub-parallel, 10 in. long, 4 in. wide; petiolules thick .25 in. long. Drupe 1 in. long oblong triquetrous .6 in. across. *Hab.* Pahang, Pulau Tinggi (Burkill).

Apparently allied to *C. hispidum* Bl., but the leaves quite glabrous and very stiff, the fruits like those of *C. Radlhoferi*. The ovate short cordate leaflets, nearly sessile, are very peculiar.

(10) **C. denticulatum** Bl. *Bijdr.* 1162. *C. Kunstleri* King, *l.c.* 248.

Tree 60 to 70 ft. tall, 15 to 20 in. through. Branchlets and inflorescence scurfy-tomentose. Leaves 14 to 20 in. long; leaflets 7 to 11 sub-coriaceous oblong or elliptic-oblong acuminate acute, base rounded, glaucous beneath; nerves 12 to 15 pairs, 4 to 8 in. long, 2.25 to 3.25 in. wide; petiolules 3.4 in. long. Stipules elk-horn-shaped 1 in. long. Male panicles terminal 10 to 12 in. long spreading; flowers .3 in. long crowded at the branch tips. Bracts oblong longer than buds. Calyx cut nearly to base into three ovate spreading lobes brown. Petals yellow ovate tapering at each end, tomentose outside. Stamens 6; anthers oblong, shorter than the free filaments. Disc corrugated. Ovary minute or 0. Female panicles as large; flowers larger. Drupes ellipsoid blunt at each end, 1 in. long, 1.6 in. wide. *Hab.* Forests 200 to 300 ft. altitude. Perak, Larut Hills and Kinta River (Kunstler); Gapis Pass (Curtis), male. Gunong Bubu (Kunstler), male. *Distrib.* Java.

The males have very narrow leaves and the females broad ones, the petals in Curtis' plant are strongly keeled and the anthers much larger than the filaments, but on the whole I think that all these specimens are Blume's species.

(11) **C. hispidum** Bl. *Bijdr.* 1163.

Big tree. Leaflets 24 in. long, about 13 elongate oblong, glabrous scabrous above, hairy beneath, shortly acuminate, coriaceous base rounded, entire; nerves elevate beneath about 24 pairs, 9 in. long, 2 in. wide; petiolules .1 in. long or hardly any, terminal one 1 in. long. Panicles elongate hairy (male) over a foot long; branches 1 to 3 in. long. Flowers clustered shortly pedicelled .3 in. long. Calyx bell-shaped, lobes broad ovate short. Petals much longer ovate tomentose. Stamens free; filaments pilose. Disc thick urceolate hairy. Drupe oblong blunt at both ends 3 in. long; stone ellipsoid acuminate narrowed at base, obscurely trigonous with a rib down each face. *Hab.* Perak at Gapis (Wray). *Distrib.* Java, Sumatra, Borneo, Celebes. *Native name:* Damar Dagon.

(12) **C. rubiginosum** Benn. *l.c.* i. 534; King, *l.c.* 248.

Tree. Branchlets and inflorescence tawny-tomentose. Leaves

9 to 12 in. long; leaflets 5 to 7 coriaceous elliptic or oblong, abruptly blunt acuminate, entire, base rounded or slightly narrowed, glabrous except midrib; nerves 10 to 13 pairs beneath, reticulations distinct, 3.5 to 4.5 in. long, 1.25 to 2 in. wide; petiolules .6 in. long, terminal one 1.5 in. long. Panicles (male) terminal 12 in. long; branches 2 to 5 in. long spreading; rachis angled tomentose. Flower-buds small globose crowded at branch end. Calyx cup-shaped entire. Petals deltoid much larger 1 in. long tomentose outside. Stamens 6 shorter on the outside edge of a cushion-like disc; anthers oblong as long as the free filaments. Drupe ellipsoid 1 in. long, .6 in. through. *Hab.* Malacca (Maingay). Pahang, Bentong Gabing (Foxworthy).

(13) **C. secundum** *Benn. l.c. i. 532; King, l.c. 250. C. Bennettii Engler Mon. p. 119.*

Tree 20 to 30 ft. tall, 10 to 15 in. through. Branchlets slender rusty-tomentose. Leaves 12 to 18 in. long; leaflets 7 to 9, thin, coriaceous oblong caudate-acuminate, minutely serrate-dentate or sub-entire, base rounded to cuneate glabrous except midrib above, hairy beneath; nerves 10 to 15 elevate beneath, 3 to 6 in. long, 1.6 to 2 in. wide; petiolules .2 to .3 tomentose, terminal one 1 to 2 in. long. Stipules reniform tomentose outside .35 in. long, .5 in. wide. Panicles slender terminal pendulous 10 to 18 in. long; branches remote 2 to 6 in. long. Flowers sub-sessile in terminal heads white tinted pink or dark pink. Bracts numerous. Calyx lobes broad brown. Petals oblong sub-acute tomentose outside. Stamens 6; anthers longer than free; filaments, outside disc. Drupe elongate ovoid trigonous acute, 2 in. long, 1 in. through. *Hab.* Woods common, Singapore (Wallich); Garden Jungle. Johor, Sedenah. Malacca, Bukit Batu Serudang (Derry). Perak, Goping and Gunong Bubu (Kunstler). Penang, Batu Feringhi. *Native names:* Damar Kijai; Kasumba; Kasumbi.

EXCLUDED AND DOUBTFUL SPECIES

CANARIUM COMMUNE *Linn.* Introduced from the Moluccas in 1796 by Christopher Smith, and planted as a roadside tree occasionally in the towns.

CANARIUM GLAUCUM *Bl. King, l.c. 491.* The only specimens given here by King are also given for *C. purpurascens* *Benn.*

C. LITTORALE *Bl. Bijdr. 1164.* In Kunstler's collection (Perak 2000 to 2500 ft. altitude, Larut No. 6998) is a fruiting specimen of a large-leafleted glabrous tree with a rather long fruit, 2 in. long in a large calyx cup. King refers it to *C. parvifolium*, which it cannot be. It closely resembles *C. littorale* *Bl.* of Java, but the single specimen is insufficient to be certain of.

3. SANTIRIA, Bl.

Resinous tree. Leaves 3-foliolate or imparipinnate; leaflets oblique entire. Flowers small bisexual in axillary or terminal panicles. Bracts minute. Calyx cup-shaped 3-lobed. Petals 3 longer. Disc annular. Stamens 6 on the edge of disc. Ovary 3-celled; ovules 2 in a cell; style short or o. Stigma capitate or 3-lobed. Drupe ellipsoid more or less compressed on the ventral side, not trigonous; stigma-scar lateral or basal, 1-celled, 1-seeded. Stone usually crustaceous. Species about 30, Malayan.

Panicles longer than the leaves.

- | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| Leaflets 12 to 20 in. by 2·5 in. long; panicle glabrous | (1) <i>S. floribunda</i> |
| Leaflets 5 by 2 in. long; panicle stiff hairy; fruit large oblong pink | (2) <i>S. laxa</i> |
| Leaflets 3 to 6 in. by 2 in. long, glabrous; panicle little longer than leaves; flowers very small tomentose; fruit oblong ·5 in. long, oblique red | (3) <i>S. fasciculata</i> |

Panicles shorter than the leaves.

- | | |
|-------------------------------------------------------------------------------------------------------------------|---------------------------|
| Leaves glabrous; flowers minute; leaflets stiff coriaceous elliptic long-acuminate to 5 in. long | (4) <i>S. minutiflora</i> |
| Flowers small; leaflets thin ovate-elliptic acuminate to 5 in. long | (5) <i>S. apiculata</i> |
| Leaflets large stiff coriaceous; leaflets 3 elliptic, 5 by 2·5 in. long; flowers ·15 in. long; fruit 1·5 in. long | (6) <i>S. macrocarpa</i> |

Panicles large; flowers small.

- | | |
|---------------------------------------------------------------|----------------------------|
| Leaves glabrous. | |
| Leaflets 7 by 9 in. long; leaflets 10 in. long | (7) <i>S. lævigata</i> |
| Leaflets 4 in. long; panicle over 12 in. long spreading | (8) <i>S. oblongifolia</i> |
| Leaflets 8 in. long, lanceolate | (9) <i>S. longifolia</i> |
| Leaflets oblong 6 in. or more long; panicle very dense, short | (10) <i>S. Wrayi</i> |
| Leaves hairy beneath. | |
| Young leaves and panicle scurfy-puberulous | (11) <i>S. conferta</i> |
| Nerves beneath hairy; panicle red hairy | (12) <i>S. costata</i> |
| Leaves densely velvety beneath | (13) <i>S. multiflora</i> |

(1) *S. floribunda* King, l.c. 254.

Tree 20 to 30 ft. tall, 3 to 4 in. through. Branchlets stout, scurfy-pubescent. Leaves 2 to 3 ft. long, base auricled, puberulous when young, glabrous when old; leaflets 13 to 17 coriaceous, oblong shortly abruptly acuminate, base rounded; nerves 20 to 30 pairs, 9 to 20 in. long, 2·35 to 5 in. wide; petiolules thick ·5 in. long. Panicles 2 to 3 ft. long, slender much branched; branchlets short with 3- to 5-flowered cymules. Flowers 1 to 2 in. long. Calyx flat 3-angled. Petals deltoid deep red fleshy concave glabrous. Stamens, anthers oblong. Drupes elliptic apiculate glabrous 1 in. long, ·5 in. through, pink, on long pendulous peduncles. *Hab.* Dense jungle rather rare. Selangor, Ginting Bidai. Pahang, Pahang River. Perak, Gunong Pondok (Kunstler).

(2) **S. laxa** King, *l.c.* 254; *Ann. Bot. Gard. Calc.* ix. 12, *pl.* 16. *Canarium laxum* Benn. in *Hook. fil. F.B.I.* i. 535.

A tree 50 to 90 ft. tall. Branchlets, rachis of leaves and inflorescence densely rough-hairy. Leaves 14 to 22 in. long; leaflets 7 to 9 oblong to oblong-elliptic, shortly abruptly acuminate, base cuneate often unequal; nerves 12 to 14 pairs hairy beneath, 5 to 8 in. long, 1·75 to 2·5 in. wide; petiolules 4 to 5 in. long. Panicles long pendent 2 to 3 ft. long. Male flowers 25 in. long, deep red, on pedicels 4 in. long glabrous. Calyx-teeth broad blunt. Petals much longer lanceolate. Anthers ovate. Female flowers larger. Petals oblong blunt 3 in. long. Stamens abortive as long as pistil. Ovary thick oblong 3-lobed. Stigma sessile 3-lobed large. Drupe ellipsoid 1 to 1·4 in. long, 6 to 7 in. through, bright rose pink, stone thin flattened on one side. *Hab.* Forests, common, Singapore, Bukit Timah; Garden Jungle. Malacca, Bukit Bruang (Curtis); Bukit Sadanen (Derry). Negri Sembilan, Bukit Tumiang (Cantley). Pahang, Sungei Tahan. Perak, Larut (Kunstler). Penang Hill (Curtis). *Native names*: Sayang; Kedondon Bulan; Kayu Rau.

(3) **S. fasciculata** Benn. *l.c.* i. 539; King, *l.c.* 255.

Tree 40 to 50 ft. tall, 10 to 15 in. through. Branchlets, rachis and panicles at first puberulous. Leaves 10 to 15 in. long; leaflets 5 to 7 membranous elliptic to elliptic-oblong caudate-acuminate, base cuneate, glabrous; nerves 7 to 8 pairs bold beneath inarching, 4·5 to 9 in. long, 2 to 3 in. wide; petiolules 75 to 1 in. long. Panicles slender terminal; branches few lax with distant 6- to 10-flowered cymes. Flowers 5 in. long. Pedicels tomentose. Calyx cupular hispid-tomentose outside, teeth deltoid acute. Petals little longer deltoid glabrous. Anthers ovate. Ovary ovoid glabrous. Drupes oblique ovoid gibbous at base. Stigma-scar terminal 8 in. long, 6 in. through, light red or waxy crimson. *Hab.* Forests, Pahang, Tahan River. Malacca, Bukit Sadanen (Derry, Maingay). Perak, Larut (Kunstler, Wray). Penang (Curtis).

var. *puberula* S. *puberula* Benn. *l.c.* i. 537; King, *l.c.* 256.

Leaflets smaller 3·5 by 1·5 in. long. Panicles short 3 in. long. *Hab.* Malacca (Maingay). *Native name*: Kedondon Balau Putih.

Maingay's specimens are smaller than the type with less prominent nerves, but I think only a state of *S. fasciculata*.

(4) **S. minutiflora** Ridl. *Journ. Roy. As. Soc. S. Br.* 82, p. 175.

Tree. Leaves 7 in. long; leaflets 5 coriaceous elliptic to ovate cuspidate-acuminate blunt, base broad or shortly narrowed; nerves about 6 pairs elevate beneath, 3 to 5 in. long, 1·5 to 2 in. wide; petiolules 1 in. long. Panicles lax axillary 2 to 3 in. long. Flowers very small cymose and racemose on branch-ends. Sepals 3 broad ovate. Petals larger ovate blunt. Stamens 5; anthers

sessile on edge of shallow cup-like disc. Pistillode very small.
Hab. Johor, Tampayan river-banks (Ridley).

(5) *S. apiculata* Benn. *l.c.* i. 537; *King, l.c.* 259.

Tree 40 to 60 ft. tall, 10 to 15 in. through. Leaves 6 to 8 in. long; leaflets 3 membranous oblong or elliptic to ovate bluntly acuminate, base round or cuneate, glabrous; nerves 8 pairs; 3·5 to 5·5 in. long, 1·75 to 2·25 in. wide; petiolules ¼ to ½ in. long. Panicles slender lax 2 to 3 in. long glabrous. Flowers greenish white very small crowded at tips, unisexual. Calyx cupular, teeth short blunt. Petals round. Anthers ovate. Ovary in females ovoid pubescent. Disc lobed and corrugate. Drupes ovoid-globose ½ in. long, scar near the base, yellowish red. *Hab.* Common in lowland woods. Singapore, Bukit Timah; Garden Jungle. Johor, Tebrau. Malacca (Maingay); Bukit Sadanen (Derry). Selangor, Kwala Lumpur (Foxworthy). Perak, Larut (Kunstler). *Native name*: Kerantei Batu.

(6) *S. macrocarpa* King, *l.c.* 256; *Ann. Bot. Gard. Calc.* ix. 13, *pl.* 17.

Glabrous tree 40 to 80 ft. tall, up to 2 ft. through. Leaves 5 to 9 in. long, thinly coriaceous dark green; leaflets 3 to 5 elliptic-oblong to ovate short blunt apiculate base cuneate or rounded; nerves 7 to 9 pairs bold inarching, 3 to 4·75 in. long, 2 to 2·75 in. wide; petiolules ⅓ to ½ in. long, terminal one 1 in. long. Panicles axillary 3 in. long; branches spreading ½ to 1 in. long. Cymules 2- to 6-flowered. Flowers ½ to ¾ in. long white. Calyx thick cupular triangular. Petals twice as long fleshy broad oblong concave, tip thickened inflexed hooded. Filaments much shorter than the lanceolate anthers, outside the quadrate lobes of the thin annular disc. Drupes oblique ovoid, 1·25 to 1·5 in. long, ¾ in. through on peduncles 1 in. long waxy deep pink or red. *Hab.* Dense wet jungle rare. Perak, Larut (Kunstler).

(7) *S. lævigata* Bl. *Mus. Bot. Lugd. Bat.* i. 211; *Benn. l.c.* i. 538; *King, l.c.* 257.

Tree 50 to 150 ft. tall, 4 to 5 ft. through, glabrous except inflorescence. Leaves 9 to 17 in. long; leaflets 7 to 9 coriaceous elliptic-oblong short acuminate, base rounded sub-cordate or narrowed oblique; nerves 11 to 17 pairs slightly elevate, beneath reticulate on both sides, 4·5 to 9 in. long, 1·5 to 2·8 in. wide; petiolules ⅓ in. long. Panicles 6 to 8 in. long, axillary spreading, tips puberulous. Flowers less than 1 in. long crowded in cymes. Bracts 0. Calyx cupular entire or with a waved edge, puberulous outside. Petals deltoid round, tip inflexed, filaments longer than anthers. Drupes ⅙ in. long ovoid blunt, one side flattened; stigma-scar near tip, on ½ in. long peduncle, dark red to black. *Hab.* Common in lowland woods. Singapore, Garden Jungle. Bukit Timah. Johor, Tanjong Kupang. Malacca, Bukit Sadanen (Derry). Sungei Hudang (Derry); Selandor (Cantley). Selangor,

Kwala Lumpur. Pahang, Bukit Goh (Foxworthy). Perak, Batang Padang (Kunstler). *Distrib.* Sumatra. *Native names*: Kerantei Merah; Gerungan Semut.

(8) **S. oblongifolia** *Bl. Mus. Bot. Lugd. Bat.* i. 211; *King, l.c.* 258; *Ann. Bot. Gard. Calc.* ix. 14, pl. 18. *S. Maingayi* *Benn. in Hook. fl. F.B.I.* i. 538.

Tree 50 to 80 ft. tall, 1·5 to 2 ft. through. Leaves 12 to 18 in. long, light green; leaflets 7 to 9 thinly coriaceous oblong or ovate blunt acuminate, base rounded or shortly cuneate, reticulate, glabrous above, minutely scurfy beneath; nerves 10 to 13 pairs or less inarching, 4 to 6 in. long, 1·75 to 2·25 in. wide; petiolules ·5 to ·7, terminal one 1·5 in. long. Panicles axillary terminal 6 in. long and wide or less divaricate spreading. Flowers pale yellow, crowded at tips ·1 in. across. Calyx campanulate, teeth large deltoid scurfy. Petals sub-rotund longer puberulous. Anthers oblong as long as filaments. Disc thin lobed. Drupes ovoid-elliptic or globose oblique ·7 in. long, ·5 in. through, green tinged purple. *Hab.* Dense low jungle, common. Malacca (Maingay); Machap (Derry). Perak, Ulu Bubong and Larut (Kunstler). Penang (Curtis). *Distrib.* Sumatra, Borneo, Java. *Native name*: Kerantei.

(9) **S. longifolia** *King, l.c.* 258; *Ann. Bot. Gard. Calc.* ix. 14, pl. 19.

Tree 10 to 20 ft. tall, 4 to 6 in. through, glabrous. Leaves dark green 2 to 3 ft. long; leaflets 11 to 15 pairs narrowed oblong-lanceolate acuminate, base rounded oblique, coriaceous reticulate beneath; nerves 12 to 14 pairs, 9 to 11 in. long, 1·75 to 2 in. wide; petiolules ·65 to 1 in. long stout. Flowers unknown. Fruiting panicles 4 to 9 in. long. Drupes ovoid, scar terminal ·75 to 1 in. long, ·5 in. through, rich waxy pink. *Hab.* Rare. Dense jungle. Perak, Larut (Kunstler); Penang Hill (Curtis).

(10) **S. Wrayi** *King, l.c.* 259; *Ann. Bot. Gard. Calc.* ix. 15, pl. 20.

Tree 20 to 30 ft. tall. Branches very thick up to 1 in. through. Leaves 12 to 30 in. long; rachis trigonous puberulous; leaflets 13 to 15, oblong, short blunt acuminate, base round, slightly oblique glabrous reticulate; nerves 10 to 15 pairs, 6 to 11 in. long, 2·5 to 4 in. wide; petiolules ·5 to 1 in. long. Panicles 3 to 4 in. long, several densely crowded in an axil puberulous. Flowers ·1 to ·15 in. long. Calyx cupular, teeth 3 broad glabrous. Petals round. Stamens 6; anthers ovate, longer than filaments. Disc corrugated. Drupes oblique ovoid blunt both ends ·6 to ·75 in. long. Stigma-scar near the peduncle. *Hab.* Perak. Gunong Keledang (Wray); Larut (Kunstler). Perhaps only a variety of the next species.

(11) **S. conferta** *Benn. l.c.* i. 537; *King, l.c.* 261.

Small tree 20 to 30 ft. tall. Branchlets stout red-puberulous as are rachis, back of leaves and inflorescence when young. Leaves

(1) **T. grandifolia** Ridl. *Journ. Roy. As. Soc. S. Br.* 54, p. 31.

Tree. Leaves over 12 in. long. Petiole, rachis and back of leaves densely red-tomentose; leaflets 7 elliptic obtuse or cuspidate base rounded, edge denticulate, stiffly coriaceous, above glabrous; nerves 12 pairs elevate, 6 in. long, 2 in. wide; petiolules .25 in. long. Panicle male 6 in. long, female shorter; branches few short densely red-tomentose. Flowers crowded sessile .5 in. long. Calyx campanulate, lobes deltoid acute, .5 in. long, .4 in. across coriaceous red-hairy. Petals as long lanceolate obtuse, backs hairy, edges glabrous. Stamens 3 free to base; anthers lanceolate. Disc annular setose; ovary in female tomentose. *Hab.* In forest local. Singapore, Bukit Timah (Cantley and Ridley). This seems to be its only known locality.

(2) **T. Griffithii** Hook. *fl. Trans. Linn. Soc.* xxiii. 170, t. 27; *King, l.c.* 251. *Santiria Griffithii* Engl. DC. *Mon. Phan. Burseraceæ*, 255.

Tree 60 to 80 ft. tall, 2 to 3 ft. through. Branchlets puberulous. Leaves 6 to 12 in. long; rachis puberulous; leaflets 13 to 15 thinly coriaceous oblong-lanceolate bluntly acuminate, base very shortly cuneate, dark green, midrib above and back tomentose-pubescent; nerves 13 to 15 sub-prominent, 1.5 to 3 in. long, .65 to 1 in. wide. Panicles short dense tomentose, bracts linear oblong. Flowers .35 in. long unisexual. Calyx velvety light brown. Petals narrower elliptic white, light brown inside, tomentose. Stamens 6 short. Disc glabrous. Ovary globose glabrous. Fruit .5 in. through "dark blue." *Hab.* Dense jungle in the low country, Singapore, Selitar; Grange Road. Johor, Tanjong Bunga (Ridley). Pahang, Rumpin (Foxworthy). Malacca (Maingay, Griffith); Selandor (Goodenough); Brisu and Sadanen (Derry); Jus (Cantley). Perak, Ulu Kerling and Ulu Bubong (Kunstler). *Native names:* Babi Kerus; Kijai or Damar Kijai; Kasir; Kadondon Matahari; Kempas Roman.

5. ICICASTER, Ridl.

Tree unisexual. Leaves pinnate of 7 to 13 leaflets. Panicles axillary shorter than the leaves. Flowers small crowded near the tips of branches. Calyx campanulate deeply cleft into 3 ovate-triangular lobes. Petals 3 slightly larger deltoid. Stamens 3; anthers ovate; filaments shorter flat, insert on the edge of a large fleshy cupular disc. Ovary in female flowers, small ovoid 3-lobed; style terminal short. Stigma 3-lobed. Drupes ovoid-globular slightly gibbous. Style persistent slightly lateral. Species 1, Malay Peninsula.

(1) **I. Planchoni** Ridl. *Journ. Roy. As. Soc. S. Br.* 75, p. 15. *Canarium Planchoni* King, *l.c.* 240. *Santiria Planchoni* Benn. *F.B.I.* i. 536.

Tree 50 to 60 ft. tall, 14 to 15 in. through. Branchlets puberulous. Leaves 5 to 10 in. long; leaflets coriaceous oblong-lanceolate acuminate, base round slightly oblique, glabrous except midrib beneath; nerves 10 to 14 pairs, 2 to 4 in. long, '9 to 1'5 in. wide; petiolules '15 to '3 in. long. Panicles numerous 3 in. long. Flowers green '1 in. long. Calyx tomentose. Petals tip subulate inflected. Anthers ovate. Ovary in female glabrous. Drupe '4 to '5 in. long yellow beadlike. *Hab.* In forests. Singapore, Bukit Mandai. Johor, Tanjong Kupang. Malacca, Ching (Griffith). Selandor (Goodenough). Perak, Goping (Kunstler). Selangor. Kwala Lumpur.

ORDER XXXV. MELIACEÆ.

Trees, rarely shrubs. Leaves alternate pinnate (rarely simple, *Turraea*, *Beddomea*); leaflets opposite or alternate more or less at base. Flowers bisexual or unisexual regular in axillary panicles usually racemose or spicate, white or yellow. Calyx 3- to 6-lobed rarely entire or with free sepals, usually imbricate in bud. Petals 3 to 6, free, rarely connate at base. Stamens 3 to 12, insert outside a disc; filaments connate in a tube (free in *Cedrela*); anthers sessile in the tube hardly exsert. Disc tubular, annular or obsolete. Ovary 3-celled; ovules 2 in a cell; style 1. Stigma capitate. Fruit capsular, drupaceous or baccate with coriaceous pericarp. Seed arillate. About 700 species, mostly tropical, both hemispheres (King, *Journ. As. Soc. Beng.* lxiv. (2), 16).

Stamens united in a tube. Cells of ovary 1- to 2-ovuled.

- | | |
|--------------------------------------------------------------------------|----------------|
| Leaves simple; flowers axillary | 1. TURRÆA |
| Leaflets serrate | 2. MELIA |
| Leaflets entire; flowers and staminal tube elongate, narrow. | |
| Leaves trifoliate; fruit baccate; stigma 3- to 5-toothed | 3. SANDORICUM |
| Leaves pinnate; fruit capsular; stigma 1, entire. | |
| Petals in 2 rows; disc short below ovary | 4. MEGAPHYLLÆA |
| Petals in one row; disc short, annular | 5. CHISOCHETON |
| Disc cylindric, longer than ovary | 6. DYSOXYLUM |
| Flowers globose; stamen-tube globose. | |
| Petals 3; stamens 6 or 10 | 7. AMOORA |
| Petals 3; stamens 3 or 6; flowers unisexual on different trees | 8. APHANAMIXIS |
| Petals 5; fruit pulpy indehiscent; style none | 9. AGLAIA |
| Petals 5; fruit large pulpy indehiscent; style thick | 10. LANSIUM |

Stamens only partly joined exsert.

- | | |
|---------------------------------------------------|---------------|
| Petals 5; fruit baccate | 11. WALSTURIA |
| Petals 4 or 5; fruit capsular | 12. HEYNEA |
| Leaves simple, anthers on a fleshy ring | 13. BEDDOMEA |

Cells of ovary 2- to 8-ovuled; fruit globose de-	
hiscing with very large corky seeds	14. CARAPA
Cells of ovary many-ovuled; fruit capsular with	
winged seeds	15. CHICKRASSIA
<i>Stamens quite separate; seeds many winged</i>	16. CEDRELA

1. TURRÆA, Linn.

Shrubs (or trees). Leaves alternate, simple. Inflorescence axillary on short racemes. Flowers few (usually elongate, white) or small green. Calyx small with 4 or 5 teeth. Petals 4 or 5, elongate, narrow. Staminal-tube cylindric of 4 or 5 teeth with slender filaments from the top; anthers 4 to 10 with ligulate points or apiculate. Disc none or thin lining the base of the stamen-tube. Ovary 5- to 10- or 20-celled; style filiform. Stigma discoid or capitate. Capsule 5- or many-celled. Seeds 1 or 2 in a cell, 5 or more valved; valves coriaceous or woody. Seeds oblong curved, edges winged, wing reflexed like an aril. Species 20, Africa, tropical Asia and Australia.

(1) *T. breviflora* Ridl.

A glabrous shrub. Leaves thin, membranous lanceolate acuminate cuspidate, narrowed and cuneate at base; nerves about 10 pairs elevate beneath, 6·5 in. long, 2 in. wide; petioles 3 in. long. Flowers 3 to 4, green on a very short 1 in. long raceme shortly pedicelled. Sepals 5, very short lanceolate acute, pubescent. Petals 5, linear blunt, green, 25 in. long. Stamen-tube stout, cylindric, shorter than petals with rather long filaments alternating with the anthers which are 10, sessile on the top of the tube, elliptic terminating with a long process. Disc short, thin lining the tube-base. Style rather stout, hairy; ovary conic. Stigma pulvinate-capitate hairy. *Hab.* In woods. Not common, Singapore, Serangoon (Ridley). Selangor, Kanching on limestone rocks (Ridley); Ulu Selangor (Goodenough).

This plant is very unlike any of the Asiatic species, and only somewhat resembles some of the African ones in its very short flowers. It may be generically distinct, but till fruit is known it is inadvisable to separate it.

2. MELIA, Linn.

Trees. Leaves pinnate or 2- to 3-pinnate, toothed (or entire). Flowers paniced axillary. Calyx 5- to 6-lobed, imbricate. Petals 5 to 6 spathulate. Stamen-tube cylindric, dilate both ends, 10- to 12-toothed; anthers 10 to 12. Disc annular. Ovary 3- to 6-celled; ovules 2; style slender. Stigma capitate. Fruit a drupe. Species about 12, Indo-Malaya.

Big tree.

Leaflets nearly entire; petals concave; drupe 1 to 1·5 in. long

(1) *M. composita*

Small trees or shrubs.

Leaflets always serrate; drupe 6 in. long.

Leaflets 3·5 in. long (or less); flowers 1 in. long

(2) *M. Azadirachta*

Leaflets 1·75 in. long, ovate cuspidate, hardly oblique; flowers 3 in. long

(3) *M. Azedarach*

(1) **M. composita** Willd. *Sp. Pl.* ii. 558; *King, l.c.* 18.

Tall tree. Stem thick. Leaves 1 to 2 ft. long; leaflets 5 to 11, ovate-lanceolate or round, often oblique at base, 2 in. long, 6 in. wide. Panicle sub-terminal, 7 in. long. Flowers .2 in. long. Sepals ovate-lanceolate. Petals linear-spathulate, concave. Staminal-tube 10-toothed. Stigma 5-toothed. Drupe ovoid, 1 to 1.5 in. long, yellow. *Hab.* Penang Hill (Maingay). Probably planted. *Distrib.* India, Australia, Africa.

(2) **M. Azadirachta** Linn. *Sp. Pl. ed. i.* 385; *Hook. F.B.I.* i. 544.

Large or small tree. Leaves simply pinnate. Leaflets 9 to 15 lanceolate acuminate oblique serrate 1 to 3 in. long, .5 to 1.5 in. wide. Panicles slender 6 to 7 in. long. Flowers white 1 in. long. Fruit oblong, .5 to .75 in. long. *Hab.* Malacca (Griffith). The Neem tree, introduced, no doubt, from India.

(3) **M. Azedarach** Linn. *Sp. Pl. ed. i.* 384; *Hook. l.c.* 544; *Bot. Mag. t.* 1066.

Small tree. Leaves bipinnate; leaflets 3 to 12, ovate or lanceolate acuminate serrate slightly oblique, .5 to 3 in. long, .3 to 1.2 in. wide. Panicles small and lax. Flowers .25 to .3 in. long, lilac. Stamen-tube purple. Ovary 5-celled. Drupe globose .5 in. through, yellowish then brown. Cultivated in gardens, hardly established outside. *Distrib.* India.

EXCLUDED SPECIES

M. EXCELSA Jack, *Mal. Misc.* 112; *Hook. fil. l.c.* 544, is a *Chisocheleon*.

3. SANDORICUM, Cav.

Big trees. Leaves trifoliolate coriaceous. Flowers in axillary panicles pentamerous imbricate. Calyx cup-shaped, tube adnate to the ovary base, lobes short. Petals oblong obtuse recurved. Stamen-tube cylindric, nearly as long as the petals, 10-toothed; anthers 10 or 8 included. Disc tubular embracing the ovary and base of the style. Ovary immersed in calyx-tube narrowed upwards to the columnar style, 5-celled; ovules 2 in each cell collateral. Stigmas 5 erect. Berry globose pericarp; leathery indehiscent 3- to 5-celled. Seeds as many, with a sweet white translucent aril. Species 7, Indo-Malayan.

Stigmas united, tips recurved (1) **S. nervosum**

Stigmas distinct; stamen-tube cylindric.

Leaves thin ovate, pubescent, 4 to 8 in. long . . . (2) **S. indicum**

Leaflets thick obovate, narrow to base, glabrous,
2 to 4 in. long (3) **S. emarginatum**

Leaflets stiff elliptic glabrous 2 to 5 in. long;
stamen-tube ventricose at top (4) **S. Maingayi**

(1) **S. nervosum** *Bl. Bijdr.* i. 165. *S. radiatum* *King, l.c.* 22.

Tree 80 ft. tall, 2 to 3 ft. through. Leaves 6 to 12 in. long; petioles 2 to 6 in. long; leaflets broadly ovate acute, base slightly cuneate, glabrous above when adult, hairy on midrib and 8 to 10 pairs of nerves elevate beneath, 6 to 8 in. long, 4 to 5 in. across; petiolules 2 to 5 in. long, terminal one 1.5 to 2.5 in. long. Panicles 3 to 4 in. long, few-flowered puberulous. Flowers 2.5 in. long. Calyx cupular, teeth broad sub-acute, puberulous. Petals narrow elliptic linear. Stamen-tube cylindric white 3 in. long, pubescent outside and in. Style dilate at base. Stigma united, tips recurved. Fruit 2 to 3 in. through, flattened globose, light orange yellow. *Hab.* The Kechapi, common in cultivation, orchards, roadsides.

Blume's description is too incomplete, and specimens of a totally different Javan plant in Herb. Kew attributed to Blume are labelled *nervosum*. Blume gives the native name as Ki Kechapi. Miquel, however, describes the plant (*S. radiatum* *King*) as *Blume's nervosum*. The oldest name and first adequate description is *Melia Koetjape* Burman. There can be no doubt that Blume intended the well-known Kechapi fruit by his *nervosum*.

(2) **S. indicum** *Cav. Diss.* vii. 359, *t.* 202, 203; *Roxb. Corom. Pl.* iii. 50, 261; *Hiern, in Hook. fil. F.B.I.* i. 553; *King, l.c.* 23.

Tree 40 to 80 ft. tall, about 18 to 20 in. through. Leaves 9 to 18 in. long; petioles 3 to 4 in. long; leaflets ovate or rounded short acuminate, base rounded or sub-cuneate glabrescent above, pubescent or glabrous except the nerves 8 to 12 pairs beneath, 4 to 8 in. long, 2 to 4.75 in. wide; petiolules 3 to 4 in. long. Panicles 2 to 6 in. long, many-flowered, more or less tomentose. Calyx sub-glabrous. Petals yellowish white oblong linear obtuse. Stamen-tube white 2 in. long, sub-glabrous outside, hairy within. Stigmas erect not recurved. Fruit globose 3 in. through, yellow flushed red. The Sentol commonly cultivated, also called Setui in Lankawi. *Hab.* Villages and roadsides, all over the Malay Peninsula and islands. *Use*: The fruit is eaten by natives, and an excellent jelly has been made of the aril by Europeans.

(3) **S. emarginatum** *Hiern, F.B.I.* i. 553; *King, l.c.* 22.

Glabrous tree. Leaves 6 in. long; petioles 1.5 to 4 in. long; leaflets obovate retuse coriaceous narrowed to base; nerves faint, 5 to 6 pairs, 2 to 4 in. long, 1.25 to 3 in. wide; petiolules .35 to .5 in. long, terminal one 1 to 1.5 in. long. Panicles 2 to 3 in. long. Flowers numerous. Calyx cup-shaped puberulous very obscurely lobed, pinkish. Petals linear-oblong obtuse, white. Stamen-tube thick cylindric. Berry 3-celled, green. *Hab.* Forests, not common. Singapore, Bukit Timah (Ridley). Malacca (Maingay). *Distrib.* Borneo.

(4) **S. Maingayi** *Hiern, l.c.* i. 554; *King, l.c.* 22.

Tree. Leaves 6 to 8 in. long; leaflets elliptic short acuminate coriaceous glabrous, narrowed at the base; nerves 6 to 8 pairs depressed above, bold beneath, 2 to 5 in. long, 1.5 to 3 in. wide;

petioles .35 in. long, terminal one 1.25 in. long. Panicles 3 in. long, slightly puberulous. Flowers .35 to .45 in. long. Calyx cup-shaped almost entire, puberulous. Petals long elliptic glabrous. Staminal-tube thick cylindric, dilated upwards. *Hab.* Malacca (Maingay), only known from Maingay's specimen.

4. MEGAPHYLLÆA, Hemsl.

Tree. Leaves large pinnate; leaflets oblique. Panicles narrow raceme-like. Flowers over 1 in. across. Calyx cylindric, fleshy annulate, 3- to 5-lobed. Petals 10, narrow elliptic, coriaceous in 2 series. Stamen-tube cylindric, mouth crenulate; anthers 10 included. Disc cushion-shaped, lobed. Ovary on disc 7-celled; style thick. Stigma capitate. Capsule large, 7- to 9-lobed, pericarp 1 in. thick. Seeds exarillate. Species 2, endemic.

Leaves 6 to 7 ft. long (1) *M. perakensis*
 Leaves 1 to 2.5 ft. long (2) *M. annulata*

(1) *M. perakensis* Hemsl. *l.c. Pl.* 1708; *King, l.c.* 24.

About 40 ft. tall. Leaves 6 to 7 ft. long; leaflets oblong, fleshy-coriaceous, sub-acute, base sub-cuneate truncate 12 to 15 in. long, 3 to 4 in. wide; petiolules .35 to .75 in. long; nerves 10 to 15 pairs. Panicle 16 to 20 in. long; rachis 4-angled. Flowers 1.25 in. across, 1 in. long, cream colour. Calyx puberulous with a thick lobed ring outside. Stamen-tube shorter than petals, pubescent inside only. Fruit globose-pyriform minutely tomentose, 3 in. through, brown. *Hab.* Dense hill-forests. Perak, Thaiping Hills (Kunstler).

(2) *M. annulata* Ridl. *Chisocheton annulatus* King, *l.c.* 31.

Tree. Leaves 18 to 30 in. long; rachis pubescent, base cuneate minutely pubescent all over; leaflets 4 to 7 pairs membranous oblong or elliptic-oblong, shortly acuminate; nerves 12 to 14 pairs oblique, prominent beneath, 9 in. long, 3 to 3.5 in. wide; petiolules .25 in. long. Panicles supra-axillary puberulous, about as long as the leaf; branches short, spike-like, few. Buds clubbed, .5 to .6 in. long. Calyx campanulate tomentose, covering the petals in bud, a thickened wavy band round the middle, 4 broad teeth. Petals 6 or more, the outer three silky outside, the inner ones glabrous. Stamens 12. Ovary conic pubescent, 5-celled. *Hab.* Dense forest at 2000 ft. altitude. Perak, Maxwell's Hill (Curtis).

This appears to me certainly a *Megaphyllæa*.

5. CHISOCHETON, Bl.

Trees or shrubs. Leaves equally pinnate; leaflets opposite more or less oblique. Flowers bisexual in extra-axillary (rarely axillary) panicles or spike-like racemes. Calyx cup-shaped or cylindric entire or 4- to 5-toothed. Petals 4 to 5 (or more) usually linear, at first cohering in a tube, then recurved. Stamen-tube tubular 4- to 12-lobed at top; anthers linear included or some-

what exsert. Disc short and fleshy or tubular. Ovary 2- to 4-celled; style filiform, longer than stamens. Stigma capitate or cylindric. Capsule sub-globose often beaked, thickly coriaceous 2- to 4-celled. Seeds arillate. Species about 24, Indo-Malayan.

Inflorescence shorter than leaves, few-flowered;
fruit beaked.

Flowers .5 in. long, narrow (1) *C. spicatus*

Flowers .9 in. long, thick (2) *C. pauciflorus*

Inflorescence shorter than leaves, many-flowered,
panicked.

Fruit very large, globose (3) *C. erythrocarpus*

Inflorescence very long, spike-like.

Leaflets 7 in. long, glabrous; shrub or small
tree (4) *C. penduliflorus*

Leaflets over 1 ft. long, strongly reticulate hairy
beneath.

Flowers 1.5 in. long in distant tufts; fruit
glabrous (5) *C. princeps*

Flowers 1 in. long, more crowded; leaves and
fruit densely red tomentose (6) *C. rubiginosus*

Inflorescence elongate with short branches.

Flowers large, thick, silky (7) *C. macrothyrsus*

Flowers slender not silky.

Leaflets 12 by 4 in. (8) *C. macrophyllus*

Leaflets 5 to 6 in. long, 3 pairs hairy beneath;
fruit hairy (9) *C. glomeratus*

Leaflets 5 to 6 in. long elliptic, 3 pairs sparsely
hairy beneath; fruit glabrous (10) *C. laxiflorus*

Leaflets narrow, 10 pairs or more glabrous (11) *C. divergens*

(1) *C. spicatus* Hiern, in Hook. fil. F.B.I. i. 550; King, l.c. 26.

Tree 30 ft. tall. Branchlets and inflorescence tomentose. Leaves 8 to 12 in. long; leaflets 2 to 3 pairs, membranous, oblong-lanceolate to elliptic or ovate, above glabrous, beneath midribs and nerves 5 to 6 pairs puberulous, 2.5 to 5 in. long, 1.35 to 2 in. wide; petiolules .25 to .35 in. long. Panicles axillary 2 to 12 in. long. Flowers few white .5 in. long. Calyx cup-shaped tomentose nearly entire. Petals 5, white tomentose outside narrow elliptic. Fruit narrowed at both ends, dilate in the middle, spearhead-shaped grey tomentose, 2 in. long, .75 in. through. Seeds 2. *Hab.* Woods; Singapore, Bukit Timah. Malacca (Maingay). Dindings, Pangkor; Pahang, Rumpin River (Foxworthy). Penang, Moniot's Road (Curtis). *Native name*: Sentol Kera.

(2) *C. pauciflorus* King, l.c. 27.

Shrub to a 20-ft. tree. Leaves 5 to 15 in. long, thinly coriaceous; leaflets 2 or 3 pairs oblong-lanceolate acuminate, base cuneate, glabrous except the midrib, and 5 or 6 pairs of nerves sometimes pubescent, 2.5 to 9 in. long, 1 to 4 in. wide; petiolules .1 to .2 in. long. Racemes or panicles 1 to 3.5 in. long, 2- to 6-flowered. Flowers white .9 in. long. Calyx tubular usually entire tomentose. Petals 4 or 6, .8 in. long. Fruit fusiform beaked green tomentose 2 in. long. *Hab.* Jungles in low country. Singapore,

Reservoir Woods. Johor, Serom. Negri Sembilan, Bukit Talan (Cantley). Perak, Salama, Larut (Kunstler). Dindings, Pangkor. *Native name*: Poko Jurai.

(3) **C. erythrocarpus** *Hiern, l.c. i. 550; King, l.c. 31.*

A big tree 80 ft. tall. Branchlets velvety tomentose. Leaves 12 to 15 in. long; leaflets 4 to 6 pairs coriaceous elliptic-oblong or broad ovate, shortly blunt acuminate, base cuneate or rounded, glabrous except midrib above, pubescent beneath; nerves 6 to 7 pairs, 2.5 to 5.5 in. long, 1.35 to 2 in. wide; petiolules .2 in. long. Panicles extra-axillary .4 in. long tomentose; branches short. Flowers .35 in. long. Calyx cylindric truncate tomentose. Petals elliptic silky outside. Stamen-tube shorter silky below, villous inside, teeth 5 or 6 emarginate. Stigma cylindric. Fruit subglobose 2 in. through minutely tomentose blood-red. Seed exarillate 1 in. long orange red. *Hab.* Forests. Singapore, Pulan Ubin. Malacca (Maingay). Selendor. *Native name*: Rongga. *Use*: The timber is good. The seeds are said to be poisonous.

(4) **C. penduliflorus** *Planch. in Hook. fil. F.B.I. i. 550; King, l.c. 28.*

Shrub 6 or 8 ft. to 20 ft. tall. Branches, leaf-rachis and inflorescence velvety. Leaves 15 to 24 in. long; leaflets 5 pairs elliptic-ovate to oblanceolate shortly cuspidate base narrowed; nerves 15 to 18, pairs, above glabrous or hairy, midrib always hairy beneath, 3 to 9 in. long, 1.5 to 3 in. wide; petiolules less than .1 in. long. Panicles raceme-like 2 ft. long tomentose pendulous. Flowers dull pink in scattered clusters, .75 to 1 in. long, clavate in bud. Calyx short, hairy, tubular; mouth entire or lobed. Petals 5 linear-spathulate silky. Stamen-tube narrow, nearly glabrous. Fruit fusiform pubescent. *Hab.* Forests. Johor, Batu Pahat; Simpai (Kelsall). Malacca (Maingay); Machap. Tebung Road (Derry). Sungei Ujong (Cantley). Dindings, Gunong Tungul, Penang (Porter); Moniot's Road (Curtis).

var. *Kunstleri*. *C. Kunstleri* *King, l.c. 27.* Leaves larger. Panicle with the flowers crowded at the tip only. Calyx rather larger. *Hab.* Perak, Goping (Kunstler). *Native names*: Medang Kasunko; Sangol Lotong hitam.

A rather variable plant in size of leaves and amount of pubescence. It has also sometimes infertile clavate flowers with a filiform base.

(5) **C. princeps** *Hemsl. Ic. Pl. t. 1844; King, l.c. 29.*

An unbranched tree with long pendulous leaves 9 to 10 ft. long, very like those of *C. rubiginosus*, but larger; leaflets elliptic-oblong coriaceous, 9 to 10 in. long; nerves 15 to 30 pairs. Panicles 3 ft. or more long; branches short and stout bearing a round head of flowers 3 in. through. Calyx .2 in. long, cup-shaped truncate tomentose, much smaller than in *C. rubiginosus*. Petals 5, linear spathulate silky outside white nearly 1.5 in. long. Stamen-tube shorter. Fruit 2.5 in. through sub-globular. Seeds 3 to 5, 1.75 in.

long. *Hab.* Forests. Selangor, Sungei Buluh (Foxworthy). Penang (Wallich 4891), Waterfall (Curtis). *Native name*: Mata Pagar.

(6) *C. rubiginosus* King, *l.c.* 29.

Tree 20 to 60 ft. tall, 8 to 15 in. through. Leaves 2 to 3 ft. long; rachis pubescent; leaflets 4 to 8 pairs, coriaceous oblong blunt, base sub-cordate, glabrous except nerves above, densely tomentose beneath; nerves 12 to 18 pairs with reticulations very prominent beneath, 5 to 12 in. long, 2.5 to 4 in. wide nearly sessile. Panicle spike-like about 1.5 ft. long; branches very short. Flowers 1.25 to 1.5 in. long red-silvery. Calyx cup-shaped entire or toothed tomentose outside. Petals 7, 8, or 9 linear-sub-spathulate 1 in. long tomentose outside. Stamen-tube shorter. Fruit ovoid rugose densely tomentose brown 1.5 in. long. *Hab.* Dense forests. Perak, Thaiping Hills (Kunstler).

(7) *C. macrothyrsus* King, *l.c.* 33.

Tree 20 to 40 ft. tall. Leaves 2 ft. long glabrous; leaflets 2 to 4 pairs, thin coriaceous elliptic-oblong, base cuneate; nerves 10 to 14 pairs prominent beneath, 3.5 to 9 in. long, 1.5 to 3.5 in. wide; petiolules .25 to .5 in. long. Panicles 18 in. to 2 ft. long, glabrous; branches distant, short. Flowers white 3.5 in. long very short and thick. Calyx tubular 1 in. long. Petals 5, elliptic blunt, tomentose outside. Stamen-tube shorter free, teeth 14 silky; anthers 7 to 8. Ovary silky. Fruit globular 1.5 in. through. *Hab.* Thick forests. Selangor, Ulu Selangor. Perak, lower part of Thaiping Hill (all collectors).

(8) *C. macrophyllus* King, *l.c.* 32.

Tree 50 to 60 ft. tall or much more. Leaves 5 to 6 ft. long; rachis flattened; leaflets many, membranous oblong shortly acuminate, base round glabrous; nerves 10 to 20 pairs elevate beneath, 5 to 13 in. long, 3.5 to 4 in. wide; petiolules .3 in. long. Panicles 2 to 3 ft. long narrow; branches short distant 1 to 3 in. long. Flowers slender .5 to .6 in. long dirty white. Calyx cupular pubescent entire or 4-toothed. Petals 4, much larger linear, tips spathulate, puberulous outside. Stamen-tube shorter adherent for half its length to petals, hairy outside near the mouth, villous within, lobes 8 linear 2- or 3-toothed. Fruit sub-globular, base narrowed 3 in. through; pedicel swollen 1 in. long. *Hab.* Forests. Singapore, Pulau Ubin. Selangor, Batu caves (Curtis). Penang, Pulau Betong (Curtis). *Distrib.* Java.

(9) *C. glomeratus* Hiern, *l.c.* i. 551; King, *l.c.* 30.

A big tree 70 ft. tall, 10 to 15 in. through. Branchlets puberulous. Leaves 12 to 18 in. long; petioles and rachis pubescent; leaflets 2 to 3 pairs thinly coriaceous glabrous except midrib above, hairy beneath, elliptic cuspidate, base rounded; nerves 9 to 11 pairs, prominent beneath, 4 to 6.5 in. long, 1.8 to 2.5 in. wide; petiolules .1 to .15 in. long. Panicles drooping supra-axillary 18 in. long (peduncle 6 in.); branches numerous 2 to 3 in. long.

Flowers .25 in. long, pale greenish yellow. Calyx bell-shaped nearly glabrous, teeth short. Petals 4 elliptic glabrous. Stamen-tube shorter glabrous, teeth long linear 6 to 8. Fruit pear-shaped 1 in. long, .75 in. through, rich crimson and yellow pubescent. Seeds 2. *Hab.* Forests. Selangor, Batu Caves. Perak, Thaiping and Ulu Bubong (Kunstler). Penang (Porter, Wall. Cat. 9040).

(10) **C. laxiflorus** King, *l.c.* 33.

Small tree. Leaves 12 in. long; leaflets elliptic 3 or 4 pairs; nerves 4 or 5 pairs, hairy beneath, 4.5 in. long, 3 in. wide. Panicle large with long branches 5 in. long. Flowers slender .4 to .5 in. long. Staminal tube villous outside, mouth slightly waved. Fruit globose 1 in. through crimson, glabrous when ripe, pseudo-stalk short. *Hab.* Forests, Pahang, Telom. Perak, Batang Padang (Kunstler); Goping and Chandleriang (Kunstler). Penang (Curtis). Lankawi, Gunong Raya (Haniff); Telaya Tujok (Curtis).

This has the broad pubescent leaflets of *C. glomeratus*, but is widely paniced and the ripe fruit is glabrous.

(11) **C. divergens** Bl. *Bijdr.* 169; King, *l.c.* 35. *C. holocalyx* Hiern, *l.c.* i. 551.

Tree 15 to 30 ft. tall. Leaves 9 to 18 in. long, glabrous; leaflets 10 to 13 pairs thinly coriaceous oblong or oblong-lanceolate acuminate, base narrowed unequal; nerves 10 to 14 pairs, 2.5 to 6 in. long, 1.15 to 1.75 in. wide, dark green. Panicles about 2 ft. long much-branched pyramidal, many-flowered. Flowers .25 in. long unisexual white foetid. Calyx cupular puberulous mouth entire. Petals 4 oblong linear blunt glabrous narrow. Stamen-tube free glabrous, teeth 6 lanceolate. Ovary hairy. Fruit ovoid or pear-shaped with or without a stout pseudo-stalk, 2 in. long, 1 in. through, glabrous when ripe, scarlet. Seed 1, black with orange aril at the base. *Hab.* Common in woods, Singapore, Changi, Tanglin. Johor, Kwala Sembrong (Kelsall). Malacca, Batang Malacca (Holmberg); Selandor (Cantley). Pahang, Pekan. Perak, Goping and Thaiping (Kunstler).

var. *a. divergens*. Leaflets narrow glabrous. Flowers .25 in. long. Fruit pear-shaped. Localities as above. *Distrib.* Java.

var. *b. patens*. *C. patens* Bl. *Bijdr.* 169; King (*in part*), *l.c.* 34. *C. fragrans* Hiern, *F.B.I.* i. 551.

Leaves as in var. *divergens*, but rather shorter. Flowers .2 in. long. Fruit globose pear-shaped, pseudo-stalk short 1.25 in. long. Malacca (Maingay, Griffith). *Distrib.* Java. *Native name*: Garontong Tengah.

6. DYSOXYLUM, Bl.

Trees usually small or medium-sized. Leaves pinnate; leaflets opposite or alternate coriaceous or sub-coriaceous, base oblique. Flowers paniculate racemose or spicate bisexual white. Calyx 4- rarely 5-fid or sub-entire. Petals 4- (rarely 5) valvate or slightly

imbricate recurved. Stamen-tube cylindric, mouth dentate; anthers 6, 8, or 10, included or tips exsert. Disc tubular as long or longer than the ovary. Ovary 3- or 4-celled; ovules 2 in each cell; style as long as stamen-tube. Capsule globose or pear-shaped, with a pseudo-stalk; pericarp coriaceous white, yellow or red 1- to 4-celled. Seeds arillate. Species about 100, India, Malaya and Australia.

Flowers pentamerous.

Small tree; leaflets small 5 in. long elliptic cuspidate; panicle short (1) *D. arborescens*

Flowers tetramerous.

Inflorescence paniced; panicles slender lax few-flowered.

Leaflets linear lanceolate flowers '6 in. long; tree (2) *D. angustifolium*

Leaflets oblong lanceolate caudate; flowers '15 in. long; shrub (3) *D. dumosum*

Panicle long, flowers in dense heads, all pubescent; leaflets oblique 6 in. long, pubescent (4) *D. interruptum*

Panicle with many spreading branches.

Leaves coriaceous nerveless; fruit 4 in. long pear-shaped; big tree (5) *D. acutangulum*

Leaflets thin; nerves conspicuously winged Nerves of leaflets not winged. (6) *D. venulosum*

Panicles short.

Flowers '1 in. long; disc hairy (7) *D. thyrsoides*

Disc glabrous; flowers '25 in. long silky in distant clusters (8) *D. turbinatum*

Flowers '2 in. long not silky; panicles elongate; branches spreading (9) *D. costulatum*

Flowers '5 in. long white silky; panicle rather short sometimes reduced to a raceme (var.) (10) *D. macrothyrsus*

Flowers '2 in. long glabrous; panicle large spreading; branches over 1 ft. long (11) *D. pulchrum*

Flowers in racemes on the trunk.

Leaflets oblique ovate; flowers '35 in. long; fruit glabrous (12) *D. cauliflorum*

Leaflets oblong lanceolate cuspidate; flowers '25 in. long; fruit tomentose (13) *D. flavescens*

Leaflets oblong 5 by 3 in.; flowers '15 in. long; fruit tomentose (14) *D. densiflorum*

Flowers in spikes on branches under 2 in. long.

Leaflets opposite or subopposite.

Disc 8- to 9-toothed exceeding ovary flowers '2 in. long (15) *D. rugulosum*

Disc 0 or very small; flowers '15 in. long (16) *D. papillosum*

Leaflets remote alternate (17) *D. alternatum*

(1) *D. arborescens* Miq. *Ann. Mus. Bot. Lugd. Bat.* iv. 24; King, *l.c.* 38. *D. Maingayi Hiern*, in *Hook. fl. F.B.I.* i. 547.

Glabrous tree 20 to 30 ft. tall, 4 to 6 in. through. Leaves 6 to 9 in. long; leaflets 5 to 7 membranous elliptic caudate, base

narrowed; nerves 6 to 8 pairs faint; 2·5 to 5 in. long, 1·25 to 2·25 in. wide, terminal one largest; petioles ·3 to ·5 in. long. Panicles extra-axillary 1·5 to 4 in. long lax; branches few. Flowers ·25 in. long; pedicels as long. Calyx cup-shaped small. Petals linear 5 white. Stamen-tube cylindric, with 10 shallow teeth. Disc longer than pubescent ovary. Fruit turbinate ovoid not narrowed at base 1·25 in. through, 2- to 4-seeded. Seeds ovoid. *Hab.* Forests in the lowlands. Pahang, Rumpin River (Evans). Malacca (Maingay); Hulu Rejang (Derry). Selangor, Ginting Bidai. Perak, Ulu Bubong and Bernam River (Kunstler). Pulau Jarak (Foxworthy). *Distrib.* Andamans, Borneo. *Native name*: Paang.

(2) **D. angustifolium** King, *l.c.* 39. *D. alliaceum* Bl. var. *laxiflora* Ridley, *Trans. Linn. Soc.* iii. 285.

A small glabrous tree with pendulous branches. Leaves 10 to 12 in. long; leaflets 5 pairs opposite membranous linear-lanceolate, base narrowed; nerves 9 to 12 pairs, 3·5 to 5·5 in. long, ·5 to 6·5 in. wide; petioles ·25 in. long. Panicles slender 4·5 to 5 in. long. Flowers alliaceous few ·6 in. long cream white. Calyx cupular, teeth triangular 4. Petals 4 linear-oblong puberulous outside. Stamen-tube cylindric 8-toothed; anthers 8. Fruit pear-shaped 1 in. long glabrous white on 1-in. peduncle. Seeds red. *Hab.* Local, river-banks on the east coast. Pahang, Tahan river-banks; Sungei Jelai (Machado). Kelantan River near Jeram Panjang. *Native names*: Dusono; Kamanjong; Langga Ayer.

A willow-like tree, flowers smelling of garlic.

(3) **D. dumosum** King, *l.c.* 39.

Shrub 3 to 6 ft. tall, glabrous except the puberulous shoots and inflorescence. Leaves 5 to 14 in. long; leaflets 4, 6 or 10 pairs, membranous, elliptic-lanceolate acuminate, base narrowed; nerves 7 or 8 pairs faint, 2·5 to 4·5 in. long, ·75 to 1·45 in. wide; petiolules ·2 in. long. Panicles 4 in. long with few short branches and few small greenish-yellow flowers ·15 in. long. Calyx cupular, teeth small 4 or 5. Petals 4 broad oblong obtuse. Stamen-tube shorter cylindric glabrous, teeth 8. Ovary pilose. Fruit depressed-globular glabrous ·5 in. through, 4-celled. Seeds 3 or 4 black. *Hab.* Dense forest, on hills about 1200 to 3000 ft. altitude. Johor, Gunong Pulai. Malacca, Mt. Ophir. Pahang, Rumpin River (Foxworthy). Perak, Ulu Kerling (Kunstler). *Native name*: Lingga Api.

(4) **D. interruptum** King, *l.c.* 40.

Tree 30 to 40 ft. tall, 6 to 8 in. through. Young parts ashy pubescent. Leaves 24 to 30 in. long; leaflets 10 pairs membranous, oblong to elliptic-oblong acuminate, base cuneate very oblique, above glabrous except midrib and nerves, beneath pubescent; nerves 18 to 24 pairs beneath elevate, hairy, 5 to 7 in. long, 2·25 to 2·75 in. wide; petiolules ·1 to ·2 in. long. Panicles supra-axillary,

hairy pubescent; branches few short, upper ones in twos and threes very short distant dense-flowered. Flowers ovoid pale yellow, 1 in. long. Calyx cupular pubescent, 4 or 5 acute teeth. Petals 4 elliptic sub-acute pubescent on both sides. Stamen-tube shorter cylindric glabrous, 8 teeth bifid. Ovary pilose. *Hab.* At 3000 to 4000 ft. altitude. Rocky jungle, rare. Perak, Larut (Kunstler).

(5) **D. acutangulum** *Miq. Fl. Ind. Bat. Supp.* 196, 503; *King, l.c.* 41; *Koorders Ic. Bogor.* i. 11.

A lofty glabrous tree. Leaves 6 to 12 in. long with 3 or 4 pairs of coriaceous leaflets elliptic or ovate acute or acuminate, base cuneate unequal, pustular rugose when dry pale green; nerves invisible, 2.5 to 4.5 in. long, 1.25 to 2.2 in. wide; petiolules .2 in. long. Panicles 2.5 to 4 in. long puberulous. Flowers crowded .35 in. long, puberulous greenish white, scented of hyacinths. Calyx very shallow with 4 deep reflexed teeth. Petals 4 oblong sub-acute. Stamen-tube shorter cylindric, teeth acute 8. Ovary pubescent. Fruit obovoid 4 in. long scarlet orange; pericarp almost woody, inside 3-celled. Seed large black, aril large orange. *Hab.* Forests not rare, but somewhat inaccessible. Singapore, Changi. Malacca, Batang Malacca (Derry). Perak (Scortechini). *Distrib.* Bangka. *Native name:* Pasak Lingga.

(6) **D. venulosum** *King, l.c.* 42.

Tree 50 to 80 ft. tall, 18 to 24 in. through. Branchlets and leaf-rachis puberulous. Leaves 12 to 18 in. long; leaflets 7 to 14 membranous alternate oblong acuminate, base narrowed oblique glabrous; nerves 13 to 15 pairs indistinct above slender elevate beneath, 5 to 7 in. long, 1.35 to 1.75 in. wide; petiolules .25 in. long. Panicles extra-axillary 6 to 8 in. long nearly glabrous; branches numerous short few-flowered. Flowers .25 in. long light yellow. Calyx cupular teeth 4 glabrous. Petals 4 oblong obtuse densely silky puberulous. Stamen-tube as long as petals cylindric glabrous irregularly bluntly toothed. Disc lobed at edge tubular covering the hoary pubescent ovary. Fruit ellipsoid 2.5 in. long. Seeds large 2 in. long. *Hab.* Forests, Pahang, Telok Mengkuang, Temerloh (Foxworthy). Perak, open bamboo forests, Ulu Bubong (Kunstler). *Native name:* Bebeke.

(7) **D. thyrsoides** *Griff. in Hook. fil. F.B.I.* i. 547; *King, l.c.* 42.

A big tree 60 to 100 ft. tall, glabrous. Leaves 12 to 16 in. long; leaflets 6 to 8 coriaceous elliptic-oblong acuminate, base narrowed oblique; nerves 6 to 8 pairs prominent beneath, 4.5 to 8.5 in. long, 1.75 to 3 in. wide; petiolules .3 in. long. Panicles pyramidal numerous 6 in. long; branches spreading. Flowers numerous fragrant white .15 in. long; pedicels as long. Calyx cupular 4-toothed glabrous. Petals 3 times as long, 4 oblong obtuse glabrous. Stamen-tube cylindric glabrous outside, pubescent inside. Disc tubular hairy. Ovary sub-strigose. Fruit globose shortly narrowed at base, 1.5 to 1.75 in. through, flesh

colour; pericarp almost woody. Seeds 1 in. long, aril bright red. *Hab.* Common in forests. Johor, Kota Tinggi. Malacca (Griffith). Pahang River. Dindings, Gunong Tungul. Penang, Pulau Betong (Curtis). *Native name*: Kasai Tembaga.

(8) **D. turbinatum** King, *l.c.* 43.

Small tree 12 to 18 ft. tall, 2 to 3 in. through. Leaves 10 to 16 in. long, glabrescent; leaflets 2 or 3 pairs thinly coriaceous glaucescent beneath, elliptic abruptly bluntly acuminate, base rounded or cuneate slightly oblique, glabrous except midrib and nerves slightly hairy; nerves 8 to 11 pairs, very bold beneath, 3 to 8 in. long, 1 to 3.5 in. wide; petiolules .35 in. long. Panicles supra-axillary 3 to 11 in. long, pubescent; branches few short with 5 to 10 flowers each. Flowers silvery white, .45 in. long. Calyx cupular short with 4 distinct teeth pubescent. Petals 4 linear-oblong silky pubescent outside, nearly glabrous within. Stamen-tube cylindric, teeth 8, puberulous outside. Disc glabrous mouth pilose, much longer than ovary. Ovary pilose. Fruit depressed-globular with a short pseudo-stalk scaly, 1.5 in. long. *Hab.* Woods south of the peninsula. Singapore, Bukit Timah. Johor, Kwala Sembrong (Kelsall). Malacca (Griffith). Selangor, Klang (Foxworthy).

(9) **D. costulatum** Miq. *Ann. Mus. Lugd. Bat.* iv. 21; King, *l.c.* 43. *D. brevipes* Hiern, *l.c.* i. 546.

A glabrous tree 20 to 50 ft. tall, 8 to 10 in. through. Leaves 9 to 14 in. long; leaflets sub-coriaceous 4 pairs elliptic-oblong cuspidate, base acute oblique; nerves 10 to 12 pairs bold beneath, 3.5 to 6 in. long, 1.5 to 2.75 in. wide; petiolules .3 in. long. Panicles axillary and terminal 8 in. long; branches raceme-like. Flowers .2 in. long white alliaceous. Calyx cup-shaped short 4-toothed. Petals 4, oblong obtuse puberulous outside. Staminal tube cylindric 8-toothed glabrous outside, villous within. Ovary glabrous. Fruit depressed-globular tapering to a pseudo-stalk 1.5 in. long, 4-celled; pericarp woody, red. *Hab.* Forests in the south. Singapore, Selitar. Johor, Castlewood. Pahang River. Malacca (Maingay, Griffith); Selangor and Merlimau (Cantley). Selangor, Dusun Tua. Perak, Ulu Bubong (Kunstler). *Distrib.* Sumatra. *Native names*: Chikeh; Kulin.

(10) **D. macrothyrsum** Miq. *Ann. Mus. Lugd. Bat.* iv. 20; King, *l.c.* 44.

Tree 30 to 60 ft. tall, 6 to 20 in. through. Leaves 16 to 18 in. long; petioles and rachis puberulous; leaflets thinly coriaceous 3 to 4 pairs, oblong-lanceolate or elliptic acuminate, base cuneate oblique glabrous; nerves 8 to 11 pairs, prominent beneath, 3 to 9.5 in. long, 2 to 4.5 in. wide; petiolules .25 to .4 in. long. Panicles racemiform slender puberulous 4 to 7 in. long. Flowers .5 in. long, white. Calyx very short broad toothed puberulous cup-shaped. Petals 4 much longer, narrow oblong sub-acute silky. Stamen-

tube cylindric pubescent outside, mouth nearly entire; anthers 8. Disc longer than ovary, glabrous outside, pubescent inside, mouth 8-toothed. Ovary pubescent. Fruit turbinate with 4 shallow grooves and 4 rounded angles, 1.5 in. through or more, cream tinted pink. *Hab.* Dense jungles. Singapore, Chan Chu Kang. Malacca, Merlimau (Derry). Negri Sembilan (Cantley). Selangor, Kwala Lumpur. Perak, Ulu Bubong and Larut (Kunstler). Tupai (Wray).



FIG. 40.—*Dysoxylum cauliflorum*.

var. *microbotrys* Ridl.; *D. microbotrys* King, l.c. 48.

Panicles reduced to racemes. Fruit reddish yellow like a peach. Perak, Ulu Bubong (Kunstler). *Distrib.* Borneo. *Native names:* Bunga Kombil; Kasip hutan.

(11) *D. pulchrum* Ridl. *Journ. Roy. As. Soc. S. Br.* 75, p. 17.

A small tree, glabrous except the flowers. Leaves over a foot long; leaflets 11 or more alternate coriaceous oblong blunt acuminate, base cuneate nearly equilateral; nerves 11 pairs bold beneath, 8 to 9 in. long, 3 to 3.5 in. wide; petiolules .2 to .3 in. long. Panicles large over 12 in. long, scurfy; branches long spreading. Flowers

white 1 to 3 in short terminal cymes, .2 in. long. Calyx saucer-shaped, lobes obscure. Petals oblong obtuse, glabrous outside, puberulous inside, mouth nearly entire; anthers 10. Disc cylindric hairy longer than the hairy ovary. *Hab.* Hill forest. Penang, Government Hill at 1500 ft. altitude (Ridley).

(12) *D. cauliflorum* *Hiern, l.c. i. 549; King, l.c. 45.* (Fig. 40, p. 396.)

Tree about 60 ft. tall, 2 ft. through. Leaves 15 to 24 in. long; rachis angled; leaflets 9 to 13 opposite and alternate, oblong-elliptic shortly acuminate, base cuneate or rounded very unequal, membranous glabrous; nerves 8 to 13 pairs sub-prominent beneath, 4 to 7 in. long, 1.75 to 2.75 in. wide; petiolules .2 to .3 in. long. Spikes 1 to 3 in. long, crowded on tubercles on the lower part of the trunk, tomentose. Flowers numerous cream colour scented of almonds .3 to .35 in. long. Calyx cupular pubescent nearly entire to 4-lobed. Petals narrow linear-oblong glabrous. Stamen-tube free nearly glabrous, silky inside; teeth 8 broad. Disc tubular longer than ovary, glabrous. Ovary and style pilose. Fruit ovoid apiculate smooth glabrous, splitting into 4 valves, red. Seeds plano-convex black, aril at top and bottom red. *Hab.* Common in forests, Singapore, Tanglin; Bukit Timah. Malacca, Selandor. Perak, Larut, and Ulu Slim (Kunstler). Penang, Government Hill 1200 ft. altitude and Batu Feringhi (Curtis). *Native names*: Balun hijau; Guatak; Kuleun; Jarong.

var. *elongatum*. *D. cuneatum* *Hiern, l.c. i. 549; King, l.c. 47.*

Differs only in the fruiting stem elongating to 12 in. long and the fruit being less pointed. Malacca (Maingay). Only a single specimen.

(13) *D. flavescens* *Hiern, l.c. i. 549; King, l.c. 49.* *D. Griffithii* *Hiern, l.c.; King, l.c. 46.*

A tree. Leaves 12 to 18 in. long, glabrous; leaflets 9 to 13 alternate membranous elliptic to oblong-lanceolate acuminate, base rounded or shortly cuneate slightly oblique; nerves numerous, very faint, midrib only prominent, 3 to 5 in. long, 1 to 2 in. wide; petiolules .1 to .25 in. long. Flowers crowded in short racemes below the leaves on the branches, .5 to .4 in. long rather thick, pubescent. Calyx very short nearly flat 4-toothed pubescent. Petals 4 pale yellow linear-oblong pubescent outside. Stamen-tube pubescent outside, teeth 8. Disc glabrous longer than the hairy tomentose ovary. Fruit obovoid 1.25 in. long, grey-tomentose. *Hab.* Thick forests, Singapore, Bukit Timah; Changi. Malacca (Maingay, Griffith). Penang Hill.

(14) *D. densiflorum* *Miq. Ann. Mus. Lugd. Bot. iv. 9; King, l.c. 46.*

Tree 20 to 40 ft. tall, 6 to 12 in. through. Leaves 15 to 20 in. long; rachis angular puberulous; leaflets alternate, elliptic or oblong acuminate, base rounded or sub-cuneate unequal, glabrous (or hairy on the lower midrib); nerves 10 to 12 pairs, 4.5 to 7 in. long,

terminal leaflet longer and obovate; petiolules .15 in. long. Spikes in clusters from the trunk or the thick branches, 1 to 2 in. long. Flowers white, .4 in. long. Calyx cup-shaped, lobes rounded 4 hairy. Petals 4 oblong 3 times as long, pubescent outside. Stamen-tube cylindric glabrous, with 8 teeth. Disc cylindric longer than the silky ovary. Fruit obovoid minutely tomentose 1.5 in. long. *Hab.* Hill forests, Perak, Ulu Bubong (Kunstler); Gunong Batu Putih (Wray). *Distrib.* Java, Sumatra.

(15) **D. rugulosum** King, *l.c.* 49.

Small tree 15 to 25 ft. tall. Leaves 8 to 12 in. long; rachis angled; leaflets 2 to 4 pairs fleshy membranous glabrous oblong oblanceolate acuminate or cuspidate, pale minutely wrinkled when dry, narrowed to the base, 4 to 8 in. long, 1.5 in. wide. Panicles supra-axillary .5 to 1.25 in. long, sometimes reduced to racemes. Flowers small puberulous cream colour. Calyx nearly flat with 4 short teeth pubescent. Petals .1 in. long, elliptic (or ovate) obtuse puberulous. Staminal-tube cylindric puberulous outside, glabrous inside 8- or 9-toothed. Disc little longer than the puberulous ovary. Fruit pyriform apiculate with many vertical ridges puberulous, 1.24 in. long, .8 in. through, red. *Hab.* Mountain forests, Selangor, Sempang Mines. Perak, Larut Hills (Kunstler).

This may perhaps prove to be a variety of *D. venulosum* King.

(16) **D. papillosum** King, *l.c.* 50.

Shrub 6 to 8 ft. tall. Branches tomentose. Leaves 12 to 18 in. long; rachis angled tomentose; leaflets 2 or 3 pairs, much resembling those of *D. rugulosum*, but nerves and midrib very prominent beneath and densely hairy, shape, size and texture identical. Flowers in short .75 to 1.25 in. spikes extra-axillary tomentose; buds globose with calyx covering petals densely tomentose. Petals 4 ovate appressed pubescent outside. Stamen-tube much shorter cylindric fleshy 8-toothed. Disc, if any, very small. *Hab.* Perak, Ulu Kal, 1200 to 1500 ft. altitude (Kunstler).

(17) **D. alternatum** Ridl.

Small glabrous tree, about 8 ft. tall. Leaves 18 in. long; petioles 4 in. long; leaflets quite alternate remote oblong-lanceolate rather thin, cuspidate acuminate oblique at base, base cuneate; nerves slender 8 pairs, 5 in. long, 1.5 in. wide; petiolules .15 in. long. Racemes very short 1 in. long on a branch. Fruit obovoid 1.5 in. long, red glabrous on a stout .75 in. peduncle. *Hab.* Pahang, below Wray's Camp on Gunong Tahan at 3000 ft. altitude in thick forest (Ridley).

This is near *D. rugulosum*, but the leaflets are quite different in form, and quite remotely alternate, and the fruit is larger smooth, not ribbed. It also somewhat resembles *D. Beccarianum* Engl. of Borneo. I have seen no flowers.

7. AMOORA, Roxb.

Trees often large. Leaves usually imparipinnate; leaflets oblique. Flowers small, in axillary fascicles often unisexual in the same panicle. Calyx 3-lobed. Petals 3 short concave imbricate. Stamen-tube sub-globose or campanulate, entire or 6- to 10-toothed; anthers 6 or 10. Disc obsolete. Ovary sessile 3-celled, cells 1- or 2-ovuled. Stigma sessile. Fruit capsular, sub-globose; pericarp coriaceous or woody 3-celled and 3-seeded loculicidally 3-valved or indehiscent. Seeds with a coloured fleshy aril usually only partly covering the seed. Species about 25, Indo-Malaya, and 1 in Australia.

Stamens 6.

Leaflets lanceolate 8 in. long red-scurfy beneath . (1) *A. rubiginosa*

Leaflets not red-scurfy about 5 in. long.

Leaflets oblong lanceolate caudate oblique; flowers .2 in. long (2) *A. Ridleyi*

Leaflets ovate lanceolate falcate blunt; flowers .15 in. long (3) *A. cucullata*

Leaflets lanceolate narrow 4 by 1.25 in.; flowers very small (4) *A. malaccensis*

Leaflets lanceolate 2 by .5 in.; nerves very faint. (5) *A. lanceolata*

Stamens 10.

Leaflets coriaceous 6 in. long; panicle 8 to 10 in. red-scurfy (6) *A. rubescens*

Leaflets thin 4 in. long; panicles 1 to 2 in. long (7) *A. Maingayi*

Leaflets thin 4 in. long; panicles lax 6 in. long (8) *A. decandra*

(1) *A. rubiginosa* Hiern, l.c. i. 561; King, l.c. 54.

A superb tree 100 ft. tall, 2.5 to 3 ft. through. Leaves 18 to 24 in. long; leaflets 8 to 10 pairs coriaceous glabrous above rusty orange-tomentose beneath, oblong or elliptic-oblong sub-acute, base cordate; nerves 20 to 24 pairs bold beneath, 5 to 9 in. long, 1.25 to 2.75 in. wide; petiolules .15 in. long, thick. Panicles bisexual 6 to 14 in. long rusty-tomentose; branches 3 to 8 in. long few; branchlets short. Flowers ovoid .25 in. long rose pink. Calyx campanulate 3-lobed tomentose. Petals 3 obovate round, glabrous. Stamen-tube ovoid; anthers 6. Fruit sub-globose apiculate 2 to 3 in. through red. *Hab.* Forests, low ground. Singapore, Chan Chu Kang. Johor, Tempayan River. Malacca (Maingay, Griffith). Perak, Larut (Kunstler).

(2) *A. Ridleyi* King, l.c. 56.

Tree 80 to 100 ft. tall, 2 to 3 ft. through. Leaves 18 to 24 in. long; leaflets 11 to 17, glabrous sub-coriaceous oblong to ovate-lanceolate caudate, base rounded or cuneate very unequal; nerves 8 to 13 pairs, 3.5 to 6 in. long, 1.35 to 2 in. wide; petiolules .25 to .4 in. long. Panicles 18 in. long on long peduncles much branched stellate-pubescent; branchlets cymulose. Flowers .2 in. long ovoid. Calyx cupular tomentose, 3 broad lobes. Petals 3 fleshy

broad elliptic blunt concave, lower half pubescent. Stamen-tube much shorter glabrous outside; anthers 6. Fruit 3 to 5 in. through, crimson splitting into 3 valves. Seed aril orange. *Hab.* Forests, lowlands. Pahang, Rumpin River. Malacca, Ayer Panas; Batang Malacca (Derry). Perak, Goping (Kunstler). Thaiping (Wray). *Native name*: Pasak.

(3) **A. cucullata** *Roxb. Corom. Pl.* iii. 54, t. 258; *King, l.c.* 55.

A glabrous tree 30 to 40 ft. tall. Leaves imparipinnate 12 to 15 in. long; petioles 3 in. long; leaflets 5 to 9 thinly coriaceous oblong elliptic sub-falcate obtuse, base very oblique; nerves numerous indistinct, midrib bold; petiolules .18 in. long. Male panicles 6 to 12 in. long axillary lax, corymboid. Flowers .15 in. long obovoid yellow. Calyx cupular scaly, teeth 3 blunt. Petals 3 broad elliptic. Stamen-tube obovoid; anthers 6. Female flowers larger in few-flowered axillary racemes 2 in. long. Seeds 3 oblong trigonous black, aril orange covering more than half. *Hab.* Tidal rivers. Singapore, Selitar; Mandai (Burkill). Johor, Tebrau River. *Distrib.* India, Nepal, Burma, Borneo.

(4) **A. malaccensis** *Ridl. Journ. Roy. As. Soc. S. Br.* 75, p. 16.

Tree. Branchlets red-pubescent. Leaves 9 to 12 in. long; rachis scarfy puberulous; leaflets 11 to 13 opposite elliptic to elliptic-lanceolate acuminate, base cuneate, coriaceous glabrous; nerves 16 pairs very fine, 2.1 to 4.25 in. long, .75 to 1.8 in. wide; petiolules .1 to .2 in. long. Panicles axillary 6 to 8 in. long with ascending branches, scurfy pubescent. Male flowers .05 in. long, 3 or 4 on the tips of the branchlets sessile. Calyx campanulate, lobes short rounded pustular. Petals ovate obtuse. Stamen-tube nearly as long oblong globose, mouth large, lobes short rounded; anthers 6. Fruit globose 2 in. through densely velvety tomentose; pericarp woody thick. *Hab.* Malacca (Maingay), Ayer Panas. Rare.

(5) **A. lanceolata** *Hiern, l.c.* i. 560; *King, l.c.* 55.

Tree glabrous except shoots and flowers pubescent. Leaves 6 to 16 in. long; leaflets 17 sub-coriaceous narrowed oblong-lanceolate acuminate blunt, base sub-cuneate; nerves 25 pairs nearly invisible, 2 to 3 in. long, .6 to .75 in. wide; petiolules .2 in. long. Panicles 6 to 8 in. long much branched; branches 1 to 2 in. long. Male flowers very small less than .1 in. long ovoid. Calyx cupular teeth 3 pubescent. Petals 3 puberulous. Stamen-tube globular glabrous; anthers 6. *Hab.* Malacca (Maingay). Only known from Maingay's collection.

(6) **A. rubescens** *Hiern, l.c.* i. 561; *King, l.c.* 57.

Tree 30 to 60 ft. tall, 8 to 12 in. through. Leaves 18 to 30 in. long glabrous; leaflets 13 to 15 coriaceous oblong acuminate obtuse rounded or narrowed hardly oblique at base; nerves 8 to 10 pairs, hardly prominent, 3.6 to 6 in. long, 1.35 to 2 in. wide; petiolules .25 to .4 in. long. Panicles axillary pubescent 6 to 10 in. long;

branches numerous spreading; branchlets 2- to 3-flowered. Flowers 1 in. long obovoid round. Calyx cupular pubescent. Petals 3 round concave. Stamen-tube ovoid 9-toothed; anthers 10. Fruit pear-shaped 2.5 in. long, 1.5 in. through; pericarp fleshy crimson or reddish brown tomentose. *Hab.* Forests. Singapore (Maingay). Malacca, Merlimau; Ayer Panas (Derry). Perak, Goping (Kunstler). Penang, Government Hill and Balik Pulau (Curtis).

(7) **A. Maingayi** *Hiern, l.c.* i. 562. *Aglaia Maingayi* King, *l.c.* 79.

Tree 25 to 35 ft. tall, glabrous. Leaves 4 to 6 in. long; petioles 1.5 in. long; leaflets 4 or 5 alternate fleshy membranous, oblong-elliptic acuminate blunt, base cuneate glabrous; nerves 6 to 9 pairs, 2.5 to 3.5 in. long, 1.15 to 1.5 in. wide; petiolules 1 in. long. Panicles 1 or 2 from axil, 1.75 to 2 in. long, scaly. Flowers 1.5 in. across depressed globular. Calyx 4- or 5-lobed, lobes round scaly. Petals 4 or 5 obovate glabrous. Stamen-tube depressed-globose obscurely toothed; anthers 10. Ovary 3-celled 3-ovuled. Fruit obovoid 3-celled. *Hab.* Malacca (Maingay). Selangor, Weld's Hill, Kwala Lumpur (Foxworthy). Perak, Larut (Kunstler). *Native name:* Petutu.

A rare and little known tree. It only resembles an *Aglaia*, to which King referred it, in its scaly flowers.

(8) **A. decandra** *Hook. fil. F.B.I.* i. 562.

Large tree. Leaves 12 in. long; petioles 2 in. long; leaflets 7 to 13, opposite oblong cuspidate, base narrowed (lower ones nearly ovate smaller), 4 in. long, 1.5 in. wide; nerves fine 12 pairs; petiolules .08 in. long or less. Panicles very lax 6 in. long; branches distant 2 in. long. Flowers globose in scattered pairs; pedicels 1 in. long. Sepals very short ovate acute. Petals 5, round .08 in. long; anthers 10. Fruit capsular 1.5 in. through. *Hab.* Malacca (Maingay). *Distrib.* Himalayas.

There is no note as to where exactly Maingay got his specimen, and it seems a very improbable distribution.

8. APHANAMIXIS, Bl.

Small trees or shrubs. Leaves imparipinnate; leaflets oblique. Male flowers in panicles, females in simple spikes or racemes on different plants, small. Sepals 5. Petals 3 concave imbricate. Stamen-tube sub-globose; anthers 3 or 6. Disc small flat or conic. Ovary 3-celled. Capsule loculicidally dehiscent; pericarp coriaceous. Seeds arillate. Species 3, Indo-Malayan.

Stamens 3; leaflets 10 in. long (1) **A. sumatrana**
Stamens 6; leaflets about 4 in. long (2) **A. Rohituka**

(1) **A. sumatrana** *Ridl.* *Amoora sumatrana* *Miq. Ann. Mus. Lugd. Bot.* iv. 35; *King, l.c.* 52.

A small tree up to 20 ft. tall, glabrous. Leaves 20 to 30 in.

long; leaflets 9 to 13 elliptic-oblong or oblanceolate, sub-coriaceous obtuse, base cuneate; nerves 9 to 20 depressed above conspicuous inarching, 6 to 10 in. long, 2 to 3·75 in. wide. Male flowers obovoid ·15, in. long scattered in panicles 12 in. long; branches about 7 to 10 in. long, pink. Sepals 5 round unequal, edges fimbriate pubescent. Petals 3 round concave. Stamen-tube globular; anthers 3. Female flowers on solitary spikes. Fruit spike 2·5 ft. long pendulous. Capsule oval round pink 1 in. through; pedicel thick ·2 in. long. Seeds ovoid scarlet. *Hab.* Hill forests 3000 to 3400 ft. altitude. Perak, Gunong Batu Putih (Wray). Penang Hill, 3000 ft. altitude. *Distrib.* Sumatra.

(2) **A. Rohituka** *Pierre, Fl. For. Cochinchine sub t.* 334. *Amoora Rohituka W. and A. Prod.* i. 119; *Hiern, l.c.* i. 559; *Bedd. Fl. Sylv. t.* 132; *King, l.c.* 53.

Tree 30 to 70 ft. tall. Young parts slightly puberulous. Leaves 1 to 3 ft. long; leaflets 9 to 15, sub-coriaceous oblong to elliptic-oblong shortly acuminate, base narrowed oblique; nerves 2 to 5 pairs not conspicuously inarching, 3 to 9 in. long (usually small), 1·75 to 3·5 in. wide. Male panicle much branched 12 in. long. Flowers globular less than ·15 in. long numerous. Sepals reniform pubescent entire. Petals 3 orbicular. Stamen-tube globular; anthers 6. Female flowers larger. Spike 14 to 18 in. long. Fruit globular red 1 to 1·5 in. through 3-valved. Seed oblong, aril scarlet. *Hab.* Forests, south of the peninsula, very conspicuous in fruit. Singapore, Toas; Selitar; Bukit Mandai. Pahang, Tabong, Endau (Evans). Malacca, Alor Gajah (Griffith); base of Ophir. Selangor, Kwala Lumpur. Perak, Goping (Kunstler); Telom. *Distrib.* India, Cambodia, China, Andamans, Sumatra. *Native names* : Kasai Paya; Pasak Lingga Merak.

9. AGLAIA, Lour.

Trees often large, bushes or shrubs, glabrous, pubescent or scaly. Leaves pinnate. Flowers in panicles usually bisexual very small, more or less globose and yellow, numerous. Calyx 5-lobed imbricate in bud. Petals 5 imbricate short. Stamen-tube sub-globose, 5-toothed or nearly entire; anthers usually 5, rarely 4 or 10 included or partially exsert. Disc minute or 0. Ovary ovoid 1- to 3-celled with 1 or 2 ovules in each cell; style short. Fruit 1- or 2-celled and seeded indehiscent with a thin pericarp. Seed with a pulpy integument. Species about 70, chiefly Malayan, some Indian, Chinese and Australasian.

Aglaia odorata Lour. *Fl. For. Cochinchine* 173. A shrub with deep green leaves and very small fragrant yellow flowers, a native of China, is often cultivated by Chinese for its flowers, which are put in their tea to flavour it. *Native names* : Belangkas or Chulan.

Stamens 5 (*sp.* 1-24).

Leaves quite glabrous not scaly beneath.

Leaves trifoliate broad elliptic (1) *A. oligophylla*

Leaves 5-foliate; flowers glabrous; leaflets narrow lanceolate 4 by .5 in. (2) *A. salicifolia*

Leaflets lanceolate 3 pairs; flowers puberulous, broad elliptic pale; panicle large, pale (3) *A. leucophylla*

Leaflets narrow lanceolate 4 by 1.5 in.; 3 pairs (4) *A. Scortechinii*

Leaflets 8 lanceolate (5) *A. Kingiana*

Leaflets 8 to 10, ovate caudate (6) *A. glabriflora*

Leaves glabrous but scaly, not tomentose beneath.

Flowers depressed globular .04 in. wide; pedicels as long.

Calyx teeth 4 to 5 long spreading (7) *A. cinerea*

Calyx teeth 5 orbicular; leaves narrow silvery beneath (8) *A. odoratissima*

Leaflet-bases cordate broad sessile (9) *A. argentea*

Leaflet-bases narrow petiolulate (10) *A. splendens*

Flowers ovoid; pedicels shorter; flowers .08 in. long; calyx pubescent; lobes 5 broad ovate (11) *A. Forbesii*

Flowers .08 in. long; calyx 4 broad round; teeth whitish tomentose; leaflets ovate to obovate, pale beneath (12) *A. Kunstleri*

Flowers .05 in. long; calyx sub-glabrous, lobes free nearly to base; leaflets yellowish shining beneath (13) *A. squamulosa*

Leaves more or less pubescent beneath; midrib sometimes nerves scurfy pubescent only.

Leaflets oblong 18 by 5 in.; panicle lax; flowers very small (14) *A. membranifolia*

Leaflets 3 by 1.5 in., elliptic acute; panicle strict; branches short (15) *A. trichostemon*

Leaflets 8 by 3 in.; panicle short (16) *A. humilis*

Leaves pubescent or hairy on back.

Leaflets large densely tomentose on back as is panicle (17) *A. lanuginosa*

Leaflets thinly red-hairy on back.

Leaflets oblong coriaceous 7 by 2.5 in.; panicle short (18) *A. Curtisii*

Leaflets thin coriaceous oblong cuspidate 8 by 2 in.; panicle long; flowers densely crowded in spikes glabrous; tree 80 ft. tall (19) *A. Hiernii*

Leaflets thinly coriaceous oblong acute 9 by 4 in.; panicle long; flowers hairy; shrub 8 ft. tall (20) *A. tenuicaulis*

Leaflets 7 broad lanceolate acuminate both ends 8 by 3 in.; panicles shorter; flowers crowded; fruit globose red woolly (21) *A. cordata*

Leaflets numerous lanceolate base broad 6 by 1.5 in.; fruit small woolly (22) *A. palembanica*

Leaflets 8 pairs narrow lanceolate; flowers very small; fruit thinly red-pubescent (23) *A. Griffithii*

Leaves and branches on both sides densely red-hairy (24) *A. rubrbarbis*

Stamens 7 to 9.

Panicles .2 in. long; stigma long narrow 3-grooved; ovary 3-celled (25) **A. macrostigma**

Panicles 2.5 to 6 in. long; stigma thick cylindric bilobed; ovary 2-celled (26) **A. heteroclita**

(1) **A. oligophylla** *Miq. Fl. Ind. Bat. Supp.* 507; *King, l.c.* 63; *Koorders, Ic. Bogor i. t.* 84.

A small tree 15 to 20 ft. tall, 4 to 6 in. through. Leaves 5 to 9 in. long, at first puberulous; leaflets 3 to 5, membranous, obovate-oblong or elliptic acute or shortly acuminate, base cuneate; nerves 5 to 6 pairs, 3 to 6 in. long, 1.5 to 2.5 in. wide; petiolules .4 to .5 in. long. Panicles axillary 1.5 to 4 in. long, scurfy to glabrous. Flowers .075 in. long, globular. Calyx cupular flat puberulous, teeth round concave 5. Petals longer orbicular; anthers 5 ovate. Fruit globular, grey brown tomentose .5 to .6 in. through, on stout .1 in. pedicels. *Hab.* Dense low forest, rare, Singapore (Wallich 4887). Perak, Larut (Kunstler). *Distrib.* Burma, Sumatra.

(2) **A. salicifolia** *Ridl. Journ. Roy. As. Soc. S. Br.* 54, p. 32.

A shrub or small tree glabrous except inflorescence. Leaves 6 in. long; petioles .75 to 1.5 in. long; leaflets 5 sub-sessile narrow lanceolate acuminate at both ends coriaceous; nerves 12 pairs, 4 in. long, .5 to .75 in. wide. Panicle 6 in. long; branches slender few scaly and scurfy. Flowers .05 in. long globose yellow; pedicels longer. Calyx 5-lobed, lobes scurfy. Petals oblong glabrous. Stamen-tube oblong. Fruit elliptic nearly .5 in. long. *Hab.* River-banks on the east coast. Pahang, banks of Tahan River. Kelantan River at Jeram Panjang. *Native name*: Tada Ikan.

(3) **A. leucophylla** *King, l.c.* 66.

Tree 40 to 60 ft. tall glabrous. Branchlets ashy when dry. Leaves 2 to 3 ft. long; leaflets 11 to 13 membranous, lower ones alternate, upper opposite, oblong-lanceolate to ovate acuminate, base cuneate, pale beneath; nerves 9 to 15 pairs, 6 to 12 in. long; petiolules .25 to .6 in. long. Panicles 18 in. long. Branchlets 1 in., lowest 8 in. long. Flowers .05 to .075 in. long, globular yellow. Calyx of 5 acute lobes puberulous. Petals much longer orbicular yellow. Stamen-tube turbinate; anthers 5 or 6. Fruit (young) turbinate ashy-tomentose. *Hab.* Rare. Dense wet jungle. Perak, Larut (Kunstler).

(4) **A. Scortechinii** *King, l.c.* 64.

Tree. Shoots, petioles, inflorescence minutely brown scaly. Leaves 6 to 12 in. long; leaflets 7 to 9 opposite membranous lanceolate or oblong-lanceolate acuminate, base cuneate; nerves 7 to 10 pairs indistinct, 3.5 to 5 in. long, .11 to .13 in. wide; petiolules .1 to .3 in. long. Panicles 7 to 9 in. long spreading lax much-branched. Flowers numerous .05 in. across on longer pedicels. Calyx with 5 orbicular lobes. Petals 5 larger ovate-orbicular. Stamen-tube

depressed campanulate; anthers 5. *Hab.* Perak (Scortechini), only specimens known.

(5) **A. Kingiana** *Ridl. Journ. Roy. As. Soc. S. Br.* 82, p. 175.

Tree 30 to 40 ft. tall, 10 to 15 in. through. Leaves quite glabrous; leaflets thin coriaceous opposite 4 or more pairs lanceolate acuminate, base very shortly cuneate and hardly oblique; nerves 12 pairs very faint both sides, 3 to 4 in. long, 1·5 in. wide; petiolules ¼ to ½ in. long. Panicle 9 in. long, glabrous. Branches spreading, lowest 3 in. long. Branchlets ½ in. long. Flowers light yellow ½ in. long. Calyx narrowed to a stout pedicel, lobes 4 ovate round scurfy. Petals elliptic blunt. Stamen-tube ovoid shorter, mouth open; anthers 5 large exsert. Ovary hairy. *Hab.* Rare, dense jungle near limestone rocks. Perak, Goping (Kunstler).

Resembles *A. Ganggo* Miq., but the leaves are not oblique at base and the inflorescence not scaly.

(6) **A. glabriflora** *Hiern, in Hook. fil. F.B.I.* i. 555; *King, l.c.* 63.

A glabrous bush or treelet up to 25 ft. tall. Leaves 5 to 8 in. long; leaflets 8 to 10 alternate membranous deep shining green ovate caudate, base narrowed or lanceolate; nerves 4 pairs, 2 to 2·75 in. long, ¾ to 1·25 in. wide; petiolules ¼ to ½ in. long. Panicles 1·5 to 4 in. long spreading. Flowers ¼ in. long waxy yellow. Calyx cupular with 5 broad teeth. Petals 5 longer ovate. Stamen-tube urceolate; anthers 5. Fruit ellipsoid blunt white puberulous 1- or 2-seeded. *Hab.* Common in the south, edges of woods, Singapore, Tanglin; Changi. Malacca, Mt. Ophir (Griffith); Merlimau; Sadanen (Derry). Perak, Ulu Bubong (Kunstler). *Native names*: Pasak bras-bras; Mulupus; Pasak Merah.

(7) **A. cinerea** *King, l.c.* 66.

A shrub or treelet, 10 to 20 ft. tall, 2 to 3 in. through. Branchlets, petioles, rachis, inflorescence brown scaly. Leaves 9 to 12 in. long; leaflets 5 to 7 thinly coriaceous, pale beneath with few rusty scales alternate distant oblong or ovate acuminate, base cuneate; nerves 8 to 13 pairs, 2·5 to 6 in. long, 1 to 1·75 in. wide; petiolules ⅓ to ⅔ in. long. Panicles slender lax scurfy 5 to 7 in. long spreading. Flowers ¼ in. long globular; pedicels longer. Calyx lobes 4 or 5 unequal blunt pubescent. Petals little longer. Stamen-tube shorter campanulate; anthers 5. Fruit pyriform with a long pseudo-stalk pubescent scaly, light grey. *Hab.* Mountain forests, Selangor, Sempang Mines, Semangkok Pass (Ridley). Perak, Larut Hills, 3000 to 3500 ft. altitude (Kunstler).

The plants from the Sempang Mines have much broader leaflets than the Perak ones, in fact quite ovate, and the panicle is more scurfy, but I cannot separate them specifically.

(8) **A. odoratissima** *Bl. Bijdr.* 171; *King, l.c.* 67. *A. Roxburghiana* *Hiern, in Hook. fil. F.B.I.* i. 555, *not of Miquel*.

Tree 20 to 40 ft. tall. Branchlets, petioles, rachis, and inflorescence

brown scaly. Leaves 5 to 9 in. long; leaflets 5 to 7 oblong-lanceolate, or ovate, opposite thinly coriaceous bluntly acuminate, base cuneate, glabrous above, scaly beneath; nerves 6 to 9 pairs slender, 2 to 6 in. long, 1 to 2·5 in. wide; petiolules 2 in. long. Panicles 3 to 8 in. long. Branches spreading, dense-flowered. Flowers depressed globular 0·35 in. long, on pedicels as long. Calyx small, lobes 5 orbicular scaly. Petals 5 elliptic or obovate glabrous, much longer. Stamen-tube truncate campanulate. Fruit ovoid or sub-globose brown scaly. *Hab.* Common in forests and lowland woods. Singapore, Bukit Mandai; Reservoir Woods. Pahang, Pulau Tioman (Kloss); Labong Endau (Evans). Malacca (Maingay); Ching (Griffith). Negri Sembilan, Tampin. Selangor, Menuang Gasing (Kloss). Perak, Larut Hills (Kunstler); Temengoh. Province Wellesley, Tasek Gelugur. Penang, Pulau Betong and Government Hill (Curtis). *Distrib.* Java, Sumatra. *Native names:* Belankas hutan (lit. King-Crab tree, as the flowers resemble its eggs); Subulat jantan; Tumilang.

(9) **A. argentea** *Bl. Bijdr.* 170; *King, l.c.* 70; *Koorders and Valetton, Ic. Bogor. i. t.* 13.

A slender tree 10 to 20 ft. tall. Shoots, leaves except upper side and inflorescence covered with pale tomentum and silvery scales. Leaves 24 to 30 in. long; leaflets 7 to 11 alternate thinly coriaceous deep green above, brown or silvery beneath, oblong-lanceolate or elliptic acuminate, base cuneate or rounded; nerves 12 to 24 pairs elevate beneath, 5 to 9 (terminal 12 to 15) in. long, 2 to 5 in. wide; petiolules 2 in. long. Panicles very dense 3 to 5 in. (in fruit 8 in.) long or more; rachis thick. Flowers numerous sessile sub-globular, 0·08 in. long. Calyx deep cut into 5 round lobes, scaly. Petals twice as long orbicular glabrous. Stamen-tube globular; anthers 5. Fruit ovoid or obovoid rusty-pubescent and scaly brown, 0·8 to 1·25 in. long. *Hab.* Widely spread, but not common, in forests by rivers. Perak (Kunstler).

var. *eximia* *Miq. Ann. Mus. Bot. Lugd. Bat.* iv. 55. Petals elliptic. Stamen-tube ovoid. Leaflets cinnamon beneath not shining, 15 to 25 opposite sub-sessile, base round, 3 to 6 in. long. The commonest form. Perak, Chanderiang (Kunstler). Temengoh (Ridley).

(10) **A. splendens** *Koorders and Valetton, Ic. Bogor. i. t.* 14. *A. argentea* var. *Curtisii* *King, l.c.* 71.

Tree 30 to 40 ft. tall, 3 to 5 in. through. Leaves 12 in. or more long with distant oblong leaflets 15 to 19 narrowed slightly at each end, smooth above, silvery beneath; nerves about 20 pairs, slender, slightly elevate beneath, hardly visible above, midrib strongly elevate beneath, 6 in. long, 1·75 in. wide; petiolules 1 in. long. Inflorescence shorter than the leaves. Flowers 1·5 in. long. Calyx short, lobes rounded scaly. Petals elliptic-lanceolate, glabrous. Staminal-tube globose. Fruit pear-shaped silvery grey. *Hab.*

Dense jungle. Perak, Kwala Dipang, on limestone hills 200 to 300 ft. altitude (Kunstler). Penang, Waterfall (Curtis). *Distrib.* South Java.

(11) **A. Forbesii** King, *l.c.* 68.

Tree 40 to 80 ft. tall, 15 to 20 in. through. Branchlets, petioles (angled) and rachis densely minutely tomentose. Leaves 12 to 15 in. long; leaflets 8 to 10 membranous alternate oblong to elliptic cuspidate, glabrous above, scurfy beneath; nerves prominent 10 to 13 pairs, 3·5 to 5·2 in. long, 1·5 to 2·5 in. wide; petiolules stout grooved ·2 in. long. Panicles axillary stellate-tomentose, 4·5 to 9 in. long, spreading. Flowers ·08 in. long cream colour ovoid; pedicels shorter. Calyx campanulate of 5 deep ovate lobes pubescent. Petals 5 twice as long orbicular or ovate-orbicular glabrous. Stamen-tube shorter turbinate globular, teeth broad 5. Fruit ellipsoid or ovoid scurfy pubescent yellow 1 to 1·25 in. long, ·7 to ·9 in. through. *Hab.* Dense jungle from 300 to 1500 ft. altitude. Dindings, Pangkor (Curtis). Perak, Ulu Kal and Goping (Kunstler). *Distrib.* Sumatra.

(12) **A. Kunstleri** King, *l.c.* 69.

Tree 50 to 60 ft. tall, 10 to 20 in. through, spreading. Branches, petioles, etc., brown pubescent and scaly. Leaves light green, greenish yellow beneath, 18 to 25 in. long; leaflets 5 to 15 alternate sub-coriaceous oblong-lanceolate to elliptic long-acuminate, base cuneate or round, beneath pale minutely sparsely scaly; nerves 10 to 11 pairs slightly prominent beneath, 4·5 to 7·5 in. long, 1·75 to 2·75 in. wide. Panicles 3 to 9 in. long, much and shortly branched many-flowered. Flowers bright yellow ·08 in. long, oblong-globular. Calyx cupular tapering at base, lobes 5 blunt. Petals broad elliptic blunt. Stamen-tube globose; anthers 5. Fruit globular, waxy white, or greyish green tomentose ·8 in. through. *Hab.* Dense jungle rare, Perak, Ulu Bubong (Kunstler). Selangor, Semangkok Pass.

(13) **A. squamulosa** King, *l.c.* 68.

Tree 40 to 60 ft. tall, 8 to 12 in. through. Leaves 15 to 30 in. long; petioles and rachis scurfy; leaflets 11 to 15, alternate, coriaceous dark green above, silvery yellow grey covered with minute scales beneath, oblong narrowed to base; nerves bold beneath, 10 to 12 pairs, 4 to 10 in. long, 1·75 to 3·5 in. wide; petiolules stout ·36 to ·6 in. long. Panicles axillary much branched 10 to 12 in. long, lower branches 4 in. long. Flowers ovoid ·05 in. long yellow. Calyx of 5 round lobes free nearly to base. Petals 5, round glabrous. Stamen-tube globose; anthers 5. Fruit (unripe) narrow elliptic densely scaly. *Hab.* Dense hill jungle, rare. Perak, Ulu Bubong and Ulu Kerling (Kunstler).

(14) **A. membranifolia** King, *l.c.* 75.

Tree 8 to 20 or 30 ft. tall, 1·4 in. through. Leaves 2 to 3 ft. long glossy deep green covered with minute harsh tomentum;

leaflets 7 to 11 thinly membranous elliptic-oblong acuminate, base cuneate, dark green glabrous above, purplish sparsely minutely stellate-pubescent beneath, midrib pubescent; nerves 20 to 30 pairs bold beneath, 9 to 15 in. long, 2·75 to 5·5 in. wide; petiolules ·7 in. long. Panicles stellate-hairy over 2 ft. long; branches numerous spreading many-flowered long. Flowers ·035 in. long, depressed globular sub-sessile light yellow. Calyx rotate, lobes 5 round pubescent. Petals broad ovate or round glabrous. Stamen-tube cupular glabrous; anthers 5. Fruit ovoid or ovoid-globose with a short pseudo-stalk minutely tomentose, 1 in. long, ·75 in. through, light grey. *Hab.* Rocky jungles, Perak, Larut Hills 1000 to 1500 ft. altitude and Kinta, Gunong Malacca (Kunstler). *Distrib.* Sumatra.

(15) **A. trichostemon** C.DC. *Mon. Phan. Meliaceæ* 608; *King, l.c.* 77. *A. edulis* Hiern, *l.c.* i. 556.

Small tree about 20 ft. tall. Branches, rachis, inflorescence sienna-coloured woolly. Leaves dark shining green 18 to 27 in. long; leaflets 9 to 13 alternate and opposite sub-coriaceous oblong to elliptic acuminate, base round or cuneate, above glabrous, beneath stellate-pubescent; nerves 12 to 16 bold beneath, 4 to 8 in. long, 2 to 2·75 in. wide; petiolules ·25 to ·4 in. long. Panicles long; branches few spreading. Flowers obovoid-globose, ·06 in. long; pedicels shorter. Calyx lobes 5 round, brown woolly. Petals ovate round brownish woolly. Stamen-tube puberulous white; anthers 5. Fruit globular-ovoid yellow tomentose ·4 to ·6 in. long. Seeds orange. *Hab.* Forests in low country. Singapore, Garden Jungle; Jurong. Pahang, Kota Bharu, Tahan River; Sungei Chenei (Fox). Malacca, Jus (Derry). Perak, Maxwell's Hill. Selangor, Kwala Lumpur (Foxworthy). Penang (Wallich 8067B, *Cupania rufescens*). *Distrib.* Borneo.

(16) **A. humilis** King, *l.c.* 69.

Shrub or treelet 8 to 10 ft. tall. Leaves 18 to 26 in. long; leaflets alternate coriaceous glabrous except midrib and nerves beneath pubescent, oblong acuminate, base unequal cuneate; nerves 11 to 20 pairs bold below, 4 to 9 in. long, 1·75 to 3·5 in. wide; petiolules ·25 to ·6 in. long. Panicle 3 to 6 in. long; branches very short few-flowered. Flowers globular ·05 in. long. Calyx campanulate, teeth 5 rounded pubescent scaly outside. Petals elliptic. Stamen-tube obovoid globose; anthers 3. Fruit globular-obovoid 2-celled ashy pubescent. *Hab.* Selangor, Ulu Selangor (Kunstler). Perak (Wray).

(17) **A. lanuginosa** King, *l.c.* 71.

Tree 50 to 70 ft. tall, 15 to 20 in. through. Branches, rachis, inflorescence rusty-tomentose. Leaves 2 to 4 ft. long; leaflets coriaceous dark green above, soft velvety brown beneath; nerves 26 to 36 pairs bold beneath, 5 to 15 in. long, 2 to 3·5 in. wide; petiolules ·25 to 4 in. long. Panicles 12 in. long; branches few short

densely woolly. Flowers globose sessile $\cdot 1$ in. through. Calyx covering petals; lobes narrow woolly outside. Petals 5 elliptic. Stamen-tube glabrous. *Hab.* Dense jungle low country. The woolliest of our species. Perak, Gunong Bubu and Gunong Pondok (Kunstler).

(18) **A. Curtisii** King, *l.c.* 71.

Tree 60 to 80 ft. tall, 2 to 3 ft. through. Leaves 10 to 30 in. long; leaflets coriaceous 11 to 15, glabrous dark green above, brown tomentose beneath, sub-opposite oblong or elliptic acuminate; nerves 16 to 24 bold beneath, 6 to 9 in. long, 2 to 4 in. wide; petiolules $\cdot 2$ to $\cdot 35$ in. long. Panicles 6 to 8 in. long; branches few short erect, scurfy puberulous. Flowers reddish brown globose sessile over $\cdot 1$ in. through. Calyx lobes 4 round tomentose. Petals 5 glabrous. Stamen-tube sub-globular. Fruit pear-shaped rusty puberulous, 1.5 in. long, 1.25 in. wide. *Hab.* Forests, Dindings, Pangkor (Curtis). Perak, Batang Padang district (Kunstler).

(19) **A. Hiernii** King, *l.c.* 74.

Tree 80 to 100 ft. tall. Petioles and inflorescence densely shortly tomentose. Leaves 14 to 18 in. long; leaflets 7 to 9 opposite oblong or oblong-lanceolate acuminate, base cuneate sub-coriaceous above, glabrous except the hairy midrib and nerves, beneath sparsely red stellate-hairy (midrib densely hairy) and entirely scaly; nerves 13 to 22 pairs bold beneath, 4 to 6 in. (terminal one 7 in.) long, 1.75 to 2.25 in. wide; petiolules $\cdot 15$ in. long. Panicle 8 to 13 in. spreading. Flowers in dense, terminal spikes globular $\cdot 04$ in. through, sessile deep yellow glabrous. Calyx lobes 4 or 5 deep cut rounded. Petals round unequal. Stamen-tube cup-shaped wide-mouthed; anthers 5. *Hab.* Forests. Johor, Hulu Sembrong (Kelsall). Malacca (Maingay). Perak, Goping (Kunstler). *Native name*: Sapo Lilin.

This differs from *A. cordata* in its much larger size, stiffer, less hairy leaves and glabrous flowers.

(20) **A. tenuicaulis** Hiern, *l.c.* i. 556; King, *l.c.* 76.

Shrub or treelet 10 to 12 ft. tall, 2 to 3 in. through. Leaves 3 ft. long; petioles, rachis, branchlets and panicles densely rufous-tomentose; leaflets membranous oblong to elliptic acuminate or cuspidate, base cuneate, above glabrous, beneath red stellate-pubescent; nerves 15 to 20 pairs, 6 to 12 in. long, 2.5 to 4.5 in. wide; petiolules stout $\cdot 3$ to $\cdot 35$ in. long. Panicles 12 in. long; branches spreading dense-flowered. Flowers $\cdot 05$ in. long, globular; pedicels longer. Calyx pubescent outside, beneath cupular teeth 5 acute. Petals ovate glabrous. Stamen-tube globular; anthers 5. Fruit obovoid densely minutely rusty stellate-tomentose $\cdot 4$ in. long. *Hab.* Dense old jungle. Selangor, Kwala Lumpur. Dindings. Perak, Larut up to 2000 ft. altitude and near Ulu Kerling (Kunstler). Penang, Government Hill to 3000 ft. altitude (Maingay); Pulau Betong (Curtis). *Distrib.* Sumatra. *Native name*: Kasip Bukit.

(21) **A. cordata** *Hiern, l.c. i. 557; King, l.c. 73.*

Tree 20 to 30 ft. tall, 3 to 4 in. through, resembling *A. palembanica*, but leaves larger 7 to 15 in. long. Leaflets 7 to 9 with 10 to 14 pairs of nerves, 1.75 to 6 in. long, .75 to 2.25 in. wide. Panicles axillary; branches short dense, spike-like. Flowers .035 in. through sub-sessile. Fruit globular or ovoid, densely brown tomentose, .5 to .65 in. through. *Hab.* Common up to 1500 ft. altitude in forests. Singapore, Selitar. Malacca, Bukit Panchur; Jasin (Derry). Perak, Thaiping; Temengoh. Penang Hill (Burkill and all collectors).

(22) **A. palembanica** *Miq. Flor. Ind. Bat. Supp. 507; King, l.c. 72; Hiern, F.B.I. i. 557.*

Shrub or tree up to 20 ft. tall. Shoots, petioles, rachis brown-tomentose. Leaves 4 to 9 in. long; leaflets 5 to 9 sub-opposite membranous oblong-lanceolate to ovate acuminate, base cuneate, terminal one longer and more narrowed at base, glabrous above, stellate-hairy beneath, midrib densely brown-velvety; nerves 6 to 11 pairs, 1.5 to 5 in. long, .65 to 1.75 in. wide; petiolules .15 in. long. Panicles 1.5 to 4 in. long; branches short. Flowers globular .025 in. across. Calyx-lobes 5 narrow acute tomentose outside. Petals obovate elliptic glabrous. Stamen-tube glabrous, mouth entire. Fruit ellipsoid .75 in. long, .6 in. wide brown-tomentose. *Hab.* In woods up to 2500 ft. altitude common, Singapore, Stagmount. Malacca, Batang Malacca (Derry). Selangor, Sepang. Perak, Sungkei (Burn-Murdoch); Relau Tujor (Wray); Maxwell's Hill. Penang to 2000 ft. altitude. Lankawi, Gunong Raya (Haniiff). *Distrib.* Bangka, Sumatra, Borneo.

(23) **A. Griffithii** *Kurz, Journ. As. Soc. Beng. xlv. 146; King, l.c. 75.*

Tree 30 to 50 ft. tall. Branchlets, petioles, inflorescence densely stellate-pubescent. Leaves 12 to 18 in. long; leaflets 13 to 19, opposite or sub-opposite narrow elliptic or oblong-lanceolate acuminate, base rounded or sub-cuneate, above glabrous except midrib, beneath sparsely stellate-pubescent pale, beneath midrib and 10 to 12 pairs of bold nerves tomentose, 2.5 to 5 in. long, 1 to 1.4 in. wide; petiolules .15 in. long. Flowers .025 in. wide. Calyx pubescent outside, lobes deep 5. Petals twice as long glabrous. Staminal-tube shorter glabrous; anthers 5. Fruit globose .4 in. through, sparsely pubescent brown. *Hab.* Forests, Malacca (Main-gay). Pahang, Rumpin (Watson); Perak, Larut Hills (Kunstler). Penang Hill and Muka Head (Curtis). *Native name:* Balun hijau.

King's description of the fruit of this belongs to another species.

(24) **A. rufibarbis** *Ridl. Journ. Roy. As. Soc. S. Br. 75, p. 17. A. rufa Ridl. Journ. Roy. As. Soc. S. Br. 54, p. 32, not of Miquel.*

Big tree. Branches densely covered with red-stellate hairs.

Leaves 12 in. or more long; petioles 6 to 9 in. long, densely red-hairy; leaflets 14 pairs sessile oblong cuspidate membranous, hairy on both sides, densely on the midrib beneath, 4 to 6 in. long, 3 in. wide. Panicles 6 to 12 in. long, much-branched densely hairy. Flowers shortly pedicelled. Calyx lobes ovate acute with tufts of hairs longer than the smaller orbicular glabrous petals. Stamen-tube semi-globose; anthers 5. Malacca (Cantley). *Native name*: Tambu Gulong. *Use*: Timber used for beams. Fruit, sweet edible.

No specific locality is given by Cantley, and the plant has never been found again, striking as its appearance must be.

(25) **A. macrostigma** King, *l.c.* 78.

Tree 40 to 60 ft. tall, 8 to 12 in. through. Leaves 2·5 to 4 ft. long; petioles very long and like rachis and inflorescence covered with scales; leaflets 15 to 17 opposite membranous elliptic to oblong acutely acuminate, base rounded glabrous; midrib and nerves 12 to 20 pairs beneath scaly, prominent, 5 to 10 in. long, 2 to 4 in. wide; petiolules 5 to 7 in. long. Panicle 12 in. long; branches stout many-flowered. Flowers obovoid 0·8 in. long; pedicels tomentose. Calyx cup-shaped with 4 broad teeth, rusty tomentose. Petals glabrous imbricate, 2 outer ones orbicular, 3 inner smaller elliptic. Stamen-tube cupular 8- to 10-toothed; anthers 7 or 8 exserted. Stigma large 3-angled. Fruit elliptic-obovoid with short pseudo-stalk, scaly 1·5 in. long, 1 in. through. *Hab.* Mountain forests, Perak, Larut Hills 1000 to 1500 ft. altitude (Kunstler).

(26) **A. heteroclita** King, *l.c.* 78.

Tree 30 to 40 ft. tall, 5 to 7 in. through, glabrous except inflorescence and underside of leaves. Leaves 18 to 30 in. long; leaflets 8, 10 or 11 alternate thinly coriaceous light green, oblong to elliptic-oblong acuminate, base cuneate, a few rusty stellate scales beneath; nerves 12 to 16 pairs hardly elevate beneath, 4 to 7 in. long, 1·5 to 2·75 in. wide; petiolules 35 to 75 in. long. Panicles 2·5 to 6 in. long; branches stout erect dense-flowered. Flowers 125 in. long sub-globular on shorter thick pedicels waxy deep yellow. Calyx fleshy gland-dotted, corrugate, lobes 5 broad rounded. Petals 5 elliptic blunt. Stamen-tube globular-cylindric; anthers 7 or 8. Fruit pear-shaped apiculate scaly tomentose, 1 in. long, 1- or 2-seeded. *Hab.* Mountain woods. Perak, Gunong Batu Putih (Wray); Ulu Kal (Kunstler).

10. LANSIUM, Jack.

Trees. Leaves pinnate; leaflets few coriaceous. Flowers bisexual small on spikes, racemes or panicles. Sepals round imbricate. Petals round concave imbricate. Stamen-tube globose, mouth entire or crenulate; anthers 10, usually in 2 rows. Disc

obsolete. Ovary globose 3- to 5-celled, cells 1- to 2-ovuled; style very short thick. Stigma 3- to 5-lobed. Fruit baccate 1- to 5-celled; cells 1- or 2-seeded. Seed oblong in a pulpy aril. Species 4, Indo-Malayan.

- | | |
|------------------------------------------------------------------------------------------|----------------------------|
| Leaflets 5 to 10 in. long; flowers nearly sessile, on stem and branches | (1) L. domesticum |
| Leaflets 4 to 5 in. long; flowers distinctly pedicelled on branches | (2) L. pedicellatum |
| Leaflets lanceolate blunt 2 to 3 in. long; flowers on slender axillary racemes | (3) L. cinereum |

(1) **L. domesticum** Jack, *Trans. Linn. Soc.* xiv. 115, t. iv. fig. 1; *Hiern, l.c.* i. 558; *King, l.c.* 81.

Tree about 20 to 30 ft. tall. Bark pale. Leaves 12 to 18 in. long; leaflets alternate oblong elliptic or obovate, abruptly short acuminate, base narrowed, light shining green glabrous; nerves 10 pairs prominent beneath, 5 to 10 in. long, 2·75 to 4 in. wide; petiolules ·5 in. long. Flowers yellow in pubescent spikes, long fascicled or solitary from the old wood sessile. Calyx fleshy puberulous, lobes 5 round. Petals glabrous. Stamen-tube subglobose; anthers in 1 row. Ovary tomentose 5-celled. Berry oblong ovoid or globose, finely tomentose cream buff, 1 to 1·5 in. long; pericarp leathery. Seeds 1 or 2 thin, with several abortive ones embedded in a translucent sweet aril. There are two forms, *Langsat*, with usually oblong fruit and thin rind containing a milky latex, and the *Duku*, more globose with thick rind and no latex, cultivated only. *Hab.* The *Langsat* is cultivated, and wild in forests, Malacca, Selangor; Mt. Ophir woods. Selangor, Batu Caves; Bukit hitam; Ginting Bidai. Perak, Blanda Mabok (Wray). Penang. *Native name*: *Langsat hutan*. *Distrib.* Malay islands.

var. *pubescens* Koorders. Leaves, underside and flower rachis pubescent. Selangor, Kwala Lumpur, Weld's Hill (Foxworthy).

(2) **L. pedicellatum** *Hiern, l.c.* i. 558; *King, l.c.* 82.

Tree. Branchlets scaly. Leaves 9 to 12 in. long; leaflets 3 or 5 alternate or sub-opposite thinly coriaceous elliptic shortly sharp acuminate, base cuneate oblique glabrous; nerves 8 to 10 pairs, 3 to 6 in. long, 1·5 to 2·5 in. wide; petiolules ·15 to ·25 in. long. Female flowers in racemes axillary 1 to 2 in. long. Flowers on pedicels ·1 to ·15 in. long. Ovary minutely tomentose 4-celled. Stigma sessile. Fruit young fleshy tomentose. *Hab.* Malacca (Maingay). A very dubious plant only once collected.

(3) **L. cinereum** *Hiern, l.c.* i. 550; *King, l.c.* 81.

Tree. Branchlets tawny-pubescent, eventually ashy. Leaves 3 to 5 in. long; leaflets 3 to 5 opposite sub-coriaceous elliptic-oblong cuspidate blunt, base acute glabrous; nerves numerous fine obscure, 2 to 3 in. long, ·8 to 1·5 in. wide. Spikes 1·5 in. long, slender glabrous. Flowers distant few ·15 in. long, sessile. Calyx cupular with 5 rounded teeth puberulous. Petals obovate glabrous;

anthers oblong mucronate. Ovary globose pubescent 5-celled.
Hab. Malacca (Maingay), only once collected.

11. WALSURA, Roxb.

Trees. Leaves 1- to 9-foliolate; leaflets opposite glaucous beneath. Panicles axillary and terminal. Flowers small bisexual. Calyx short 5-lobed, imbricate in bud. Petals 5 ovate oblong. Filaments 10 or 8, linear free or connate in a tube; anthers terminal or inserted in a notch in the filament. Disc annular. Ovary short 2- or 3-celled, imbedded in the disc; ovules 2 in each cell; style short. Stigma capitate 2- or 3-toothed. Fruit baccate tomentose indehiscent 1- rarely 2-celled and seeded. Seed arillate. Species 12, Indo-Malayan.

Filaments united near base.

Leaflets 5 to 9; panicles short 2 to 3 in. long . . . (1) **W. multijuga**

Leaflets 5; panicles 7 to 14 in. long.

Nerves 6 pairs (2) **W. villosa**

Nerves 8 to 10 pairs (3) **W. neurodes**

Filaments united half-way.

Leaflets 2 pairs; panicles 12 to 14 in. long . . . (4) **W. tenuifolia**

(1) **W. multijuga** *King, l.c.* 83.

Tree 15 to 30 ft. tall, 2 to 3 in. through. Branchlets, rachis, inflorescence puberulous. Leaves 5 to 10 in. long; leaflets 5 to 9 sub-coriaceous lanceolate to ovate acuminate, base narrowed or rounded oblique; nerves 5 to 6 pairs, 2½ to 5 in. long, ⅞ to 1½ in. wide; petiolules ⅓ to ½ in. long. Panicles umbellate cymose axillary and terminal; peduncles 1 to 2 in. long, heads 1 in. across. Flowers white ⅓ in. long; pedicels shorter. Calyx teeth broad spreading. Petals 5 broad elliptic obtuse. Stamens 10 pink; filaments united in a tube at the base, above free, glabrous outside. Ovary glabrous. Fruit ovoid or globose apiculate rusty-tomentose ½ in. long dark green velvety. *Hab.* Dense lowland forest. Malacca, Jus (Cantley). Perak, Larut and Ulu Bubong (Kunstler); Waterfall, Thaiping (Wray). *Native names:* Pasak Lingga Merah; Laka Laka Jantan. *Distrib.* Borneo.

(2) **W. villosa** *Wall. Cat.* 1264; *Hiern, in Hook. fil. F.B.I.* i. 564.

Tree 25 ft. tall. Leaves under 6 in. long; leaflets 5 elliptic acuminate, 3 to 5 in. long, 1½ in. wide, thinly coriaceous glaucous beneath; nerves 6 pairs; petiolules ¼ in. long. Panicles 14 in. long minutely pubescent lax. Flowers ⅓ in. long. Calyx lobes 5 ovate acute pubescent. Petals twice as long oblong pubescent. Stamens 10 free nearly to base hairy; anthers pubescent. Ovary silky hairy. *Hab.* In forests rare. Selangor, Gombak (Burn-Murdoch). Perak, Kamuning. *Distrib.* Tenasserim, Siam, Cambodia.

(3) **W. neurodes** *Hiern, l.c.* i. 564; *King, l.c.* 83.

Tree. Branchlets puberulous, otherwise glabrous. Leaves 6 to

8 in. long; leaflets 5, coriaceous glaucous beneath, elliptic-oblong shortly blunt acuminate, base cuneate or round; nerves 8 to 10 pairs elevate beneath, 2 to 4 in. long, 1 to 2 in. wide; petiolules .25 to .35 in. long. Panicles 7 to 12 in. long many. Flowers not numerous at tips of branches .15 in. long. Calyx teeth ovate. Petals puberulous outside elliptic. Stamens 10 pubescent slightly united below. Ovary pubescent. Fruit elliptic-ovoid, tip round, minutely puberulous .65 in. long. *Hab.* Malacca (Maingay, Griffith).

(4) **W. tenuifolia** *Ridl. Journ. Roy. As. Soc. S. Br.* 75, p. 17.

Tree, glabrous except the flowers. Leaves 5 in. long; leaflets opposite 2 pairs thin membranous, glaucous beneath, elliptic acuminate acute, base rounded or shortly cuneate; nerves about 8 pairs elevate beneath, reticulations fine conspicuous, 2 to 4 in. long, 1 to 1.5 in. wide; petiolules .2 in. long. Panicles 12 to 14 in. long lax with distant branches 1.5 in. long, glabrous below, scurfy above. Flowers few .2 in. long. Calyx minutely puberulous short, 5 acute lobes. Petals oblong obtuse puberulous outside, glabrous within. Stamens connate for half their length pubescent on both sides; filaments linear-subulate. Ovary cylindric glabrous; style stout shorter than the stamens. Disc thick fleshy annular. *Hab.* Forests. Rare, Perak, Kamuning (Ridley).

12. HEYNEA, Roxb.

Trees or shrubs. Leaves 5- to 11-foliolate; leaflets opposite. Panicles terminal and axillary corymbose pedunculate. Flowers small bisexual. Calyx 4- to 5-fid imbricate. Petals 4 or 5 oblong imbricate. Stamen-tube 8- to 10-fid, lobes linear bidentate; anthers between the teeth. Disc annular. Ovary immersed in disc 2- or 3-celled, ovules 2 in each cell; style short. Fruit capsular 1-celled, 2-valved. Seed 1, aril thin white. Species 1 to 3, Indo-Malaya.

(1) **H. trijuga** *Roxb. Hort. Beng.* 33; *Bot. Mag.* 1738; *Hiern, in Hook. fil. F.B.I.* i. 565; *King, l.c.* 86.

Tree 15 to 20 ft. tall. Leaves 6 to 16 in. long; leaflets ovate to ovate-lanceolate acuminate, base round or cuneate, glaucous beneath or not; nerves 6 to 8 pairs, 2.5 to 5.5 in. long, .8 to 2.75 in. wide; petiolules .15 to .45 in. long. Panicles glabrous 6 to 9 in. long; peduncle 4 to 6 in. long. Flowers white .15 in. long. Fruit ovoid beaked. *Hab.* Perak, Larut (Kunstler). Penang, Penara Bukit, and Balik Pulau (Curtis). var. *multijuga* (leaflets 11). Probably introduced only. *Native name:* Manchabei. *Distrib.* India, Sumatra.

13. BEDDOMEA, Hook. fil.

Trees or shrubs with simple or pinnate leaves. Flowers bisexual small. Sepals 5. Petals 5 orbicular imbricate. Stamens 5; anthers lanceolate connivent into a cone sub-sessile in a fleshy

ring composed of the filaments and disc. Pistil adnate to the disc; ovary hairy. Species 2 or 3, S. India, Malaya.

(1) **B. racemosa** *Ridl. Journ. F.M.S. Mus.* iv. 10.

A large tree. Young parts ferruginously tomentose. Leaves simple glabrous when adult, thinly coriaceous ovate to elliptic-ovate sub-acute, base narrowed, 4 to 8 in. long, 2·5 to 4 in. wide; petioles ·25 to 1 in. long. Flowers 1 in. long greenish white in racemes 2 or 3 axillary, tomentose 2 to 6 in. long. Sepals oblong tomentose. Petals glabrous larger. *Hab.* Dense forests. Perak, Ulu Batang Padang, near the Telom Valley (Ridley).

14. CARAPA, Aubl.

Glabrous littoral trees. Leaves 2- to 4- or 6-foliolate; leaflets opposite coriaceous; nerves faint. Panicles lax, axillary cymose. Flowers small white bisexual. Calyx 4-fid. Petals 4. Stamen-tube urceolate-globose 8-dentate, teeth bipartite; anthers 8 included alternating with teeth. Disc fleshy cup-shaped. Ovary 4-celled, 4-grooved; cells 2- to 8-ovuled; style short. Stigma discoid. Fruit large globose 4-celled 6- to 12-seeded; pericarp leathery brown dehiscing by 4 valves. Seeds large angular irregular, testa thick soft spongy. Species 6, tropics.

Leaves obovate blunt narrowed to the base . . . (1) **C. obovata**
Leaves ovate sub-acute broad at base . . . (2) **C. moluccensis**

(1) **C. obovata** *Bl. Bijdr.* 179; *King, l.c.* 87.

Low tree. Leaves 3 to 6 in. long; leaflets bright green, 1 or 2 pairs obovate, 3 to 3·75 in. long, 1·5 to 2 in. wide; petiolules ·2 to ·35 in. long. Panicles 1·5 to 2·5 in. long stout. Flowers few ·25 in. long; pedicels ·3 to ·5 in. long. Calyx lobes rounded. Petals white broad elliptic imbricate. Fruit the size of an orange. *Hab.* Tidal rivers, common. Singapore, Pasir Panjang. Johor, Pulau Kukub. Pahang. Selangor, Klang (Foxworthy). Province Wellesley (Brooks). *Distrib.* Bengal, Malay islands, Africa. *Native name*: Nireh Bunga.

(2) **C. moluccensis** *Lam. Encycl. Method.* i. 621; *King, l.c.* 87.

Tree usually about 40 ft. tall, 1 to 2 ft. through with flaking bark, much branched. Leaves 4 to 10 in. long; leaflets 2 pairs coriaceous dark green ovate to ovate-oblong sub-acute, base broad, 2 to 4 in. long, 1·5 to 1·75 in. wide. Panicles 3 to 5 in. long slender with spreading branches. Petals white rather broader than in *obovata*. Fruit large globular brown, about 6 in. through or more. *Hab.* Very common in all tidal forests and mangroves. Whole peninsula from Singapore to Lankawi. *Distrib.* Africa, Asia, Fiji. *Native name*: Nireh Batu. *Use*: Timber very hard, as a rule too short and bent for beams and hard to cut, valued as firewood. Bark astringent, valued for dysentery.

15. CHICKRASSIA, Adr. Juss.

Tree with paripinnate leaves; leaflets alternate or opposite oblique entire. Panicles terminal. Flowers 4- or 5-merous. Calyx toothed. Petals oblong imbricate. Stamen-tube cylindric, teeth 10; anthers 10. Disc 0. Ovary cylindric stalked 3-celled; ovules numerous in 2 rows; style short stout. Stigma capitate. Capsule woody 3-celled loculicidal. Seeds numerous flat winged below. Species 1.

(1) *C. tabularis* Juss. *Mem. Mus.* xix. 251, t. 22, f. 27; *Wight, Ill.* t. 56; *King, l.c.* 88.

Tall tree. Leaves 12 to 18 in. long; leaflets 10 to 16 ovate to oblong acute or acuminate, base rounded on one side, narrowed on the other, glabrous above, velvety beneath (var. *velutina*) or glabrous, 2 to 5 in. long, 1 to 2.5 in. wide; petiolules .15 to .35 in. long. Panicles 6 in. long pubescent. Flowers white .4 to .5 in. long pubescent. Capsule ovoid 1.75 in. long. Seeds .65 in. long. *Hab.* Malacca, Selandor (Cantley). Penang, Balik Pulau (Curtis). Possibly introduced from India. *Distrib.* India, China. *Native names*: Chenana Putih; Suntang; Suntang Putih. *Use*: Timber for building. Bark a decoction used for fever.

15. CEDRELA, Linn.

Tall tree. Leaves pinnate; leaflets numerous opposite or sub-opposite entire or serrate. Panicles sub-terminal. Flowers 5-merous white. Calyx short 5-lobed. Petals oval. Stamens 5 free on a thick 5-lobed disc. Ovary sessile on the disc 5-celled, 8 to 12 ovules in each cell in 2 rows; style filiform. Stigma discoid. Capsule thinly woody 5-celled, 5-valved. Seeds flat winged at each end. Species 16, tropics of both worlds.

(1) *C. febrifuga* Forst. *Diss. Cedrel.* 16; *King, l.c.* 89.

Tree 80 to 100 ft. tall, 2 to 3 ft. through. Leaves 15 to 24 in. long glabrous; leaflets 7 to 10 pairs oblique ovate-oblong membranous, base broad unequal; nerves 12 to 15 pairs, 3.5 to 4.25 in. long, 1.75 to 2 in. wide; petiolules .2 in. long. Panicles 12 to 18 in. long lax, glabrous. Flowers .2 in. across pubescent. Capsule 1 in. long, pale lenticellate. Seeds .6 to .7 in. long. *Hab.* Perak, Ulu Bubong, dense jungle (Kunstler). Penang (Curtis). *Distrib.* India, Java. Probably introduced from India by Tamils.

ORDER XXXVI. CHAILLETIACEÆ.

Shrubs or trees often scandent. Leaves simple alternate coriaceous. Stipules 2. Flowers small uni- or bi-sexual, white or yellow, in axillary rarely terminal cymes. Sepals 5 more or less connate at base imbricate. Petals 5, bilobed or notched. Stamens

5, sub-perigynous free or adnate to corolla; anthers oblong, connective often thickened at the back. Disc of 5 glands or scales or a 5-lobed cup. Ovary free pubescent or villous 2- or 3-celled; ovules anatropous, pendulous in pairs from the top of the cells; styles 1 to 3. Stigmas simple or capitate. Drupe pubescent or hispid oblong, transversely oblong or didymous compressed; epicarp dehiscent or not, 1- to 3-celled. Seeds pendulous; testa membranous albuminous. Tropics generally, 3 genera and about 40 species (King, *Journ. As. Soc. Beng.*, lxiv. 90).

CHAILLETIA, DC.

Shrubs often climbing. Sepals unequal united at base, blunt. Petals 5 bilobed free, narrow. Stamens sometimes adnate to petals at base. Disc of 5 quadrate glands opposite the petals. Species about 30, chiefly American, some in Asia and Africa.

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|----------------------------------------------------------------------------------|----------------------------|
| Shrub. Leaves quite glabrous; cymes globular very small; leaves thin elliptic | (1) <i>C. tenuifolia</i> |
| Climber. Leaves coriaceous ovate-elliptic; nerves prominent | (2) <i>C. tessellata</i> |
| Climber. Leaves coriaceous; cymes lax small; nerves faint | (3) <i>C. Laurocerasus</i> |
| Climber. Midrib pubescent on back; leaves elliptic cuspidate, thin coriaceous | (4) <i>C. Helferiana</i> |
| Climber. Panicles lax peduncled. Leaves lanceolate-oblong glabrous except midrib | (5) <i>C. Hookeri</i> |
| Climber. Leaves oblong 3 in. long nearly glabrous | (6) <i>C. sordida</i> |
| Climber. Leaves ovate-lanceolate broad 5 in. long tomentose beneath; cymes large | (7) <i>C. deflexifolia</i> |
| Shrub. Whole plant and large fruit rough hairy, erect | (8) <i>C. Griffithii</i> |

(1) *C. tenuifolia* King, *l.c.* 91.

Shrub 6 ft. tall to treelet 15 ft. tall. Leaves thin membranous wrinkled elliptic-lanceolate tapering to both ends glabrous; nerves 5 to 8 pairs bold beneath, 6 to 8 in. long, 2·25 to 2·75 in. wide; petioles strigose ·15 in. long. Cymes globular ·25 to ·4 in. wide; pedicels ·15 in. long strigose. Flowers ·05 in. wide. Sepals elliptic obtuse, silky outside. Petals shorter broader, glabrous slightly bifid sub-acute. Stamens shorter silky; anthers oblong. Ovary ovoid silky. Fruit deeply 3-lobed ·6 in. long, ·75 in. wide, light yellow. *Hab.* Rare 300 to 2000 ft. altitude in rocky jungle. Perak, Larut Hills and Selama (Kunstler).

(2) *C. tessellata* King, *Journ. Roy. As. Soc. Beng.* lxxv. 515.

Climber 10 to 15 ft. long, glabrous. Leaves coriaceous elliptic or elliptic-oblong, shortly abrupt-acuminate, base narrowed; nerves 6 to 7 pairs inarching far from edges, 4·5 to 5 in. long, 2·5 to 3 in. broad; petioles ·4 in. long transversely rugose. Cymes in pairs much branched ·5 to 1 in. across. Sepals oblong obtuse tomentose outside, glabrous inside. Petals glabrous obovate sub-acute deeply bifid, lobes oblanceolate. Stamens longer glabrous,

connective orbicular; anther-cells on edge. Ovary ovoid woolly.
Hab. Perak, Trong (Wray).

(3) *C. Laurocerasus* Planch. in Hook. fil. *F.B.I.* i. 572; King, *l.c.* *Journ. As. Soc. Beng.* lxiv. 93.

A scandent glabrous shrub, 30 to 40 ft. long. Leaves coriaceous elliptic blunt acuminate base narrowed, shining dark green; nerves 7 to 8 pairs, 3·5 to 4·5 in. long, 1·5 to 2·5 in. wide; petioles 1 in. long. Cymes globose few-flowered 3 in. through, pedunculate. Flowers 1·5 to 2 in. wide. Sepals hoary outside, glabrous inside, ovate or orbicular. Petals longer glabrous, cut half-way down



FIG. 41.—*Chailletia Laurocerasus*.

into 2 oblong blunt lobes; filaments nearly as long. Ovary silky. Fruit transversely oblong or globose 1·25 in. through hairy. *Hab.* Forests local. Perak, Goping (Kunstler). Penang Hill (Wallich 7513, Curtis). Common. *Native name*: Tahi Ulat.

(4) *C. Helferiana* Kurz. *Journ. As. Soc. Beng.* xli. (2), 297; King, *l.c.* 92.

Scandent shrub 6 to 8 ft. long. Leaves thinly coriaceous elliptic abruptly acutely acuminate, base cuneate, glabrous, midribs strigose; nerves 7 or 8 pairs faint, 4 to 6 in. long, 1·25 to 2·25 in. wide; petioles 25 in. long strigose. Cymes 5 in. across; pedicels

·3 in. long strigose. Flowers sub-globular less than ·1 in. long, white. Sepals ovate blunt, silky outside, pubescent inside. Petals smaller elliptic shortly bifid blunt. Filaments very short; anthers ovate. Ovary silky. Fruit globose or transversely oblong tomentose dehiscent into 4 valves ·4 in. long, ·5 in. wide. *Hab.* Open country in the north. Lankawi islands (Curtis). Perlis, Chupeng (Ridley). *Distrib.* Tenasserim, Burma. *Native name:* Gunda Mahmot.

(5) **C. Hookeri** King, *l.c.* 91.

A climber nearly glabrous. Leaves coriaceous oblong obtuse to oblong-lanceolate, base slightly narrowed blunt, glabrous except on the midrib, finely reticulate and shining on both sides; nerves 8 to 10 pairs, 4·5 to 6·5 in. long, 1·5 to 2 in. wide; petioles ·5 to ·75 in. long, strigose. Cymes in pairs dichotomous tomentose 1 to 2 in. across; peduncles ·5 to ·75 in. long. Flowers ·1 in. long. Sepals oblong blunt silky-tomentose outside, glabrous inside. Petals glabrous shorter broader, deeply cut into 2 obovate over-lapping lobes. Stamens as long glabrous; anther-cells on the edge of connective. *Hab.* Very rare, forests. Perak (Scortechini). Penang (Porter, Wallich, 7443).

(6) **C. sordida** Ridl. *C. deflexifolia* var. *sordida* Hook. fil. *F.B.I.* i. 571.

Climbing shrub. Leaves elliptic narrowed at the base shortly acuminate, glabrous and shining above, except the pubescent midrib and 4 to 5 pairs of slender nerves, 2·75 to 4·5 in. long, 1·5 to 2 in. wide; petioles ·1 in. long pubescent. Panicles in pairs axillary 1 in. long or less, scurfy puberulous, often sub-globose and nearly sessile when young. Sepals elliptic obtuse hairy. Petals yellow. Fruit obovoid dehiscent into 3 lobes at the tip, yellow tomentose ·6 in. long. *Hab.* South of the peninsula. Singapore (Wallich 9016, Maingay). Bajau River. Johor, Kota Tinggi.

This has been confused with the next, but differs in its leaves being always much smaller and narrowly elliptic.

(7) **C. deflexifolia** Turcz. *Bull. Mosc.* 1863 (1), 611; King, *l.c.* 94 var. *tomentosa*. *Dichapetalum malaccense*, *Engl. Jahrb.* xxiii. 143.

Climber 30 to 70 ft. long. Branchlets, underside of leaves, and cymes all tomentose. Leaves thinly coriaceous elliptic-obovate retuse, above glabrous; nerves 5 to 7 pairs, 4·5 to 6·5 in. long, 2·5 to 3·25 in. wide; petioles ·3 to ·4 in. long. Cymes often terminal dichotomous as much as 3 in. across; peduncles 1 to 1·25 in. long. Flowers ·25 in. long white. Sepals oblong-lanceolate deflexed, tomentose outside, glabrous inside. Petals as long deeply cut into 2 lanceolate lobes. Stamens as long. Ovary depressed-globular. Fruit round reniform silky pitted 1 in. broad, green. *Hab.* Forests. Malacca, Sungei Baru; Merlimau. Negri Sembilan, Tampin

(Goodenough). Perak, Larut (Kunstler); Gunong Keledang. *Distrib.* Java. *Native names*: Akar Pah Kudah; Akar Tugor Pontianak.

(8) **C. Griffithii** Hook. *fil.* *F.B.I.* i. 571; *King*, *l.c.* 82. *C. setosa* King, *Journ. As. Soc. Beng.* lxx. 515.

Slender shrub with bristly stems. Leaves membranous oblong-lanceolate acuminate, base cordate, above glabrous, midrib bristly, edges and nerves beneath bristly; nerves 9 to 11 pairs elevate beneath, 4 to 7 in. long, 1 to 2 in. wide. Cymes 4 in. long compact at first globose, bristly. Flowers campanulate white 25 in. across. Sepals ovate densely silky outside, pubescent inside. Petals glabrous obovate bifid as long as and broader than sepals. Stamens as long. Ovary ovoid silky. Fruit pyriform, densely hairy, 1.5 in. long, .75 in. wide. *Hab.* Forests, not rare. Malacca, Chabau (Griffith). Negri Sembilan, Gunong Angsi. Selangor, Batu Caves; Batang Berjuntai (Ridley). Perak, Goping (Kunstler); Ulu Bubong (Kunstler). *Native names*: Akar Putih Angin; Kerutot; Akar Putih Kambing.

By some mistake King gives this as a climber 15 to 20 ft. long. It is quite a small erect shrub. The *C. setosa* King of Ulu Bubong seems to me to be a form with stiffer and rather more hairy leaves.

ORDER XXXVII. OLACINEÆ.

Trees and shrubs, sometimes climbing. Leaves alternate rarely opposite simple exstipulate. Inflorescence cymose or racemose terminal or axillary. Flowers regular bi- or uni-sexual. Calyx small 4- or 5-toothed free or adherent to fruit. Petals 3 to 6 valvate or imbricate. Stamens 3 to 15 inserted with the petals; anthers 2-celled dehiscing longitudinally. Disc hypogynous, cup-shaped or none. Ovary free, 1- or imperfectly 2- to 5-celled; style simple or 0. Stigma 1 or rarely 2. Ovules 1 to 5 pendulous from a minute free central placenta or from side or apex of the ovarian cavity. Fruit drupaceous or dry indehiscent, 1- rarely 2-celled and seeded. Seed pendulous. Albumen fleshy. Species about 200, tropics of both hemispheres.

I exclude the section *Opilieæ* (*Cansjera* and *Lepionurus*) referred to the neighbourhood of *Santalaceæ*. The rest of the order really consists of an assemblage of plants characterised mainly by the pendulous ovule. It is usual now to keep the *Icacineæ* as a separate order. I have, to save space, kept all the sections under *Olacineæ* except *Cardiopterideæ*, which is put under *Gamopetalæ* near *Convolvulaceæ*. *Braceæ*, King is *Sarcosperma* (*Sapotaceæ*). (King, *Journ. As. Soc. Beng.* lxxiv. 94.)

i. OLACINÆ. Trees or shrubs; flowers small usually white; stamens twice as many, or as many as petals and opposite them; ovary 2- to 5-celled, at last 1-celled at tip.

Ovary superior.

- | | |
|----------------------------------------------------------------------------------|------------------|
| Stamens 3 to 5 free | 1. OLAX |
| Stamens 4 in a tube; calyx in fruit forming a large coloured disc | 2. HARMANDIA |
| Tree; stamens 12 to 15; flowers in a long raceme; fruit a simple drupe | 3. OCHANOSTACHYS |
| Trees; stamens 10; fruit capsular; leaves opposite | 4. CTENOLOPHON |
| Spiny shrub; stamens 8 to 10 free; fruit a drupe; leaves alternate | 5. XIMENIA |
| Big tree; stamens 10 attached to petals; fruit a drupe | 6. SCORODOCARPUS |
| Stamens 6 in concavities of petals | 7. ANACOLOSA |
| Ovary inferior or partly inferior; stamens 5 | 8. STROMBOSIA |

ii. ICACINÆ. Trees or shrubs; flowers white or green, unisexual or bisexual; stamens as many as petals and alternate with them; ovary rarely 2-celled; fruit a drupe.

Ovary and fruit 1-celled.

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|--------------------------------------------------------------------------------------------|----------------|
| Tree unisexual; sepals 5 distinct; flowers in short spikes | 9. PLATEA |
| Shrubs unisexual; calyx cup-shaped 4-toothed; flowers cymose | 10. GOMPHANDRA |
| Trees low; flowers bisexual rather large | 11. STEMONURUS |
| Ovary and fruit 2-celled; shrub; flowers bisexual; racemose corolla gamopetalous | 12. GONOCARYUM |

iii. PHYTOCRENÆ. Climbing shrubs, unisexual or bisexual 4- to 5-merous, parts imbricate; ovary 1-celled; ovules 2.

Monochlamydeous.

- | | |
|----------------------------------------------------------------------------------------------------|----------------|
| Flowers 4-merous large lianes; flowers in racemed heads; fruit, head very large, bristly | 13. PHYTOCRENE |
| Flowers 5-merous slender climber; fruit not bristly | 14. MIQUELIA |

Dichlamydeous.

- | | |
|-------------------------------------------------------------------------------------------------------------------|------------------|
| Flowers unisexual; cymose paniced; fruit a drupe | 15. IODES. |
| Flowers unisexual in long cymes; fruit linear-oblong | 16. LOPHOPYXIS |
| Flowers bisexual; ovary half immersed in disc; fruit pericarp splitting in 4 valves red; seed dark blue | 17. ERYTHROPALUM |
| Doubtful plant | 18. CANTLEYA |

1. OLAX, Linn.

Shrubs or trees sometimes scandent and thorny. Leaves alternate. Racemes axillary simple or branched, short. Calyx minute cup-shaped truncate accrescent. Petals 4 to 5 hypogynous valvate connate. Fertile stamens 3 opposite the petal-edges attached to base. Staminodes 5 or 6 opposite petals. Ovary free, usually surrounded by a cup-shaped disc, 1-celled above, 3-celled below; ovules 3 linear; style simple; stigma 3-lobed. Drupe half

covered by the accrescent calyx; stone crustaceous 1-celled, 1-seeded. Species 20 to 30, Old World Tropics.

Scandent armed; flowers .2 in. long (1) **O. scandens**
 Erect unarmed; flowers .5 in. long (2) **O. imbricata**

(1) **O. scandens** Roxb. *Fl. Ind.* i. 163; *Corom. Pl.* ii. t. 102; *Hook. fil. l.c.* 575. *O. Wightiana* Wall. *Cat.* 6774.

Scandent shrub, often prickly. Leaves ovate-oblong or oblong-lanceolate, 2 to 2.5 in. long, 1 to 1.5 in. wide, coriaceous glabrous blunt, base narrowed; nerves 5 pairs faint; petioles .25 in. long. Racemes .3 in. long puberulous. Flowers white .2 in. long. Petals 3, 5, or 6 irregularly cleft. Stamens 3; staminodes bifid. Drupe ovoid or globose .3 in. long, almost covered by the calyx. *Hab.* Open sandy country, Malacca (Griffith, Maingay). Pulau Tioman. Pahang, Kuala Pahang. Perlis, Besih Hangat, near Kanga. Kedah, Alor Sta. *Distrib.* India, Java.

(2) **O. imbricata** Roxb. *Fl. Ind.* i. 164; *Hook. fil. F.B.I.* i. 577; *King, l.c.* 98.

Unarmed shrub. Leaves coriaceous oblong-lanceolate to ovate-oblong, base rounded or narrow, tip acute or blunt glabrous; nerves 8 to 9 pairs faint, 3.5 to 5.5 in. long, 1.25 to .75 in. wide; petioles .1 in. long. Racemes 5 in. long pubescent. Bracts ovate rather large deciduous. Flowers 5 in. long yellowish white. Petals 6 united in pairs. Stamens 3. Style long filiform. Fruit subglobose 5 in. through, enveloped except the tip by the calyx. *Hab.* Rare, woods. Malacca, Selandor (Ridley). Kelantan, Kuala Lebir (Gimlette). *Distrib.* Andamans, Nicobars, Burma, Java, Philippines. *Native name:* Kodak Aching. *Use:* Leaves and roots decoction for worms in children.

2. HARMANDIA, Pierre.

Glabrous trees. Leaves alternate sub-coriaceous. Flowers unisexual racemose axillary. Calyx cupular, entire or 4-toothed, very much enlarged in fruit. Corolla urceolate fleshy, lobes 4 acute valvate. Disc annular crenate. Anthers 4 sessile in a fleshy stamen-tube. Ovary superior pyramidal 1-celled; ovules 2 or 1. Stigma sessile 3-lobed. Drupe oblong black surrounded by the large fleshy spreading orbicular pink calyx. Species 2, Indo-China. Malay Peninsula.

(1) **H. Kunstleri** King, *l.c.* 100.

Tree 60 to 80 ft. tall, 2 to 3 ft. through. Leaves ovate-lanceolate or lanceolate acute, base cuneate; nerves 6 pairs indistinct, 2.5 to 3.5 in. long, 1 to 2 in. wide; petioles .25 in. long. Racemes .2 in. long. Flowers .15 in. long green. Calyx 4-toothed. Fruit 1.25 in. long, .6 in. wide. Calyx 3 or 4 in. wide fleshy undulate pink. *Hab.* Rare. Forests. Malacca, Tebong (Derry); Ayer Panas. Selangor,

Batu Caves. Perak, Batang Padang and Goping (Kunstler).
Native name: Mempudu Tanah.

3. *OCHANOSTACHYS*, Mast.

Tree. Leaves alternate thinly coriaceous. Flowers small numerous on slender branched axillary spikes. Calyx cup-shaped 4- or



FIG. 42.—*Ochanostachys amentacea*.

5-toothed. Petals 4 or 5 valvate. Stamens 12 to 15 hypogynous; filaments subulate. Disc hypogynous annular. Ovules free hemispheric 1-celled above, incompletely 3-celled below; style short. Fruit drupaceous milky. Species 1 or 2, Malay Peninsula and Borneo.

(1) *O. amentacea* Masters, in *Hook fil. F.B.I.* i. 579; King, *l.c.* 100.

Tree 30 to 60 ft. tall, 12 in. through straight. Bark flaky. Leaves elliptic-oblong bluntly acuminate, base narrowed glabrous; nerves

5 pairs bold beneath, 3 to 5 in. long, 1·5 to 2·5 in. wide; petioles ·5 to ·75 in. long. Spikes 2 to 3 in. long puberulous. Flowers sub-sessile green under ·1 in. long. Petals ovate acute. Fruit oblong 1·5 in. long fleshy, milky, light green. *Hab.* Common in forests from Singapore to Penang. *Distrib.* Borneo. *Native name:* Petaling. *Use:* Valuable building timber, though not very large.

4. CTENOLOPHON, Oliv.

Trees. Leaves opposite coriaceous. Inflorescence panicked cymose terminal and axillary. Flowers bisexual white, medium-sized. Calyx 5-partite imbricate. Petals 5 oblong. Stamens 10 free from a short annular disc, unequal; anthers apiculate. Ovary free imperfectly 2-celled; ovules 2 in a cell; style bifid at tip. Fruit coriaceous dehiscent on one side. Seed 1 with an orange pectinate aril. Species 2, Malayan.

Inflorescent pale tomentose; flowers ·2 to ·25 in. long. (1) *C. parvifolius*

Inflorescence rusty; flowers ·4 in. long. (2) *C. grandifolius*

(1) *C. parvifolius* Oliv. *Trans. Linn. Soc.* xxviii. 516, t. 43; *Masters, l.c.* i. 577; *King, l.c.* 106.

Tree about 40 ft. tall, 1 to 1·5 ft. through. Leaves elliptic-oblong blunt acuminate, base cuneate or rounded dark shining green; nerves 10 pairs faint, 2·5 to 4·5 in. long, 1·25 to 2 in. wide; petioles ·3 in. long. Panicles whitish tomentose 1·5 to 3·5 in. long, dense many-flowered. Flowers ·2 to ·25 in. long. Calyx round, tomentose outside. Petals coriaceous oblong, tomentose outside. Anthers ovate. Ovary woolly; style glabrous. Fruit ellipsoid apiculate grey tomentose ·75 in. long. *Hab.* Common in the southern woods. Singapore, Gardens; Changi (Hullett). Johor, Ulu Batu Pahat (Kelsall). Malacca, Sungei Hudang (Derry); Mt. Ophir. Pahang, Ulu Rumpin (Foxworthy). Selangor, Labu. Perak, Batang Padang, Goping and Thaiping (Kunstler). Perlis, Tebing Tinggi. Lankawi (Curtis). *Distrib.* Borneo, Sumatra. *Native names:* Mertas; Mertas Kuning; Bangkal; Pompom Paya.

(2) *C. grandifolius* Oliv. *l.c.* 517, t. 43, figs. 8 to 10; *Masters, l.c.* i. 577; *King, l.c.c.*

Leaves oblong 3·5 to 7 in. long, 1·5 to 2·5 in. across; petioles ·5 in. long. Branches of panicle stouter. Flowers ·4 in. long, reddish tomentose. *Hab.* Forests, rare. Perhaps only a variety of the last. Malacca (Maingay). Penang, Muka Head (Curtis). *Distrib.* Borneo.

5. XIMENIA, Linn.

Shrub or low branching tree, spiny. Leaves alternate coriaceous elliptic-obovate. Flowers racemose usually bisexual, white.

Calyx cupular 4- or 5-toothed not accrescent. Petals 4 to 5 oblong hairy inside. Stamens 8 to 10 hypogynous; anthers linear. Staminodes none. Ovary superior 4-celled; ovules solitary; style columnar. Stigma simple. Drupe ovoid, 1-seeded. Species 4 or 5, southern tropics.

(1) **X. americana** Linn. *Sp. Pl.* 1193; *Hook. fil. l.c.* 574; *Pierre, Fl. For. Cochinchine*, x. 265; *King, l.c.* 107.

Glabrous. Leaves 1·5 in. long, ·5 in. wide; nerves 5 pairs very faint; petioles ·2 in. long. Raceme 1 in. long. Flowers about 5, nodding ·3 in. long. Petals linear, very hairy inside. Fruit plum-like yellow pulpy ·75 in. long; endocarp bony. *Hab.* Sea-shores, Singapore, Changi (Hullett); Pasir Panjang. Johor, Pulau Tinggi (Burkill). Malacca, Pulau Besar (Griffith). Dindings, Pangkor. *Distrib.* Tropics of both worlds. *Native name*: Bidara Laut.

6. SCORODOCARPUS, Becc.

Big tree. All parts with an odour of onions when crushed. Leaves alternate glabrous coriaceous. Calyx small cupular 4-crenate. Petals 4 or 5 white, valvate, woolly inside. Stamens 8 to 10; filaments shorter than linear anthers. Ovary ovoid 4- or 5-celled; ovules 4 or 5; style long. Fruit globose green 1-celled; epicarp thin fleshy; endocarp crustaceous. Seed 1 globular. Species 1, Malay Peninsula, Borneo.

(1) **S. borneensis** Becc. *Nuovo Giorn. Bot. Ital.* ix. 273; *King, l.c.* 108.

Tree about 60 to 70 ft. tall. Leaves elliptic-oblong acute dark shining green 5 to 6 in. long, 2·5 to 3 in. wide; petioles ·75 in. long. Racemes 1 to 2 in. long puberulous. Petals ·3 to ·35 in. long. Fruit 2 in. through. *Hab.* Forests in the south. Singapore (Wallich) (*Schmidelia fœtidissima*, Wall. *Cat.* 8064); Tanglin. Johor, Kota Tinggi; Gunong Pulai. Pahang, Kuala Baloh (Sanger-Davies); Kwantan. Perak, Larut Hills; Pondok Tanjong (Kunstler). *Distrib.* Borneo. *Native name*: Kulim. *Use*: A first-class timber, deep red in colour.

7. ANACOLOSA, Bl.

Glabrous shrubs or trees, habit of *Strombosia*. Leaves alternate thickly membranous or coriaceous. Cymes axillary. Calyx cup-shaped 5- to 7-toothed not accrescent. Petals 5 to 7 oblong valvate with the stamens on a hypogynous or perigynous disc. Stamens concealed in petals and adnate to their bases. Ovary imperfectly 2- to 3-celled below, 1-celled above; ovules 2 or 3 pendulous, placenta central; style cylindric. Stigma lobed. Fruit drupe-like with disc persistent at tip and calyx at base, stone crustaceous. Seed 1. Species 5 or 6, Indo-Malayan.

(1) **A. heptandra** Maing. in Hook. fil. F.B.I. i. 501; King, l.c. 109.

Shrub or tree. Branches whitish. Leaves coriaceous oblong-lanceolate, base and tip sub-acute; nerves 5 to 6 pairs prominent beneath, 6 to 7 in. long, 2.25 to 3 in. wide; petioles .3 in. long. Flowers in dense axillary cymes; rachis thick .2 in. long. Pedicels .2 in. long pubescent. Calyx with 6 minute teeth. Petals .1 in. long, oblong; anthers hairy. *Hab.* Malacca (Maingay) only once collected.

8. STROMBOSIA, Bl.

Trees medium size or shrubs. Leaves alternate, inflorescence cymose axillary. Flowers bisexual. Calyx a shallow cup more or less 5-lobed inferior. Petals 5 hairy inside. Stamens 5 opposite and adnate to base of petals; staminodes 0. Ovary superior or partly inferior, imperfectly 4- or 5-celled; ovules 4 or 5 pendulous from central placenta; style simple. Disc lobed perigynous. Fruit a drupe terminated by the remains of calyx and style; stone crustaceous. Species 6, Indo-Malayan.

Flowers in pedicelled few-flowered cymes (1) **S. javanica**

Flowers in sessile many-flowered fascicles.

Leaves ovate to oblong; petals .2 in. long (2) **S. multiflora**

Leaves round; petals .15 in. long (3) **S. rotundifolia**

(1) **S. javanica** Bl. Bijdr. 1154, Masters, in Hook. fil. F.B.I. i. 579; King, l.c. 102.

A tree 20 to 30 ft. tall, glabrous. Leaves thinly coriaceous oblong or elliptic acuminate, base rounded; nerves 5 or 6 pairs, 4 to 7 in. long, 1.65 to 2.65 in. wide; petioles .6 to 1 in. long. Cymes few-flowered .5 in. long. Calyx flat shortly 5-lobed. Petals oblong obtuse hairy at tip. Ovary elongate tapering to the short style. Fruit oblong-ovate .8 in. long, .6 in. through. *Hab.* Forests, Malacca (Maingay). Johor, Pulau Tinggi (Burkill). Selangor, Ulu Gombak. Perak, Waterloo (Curtis); Ulu Bubong (Kunstler). Penang (Wallich). *Distrib.* Tenasserim, Sumatra and Java.

(2) **S. multiflora** King, l.c. 102.

Glabrous tree 50 to 100 ft. tall, 2 to 3 ft. through. Leaves coriaceous ovate to oblong-ovate acute, base rounded, edge undulate; nerves 5 to 8 pairs rather prominent beneath, 2.5 to 4 in. long, 1.5 to 2 in. wide; petioles .35 in. long. Flowers numerous dense fasciated .2 in. long, white. Calyx cup-shaped, lobes broad round. Petals oblong blunt, tips incurved pubescent. Ovary sub-globular; style long. *Hab.* Dense forests on low hills. Perak, Batang Padang (Kunstler). Penang (Curtis).

(3) **S. rotundifolia** King, l.c. 103. *Anacolosa* Maingay in Masters, l.c. i. 580.

Large shrub. Leaves rather thickly coriaceous ovate rounded blunt, base round; nerves 6 or 7 pairs, 2 to 4 in. long, 2 to 2.5 in.

wide; petioles thick '2 to '3 in. long. Flowers '15 in. long, white in very small axillary fascicles. Calyx cup-shaped, teeth broad and round. Petals hairy in upper half inside. Fruit globose woody '5 in. through. *Hab.* Dense forests. Singapore, Chan Chu Kang (Maingay). Bukit Timah; Garden Jungle. Pahang, Rumpin (Foxworthy). *Native name*: Kemap.

Like *S. multiflora*, but a shrub, with few very small flowers and stiffer more leathery leaves.

9. PLATEA, Bl.

Trees. Leaves alternate coriaceous. Male flowers in short axillary spikes. Females in short cymes. Sepals 5 free imbricate. Petals 5 connate in a tube below, in female absent. Stamens 5 insert at base of petals and alternate; filaments short. Ovary (in female) cylindric 1-celled; ovules 2. Stigma discoid. Drupe ellipsoid narrowed at base; endocarp woody. Species 4, Malayan.

(1) *P. latifolia* Bl. *Bijdr.* 646. Pl. excelsa King, l.c. iii. *not of Blume.*

A tall tree to 100 ft. high. Leaves thinly coriaceous elliptic or oblong acuminate, base shortly narrowed sparsely puberulous on both surfaces at length glabrescent; nerves 7 pairs, reticulations minute distinct, 4'5 to 7 in. long, 1'75 to 3'5 in. wide; petioles '5 to '75 in. long. Male flowers not known. Females in short axillary 7- or 8-flowered cymes '5 in. long. Sepals less than 1 in. long ovate pubescent. Petals 0. Ovary cylindric puberulous. Fruit orange and yellow ellipsoid, 1 to 1'3 in. long; stone bony with 2 or 3 furrows. Seed much narrowed at tip. *Hab.* Hill forests. Perak, Larut (Kunstler). Penang, Government Hill and by the spout (Curtis). *Distrib.* Java.

10. GOMPHANDRA, Wall.

Shrubs, rarely small trees. Leaves alternate. Flowers usually unisexual. Calyx minute cupular, 4- or 5-toothed. Petals 4 or 5 sometimes partly united white (sometimes absent in females). Stamens 4 or 5 alternate; filaments thick flattened hollowed in front usually hairy; anthers small pendulous from apices, bilobed. Disc thick annular, or none. Male flowers, ovary rudimentary sunk in disc. Stigma minute. Female flowers, ovary long cylindric; ovules 2. Stigma discoid 1- (rarely 2)-celled. Drupe elongate; pericarp thin; endocarp leathery. Species 12, Asiatic tropics.

- | | |
|----------------------------------------------------------------------------------------------------|--------------------------|
| Leaves large obovate-oblong, 7 by 2 in. sub-coriaceous; nerves prominent | (1) <i>G. nyssifolia</i> |
| Leaves lanceolate cuspidate 5 by 1'75 in. long, thin membranous; nerves slender | (2) <i>G. penangiana</i> |
| Leaves narrow lanceolate acuminate 4 by 1'25 in. thin; cymes umbellate densely pubescent | (3) <i>G. ophirensis</i> |
| Leaves elliptic short cuspidate 4 in. long sub-coriaceous; cymes glabrous | (4) <i>G. affinis</i> |

- Leaves elliptic 3 to 5 in. long stiff; cymes short; flowers rather large (5) *G. lanceolata*
 Leaves ovate-rhomboid narrowed to base 2·5 to 3 in. long stiff; cymes compact (6) *G. Maingayi*
 Leaves willow-like 3 in. long, 2·5 in. wide; nerves few and faint; cymes compact (7) *G. salicifolia*
 Leaves ovate acuminate 3 in. long thin; branches and midrib pubescent; flowers very small (8) *G. pubescens*
 Leaves broad elliptic acuminate blunt 5 by 2 in; cymes lax spreading; branches slender (9) *G. gracilis*
 Leaves narrowed lanceolate 4·5 by 5 in. var. *gracillima*

(1) *G. nyssifolia* King, l.c. 114.

Tree 15 to 50 ft. tall, 8 to 10 in. through. Leaves coriaceous elliptic-ovate abruptly acuminate, base cuneate; nerves 6 pairs hardly inarching, 3·5 to 5·5 in. long, 2 to 2·5 in. wide; petioles 3 in. long. Cymes axillary single or 2 together 4 in. long. Flowers sessile 4 to 6, white 2 in. long (male flowers not known). Females, petals 5, puberulous outside. Ovary as long puberulous. Stigma discoid large. Fruit ellipsoid, narrowed at base 8 in. long, 35 in. through. *Hab.* Mountain forests 3000 to 4000 ft. altitude, not common. Perak, Thaiping Hills (Kunstler); Temengoh (Ridley).

(2) *G. penangiana* Wall. Cat. 7304; Masters, in Hook. fil. F.B.I. i. 507; King, l.c. 113.

Shrub glabrous 4 to 8 ft. tall. Leaves membranous oblong or oblong-lanceolate long-acuminate, base shortly narrowed, 4 to 6 in. long, 2 in. wide; nerves 8 to 10 pairs elevate beneath, glabrous except the puberulous nerves on the back; petioles 1 in. long. Cymes small 5 to 1 in. long, puberulous. Flowers small tetramerous under 1 in. long. *Hab.* Penang (Wallich); Telok Bahang (Curtis).

Very near a narrow-leaved form of *G. affinis* Masters, but there are more nerves on the narrower leaf, and the texture is thinner.

(3) *G. ophirensis* Ridl. Lasianthera lanceolata Masters, l.c. i. 585, not *G. lanceolata* King.

Branches slender. Leaves thin membranous lanceolate acuminate, base narrowed blunt; nerves distant 7 pairs, 4 in. long, 1·5 in. wide; petioles 5 in. long. Cymes umbellate on a long extra-axillary sub-terminal peduncle 1·5 in. long; branches about 4 whorled, 4 in. long; branchlets short sub-divided again. All densely pubescent. Flowers small bisexual. Calyx cup-shaped 5-toothed. Petals 4 to 5 lanceolate. Stamens 4 to 5 pilose below and at back of anther. *Hab.* Malacca, Mt. Ophir (Griffith).

Perfectly distinct from the plants associated with this by King under his *G. lanceolata*.

(4) *G. affinis* Masters, l.c. i. 586.

Shrub about 8 ft. tall. Leaves glabrous membranous lanceolate or oblong or ovate-lanceolate, base narrowed, 2·5 to 8 in. long, 6 to 3 in. wide; nerves 7 pairs; petioles 3 in. long. Cymes

axillary or extra-axillary .5 in. long or less, few and short-branched, slightly puberulous. Calyx 4- to 5-toothed. Corolla .1 in. long, 4- or 5-lobed; filaments hairy on the back. Stigma large discoid. Fruit fusiform blunt .4 in. long, .2 in. through ribbed. *Hab.* Woods in the low country. Singapore, Chan Chu Kang; Bukit Timah. Johor, Gunong Pulai. Malacca (Griffith). Selangor, Dusun Tua. Perak, Kal (Kunstler).

var. *floribunda* Ridl.

Cymes with peduncle 1 in. long. Branches 1 in. long di- or trichotomous with many shortly pedicelled tetramerous flowers nearly .1 in. long. *Hab.* Selangor, Weld's Hill; Rawang (Ridley). *Distrib.* Moulmein.

(5) **G. lanceolata** King, l.c. 112.

A shrub 5 to 10 ft. tall, slender. Leaves sub-coriaceous lanceolate to oblong-lanceolate acuminate, base cuneate, glabrous above, sparsely puberulous beneath; nerves 5 to 8 pairs, conspicuous beneath 2 to 4 in. long, .5 to 1.5 in. wide; petioles .15 to .3 in. long. Cymes axillary and terminal; peduncles very short, .1 to 1 in. long trichotomous. Cymules 3- to 10-flowered. Flowers sessile .1 in. long. Calyx cupular 3- or 4-toothed. Petals 4 oblanceolate white villous inside. Filaments flat tapering to each end with a tuft of white hairs at tip. Fruit ellipsoid narrowed at the ends .4 in. long. *Hab.* Hill forests. Pahang, Kwala Tembeling. Negri Sembilan, Gunong Angsi. Selangor, Gunong Mengkuang Lebah (Robinson); Weld's Hill; Kwala Lumpur; Perak, Ulu Bubong (Kunstler). *Native names*: Chemperai Ayam; Chemparai Hitam; Sebasah Payah.

As King's species included more than one, I have retained the name for the Perak plants which he identified with Master's *Lasianthera lanceolata*, and for the varieties below.

var. *angustifolia* King, l.c. 113.

Leaves oblong lanceolate 2 to 4 in. long, .4 to .7 in. wide, more fleshy. Flowers larger .15 in. long. King's variety as represented by a plant from Scortechini. *Hab.* Mountain forests common. Pahang, Gunong Tahan. Selangor, Sempang Mines; Bukit Kutu. Perak, Gunong Kerbau at 4000 ft. altitude (Robinson); Bujong Malacca. Penang, Western Hill 3000 ft. altitude.

var. *triplinervis* King, l.c. 113.

Like the last, but with only three nerves, 2 basal nerves and midrib, with very faint nerves from the midrib. Traces of this form of nervation occur on some plants of the last variety. *Hab.* Perak (Scortechini).

var. *ovalifolia* Ridl.

Leaves ovate rounded or shortly narrowed at the broad base, acuminate 3.7 in. long, 1.5 in. wide; petioles stout .2 in. long. Flowers .2 in. long. *Hab.* Selangor, Gunong Mengkuang Lebah at 5000 ft. altitude (Robinson).

(6) **G. Maingayi** King, *l.c.* 114. *Lasianthera Maingayi* Masters, *F.B.I.* i. 585.

Shrub 4 to 6 ft. tall. Young parts puberulous. Leaves coriaceous lanceolate to ovate acuminate, base narrowed, drying dark brown, glabrous above, puberulous beneath; nerves 5 or 6 pairs prominent beneath, 2 to 3·5 in. long, ·9 to 1·2 in. wide; petioles ·25 in. long. Peduncle ·2 in. long. Cymules 1- or 2-flowered. Flowers 4 or 5 sessile ·15 in. long. Calyx tomentose, teeth 4 or 5 shallow. Petals 5 oblong; filaments with a tuft of hair at tip. *Hab.* Hill woods, 3000 to 5000 ft. altitude. Penang, top of Government Hill (Maingay).

var. *pubescens* Ridl. *G. puberula* Ridl. *Journ. F.M.S. Mus.* vi. 142.

Leaves broad elliptic minutely pustular and pubescent beneath, midrib densely pubescent; branchlets red tomentose. *Hab.* Pahang, Gunong Tahan (Ridley).

Though very much more pubescent than the Penang plant, it seems better to treat this as a variety.

(7) **G. salicifolia** Ridl. *Journ. Roy. As. Soc. S. Br.* 82, p. 176.

Small tree with wiry branches, glabrous except cyme. Leaves narrow linear acuminate, base very shortly narrowed, coriaceous, midrib prominent; nerves invisible above, beneath 4 or 5 pairs very short and inconspicuous forming rather conspicuous loops, 3 in. long, ·3 in. wide; petioles ·15 in. long. Cymes terminal compact; branches very short; peduncle ·2 in. long puberulous. Flowers crowded glabrous. Calyx very small. Petals 4 oblong ·15 in. long. Stamens 4; filaments broad long-hairy below and with a tuft of hairs at the top. *Hab.* Penang, West Hill (Curtis) at 2500 ft. altitude.

(8) **G. pubescens** Ridl. *l.c.* 176.

Shrub with wiry branches pubescent. Leaves lanceolate caudate, blunt, base shortly cuneate, sub-coriaceous; nerves basal pair running from near base along the edge; nerves from midrib 6 pairs, midrib pubescent, 3 to 5 in. long, 1 in. wide; petioles ·15 in. long pubescent. Cymes extra-axillary compact ·5 in. long; peduncles ·25 in. long, pubescent. Flowers very small. Calyx lobes large ovate cuspidate glabrous at base. Petals 4 very short oblong, tip incurved. Stamens very short; filaments obcuneate very short; anthers small with a short process at the back. *Hab.* Thick woods. Selangor, Weld's Hill, Kwala Lumpur (Ridley).

This is remarkable for its very small flowers.

(9) **G. gracilis** King, *l.c.* 115.

Shrub 10 to 18 ft. or tree up to 40 ft. tall. Leaves thickly membranous elliptic or lanceolate cuspidate acute or blunt glabrous, edges wavy; nerves 5 to 8 pairs elevate beneath, 3 to 6 in. long, 1 to 2 in. wide; petioles ·25 to 1 in. long. Peduncles slender 1·5 to

2 in. long. Cyme dichotomous; branches spreading .5 in. long, with 3 short branchlets pubescent. Flowers white .1 in. long. Male flowers, calyx cupular with 5 teeth minute. Petals 5 glabrous; filaments flat, narrowed upwards with a tuft of white hair at the top. Females with calyx and abortive stamens as in male. No petals. Ovary cylindric. Stigma large pileate, 2-celled. Fruit ellipsoid flat on one side, veined and keeled .65 in. long, imperfectly 2-celled. Seed 1. *Hab.* Forests. Larut at 1800 to 2000 ft. altitude (Kunstler).

var. *gracillima* Ridl.

Tree with slender hanging branches. Leaves lanceolate acuminate, 2 in. long, .5 in. wide; petioles .2 in. long. Cymes with peduncles .5 in. long. *Hab.* Dense jungle. Perak, Chanderiang (Kunstler).

This tree varies very much in the size and form of leaves. The long lax cyme and the imperfectly 2-celled fruit are peculiar in the genus.

11. STEMONURUS, Bl.

Trees or large shrubs. Leaves alternate coriaceous. Flowers bisexual white in stalked axillary cymes. Calyx cupular small 4- or 5-lobed. Petals 5, tip inflexed. Stamens 5 hypogynous alternate with petals; filaments flat with a tuft of long hair at the back; anthers bilobed. Disc cup-shaped hypogynous. Ovary ovoid 1-celled; ovules 2; style subulate. Drupe large fleshy fibrous outside; stone woody within. Species about 10, Malayan.

Leaves 10 by 4 in.; cymes scorpioid 3 in. long . . . (1) **S. secundiflorus**

Leaves elliptic acute 4 by 2 in.; cymes under 1 in. wide, compact . . . (2) **S. capitatus**

Leaves obovate obtuse 2 to 5 by 1 in.; cymes, peduncle .5 in. long, head .2 in. wide . . . (3) **S. umbellatus**

(1) **S. secundiflorus** Bl. *Bijdr.* 649; *Beccari, Malesia* I. i. t. iv. 16, 17. *Lasianthera secundiflora* Miq. *Fl. Ind. Bat.* i. (1), 792; *King, l.c.* 117.

Tree 50 to 70 ft. tall, 10 to 15 in. through. Leaves stiffly coriaceous elliptic to ovate-elliptic acuminate or blunt, base narrowed or rounded; nerves 10 pairs; nervules nearly as prominent, 5 to 10 in. long, .25 to .4 in. wide; petioles .5 to .75 in. long, stout. Peduncle 1 to 5 in. long, with an umbel of 5 or 6 scorpioid secund cymes 1.5 in. long. Flowers .2 in. long, sessile. Calyx puberulous. Petals glabrous with a conic inflexed process below the tip. Stamens with a tuft of white hair as long as themselves. Fruit ellipsoid acute greyish green, or white, 2 to 5 in. long, 1 in. through, base tapering. *Hab.* River-banks and low swampy woods. Singapore, Selitar; Bukit Mandai. Johor, Sedenak; Kota Tinggi. Selangor, Ulu Selangor. Perak, Larut (Kunstler); Asam Kumbang (Wray), Dindings, Pangkor (Curtis). *Distrib.* Sumatra, Java.

(2) **S. capitatus** *Beccari, Malesia i. (1), 114, pl. xv. figs. 7 to 11.* *Lasianthera malaccensis Masters, F.B.I. i. 584; King, l.c. 118.*

Tree 30 to 40 ft. tall. Leaves coriaceous elliptic-oblong acuminate narrowed to base; nerves 10 pairs, 3 to 4·5 in. long, 1·2 to 2·25 in. wide; petioles ·3 to ·4 in. long. Cymes ·6 in. long with 3 short branches, pubescent, each bearing 2 or 3 sessile flowers ·2 in. long. Calyx teeth acute puberulous. Petals 3 or 4 times as long. *Hab.* Forests. Johor, Sedenah. Malacca (Maingay). Perak, Ulu Slim (Kunstler). Penang, Muka Head (Curtis). Lan-kawi, Gunong Raya (Haniff).

(3) **S. umbellatus** *Beccari, Malesia i. (1), 115, pl. xv. figs. 5 and 6.* *Lasianthera umbellata King, l.c. 117.*

Glabrous tree 50 to 120 ft. tall, 15 to 20 in. through. Leaves obovate-obcuneate obtuse; nerves 7 to 9 pairs, 2·5 to 3·5 in. long, 1·25 to 1·8 in. wide; petioles ·5 to ·7 in. long. Cymes umbellate; peduncles ·75 to 1 in. long; pedicels ·1 in. long with 2 to 4 sessile flowers ·15 in. long at the top. Calyx pubescent. Petals elliptic twice as long, puberulous outside. Anther-connectives densely silky hairy. Disc thin enwrapping only the ovary base. *Hab.* Forests. Malacca, Bukit Sadanen (Derry). Perak, Thaiping Hills 3000 to 3500 ft. altitude (Kunstler). *Distrib.* Java, Sumatra, Borneo.

12. GONOCARYUM, Miq.

Shrubs or small trees. Leaves alternate coriaceous. Flowers small in axillary spikes. Sepals free 5 ovate imbricate. Corolla gamopetalous tubular, teeth short acute 5. Stamens 5 alternate with the corolla-lobes; filaments adnate to corolla except at tips. Ovary ellipsoid on a minute annular disc, 2-celled; ovule 1; style short. Drupe dry woody, 4- or 5-ridged, 1-celled, 1-seeded. Species about 4, Burmese and Malayan.

Leaves oblong; spikes glabrous . . . (1) **G. longe-racemosum**
Leaves ovate; spikes pubescent . . . (2) **G. crassifolium**

(1) **G. longe-racemosum** *King, l.c. 120.*

A shrub with pale bark about 8 to 10 ft. tall, with drooping branches. Leaves elliptic-oblong acuminate, base narrowed; nerves 4 pairs, prominent, 5 to 10 in. long, 2·25 to 3·5 in. wide; petioles ·3 to ·5 in. long. Spikes glabrous pendulous from the branches, 6 in. or more long. Flowers ·2 in. long bluish green or purplish blue, sessile scattered. Sepals puberulous. Fruit green obovoid 4- or 5-ridged, shortly beaked, narrowed to the broad base, 1·5 to 2 in. long, ·5 to 1 in. through; mesocarp woody. *Hab.* Dry lowland woods. Singapore, Garden Jungle; Changi (Hullett). Johor, Kwala Sembrong (Kelsall). Malacca, Brisi; Batang Malacca (Derry). Selangor, Batu Caves; Kajang; Ulu Gombak (Ridley). Perak near Gunong Bubu (Kunstler). *Native name:* Toioh.

(2) **G. crassifolium** *Ridl. Journ. Roy. As. Soc. S. Br.* 75, p. 18.

Shrub. Leaves coriaceous glabrous ovate acuminate to oblong, base broad or very shortly cuneate; nerves 5 pairs elevate beneath, midrib strongly elevate, 7 in. long, 3·5 in. wide; petioles yellow thick ·75 in. long. Spikes slender 2 to 4 in an axil, 2 to 2·2 in. long, pubescent. Flowers male ·05 in. long sessile. Calyx cupulate 5-lobed pubescent. Petals 5 oblong thick with incurved tip, nearly free; anthers red nearly sessile. Ovary (abortive) pilose. *Hab.* Rare in mountains in forest about 3000 ft. altitude. Selangor, Sempang Mines (Ridley).

13. PHYTOCRENE, Wall.

Long climbing shrubs, usually hairy. Leaves alternate entire or palmately lobed. Flowers unisexual, males in globose clusters on long branching spikes or panicles, females in large globose pedunculate heads, males with an involucre of 3 to 5 pieces. Perianth of 4 pieces free or united below valvate. Stamens as many, alternate. Female flowers, no involucre, perianth as in male. Staminodes minute or none. Pistil sessile 1-celled villous. Ovules 2 from apex of cavity; style thick. Stigma capitate. Drupes wedge-shaped numerous in a large globose bristly head; stones hard 1-celled, 1-seeded, pitted outside. Species 8, Indo-Malayan.

Bracts inconspicuous or filiform.

Leaves entire	(1) P. oblonga
Leaves ovate often 3-lobed	(2) P. bracteata
Leaves palmate 5-lobed	(3) P. palmata
Bracts long plumed	(4) P. trichura

(1) **P. oblonga** *Wall. Pl. As. Rar.* iii. 12; *Hook. fil. F.B.I.* i. 592; *King, l.c.* 122.

Stem more slender than *Ph. bracteata* Wall., not prickly. Leaves oblong or oblong-lanceolate acuminate, base narrowed, above glabrous, beneath densely hairy; nerves from midrib 9 pairs prominent beneath, 4·5 to 9 in. long, 2 to 3·5 in. wide; petioles ·6 to 1 in. long. Male flowers in a dark brown spike 1 to 2 in. long. Bracts of umbellules much shorter than the flowers. Fruit head as big as a cricket-ball; drupes cuneate ovoid covered with stiff bristles, 1·5 in. long, ·75 in. wide. *Hab.* Lowland country. Malacca, Ayer Panas (Griffith). Perak, Larut (Kunstler). Penang, Telok Bahang (Curtis).

(2) **P. bracteata** *Wall. Pl. As. Rar.* iii. 12; *Hook. fil. F.B.I.* i. 592; *King, l.c.* 122. *Ph. macrocarpa* *Griff. Notulæ* iv. 322; *Ic. Pl. Ind. Or.* 487, 488.

Stem 1 in. through, prickly and hairy when young. Leaves broad ovate-cordate, often 3-lobed, acute, smooth above; nerves pubescent beneath softly pale tomentose; nerves from base 7, reticulations conspicuous beneath, 4 to 8 in. long, 3 to 5·5 in. wide; petioles tomentose hairy 1·25 to 3 in. long. Male panicles bracteate

4 to 8 in. long, .75 to 1.25 in. through, dense hairy. Flowers sessile .05 in. across. Bracts of pedicels of umbellules filiform .4 to .5 in. long. Drupes ovoid-oblong tapering to each end densely yellow bristly 1.5 in. long, in capitula as big as a man's head. *Hab.* Lowland woods and hedges. Singapore, Cluny Road; Bukit Timah. Malacca (Griffith). Perak, Larut Hills (Kunstler). *Distrib.* Borneo.

(3) **P. palmata** Wall. *Pl. As. Rar.* iii. 12; *Hook. fil. F.B.I.* i. 592; *King, l.c.* 123.

Stem prickly and red-hairy. Leaves reniform palmate deeply 5-lobed, above glabrous, beneath densely red-hairy; nerves 5 to 7 palmate, 7 to 12 in. or more long and as wide; petioles 3 to 5 in. long red-hairy. Male panicles 2.5 to 13 in. long, umbellules ebracteate. Drupes ellipsoid-obovoid acute densely yellow bristly 1.5 to 2 in. long, in heads 3 to 4 in. through. *Hab.* Malacca (Griffith); Durian Tungul. *Hab.* Selangor, Kwala Lumpur. Perak, Larut Hills (Kunstler). Penang, Government Hill (Curtis); Balik Pulau. *Native name:* Akar Pisang-Pisang Buluh.

(4) **P. trichura** Ridl.

Very big long woody climber. Leaves unknown. Male panicles on bare stem sessile 8 in. long, 1.5 in. through, dense, dichotomously branched; branches slender flexuous pubescent with distant globose short-pedicelled or sessile heads of flowers .25 in. apart and .2 in. through; bracts terminated by a brush of long reddish hairs, .5 in. long. Flowers sessile glabrous. Sepals 5 obcuneate campanulate, apex rounded fringed with hairs. Petals 4 oblong blunt. Stamens 3 longer; anthers elliptic; filaments slender. Pistil white-hairy. *Hab.* Very rare in dense forest ascending to the tops of lofty trees. Perak, Batang Padang valley near Telom (Ridley).

Leaves of this plant were quite unprocurable owing to its lofty height, but the large squirrel-tail plume (bract) in the end of the raceme of heads makes it quite distinct. It is nearest to *P. bracteata* Wall.

14. MIQUELIA, Meissn.

Climbing shrubs. Leaves alternate. Flowers unisexual, males pedicellate in umbels, females sessile in solitary heads. Males pedicelled; perianth 5-merous, lobes oblong or lanceolate valvate. Stamens as many and alternate; filaments short; anthers linear oblong. Females perianth deeply 4-lobed, lobes lanceolate. Ovary 1, compressed 1-celled; ovules 2. Stigma discoid. Drupe oblong compressed.

(1) **M. caudata** King, *l.c.* 124.

Slender climber, 10 to 20 ft. long. Leaves membranous oblong-lanceolate acuminate, base narrowed, glabrous above, puberulous beneath; nerves 5 or 6 pairs, 5 to 8 in. long, 1.5 to 2 in. wide; petioles .5 to .65 in. long. Male umbels 65 to 1 in. long; pedicels .15 to .2 in. long. Flowers .15 in. across, puberulous white. Anthers

linear sagittate. Female heads .25 in. long, ovoid. Flowers .15 in. across. Drupe ovoid compressed, base round tapering upwards to a tail, red pubescent; endocarp bony and pitted. *Hab.* Rare in forests. Selangor, Sempang, Semangkok Pass. Perak, Thaiping Hills; Ipoh; Gunong Bubu (Kunstler). Kemaman (Vaughan Stevens). *Use*: In Sakai dart poison.

15. IODES, Bl.

Slender climbing shrubs, with tendrils. Leaves opposite. Inflorescence cymose axillary or extra-axillary, lower peduncles often cirrhone. Flowers unisexual small white. Males, calyx minute, cup-shaped 4- or 5-toothed. Corolla 4- or 5-lobed valvate. Stamens hypogynous, alternate; anthers basifixed. Females, corolla lobes connate below. Stamens 0. Ovary 1-celled; ovules 2. Stigma sessile discoid. Drupe 1-seeded. Species 8, Indo-Malaya, Africa.

Flowers 4-merous.

Leaves ovate reticulate (1) **I. reticulata**

Flowers 5-merous.

Calyx cupular with short teeth; leaves ovate not reticulate (2) **I. velutina**

Calyx deeply cut into lanceolate lobes; leaves ovate; cymes long much-branched (3) **I. ovalis**

Leaves oblong; cymes small (4) **I. oblonga**

(1) **I. reticulata** King, l.c. 126.

Climber 20 to 30 ft. long with a broad line of tomentum on one side. Leaves thinly coriaceous elliptic or broadly ovate sharply acuminate, base rounded, glabrous above, soft hairy beneath; nerves 4 or 5 pairs, depressed above, prominent beneath, as are reticulations, 2 to 5 in. long, 1.3 to 2.5 in. across; petioles .4 to .6 in. long. Tendrils pubescent. Cymes 1 to 2 in. long, peduncled slender lax branched pubescent. Male flowers .05 in. long, 4-merous. Calyx with 4 acute lobes pilose outside. Corolla with 4 ovate lobes pilose outside, light brown. Stamens shorter; anthers ovate. Females larger, ovary tomentose. Drupe elliptic narrowed to base velvety; endocarp 4-angled, 1.2 in. long, .75 in. across. *Hab.* Open jungle. Perak, Goping (Kunstler); Ayer Larut (Wray).

(2) **I. velutina** King, l.c. 127.

Puberulous climber. Leaves coriaceous ovate acute, base rounded, sparsely pilose above, densely whitish velvety beneath, reticulations not elevate; nerves 4 pairs, 2.5 to 3.75 in. long, 1.35 to 2.25 in. wide; petioles .36 to .6 in. long. Cymes short pubescent few-flowered, tendrils pubescent. Male flowers .1 in. wide; pedicels short. Calyx 5-toothed. Corolla twice as long, teeth oblong adpressed-pilose outside. Drupes elongate obovoid 4-angled when dry, ashy tomentose, 1.25 in. long, .5 in. through; endocarp bony 8-angled. *Hab.* Woods and hedges. Singapore, Bukit Timah

road. Malacca, Merlimau (Cantley). Negri Sembilan, Bukit Danan (Cantley). Perak, Batu Togoh (Scortechini). *Native names*: Akar Salupat; Akar China Bukit.

(3) **I. ovalis** *Bl. Bijdr.* 30; *King, l.c.* 128; *Masters, in Hook. fil. F.B.I.* i. 596. *I. tomentella* *Miq. Fl. Ind. Bat.* i. (1), 796; *Br. in Benn. Pl. Jav. Rar.* 243, t. 48.

Climber 30 to 60 ft. long, slender tomentose. Leaves subcoriaceous ovate or round acute, base round glabrescent above; nerves above and on under-surface tomentose, 4 or 5 pairs bold; 2·5 to 5·5 in. long, 1·75 to 3·25 in. wide. Cymes 6 to 8 in. long, much-branched tomentose. Male flowers 1·5 in. long, pale yellow; pedicels 1 to 2 in. long. Calyx villous discoid 3- to 6-toothed. Corolla 5 or 6 times as long, lobes 5 acuminate strigose outside. Stamens short. Females, ovary tomentose. Drupe ovoid compressed tomentose 75 in. long, 5 in. wide; endocarp rugose. *Hab.* Woods. Johor, Sungei Tebrau. Malacca (Griffith). Perak, Kamuning (Curtis); Larut (Kunstler); Hermitage Hill; Changkat Mentri (Kloss). *Distrib.* Tenasserim, Sumatra.

(4) **I. oblonga** *Planch. in Hook. fil. F.B.I.* i. 597; *King, l.c.* 128.

Stiff pubescent climber. Leaves membranous oblong to oblong-lanceolate, glabrous above except pilose nerves, beneath pilose; nerves 7 or 8 pairs, 3 to 4·5 in. long, 1 to 1·6 in. wide; petioles 3 to 4 in. long. Cymes short 1 in. long pilose. Male flowers 1·05 in. long white. Calyx of 5 deep lanceolate lobes. Corolla tomentose outside. Fruit scarlet. *Hab.* Borders of woods. Singapore, Bidadari; Garden Jungle; Changi. Johor, Kwala Kahang (Kelsall). Province Wellesley, Bukit Juru. Penang (Wallich); Waterfall (Curtis).

16. LOPHOPYXIS, Hook. fil.

Climbing shrubs. Leaves alternate coriaceous ovate round. Flowers small unisexual in long axillary terminal cymes. Male, calyx 5-lobed, lobes ovate. Petals minute between the lobes of the annular disc. Stamens 5; filaments short. Pistillode villous. Females in lower cymes. Perianth as in male. Ovary ovoid hairy; ovules 2 in each cell. Stigmas 5 sessile decurved. Fruit linear oblong 5-grooved. Species 3, Malay Archipelago.

(1) **L. Maingayi** *Hook. fil. Ic. Pl.* 1714; *F.B.I.* v. 476.

Climber 100 ft. long, 3 to 5 in. through. Leaves acuminate glabrous 6 in. long, 2·5 in. wide; petioles 2 in. long. Cymes tomentose 6 to 7 in. long; branches few, 3 in. long. Flowers 1·05 in. long in small distant heads, white. Fruit 4 in. long tomentose. *Hab.* Dense jungle. Malacca (Maingay). Perak, Ulu Kerling (Kunstler).

17. **ERYTHROPALUM**, Bl.

Climbing glabrous shrubs with axillary tendrils. Leaves alternate entire 3- to 5-nerved at base. Cymes slender peduncled dichotomous. Flowers small yellow bisexual. Calyx 5-toothed, tube adherent to fruit. Petals perigynous 5 short. Stamens 5 opposite petals; filaments short; anthers ovate. Disc large fleshy 5-lobed. Ovary half immersed 1-celled; ovules 1 to 3 pendulous from apex; style short. Fruit crowned by persistent calyx and disc oblong 1-celled; pericarp red thin sub-coriaceous, splitting and reflexed into 3 to 5 segments. Seed solitary, deep blue, albumen large. Species 2 or 3, Malayan.

(1) **E. scandens** Bl. *Bijdr.* 921; *Hook. fil. F.B.I.* i. 578; *Pierre, Fl. For. Cochinchine*, t. 704; *King, l.c.* 129. *E. vagum* Masters, *F.B.I.* i. 578. *Modeccopsis vaga* Griff. *Notulæ* iv. 633; *l.c. Pl. Ind. Or.* 628.

Leaves membranous elliptic or oblong-lanceolate acuminate, base rounded sub-peltate; basal nerves 3 to 5 pairs, laterals 4 pairs faint, 3 to 6 in. long, 1.75 to 3.75 in. wide; petioles .75 to 1.75 in. long. Cymes .75 to 2.75 in. across; peduncles 1 to 3 in. long very slender; pedicels .3 in. long. Flowers under .1 in. across green; disc yellow. Fruit .75 in. long, red outside, yellow inside. Seed deep blue. *Hab.* Forests. Singapore, Garden Jungle; Reservoir Woods. Malacca (Maingay); Hulu Chembong (Derry). Pahang, Kwantan (Foxworthy). Perak, Goping (Kunstler); Thaiping Hills (Curtis). Dindings, Simpiti. Penang, Balik Pulau (Curtis); Waterfall. *Distrib.* India, Burma, Java. *Native name*: Kulim Akar.

DOUBTFUL PLANT

18. **CANTLEYA**, Ridl.

Tree. Leaves alternate entire coriaceous glabrous. Inflorescence axillary cymose sessile; rachis thick pubescent with thick short branches seated in alveoli in rachis and above dichotomous with 3 to 5 terminal sessile flowers. Calyx cupular short, edge undulate wavy. Petals and stamens not seen. Ovary glabrous cylindric. Stigma large sessile pulviniform. Species 1.

(1) **C. johorica** Ridl.

Leaves elliptic acuminate, base cuneate; nerves 10 pairs very indistinct, 2.7 in. long, 1.4 in. wide; petioles .3 in. long. Cymes when fully developed .75 to 1 in. long, pale pubescent; branches .5 in. long pubescent. Calyx pubescent. Johor (Cantley). *Native name*: Daru Daru.

I cannot find any genus to fit this plant, which seems, however, to be most nearly allied to *Gomphandra*. The specimens are very incomplete. Cantley labels it as Kayu Daru-Daru, a highly valued timber, of what species is not known. It should be sought for again.

ORDER XXXVIII. ILICINEÆ

Trees or shrubs with alternate coriaceous leaves. Flowers small white yellowish or pink on axillary cymes, fascicles or rarely racemes. Sepals 4 or 5 rounded connate at base often unequal. Petals 5 or 6 connate at base, rarely quite free, larger rounded. Stamens 5 shorter or longer than the petals adnate to them; filaments subulate; anthers small. Ovary in female flower 2- to 12-celled; ovules 1 or 2; style 0 or very short. Stigma capitate. Drupe globose small of 2 to 16 pyrenes. Genera 3, species 220, tropics and temperate zone. Petals connate at base; stamens as many; ovary 4- to 6-locular. Species about 150, whole world.

1. ILEX, Linn.

- | | |
|---------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| Flowers of both sexes in simple racemes . . . | (1) <i>I. malaccensis</i> |
| Flowers in axillary fascicles; leaves 1 to 2 in. long, coriaceous usually serrate . . . | (2) <i>I. triflora</i> |
| Leaves .5 in. long obovate . . . | (3) <i>I. myrtillus</i> |
| Leaves .5 in. long ovate acute serrate at top . . . | (4) <i>I. polyphylla</i> |
| Leaves 3 by 1.5 to 2 in. very coriaceous entire elliptic to obovate . . . | (5) <i>I. epiphytica</i> |
| Leaves elliptic acuminate 5 by 2.25 in. entire; flowers large . . . | (6) <i>I. grandiflora</i> |
| Leaves elliptic acuminate undulate thin 4 by 1.25 in.; flowers rather small . . . | (7) <i>I. glomerata</i> |
| Leaves elliptic crenulate thick 7 by 3 in.; fruits .4 in. through . . . | (8) <i>I. illustris</i> |
| Flowers in peduncled cymes. | |
| Peduncles short .1 to .2 in. long. | |
| Leaves elliptic blunt very coriaceous pale beneath entire 2 by 1 in. . . | (9) <i>I. rupicola</i> |
| Leaves elliptic blunt, entire very coriaceous 5 by 3 in. . . | (10) <i>I. sclerophylla</i> |
| Leaves elliptic blunt-cuspidate entire 3 by 1.5 in. . . | (11) <i>I. sclerophylloides</i> |
| Leaves thin coriaceous elliptic entire 6 by 2.5 in. . . | (12) <i>I. Maingayi</i> |
| Peduncle .5 in. long; pedicels as long 3-flowered; leaves lanceolate; nerves depressed above 3 by .75 in. . . | (13) <i>I. patens</i> |
| Peduncle, 6 in. long slender; branches 2 with short branchlets; leaves rather thin elliptic-lanceolate, 5 by 1.25 in. . . | (14) <i>I. pauciflora</i> |
| Cymes paniced many-flowered umbelled; pyrenes 5 or 6; leaves ovate-elliptic cuspidate stiff . . . | (15) <i>I. venulosa</i> |
| Pyrenes 8; cymes lax; flowers and fruit small . . . | (16) <i>I. cymosa</i> |
| Cymes compact; flowers and fruit larger . . . | (17) <i>I. macrophylla</i> |

(1) *I. malaccensis* Loesener *Monogr. Aquifol.* 432. *I. spicata* Hook. *fil. F.B.I.* i. 508; King, *l.c.* 134, not of Blume.

Shrub 10 to 18 ft. tall. Leaves coriaceous elliptic caudate-

acuminate, base rounded or short cuneate; nerves faint 7 to 12 pairs, 3·5 to 6 in. long, 1·5 to 2 in. wide; petioles 2 in. long. Racemes 75 to 15 in. long puberulous. Flowers under 1 in. long; pedicels 1 in. long. Petals oblong connate at base. Stamens longer. Females smaller than males. Drupes 15 in. long ovoid; pyrenes 10 to 16. *Hab.* Lowlands, rare. Malacca (Maingay). Perak, Larut (Kunstler).

(2) ***I. triflora*** *Bl. Bijdr.* 1150; *Loesen. l.c.* 344. *I. Griffithii* *Hook. fil. F.B.I.* i. 601; *King, l.c.* 135.

A pubescent bush 3 to 15 ft. tall. Leaves coriaceous elliptic acute serrulate, base narrowed, glabrous above except midrib, pubescent beneath; nerves 8 pairs, 1 to 1·25 in. long, 5 to 1·3 in. wide; petioles 15 to 25 in. long. Flowers 4-merous pink, fascicled or females sometimes solitary 2 in. across or less; pedicels longer. Calyx cup-shaped, lobes ciliolate. Petals oblong connate at base. Ovary globose. Stigma sessile. Drupe globose 15 in. through, black; pyrenes 4; pedicel 35 to 6 in. long. *Hab.* High mountains 3000 to 6600 ft. altitude, common. Malacca, Mt. Ophir. Pahang, Gunong Tahan (Robinson). Gunong Berumbun, Telom. Selangor, Gunong Semangkok. Perak, Hermitage Hill (Curtis); Thaiping Hills 4000 to 5000 ft. altitude (Kunstler); Gunong Batu Putih (Wray); Gunong Inas (Wray). Kedah Peak (Low). *Distrib.* Indo-Malaya, Cochin-China, China.

A variable shrub; the common form appears to be the var. *Lobbiana* Loesener. The var. *Kurziana* Loesener is more ashy-tomentose on the leaves. It occurs on Gunong Bubu.

var. *longifolia* *Ridl.*

Leaves nearly glabrous oblong acuminate, base sub-cuneate shortly, edge crenulate 2·5 in. long, 1·2 in. wide; petioles 1 in. long. Cymes female 4- to 5-flowered; peduncle 2 in. long; pedicel 3 in. long, pubescent. Flower 2 in. across. Calyx glabrous short toothed. Petals round pink. *Hab.* Perak, Hermitage Hill (Curtis 1340); Maxwell's Hill.

(3) ***I. myrtillus*** *Ridl. Journ. F.M.S. Mus.* v. 31.

Shrub much-branched. Leaves thickly coriaceous elliptic to obovate blunt or retuse; nerves invisible, 75 in. long, 5 in. wide; petioles 1 in. long. Panicles or racemes shorter than leaves, pubescent. Sepals 4 ovate or orbicular pubescent. Petals 4 ovate connate at base. Stamens 3; filaments thick. Ovary conic. *Hab.* Rare on high mountains. Selangor, Guncng Mengkuang Lebah (Robinson).

(4) ***I. polyphylla*** *Ridl. Journ. F.M.S. Mus.* vi. 45.

Pubescent shrub densely leafy. Leaves elliptic acute serrate, base shortly narrowed 75 in. long, 4 in. wide, glabrous, dotted beneath; petioles 1 in. long puberulous. Flowers 2 to 4 on thick axillary peduncles. Pedicels 1 in. long. Sepals 4 ovate blunt

pubescent. Petals 4 ovate oblong blunt. Stamens 4 shorter. *Hab.* High mountains, rare. Perak, Gunong Kerbau 6600 ft. altitude (Robinson).

(5) **I. epiphytica** King, *l.c.* 134.

Shrub with stout branches. Leaves coriaceous glabrous oval or elliptic quite obtuse entire, base narrowed blunt; nerves 5 to 6 pairs, slender, 2 to 3 in. long, 1 to 2.75 in. wide; petioles .15 in. long. Flowers white fascicled 5 to 12, .2 in. across; pedicels .2 in. long. Calyx teeth 5 to 7 ovate blunt imbricate, edges pubescent. Petals 6 oblong free. Stamens much shorter 6. Ovary tapering to style. Stigma discoid. Drupe ovoid .2 to .25 in. long; pyrenes trigonous 6 or 7. *Hab.* High mountains 3000 to 6600 ft. altitude. Malacca, top of Mt. Ophir (Hullett). Pahang, Gunong Tahan. Selangor, Gunong Mengkuang Lebah (Robinson). Perak, Gunong Bubu 5000 ft. altitude (Kunstler); Gunong Kerbau (Robinson).

(6) **I. grandiflora** Ridl. *Journ. F.M.S. Mus.* vi. 54.

Branches stout. Leaves coriaceous elliptic cuspidate, base cuneate; nerves 7 pairs, reticulations conspicuous, 5.5 to 6 in. long, 1.75 in. wide; petioles stout .5 to 1 in. long. Flowers, female in pairs or in fours on a short peduncle, .25 in. across; pedicels .2 in. long. Sepals 4 ovate round. Petals 4 unequal oblong obtuse. Stamens 4; filaments broad. Ovary ovoid. *Hab.* High mountains, rare. Perak, Gunong Kerbau at 4200 ft. altitude (Robinson).

(7) **I. glomerata** King, *l.c.* 135; *Loesener, l.c.* 325.

Tree 30 to 35 ft. tall, 4 to 6 in. through, glabrous. Leaves thinly coriaceous oblong or elliptic acuminate, edge wavy, base cuneate; nerves 6 or 7 pairs invisible above, faint below, 3 to 4.5 in. long, 1.3 to 1.75 in. wide; petioles .3 to .4 in. long. Flowers male .2 in. across pale yellow, fascicled 6 to 12 together; pedicels .15 in. long. Calyx minute, teeth round 4. Petals 4 ovate connate at base. Stamens longer; filaments subulate; anthers ovoid short. *Hab.* Mountain forests. Perak, Larut Hills 3500 to 4000 ft. altitude (Kunstler). *Distrib.* Tenasserim.

(8) **I. illustris** Ridl. *Journ. Roy. As. Soc. S. Br.* 82, p. 177.

A shrub with stout branches. Leaves stiff coriaceous elliptic minutely apiculate, base narrowed, crenate, shining green, midrib channelled above, strongly elevate and keeled beneath; nerves 8 pairs, elevate beneath, as are secondary nerves and reticulations, 7 in. long, 3 in. wide; petioles .75 in. long. Flowers unknown. Fruit on a peduncle .1 in. long axillary with 5 or 6 flowers; pedicels .4 in. long; berry .4 in. long oblong globose, sepals connate of 4 short blunt lobes. Stigma flat 4-lobed. Pyrenes 4, backs round .25 in. long, .15 in. through. *Hab.* Mountains, local. Pahang, Gunong Tahan (Ridley). In fruit only.

(9) **I. rupicola** Ridl. *Journ. F.M.S. Mus.* vi. 142.

Shrub. Leaves elliptic blunt or sub-acute coriaceous, base rounded; nerves invisible above, faint 4 to 5 pairs, beneath;

glaucous 2 to 2.5 in. long, 1 to 1.25 in. wide; petioles .15 in. long. Cymes .5 in. long; branches 6. Flowers 8 sub-umbellate; pedicels .1 in. long. Sepals 5 edges ciliate. Petals 5 oblong almost free. Stamens 5. Ovary conic. Berry globose .15 in. long; pyrenes 4. *Hab.* High mountains, Pahang, Gunong Tahan, 5500 ft. altitude (Ridley).

(10) ***I. sclerophylla*** Hook. fil. *F.B.I.* i. 606; *King, l.c.* 137.

Leaves thickly coriaceous elliptic-oblong blunt narrowed at base; nerves about 6 pairs slender elevate, beneath glaucous, 5 to 6 in. long, 2.5 in. wide; petioles .5 in. long very thick. Cymes, female 1 in. long sparingly branched; peduncles stout. Calyx 5 ciliate lobes. Petals minute free. Ovary ovoid truncate. *Hab.* Malacca, Mount Ophir (Maingay).

Only known from a scrap, and not since found on Mount Ophir. Possibly a state of *I. hypoglauca* Loesen. of Bangka and Sumatra.

(11) ***I. sclerophylloides*** Loesen. *Nov. Act. Cur.* lxxviii. 77.

Tree with white bark. Leaves stiff coriaceous elliptic shortly apiculate blunt, base cuneate entire, midrib sunk above, strongly elevate beneath; nerves 9 pairs, slender not very conspicuous inarching, reticulations invisible, 3.5 to 4 in. long, 1.25 to 1.5 in. wide; petioles .3 in. long. Flowers very small in peduncled sub-terminal cymes; peduncles 1.5 in. long or less puberulous. Fruit sub-globose .2 in. through on pedicel, as long, and on a peduncle .3 in. long. Calyx lobes round 4. Pyrenes about 10. *Hab.* Kedah Peak at 3000 ft. altitude (Robinson and Kloss). *Distrib.* Borneo.

I have only fruit of this, and take the description of the flowers from Borneo specimens, which in vegetative organs this plant very closely resembles. It also is near *I. eugeniaefolia* Pierre of Cochin-China, but the leaves are more coriaceous.

(12) ***I. Maingayi*** Hook. fil. *F.B.I.* i. 605; *King, l.c.* 135; *Loesen. Monogr. l.c. Aquifol.* 426.

A glabrous tree 20 to 80 ft. tall. Branchlets dark. Leaves coriaceous elliptic to oblanceolate-oblong sub-acuminate, base narrowed, sub-glaucous beneath; nerves 10 to 12 pairs faint, 4 to 5.5 in. long, 1.35 to 2 in. wide; petioles .4 to .65 in. long. Male flowers less than .1 in. across, in peduncled umbellate cymes 1.25 in. long. Male, calyx lobes 4 rounded glabrous. Petals 4 broad oblong. Stamens longer. Females in short racemes. Sepals, petals, stamens 6. Drupes ovoid or globular greenish yellow .2 to .25 in. through, grooved when dry; pyrenes 4 to 6 trigonous. *Hab.* In woods. Singapore, Bukit Mandai. Selangor, Kwala Lumpur (Foxworthy). Perak, Goping, Limestone Hills (Kunstler). Penang (Maingay); Government Hill.

(13) ***I. patens*** Ridl. *Journ. F.M.S. Mus.* vi. 143.

Spreading tree about 30 ft. tall. Leaves dark green thin coriaceous ovate entire obtuse, base round, 2 to 3 in. long, 1.5 to 2 in.

wide; nerves 4 or 5 pairs; petioles .25 in. long. Cymes peduncled 5-flowered. Flowers white or rose. Calyx lobes 4 or 5 glabrous rounded. Petals connate at base. Stamens 4; filaments short. Fruit globose .25 in. long. *Hab.* Woods on high mountains by streams, Pahang, Gunong Tahan at 5500 ft. altitude (Ridley).

(14) **I. pauciflora** Ridl. *Journ. Roy. As. Soc. S. Br.* 82, p. 177.

Tree. Branches slender. Leaves coriaceous lanceolate-acumin-



FIG. 43.—*Ilex cymosa*.

ate, shortly narrowed at base; nerves prominent beneath inarching .15 in. from edge, 7 pairs, midrib sunk above, prominent beneath, 4.75 to 7 in. long, 1.25 to 2 in. wide; petioles .28 in. long. Panicles in terminal axils, 3 to 4.5 in. long; branches distant few, 1.25 in. long, dichotomous at the ends with a few flowers in small pubescent cymes at the tips; pedicels pubescent very short. Sepals triangular-ovate pubescent. Petals 4 rounded .024 in. long, free nearly to base. Stamens 4 as long. Pistil conic; style short. *Hab.* Penang, Waterfall (Fox).

(15) **I. venulosa** Hook. *fil. F.B.I.* i. 602; *Loesen. l.c.* 90. *var. nervulosa Loesen. l.c.*

Glabrous tree. Leaves oval to elliptic or ovate-elliptic coriaceous abruptly caudate-acuminate, base very shortly cuneate, pale beneath; nerves slender numerous much reticulate. Umbellules peduncled 1·5 to 2 in. long, simple or paniced. Flowers numerous greenish white 1 in. across; pedicels 25 in. long. Males 4-merous. Petals connate. Stamens short. Females, umbels shorter stouter, 5- or 6-merous. Drupe red globose 2·5 to 3 mm. through; pyrenes 5 or 6. *Hab.* Singapore, Woodlands (Beccari). *Distrib.* of type from India, Burma. I have seen no specimen from the Malay Peninsula.

(16) **I. cymosa** Bl. *Bijdr.* 1149; *Hook. fil. F.B.I.* i. 605; *King. l.c.* 136. *I. singaporiana Wall Cat.* 6526 (Fig. 43, p. 441).

A glabrous tree, bark white 20 to 50 ft. tall. Leaves dark green thinly coriaceous elliptic oblong shortly blunt acuminate, base narrowed or rounded slightly glaucous beneath; nerves 6 to 8 pairs, 2·5 to 4·5 in. long, 1·35 to 2·5 in. wide; petioles 25 in. long. Cymes branched paniced, lax many-flowered 2 or more inches long. Flowers 1 in. long; pedicels 25 in. long. Males 4- or 5-merous. Stamens as long as petals. Females, sepals 5 or 6. Petals 6 to 8. Ovary globular with short style. Stigma large. Drupes red globular, grooved when dry; pyrenes 8 trigonous. *Hab.* Common in the low country in woods and secondary forest. Singapore, common. Johor, Batu Pahat. Pahang, Pekan. Malacca, Ayer Panas (Griffith); Tanjong Kling. Selangor, Ulu Selangor (Kunstler). Perak, Goping (Kunstler). Penang, Batu Feringhi (Curtis). Lankawi (Curtis). *Distrib.* Java, Sumatra, Borneo. *Native names:* Mensirah Bukit or M. putih; Timah-Timah; Titimah.

(17) **I. macrophylla** Wall. *Cat.* 4331; *Hook. fil. F.B.I.* i. 605; *King, l.c.* 136; *Loesen. l.c.* 84.

Glabrous tree about 60 ft. tall. Leaves elliptic-oblong obtuse sub-coriaceous, base narrowed; nerves 12 pairs visible beneath, 4 to 7 in. long, 2 to 2·5 in. wide; petioles 5 in. long. Cymes 1·25 in. long; peduncle long; branches several. Flowers in heads at the ends white 15 in. across 4- or 6-merous. Petals oblong blunt connate at base in males, free in females. Stamens longer. Drupe sub-globular 2 in. through red; pyrenes 8. *Hab.* Common on roadsides and in woods. Singapore, Bukit Timah; Changi. Malacca, Ayer Panas (Griffith); Bukit Bruang. Province Wellesley, Permatang Bertam. Penang, Chalet; Penara Bukit (Curtis). *Distrib.* Mergui. *Native names:* Medang Tulok; Timah Timah Bulan; Gading.

ORDER XXXIX. CELASTRINÆ.

Trees or bushes, or lianes, sometimes spiny. Leaves opposite rarely alternate coriaceous often serrate. Flowers generally cymose small, usually bisexual. Calyx small 4- or 5-lobed. Petals 4 or 5 insert below disc imbricate. Stamens 4 or 5 (except *Hippocratea* and *Salacia* 3 only). Disc usually large and conspicuous. Ovary sessile on disc or immersed in it, 3- or 5-celled; style short or none; ovules 2 to 4 in each cell anatropous, rarely 1 pendulous or many attached to axis. Stigma triangular. Fruit capsular, baccate or a drupe or samaroid. Seed often arillate, sometimes winged. Species 500, whole world (*King, Journ. As. Soc. Beng.* lxx. 339).

Stamens 4 or 5; filaments slender.

Fruit dehiscent; leaves generally opposite.

Ovules 2 in a cell.

Petals connate

Petals free, clawed

Ovules solitary; petals bifoveolate

Ovules 4 or more in a cell; seeds winged in large capsule; trees

Disc free from ovary; stamens insert on edge; capsule 3-celled

Disc confluent with ovary; stamens from beneath it; capsule 3-celled

Ovary free, with tuft of hairs at top; styles 2; capsule entire or 2-lobed; trees

Drupe unilocular 1 or 2 seeds

Fruit a dry compressed indehiscent drupe 1 or 2 seeds

Fruit a berry; seeds 3 or 4

Stamens 3; filaments broad flat.

Climbers; fruit flat dehiscent; seed winged

Climbers or shrubs; fruit pulpy indehiscent

1. MICROTROPIS

2. EUONYMUS

3. GLYPTOPETALUM

4. LOPHOPETALUM

5. CELASTRUS

6. GYMNOSPORA

7. KURRIMIA

8. PLEUROSTYLIS

9. ELÆODENDRON

10. PERROTTETIA

11. HIPPOCRATEA

12. SALACIA

1. MICROTROPIS, Wall.

Glabrous trees or shrubs. Leaves opposite, entire. Flowers in sessile clusters or pedunculate, cymes axillary or supra-axillary small sometimes unisexual. Sepals 4 or 5 imbricate. Petals 4 or 5 connate at base or erect. Stamens 5, insert on disc or corolla. Disc 0 or small. Ovary free ovoid 2- or 3-celled; ovules 2 in each cell; style very short or 0. Stigma minute. Capsule ovoid or oblong coriaceous 2-valved, 1-seeded, dehiscing on one side and falling, leaving the red pulpy arillate seed still attached. Species about 12, India, Ceylon, Java.

Cymes sessile condensed under .5 in. long (1) *M. elliptica*

Cymes and peduncles 1 in. long or less.

Leaves thin coriaceous oblong-lanceolate acuminate (2) *M. discolor*

Leaves coriaceous ovate-lanceolate blunt (3) *M. ophirensis*

Cymes on long thin peduncles, 3- to 5-flowered; peduncles

.75 in. long; petals ovate (4) *M. bivalvis*

Cymes many-flowered; peduncles 3 in. long; petals

oblong

(5) *M. filiformis*

Cymes stout much branched 3 in. long; petals round : (6) *M. valida*

(1) *M. elliptica* King, l.c. 340.

Shrub or small tree. Leaves thinly coriaceous elliptic cuspidate-acuminate acute, base connate; nerves 6 pairs, 4·5 to 5 in. long, 1·85 to 2·5 in. wide; petioles 3 in. long. Cymes axillary 2 in. long, with 6 to 8 white flowers 25 in. across sessile. Sepals 4 or 5 reniform toothed. Petals 4 or 5 larger sub-rotund. Stamens 4 or 5; filaments connate half-way. Ovary 2-celled. Fruit ovoid beaked tapering at base, 6 to 7 in. long; peduncle 2 in. long. *Hab.* Forests to 2000 ft. altitude. Perak, Larut (Kunstler). Penang, Moniot's Road, West Hill (Curtis).

(2) *M. discolor* Wall. Cat. 4337; King, l.c. 341; Lawson, in Hook. fil. F.B.I. i. 614.

Shrub or small tree. Leaves thinly coriaceous oblong-lanceolate much acuminate base acute; nerves 4 or 5 pairs, 3·5 to 4·5 in. long, 1 to 1·75 in. wide; petioles 25 to 3 in. long. Cymes 5 to 75 in. long, extra-axillary spreading 8- to 10-flowered. Flowers 7 in. long sub-sessile. Sepals reniform, edge ciliate. Petals much larger oblong-ovate. Stamens 5; filaments short on a hypogynous disc. Fruit sub-globular 3 in. long. *Hab.* Forests, local. Penang, damp ravines, West Hill 2000 ft. altitude (Curtis). *Distrib.* Himalayas, Burma.

(3) *M. ophirensis* Ridl. Journ. Roy. As. Soc. S. Br. 35, p. 10.

Tree. Leaves lanceolate or ovate-lanceolate blunt, base narrowed, coriaceous 2 or 3 in. long, 1 to 5 in. wide; nerves 7 or 8 pairs; petioles 15 to 25 in. long. Cymes short; peduncles 1 in. or less. Flowers few, white. Sepals scale-like, edge toothed. Petals ovate sub-acute. Stamens attached to petals; filaments short. Fruit 75 in. long elliptic, base narrowed, beaked. *Hab.* Malacca, Mount Ophir. Rare about 3000 to 4000 ft. altitude.

(4) *M. bivalvis* Wall. Cat. 4340; King, l.c. 342.

Shrub or small tree 10 ft. tall. Stem 5 in. through. Leaves coriaceous oblong-lanceolate acuminate, base shortly narrowed; nerves 5 or 6 pairs, 2·5 to 3·5 in. long, 1 to 1·75 in. wide; petioles 25 in. long. Cymes extra-axillary 1 to 1·5 in. long; peduncle filiform 5 to 75 in. long. Flowers 3 to 5 in a cyme, 25 in. across; pedicels 2 to 3 in. long. Sepals reniform, edges crenulate. Petals larger ovate round, base narrow. Stamens 5; filaments dilate and connate half-way. Disc 0. Fruit ellipsoid 5 in. long, 1- or 2-celled and 1- or 2-seeded. Seed with a bright red pulpy aril. *Hab.* Penang Hill (Maingay, Curtis, etc.).

(5) *M. filiformis* King, l.c. 343. *M. bivalvis* Lawson, l.c. i. 614 (part).

Shrub or small tree 10 to 15 ft. tall. Leaves coriaceous elliptic acuminate, base cuneate; nerves 5 to 8 pairs indistinct, 4·5 to

7 in. long, 1·5 to 2·75 in. wide; petioles ·3 to ·4 in. long. Cymes axillary or extra-axillary on filiform peduncles 1·25 to 3 in. long, divaricate many-flowered. Flowers ·3 in. across greenish yellow. Sepals reniform, puberulous. Petals much longer oblong blunt, puberulous connate at base. Stamens shorter than petals, attached at base to corolla-tube. Disc none. Fruit ovoid pointed ·5 in. long. *Hab.* Forests low country up to 3000 ft. altitude. Selangor, Sungei Buloh. Dindings (Curtis). Perak, Gunong Batu Putih at 3400 ft. altitude (Wray); Larut Hills, 2000 ft. altitude (Kunstler). Penang (Porter). Kedah, Alor Sta (Ridley). *Distrib.* Burma.

(6) **M. valida** Ridl. *Journ. Roy. As. Soc. S. Br.* 75, p. 19.

Branches stout. Leaves thickly coriaceous elliptic acuminate shining acute, base cuneate, 3·5 to 6 in. long, 1·5 to 3 in. wide; nerves 6 to 8 pairs fine; nervules as large, reticulations conspicuous on both sides; petioles thick grooved ·5 in. long. Cymes stout 3 in. long; peduncles 1·5 in. long. Bracts ovate acute ·1 in. long, 3 to each flower. Flowers 3 clustered on the top of each cyme-branchlet, ·4 in. across; branches ·5 in. long; branchlets ·2 in. long sessile. Sepals 4 imbricate rounded in 2 unequal pairs glabrous, edges thinner, inner ones the larger, coriaceous. Petals 4 connate below, short broad rounded. Stamens 4 broad inserted on the tube. Pistillode truncate. *Hab.* Perak, Hermitage Hill (Curtis).

2. EUONYMUS, L.

Small trees or shrubs, glabrous. Leaves opposite. Calyx 4- or 5-fid. Petals 4 or 5. Stamens 4 or 5 inserted on the disc; anthers broad, 2-celled. Disc large fleshy 4- or 5-lobed. Ovary sunk in disc 3- to 5-celled; ovules 2 in each cell; style short or 0. Stigma 3- to 5-lobed. Capsule pyriform 3- to 5-celled, 3- to 5-lobed or angled, coriaceous, cells 1- or 2-seeded. Seeds covered by a coloured aril. Species 80, tropical and sub-tropical Asia, Europe, and North America.

- | | |
|--------------------------------------------------------------------------|-------------------------|
| Flowers in fascicles of 2 or 3; petals fimbriate | (1) E. javanicus |
| Flowers in lax 10- to 20-flowered cymes; petals not fimbriate | (2) E. Wrayi |
| Flowers in lax cymes and ·15 in. across; petals oblong toothed | (3) E. rufulus |

(1) **E. javanicus** *Bl. Bijdr.* 1146; *Hook. fil. F.B.I.* i. 607; *Benn. Pl. Jav. Rav.* 13, t. 28; *King, Journ. As. Soc. Beng.* lxx. (2), 339.

Glabrous shrub, from 6 to 20 ft. tall. Leaves thinly coriaceous oblong-lanceolate to elliptic oblong, base connate; nerves 5 to 6 pairs, 4 to 6 in. long, 1·35 to 2·5 in. wide; petioles ·3 to ·5 in. long. Flowers in fascicles of 2 or 3, or in 2- or 3-flowered cymes. Peduncles ·5 in. long, ·5 in. across. Sepals 5 round. Petals oblong fimbriate greenish white. Stamens 5; ovary conic. Fruit pyriform deep

5-lobed beaked, .75 in. long, red. *Hab.* Common in hill woods. Pahang, Gunong Tahan. Selangor, Batu Caves. Negri Sembilan, Tampin Hill (Robinson). Perak, Goping (Kunstler). Penang Hill. Kedah Peak (Low). Adang islands, Pulau Rawei. Kelantan, Chaning Woods. *Distrib.* Burma and Malay islands.

(2) **E. Wrayi** King, *l.c.* 343.

Small tree. Stem 4 to 6 in. through. Leaves as in *E. javanicus*. Cymes axillary or terminal spreading; peduncles 1.5 to 3 in. long; branches filiform 1.5 in. or less. Flowers .25 in. across. Sepals large 5. Petals 5, little larger, round clawed, edge undulate, green veined crimson. Ovary sunk in disc. Fruit pyriform 5-lobed .75 in. long red. *Hab.* Mountains up to 5000 ft. altitude. Pahang, Kota Glanggi, limestone rocks; Telom. Selangor, Gunong Mengkuang Lebah (Robinson). Perak, Gunong Batu Putih (Wray); Gunong Inas (Yapp); Gunong Kerbau (Robinson). Kedah, Gunong Bintang (Kloss).

(3) **E. rufulus** Ridl. *Journ. Roy. As. Soc. S. Br.* 75, p. 19.

Small tree. Leaves coriaceous elliptic, blunt-acuminate at both ends; nerves about 5 pairs, invisible above, obscure beneath, midrib elevate both sides, 1.5 to 4 in. long, .5 to .75 in. wide; petioles .25 in. long, thick. Cymes 8 in. long very slender. Peduncles .4 in. long; pedicels as long. Flowers .15 in. across dull red. Sepals orbicular. Petals broader than long, rounded-oblong denticulate punctate. Stamens very short; filaments tapering upwards. *Hab.* Pahang, Gunong Tahan at 5000 ft. altitude (Robinson).

3. GLYPTOPETALUM, Thw.

Erect shrubs or treelets glabrous. Leaves opposite. Cymes 3- or more flowered. Calyx of 4 short lobes. Petals 4 with 2 pit-like depressions above. Stamens 4, insert above disc, connective dilate. Disc 4-lobed. Ovary immersed 4-lobed, 4-celled; style short; ovules solitary pendulous from the top of cell. Stigma capitate. Capsule globose depressed coriaceous 1- to 4-celled, 1- to 4-seeded. Seeds arillate. Species 7, South India, Ceylon and Malay Peninsula.

Leaves bullate entire, 6 to 12 in. long (1) **G. quadrangulare**

Leaves smooth serrate, 2.5 to 3.5 in. long (2) **G. Scortechinii**

(1) **G. quadrangulare** Prain, *in King, l.c.* 245.

Shrub 2 to 15 ft. tall. Branchlets angled and winged. Leaves thinly coriaceous elliptic to oblong acuminate bullate; nerves 10 to 12 pairs depressed above, reticulations large conspicuous, 6 to 12 in. long, 2.5 to 5 in. wide; petioles .3 to .6 in. long. Cymes slender 3 in. long few-branched lax. Flowers few .3 in. across. Sepals reniform. Petals round reniform clawed, on the edge of a 4-lobed disc; anthers reniform. Fruit rounded 4-angled .4 to

·6 in. long. *Hab.* Hill woods, Pahang; Temerloh (Foxworthy). Selangor, Menuang Gasing, Langat (Kloss). Perak, Thaiping Hills 2500 ft. altitude (Wray); Ulu Bubong (King). *Native name:* Perupong.

(2) *G. Scortechinii* King, *l.c.* 345.

Leaves coriaceous elliptic to obovate cuspidate obscurely serrate, base cuneate; nerves 8 to 10 faint, 2·5 to 3·5 in. long, 1·35 to 1·75 in. wide; petioles ·25 in. long; peduncles supra-axillary 1·5 to 2 in. long; pedicels under 1 in. long. Sepals 5 round. Fruit (immature) obovate 5-lobed ·45 in. long. Ovules solitary. Very rare and little known, perhaps an *Euonymus*. *Hab.* Perak (Scortechini).

4. LOPHOPETALUM, Wight.

Trees often large. Leaves opposite or alternate coriaceous. Cymes usually spreading many-flowered. Flowers small to medium. Sepals 5 rounded short. Petals 5 continuous with disc, upper surface often crested or covered with fleshy villi. Stamens 5, inserted on the top of a disc. Disc large conspicuous often lobed. Ovary immersed in the disc 3- or 4-celled; ovules 4 or more in each cell; style short. Capsule large oblong, 3- to 4-angled, 3- to 4-celled. Seeds long winged. Species about 20, Indo-Malayan.

Petals crested; ovary buried in disc.

Leaves thickly coriaceous glaucous beneath;
flowers ·75 in. wide (1) *L. pachyphyllum*

Leaves thin coriaceous.
Flowers ·5 in. wide; leaves elliptic, 7 by 3 in. (2) *L. fimbriatum*

Flowers up to ·3 in. wide; leaves obovate;
panicle lax (3) *L. subobovatum*

Leaves oblong 4 to 5 in. long.
Disc without processes.
Sepals blunt ovate; flowers ·25 in. wide (4) *L. Scortechinii*

Sepals deltoid round; flowers ·3 in. wide (5) *L. oblongum*

Leaves 4 to 8 in. long; flowers ·2 in. wide (6) *L. fuscescens*

Disc with numerous processes; flowers ·25 in.
wide (7) *L. oblongifolium*

Leaves elliptic 4 by 2 in.; umbels 1 to 5 in.
long, peduncled; petals orbicular (8) *L. pedunculatum*

Leaves elliptic 4 by 1·75 in.; petals oblong
fimbriate (9) *L. intermedium*

Leaves elliptic-oblong 3 by 1·5 in. (10) *L. pallidum*

Leaves lanceolate 2·5 by ·75 in.; flowers very
small ·1 in. wide (11) *L. reflexum*

Petals not crested; disc cupular; stamens insert
on edge; ovary immersed in disc
(§ *Kokoona*).

Leaves elliptic-ovate 5 by 2·75 in. (12) *L. coriacea*

Leaves stiffly coriaceous 4 by 1·5 in. elliptic (13) *L. Maingayi*

Leaves elliptic acuminate 2·5 by 1·75 in. (14) *L. littoralis*

Very doubtful; flowers in a spicate panicle *L. dubium*

(1) **L. pachyphyllum** King, *l.c.* 348.

Tree 80 to 100 ft. tall, 2 to 3 ft. through. Leaves very thick coriaceous elliptic-oblong light green, bluish beneath; nerves 7 or 8 pairs, 4 to 5·5 in. long, 1·6 to 2·75 in. wide; petioles ·5 to ·75 in. long. Cymes 3 to 4 in. across, 7 in. long. Flowers ·75 in. across on ·5 in. pedicels. Calyx and disc hardly lobed, round. Petals yellow attached to edge of the deep red disc. *Hab.* Forests, Malacca (Maingay). Perak, Larut Hills 800 to 1500 ft. altitude (Kunstler).

(2) **L. fimbriatum** Wight *Ill. i.* 1708; *Lawson, in Hook. fil. F.B.I. i.* 615; *King, l.c.* 349.

A medium-sized tree. Leaves thinly coriaceous elliptic cuspidate, base rounded or retuse; nerves 7 to 10 pairs thin, bold beneath, 3 to 8 in. long, 1·75 to 3·5 in. across. Panicles 1 to 4 in. long many-flowered. Flowers ·5 in. across; pedicels ·25 in. long. Sepals very short. Petals orbicular-obovate, yellow. Disc large purple. Stamens rather long. *Hab.* Woods rare. Singapore, Changi (Ridley). *Distrib.* Burma. *Native names:* Krabu; Medang Asam.

(3) **L. subobovatum** King, *l.c.* 349.

Medium-sized tree. Leaves coriaceous obovate obtuse shortly cuspidate blunt, much narrowed to base; nerves 6 pairs, 2·5 to 4 in. long, 1·4 to 2 in. wide; petioles ·35 to ·45 in. long. Panicles axillary 4 to 5 in. long; branches 1·5 in. spreading. Flowers ·3 in. in diameter. Calyx teeth deltoid. Petals ovate obtuse, keeled and wrinkled above. Disc entire. *Hab.* Penang, Cooly lines, Government Hill, 1200 ft. altitude (Curtis).

(4) **L. Scortechinii** King, *l.c.* 350.

Tree 60 to 80 ft. tall, 15 to 20 in. through. Leaves coriaceous elliptic to obovate, blunt or sub-acute, base narrowed; nerves 5 pairs, 3·5 to 4·5 in. long, 1·75 to 2·25 in. wide; petioles ·4 to ·5 in. long. Panicles axillary cymose 2·5 to 4 in. long, spreading; branches 1·5 in. long. Flowers rather crowded at branch ends ·25 in. across yellow. Calyx lobes ovate obtuse. Petals deltoid, round smooth. Disc thin. *Hab.* Perak, Larut Hills 500 to 1000 ft. altitude (Kunstler).

(5) **L. oblongum** King, *l.c.* 350.

Tree 50 ft. tall. Leaves coriaceous oblong, shortly cuspidate, base cuneate; nerves 7 or 8 pairs, 3·5 to 4·5 in. long, 1·5 to 1·8 in. wide. Panicles 3 to 3·5 in. long; branches lax. Flowers ·3 in. across; pedicels ·1 in. long. Sepals deltoid round. Petals longer, oblong with a fimbriate crest above. Fruit woody, 5 in. long, 1·5 in. wide. Seeds 2·5 in. long. *Hab.* Penang, Waterfall (Curtis). Lankawi, Kesap (Haniff).

(6) **L. fuscescens** Kurz, *Journ. As. Soc. Beng.* xlv. 202.

Tree. Leaves coriaceous oblong shortly acuminate, base rounded; nerves 16 to 18 in pairs, 4 to 8 in. long, 2·5 to 3 in. wide; petioles ·8 to 1·25 in. long. Panicles axillary and terminal.

Branches cymose spreading, on a peduncle puberulous. Flowers 2 in. across; pedicels stout. Calyx lobes short round. Petals ovate sub-obtuse coriaceous with elongate trigonous corrugate processes above. Disc obscurely 5-lobed. *Hab.* Singapore (T. Anderson). I have not seen this plant.

(7) ***L. oblongifolium*** King, *l.c.* 351.

Tree 80 to 100 ft. tall. Leaves coriaceous, oblong acuminate, base narrowed; nerves 8 or 9 pairs, 4.5 to 6 in. long, 1.75 to 2.25 in. wide; petioles .5 to .65 in. long. Panicles axillary terminal 4 in. long rather stout, many-flowered; branches 1 in. long. Flowers .25 in. across. Calyx flat; teeth 5 sub-reniform. Petals ovate-elliptic, edges lacinate or not, a broad-based fleshy appendage and some hairs on the upper surface. Disc covered with short bristles. *Hab.* Perak (Scortechini). No locality given. *Distrib.* Sumatra.

(8) ***L. pedunculatum*** Ridl. *Journ. Roy. As. Soc. S. Br.* 59, p. 85.

Tree. Leaves sub-coriaceous oblanceolate cuspidate, base narrowed, 5 in. long, 2 in. wide; nerves 6 pairs; petioles hardly .15 in. long. Peduncles 1.75 in. long bifurcating; branches of cyme 5 in. long with 2 cymules of 3 flowers each. Flowers .15 in. across. Calyx-lobes orbicular. Petals orbicular-ovate, edges toothed. Stamens very short. Ovary immersed. *Hab.* Open country. Perlis, Bukit Telor Jambu, Kanga (Ridley).

(9) ***L. intermedium*** Ridl. *Journ. Roy. As. Soc. S. Br.* 59, p. 85.

Tree 40 to 50 ft. tall. Leaves thinly coriaceous, elliptic, base rounded, tip shortly acuminate; nerves 8 pairs, 4 to 5 in. long, 1.75 to 1.5 in. wide; petioles .25 in. long. Panicles 2 in. long; branches few. Pedicels .15 in. long. Calyx lobes short ovate. Petals oblong, tip fimbriate, white, with transverse crest of processes near the base. Disc thick. Ovary free from disc trigonous. *Hab.* Lankawi, Kesap (Haniff).

(10) ***L. pallidum*** Lawson, in Hook. *fl. F.B.I.* i. 615.

Glabrous tree. Leaves elliptic-oblong, pale when dry; nerves fine 8 to 10 pairs, nervules nearly as prominent, 2.5 to 3 in. long, 1.1 to 1.3 in. wide; petioles .3 in. long. Cymes .5 to .75 in. long. Flowers .25 in. across, 6 to 8 in a cyme. Calyx and disc round entire. Petals round deltoid papillose above. Disc flat with many hair-like processes. *Hab.* Lowland woods. Malacca (Maingay, Derry).

var. *Curtisii* Ridl. *L. Curtisii* King, *l.c.* 351.

Leaves ovate cuspidate, slightly stiffer. Cymes more lax. Disc with fewer processes. *Hab.* Penang, Government Hill (Curtis). *Native name:* Kroi.

(11) ***L. reflexum*** Lawson, *l.c.* i. 616; King, *l.c.* 352.

Tree 40 to 50 ft. tall. Leaves thinly coriaceous lanceolate acuminate narrowed to base; nerves 4 or 5 pairs, 2.25 to 3.25 in.

long, 1 to 1·2 in. wide; petioles ·25 to ·3 in. long. Panicles slender, ·2 in. long rufous-pubescent. Flowers ·1 in. across. Sepals deltoid round fleshy. Petals round ovate. Disc orbicular. *Hab.* Hill forests, Penang, Mount Elvira; Government Hill 1200 ft. altitude (Curtis).

(12) **L. coriacea** Ridl. *Kokoona coriacea* King, l.c. 347.

Tree 30 to 40 ft. tall, 12 to 18 in. through. Leaves coriaceous ovate-oblong sub-acute, base cuneate, lighter beneath; nerves 6 or 7 pairs, 4·5 to 5 in. long, 2 to 3 in. wide; petioles ·5 to ·6 in. long. Panicles axillary 4 to 5 in. long, peduncled; branches lax 1·5 in. few-flowered. Flowers pale yellow ·3 in. wide; pedicels shorter. Calyx cupular, short-toothed. Petals ovate thick, centre ridged. Stamens insert on the inner edge of the 5-lobed disc; anthers large cordate long-appendaged. Ovary ovoid free from the disc. *Hab.* Perak, Larut (Kunstler).

(13) **L. Maingayi** Ridl. *Kokoona Scortechinii* King, l.c. 347.

Tree 40 to 80 ft. tall. Leaves coriaceous elliptic-oblong acute, pale beneath. Panicles axillary terminal divaricate; branchlets racemose. Flowers ·25 in. across; pedicels short. Calyx lobes ovate acute. Petals longer broad ovate, ridged in centre. Disc shortly cylindric, teeth 10. Anthers ovate pustular apiculate. Ovary free from disc. *Hab.* Forests. Malacca (Maingay). Perak, Sungkai (Foxworthy). Perak (Scortechini). Penang Hill at 2000 ft. altitude (Curtis). *Native name*: Mata Ulat.

(14) **L. littoralis** Ridl. *Kokoona littoralis* King, l.c. 346; *Lawson, F.B.I.* i. 617.

A tall tree. Leaves thinly coriaceous ovate acute, base rounded; nerves 8 to 10 pairs, 3 to 4 in. long, 2 to 2·5 in. wide; petioles ·8 to 1 in. long. Panicles axillary and terminal 4 to 6 in. long; branchlets spreading cymose. Flowers ·1 in. across; pedicels ·1 in. long. Calyx lobes sub-acute. Disc orbicular. Fruit broadly 3-winged, 4·5 in. long, 1·5 in. wide. Seeds 1·5 to 2 in. long. *Hab.* A tall tree always growing in the water (Lawson), rare. Singapore (Lobb). Malacca (Maingay).

L. dubium *Lawson, l.c.* i. 616.

Glabrous. Leaves coriaceous elliptic acute at both ends, 3 in. long, 1·75 in. wide. Flowers ·3 in. wide in axillary spicate racemes, 1·5 in. long. Petals sub-triangular. Bracts small persistent. *Hab.* Malacca (Maingay).

I do not think this is a *Lophopetalum* at all, the specimen is very poor. Maingay suggests *Rutaceæ*.

5. CELASTRUS, Linn.

Climbing shrubs. Leaves alternate often crenulate. Flowers uni- or bi-sexual in terminal or axillary racemes. Calyx 5-lobed. Petals 5. Disc broad concave. Stamens 5 insert on the margin.

Ovary not immersed 2- to 4-celled; ovules 2 in each cell; style short. Stigma 3-lobed. Capsule sub-globose or ovoid, valves 3, Seeds 1- to 6-arillate. Species about 20, tropical Asia, Australia, China, Japan, N. America.

Leaves membranous; flowers in terminal panicles . (1) **C. paniculata**
 Leaves coriaceous; flowers in axillary racemes . (2) **C. malayensis**

(1) **C. paniculata** Willd. *Sp. Pl.* i. 1125; Lawson, in Hook. *fil. F.B.I.* i. 617.

Scandent shrub. Branches slender. Leaves oval to elliptic acuminate, base shortly cuneate serrate, membranous 2·5 to 5 in. long, 1·6 in. wide; petioles ·25 in. long. Panicles terminal 3 in. long, 2 in. wide pyramidal. Flowers ·1 in. wide, greenish yellow. Sepals orbicular. Petals obovate-oblong. Fruit 3-celled, 3- to 6-seeded. Seed ·13 in. long ovoid. *Hab.* Not common, usually in open country. Pahang, Kota Tongkat (Evans). *Distrib.* India, and Malay islands.

(2) **C. malayensis** Ridl. *Journ. Roy. As. Soc. S. Br.* 75, p. 11. *C. Championii* King, *l.c.* 353, not of Bentham.

Glabrous woody climber 40 to 50 ft. long. Branches black. Leaves coriaceous elliptic to ovate acute or acuminate, serrate or nearly entire, base shortly cuneate; nerves 5 or 6 pairs prominent, 3·5 to 4·5 in. long, 1·5 to 1·7 in. wide; petioles ·2 to ·25 in. long. Racemes several from one axil 2 in. long. Flowers ·1 in. across, white. Calyx obscurely lobed. Petals very small oblong. Fruits on pedicels ·2 in. long, 3-valved orange, valves ovoid ·3 in. long and as wide. Seed 1 aril red. *Hab.* In hilly country in forests. Pahang, Sungei Jelai (Machado); Telom. Perak, Gunong Batu Putih (Wray); Maxwell's Hill. Penang Hill, Penara Bukit (Curtis). Patani, Tomoh (Machado). Kedah, Alor Sta. *Native names:* Gurugun; Akar Serapoh.

6. GYMNOSPORA, Wight.

Shrubs or treelets often spiny. Leaves alternate. Flowers in small dichotomous cymes. Calyx 4- to 5-cleft. Petals 4 or 5. Stamens 4 or 5 insert beneath a broad flat disc. Ovary confluent with disc 2- or 3-celled; ovules 2 in each cell; style short 2- or 3-lobed. Capsule ovoid. Seeds 1 or 2 in each cell, aril more or less covering the seed. Species 55. Dry warm regions. Old World.

(1) **G. Curtisii** King, *l.c.* 353.

Scandent shrub glabrous. Leaves coriaceous, ovate-elliptic sub-acute crenate, base narrowed; nerves 10 to 15 pairs faint, 4 to 6 in. long, 2·25 to 3 in. wide; petioles ·4 to ·5 in. long. Cymes ·5 to ·7 in. long, fascicled on the ends of nude branches. Flowers ·15 in. long; pedicels much longer. Sepals 5 semi-orbicular. Petals 5 oblong blunt. Stamens 5 shorter. Disc entire. Fruit ovoid 3-angled, 3-valved. *Hab.* Lankawi (Curtis).

7. KURRIMIA, Wall.

Big trees. Leaves opposite coriaceous entire large; petioles slender. Flowers small in panicles or racemes. Calyx 5-fid. Petals 5. Stamens 5 from edge of disc. Disc lobed. Ovary puberulous at base with tuft of hairs at tip; ovules 2 in a cell; styles filiform 2. Stigmas small capitate. Capsule entire or bilobed dehiscent by 2 valves. Seed arillate. Species 3 or 4, Indo-Malayan.

Flowers red, racemose; fruit not bifid (1) **K. pulcherrima**
 Flowers green, paniced; fruit bifid (2) **K. paniculata**

(1) **K. pulcherrima** Wall. *Cat.* 4334; *Lawson, in Hook. fil. F.B.I.* i. 622; *King, l.c.* 354. *K. Maingayi* *Lawson, l.c.* 622.

Tree 40 to 70 ft. tall. Leaves oblong acuminate, base rounded; nerves 12 pairs, 6 to 8 in. long, 1.75 to 3.25 in. wide; petioles .8 in. long. Racemes several in an axil. Flowers red .15 in. across. Sepals elliptic. Petals elliptic round. Disc obscurely lobed. Capsule crimson, narrow ellipsoid narrowed to tip 1 to 1.5 in. long. Seed .6 to .8 in. long white. *Hab.* Lowland woods. Singapore, Tanglin; Bukit Mandai. Malacca, Ayer Panas; Sungei Hudang (Derry). Negri Sembilan, Petasih (Foxworthy). Perak, Hermitage (Curtis). Penang, Penara Bukit. *Native names*: Medang Gidap; Boko-Boko; Medang Tijoh.

(2) **K. paniculata** Wall. *Cat.* 4336; *Lawson l.c.* i. 622; *King, l.c.* 355.

Tree 30 to 60 ft. tall, much branched. Leaves deep shining green, elliptic-oblong 8 in. long, 3.25 in. wide; nerves 24 pairs; petioles 1 to 3 in. long. Panicles 12 in. long spreading. Flowers .15 in. wide pale yellow. Sepals and petals oblong obtuse, puberulous. Disc 4-lobed. Fruit cordate flattened laterally, bilobed at the top olivaceous yellow flushed pink at the base, .75 in. across dehiscent across the top. Seeds 1 to 3, usually 2, covered with a sweet pulpy red aril. *Hab.* Lowland woods, common. Singapore, Johor, Malacca, Selangor, Perak, Pahang, Penang. Kedah to Southern Siam. *Native names*: Bunak; Biko-Biko.

8. PLEUROSTYLIS, Wight.

Small glabrous tree. Branches angled. Leaves opposite coriaceous, entire. Cymes axillary small. Flowers small. Calyx 4-lobed. Petals 5 bigger. Stamens 5 insert below disc; filaments short flat, connective of anthers dilate. Disc thick crenulate. Ovary half-immersed confluent with disc unilocular; ovules 2; style short thick. Stigma wide peltate. Drupe 1- to 2-celled. Style scar lateral. Seed 1, rarely 2. Species 2, S. India. Madagascar to Malay Peninsula and N. Caledonia.

(1) **P. Wightii** *Wight and Arnott Prodr.* 157; *Wight Ic.* 155; *Lawson, l.c.* i. 617.

Leaves elliptic to lanceolate obtuse, narrowed at both ends, glaucous beneath; nerves numerous fine, 2.5 in. long, 1 in. wide; petioles 1 in. long. Cyme 1- or 2-flowered, 1 in. long. Fruit ellipsoid 2 in. long. *Hab.* Woods in the north. Penang, Batu Feringhi (Curtis). *Lankawi* (Curtis). *Distrib.* Mascarene isles and S. India.



FIG. 44.—*Elæodendron subrotundum*.

9. ELÆODENDRON, Jacq. fil.

Trees or shrubs. Leaves opposite crenate or entire. Flowers small in axillary branching cymes. Calyx 4- or 5-cleft. Petals 4 or 5 spreading. Disc cupular. Stamens 4 or 5; anthers subglobose. Ovary continuous with disc, 2- to 4- or 5-celled; ovules 2 in a cell; style very short. Drupe 1- or 2-celled indehiscent, cells 1- or 2-seeded. Species 40, all tropics.

(1) **E. subrotundum** *King, l.c.* 356.

Small stout tree 20 to 30 ft. tall. Leaves coriaceous ovate or

sub-rotund blunt, base shortly narrowed; nerves 6 or 7 pairs, 2 to 2·5 in. long, 1·2 to 1·8 in. wide; petioles ·3 to ·5 in. long. Cymes axillary and terminal 1·5 to 2·5 in. long, much-branched. Flowers numerous ·2 in. across yellowish white; pedicels longer. Calyx cupular 4- or 5-lobed. Petals 4 or 5 oblong blunt. Disc cupular thin. Stamens 4 or 5 on outer edge of disc. Ovary 2-celled. Drupe pear-shaped ·4 in. long, ·25 in. wide in widest part, brown woody 1-celled. *Hab.* Common on sea-shores and in sandy woods behind the mangroves. Singapore, Serangoon; Kranji; Tanjong Katong. Johor coasts. Pahang near Pekan. Selangor, Port Swettenham (Burkill). Perak, Krian (Burgers). *Distrib.* Borneo.

10. PERROTTETIA, H.B.K.

Shrubs. Leaves alternate ovate-oblong acuminate serrulate. Cymes short axillary. Flowers very small. Calyx cupular 3-lobed. Petals 5 valvate. Stamens 5 inserted on disc edge; filaments subulate; anthers sub-globose. Disc sub-lobed. Ovary half-immersed 3- to 4-locular. Stigma sub-sessile or style short. Berry small globose 2- to 4-celled, 2-seeded. Species 10, Malayan 4, the others Polynesian and American.

(1) *P. alpestris* Loesener, Engler and Prantl, *Pflanzenfamilien* iii. (5), 340. *Caryospermum serrulatum* Miq. *Fl. Ind. Bat.* i. 2. *Maesa perakensis* Ridl. *Journ. F.M.S.* iv. 45 (*partly*).

Shrub about 13 ft. tall. Leaves membranous elliptic, base round, obscurely crenulate; nerves 8 pairs puberulous when young, 3·25 to 4·5 in. long, 1·2 to 2·1 in. wide; petioles ·2 in. long. Cymes 1·25 in. long, puberulous. Flowers ·05 in. wide, brown. Calyx lobes acuminate puberulous. Petals puberulous acute little longer. Berry ·1 in. long, dull red. *Hab.* Common in hill woods at 3000 ft. altitude and upwards. Pahang, Telom. Selangor, Sempang Mines, Semangkok Pass. Perak, Thaiping Hills (Ridley). *Distrib.* Java, Borneo.

11. HIPPOCRATEA, Linn.

Scandent shrubs. Leaves opposite. Flowers white or yellow, small in axillary cymes. Calyx of 5 lobes or free. Petals 5 larger. Stamens 3; filaments recurved lying in grooves of the ovary. Disc flat. Ovary 3-celled; ovules 2 to 10 in 2 series in each cell; style very short. Fruit of 2 or 3 flattened carpels dehiscent. Seeds compressed winged below. Species 90, tropics generally.

- | | |
|--------------------------------------------------------------------------------------|---------------------------|
| Panicles and flowers red tomentose | (1) <i>H. ferruginea</i> |
| Panicles and flowers glabrous; flowers yellow ·3 in. across; leaves entire | (2) <i>H. macrantha</i> |
| Panicles puberulous; leaves crenate; flowers yellow ·3 in. wide | (3) <i>H. nigricaulis</i> |
| Panicles glabrous; leaves crenulate; flowers ·05 in. across white | (4) <i>H. indica</i> |

(1) **H. ferruginea** King, *l.c.* 357. *Salacia Griffithii* Lawson, in *Hook. fil. F.B.I.* i. 628; *King, l.c.* 364.

Leaves coriaceous elliptic-oblong sub-acute, base rounded or sub-acute crenulate; nerves 5 pairs, 3'25 to 5'5 in. long, 2 to 2'25 in. wide; petioles '3 to '4 in. long. Panicles axillary 3 to 5 in. long, spreading lax, ferruginous pubescent. Flowers '2 in. across, greenish brown. Sepals round rusty-tomentose outside. Disc large, edge wavy thick. Ovary sub-globose, 3-lobed. Rare in forests. Penang, Western Hill (Curtis). *Distrib.* Koh Samui, Peninsula, Siam.

(2) **H. macrantha** Korth. *Verh. Nat. Gesch.* 187, t. 39, not of King. *H. Cumingii* Lawson *l.c.* i. 624.

Stem brown smooth. Leaves coriaceous elliptic acuminate or blunt entire, light green, base rounded or shortly narrowed; nerves about 7 pairs, reticulations large conspicuous beneath, 5 in. long, 3 in. wide; petioles '1 in. long. Panicles 2 in. long; branches many stout. Flowers '45 in. across yellow star-like; pedicels '2 in. long glabrous. Calyx short blunt-lobed. Petals lanceolate coriaceous pubescent outside, hairy on the upper part inside. Disc large hairy outside, 5-lobed. Capsule elliptic of 2 flat boat-like carpels thin, woody 2'8 in. long, and each '6 in. wide, lanceolate narrowed to tip. Seed 1'75 in. long, flat sub-spathulate. *Hab.* River-banks, not rare. Singapore, Sungei Pandan; Selitar, Johor, Tebrau River; Kota Tinggi. Muar, Sungei Pauh (Fox). Pahang, Sungei Chenei (Fox). *Distrib.* Borneo to Philippines. *Native names:* Akar Bintang; Gambir Ayer.

(3) **H. nigricaulis** Ridl. *Journ. Roy. As. Soc. S. Br.* 75, p. 20. *H. macrantha* King, *l.c.* 357 (not of Korthals).

Slender climber 10 to 30 ft. long. Bark black, wrinkled. Leaves coriaceous elliptic shining bright green, blunt, base round, crenulate; nerves 6 pairs, elevate beneath, 2 to 5 in. long, 1'3 to 2'75 in. wide; petioles '1 in. long. Panicles 1 in. long red-puberulous. Flowers '3 in. across pale yellow. Calyx cupular teeth broad, shallow. Petals lanceolate glabrous minutely puberulous outside. Disc deep, fleshy, glabrous except for some minute hairs on the upper part. Fruit (carpels 2) elliptic oblong, 3'2 in. long, '75 in. wide, thin woody striate. Seed 2'25 in. long. *Hab.* Low open jungle. Malacca (Griffith). Selangor, Rawang, camphor forest. Perak, Thaiping Hills (Kunstler). Penang, Government Hill, below the Crag Hotel (Burkill). *Distrib.* Chittagong, Burma.

(4) **H. indica** Willd. *Sp. Pl.* i. 193; *King, l.c.* 359.

A large climber. Leaves membranous elliptic acuminate minutely crenulate, blunt at both ends to lanceolate; nerves slender 6 pairs, 2'25 to 3 in. long, 1 to 1'5 in. wide; petioles 2 in. long. Panicles 1 to 3 in. wide. Flowers numerous very small white '05 in. across. Calyx lobes triangular hairy. Petals oblong obtuse. Carpels 2 oblong blunt striate 2 in. long. Seeds 2 in each. *Hab.* Open

country and borders of woods local. Singapore, Changi; Pulau Ubin (Hullett). Malacca (Griffith). Pahang, Gunong Senyum (Evans). Penang, Waterfall (Curtis).

EXCLUDED

H. MAINGAYI *Lawson, l.c.* i. 635, is a *Lophopetalum*.

12. SALACIA, Linn.

Climbing or scrambling shrubs or treelets. Leaves opposite rarely alternate. Flowers small in fascicles or small cymes in leaf-axils. Calyx 5-lobed. Petals 5 imbricate. Stamens 3 continuous with the disc. Ovary conic immersed in disc 3-celled; ovules 3 to 8 in a cell; style very short. Fruit baccate red or orange 1- to 3-celled. Seed imbedded in white pulp large angular. Species about 130, tropics generally.

- Leaves alternate (1) *S. viminea*
 Leaves opposite.
 Flowers in pedunculate cymes, very short.
 Flowers campanuloid (2) *S. campanuloidea*
 Flowers with spreading petals (3) *S. perakensis*
 Flowers in paniced cymes, 1·5 in. long (4) *S. Korthalsiana*
 Flowers fascicled on axillary tubercles.
 Flowers 35 to 45 in. long.
 Leaves 6 to 12 in. long coriaceous.
 Flowers 10 to 12 in a fascicle (5) *S. Scortechinii*
 Flowers 3 to 6 on a tubercle.
 Leaves broad shining, oblong to lanceolate; nerves inconspicuous (6) *S. grandiflora*
 Leaves elliptic; nerves conspicuous, 4·5 by 3 in. (7) *S. latifolia*
 Flowers 25 in. wide.
 Leaves elliptic to lanceolate, 3 in. long (8) *S. prinoides*
 Leaves oblong, 4 by 1·75 in. (9) *S. verrucosa*
 Flowers 1 to 15 in. wide.
 Leaves oblong, 7 in. long (10) *S. flavescens*
 Leaves elliptic, 3·5 in. long; flowers on long slender pedicels (11) *S. Kunstleri*
 Leaves elliptic, cuspidate, 2·5 by 1·25 in.; pedicels short (12) *S. Wrayi*
 Leaves elliptic, cuspidate 3 by 1·5 in.; pedicels 1·5 in. long (13) *S. rubra*
 Flowers solitary or in pairs, not on tubercles (14) *S. Maingayi*

(1) *S. viminea* *Wall. Cat.* 7267; *Lawson, in Hook. fil. F.B.I.* i. 627; *King, l.c.* 362.

Slender climber. Leaves membranous, usually alternate, lanceolate acuminate both ends; nerves 5 to 7 pairs very faint, 2·5 to 4 in. long, 8 to 1·5 in. wide; petioles 8 to 1·5 in. long. Flowers 15 in. across, yellow; pedicels thin, 3 in. long, solitary or 2 to 3 together on small tubercles. Calyx flat, lobes triangular. Petals 5, round or ovate. Disc very convex. Stamens 3, filaments flat, triangular. Fruit globose red, 4 in. through. *Hab.* Forests, Singa-

pore, Garden Jungle. Malacca (Griffith). Perak, Durian Sabatang (Kunstler). Penang (Wallich), Lankawi (Curtis). *Distrib.* Peninsula, Siam.

(2) **S. campanuloidea** King, *l.c.* 363.

Woody climber 50 ft. long. Leaves thinly coriaceous ovate to elliptic-oblong, crenulate bluntly cuspidate, narrowed to base; nerves 6 to 8 pairs faint, 3 to 4.5 in. long, 1.35 to 2 in. wide; petioles .3 to .4 in. long. Cymes few-flowered very short solitary. Flowers greenish yellow, campanulate .15 to .2 in. long. Pedicels as long or longer. Calyx lobes transversely oblong. Petals obovate-elliptic glaucous campanulate. Disc conical. Ovary immersed. Fruit sub-globose or pyriform 1.5 to 2 in. through, reddish yellow. *Hab.* Climbing on tree-trunks in forests, 800 ft. altitude. Perak, Goping and Ulu Bubong (Kunstler).

(3) **S. perakensis** King, *l.c.* 364.

Climber. Leaves elliptic blunt acuminate; nerves 4 to 5 pairs, 2 to 2.75 in. long, 1 to 1.35 in. wide; petioles .2 in. long. Cymes .3 to .45 in. across on peduncles .3 to .75 in. long, 5- to 8-flowered. Flowers .15 in. long; pedicels longer. Calyx of 5 round lobes. Petals erect oblong puberulous much longer. Disc cylindric. Anthers 3 sessile on disc. Ovary immersed. *Hab.* Perak (Scortechini). I have not seen this plant.

(4) **S. Korthalsiana** Miq. *Ann. Mus. Bot. Lugd. Bat.* iv. 152. *S. Radula* Hassk. *Pl. Jav.* 231, *not of Don.*

Climbing shrub. Leaves coriaceous alternate, elliptic bluntly acuminate, base very shortly narrowed, edge undulate; nerves elevate beneath rather slender 7 pairs, 7 in. long, 2.75 in. wide; petioles thick .2 in. long. Cymes axillary with few dichotomous branches rather thick, 1.5 in. long, nearly 1 in. across. Flowers small in cymules of 3 or 4; pedicels .2 in. long. Calyx lobes 5 round. Petals 5 oblong obtuse, fleshy, .1 in. long, yellow. Disc large cushion-shaped. Stamens 3 projecting from disc. Ovary immersed. Fruit ovoid blunt .75 in. long (dry). Seed globose, 5 in. long. *Hab.* Very rare. Edges of woods. Singapore, Bukit Timah, west side at $7\frac{1}{2}$ miles from town (Hullett). *Distrib.* Java.

Young branches much lenticellate sometimes. Very distinct in its long paniced cymes. It has long ago disappeared from this one locality.

(5) **S. Scortechinii** King, *l.c.* 364.

Stout climber. Leaves coriaceous, oblong to elliptic sub-acute, base narrowed or rounded not reticulate below; nerves 6 to 8 slightly prominent beneath, 6 to 10 in. long, 2.25 to 3.5 in. wide; petioles .6 to .75 in. long. Flowers .35 in. across, 10 to 12 on axillary tubercles. Pedicels .35 to .4 in. long. Calyx lobes reniform. Petals orbicular. Disc convex. Stamen-filaments triangular. Ovary flat immersed. *Hab.* Perak (Scortechini). Possibly only a form of *S. grandiflora*.

(6) *S. grandiflora* Kurz. *Journ. As. Soc. Beng.* xli. 300; *Lawson, l.c.* i. 626. *S. longifolia* *Lawson, l.c.*

A large more or less sarmentose shrub with pale bark. Leaves coriaceous, deep shining green, oblong-elliptic to oblong-lanceolate, base narrowed or rounded; nerves 7 to 9 pairs, 5 to 6 in. long, 2.25 to 3.25 in. wide; petioles .5 in. long. Flowers glabrous pearly white .25 in. across, in groups of 3 to 6 or more on short axillary



FIG. 45.—*Salacia grandiflora*.

tubercles abundant; pedicels .2 in. long. Calyx cupular, lobes sub-orbicular. Petals orbicular to obovate. Disc convex glabrous. Stamens 3, filaments broad triangular from apex of disc. Ovary immersed. Fruit globular or ovoid, 1 to 1.25 in. wide, orange with sweet white pulpy seeds. *Hab.* Very common in woods and open country whole peninsula. Singapore to Penang. *Distrib.* Tenasserim. *Native names:* Nasi Sejuk; Ampedal Ayam.

This plant is very variable in the form of its leaf, and it varies from a distinctly scandent stout shrub to a small straggling tree. The large pearly

flowers and brilliant fruit are well-marked points of difference from any other species.

(7) **S. latifolia** Wall. Cat. 4222.

Climber. Leaves coriaceous elliptic or rounded blunt, edge undulate base, rounded or shortly cuneate; nerves 4 to 8 pairs slightly prominent beneath, 3 to 6 in. long, 2 to 2·5 in. wide; petioles ·5 in. long. Flowers ·4 in. across in fascicles of 6 or 8 from axillary tubercles; pedicels slender ·5 in. long. Calyx lobes rounded reniform. Petals much larger, obovate blunt. Stamens, filaments flat long. Fruit globose 1 in. through. Seeds ·75 in. long. *Hab.* Singapore (Wallich), Johor, Sedenah. Dindings, Tanjong Hantu; Pangkor (Scortechini). *Distrib.* Andamans, Nicobars, Tenasserim.

Perhaps only a form of *S. prinoides*.

(8) **S. prinoides** DC. Prodr. i. 571; Lawson, l.c. i. 626; King, l.c. 366.

Climbing shrub or bush. Leaves opposite, coriaceous, pale beneath or not, elliptic-oblong cuspidate, edges crenulate waved or entire, base cuneate; nerves 5 or 6 pairs, 1·75 to 3·5 in. long, 1 to 1·5 in. wide; petioles ·15 to ·25 in. long. Flowers ·25 in. across brown, 3 to 6 or more on small tubercles in the axils; pedicels slender ·25 to ·35 in. long. Calyx lobes rounded. Petals cordate obtuse, base clawed. Disc convex. Stamens 3. Fruit ovoid-globular ·5 in. long, 1-celled, 1-seeded. *Hab.* Borders of woods. Singapore, Bukit Timah Road. Malacca (Maingay). Perak (Scortechini). *Distrib.* Indo-Malaya.

var. *macrophylla* King. *S. macrophylla* Bl. Bijdr. 221.

Leaves broad elliptic acuminate narrowed at base, 4 to 5 in. long, 1·75 to 2·75 in. wide. *Hab.* Perak, Larut, open jungle (Kunstler, Wray).

(9) **S. verrucosa** Wight, Ill. i. 134; Lawson, l.c. i. 628. *S. polyantha* Korth. Flora xxxi. 379; King, l.c. 367.

Scandent shrub. Branches minutely warted. Leaves thin coriaceous elliptic-lanceolate, blunt acuminate, base cuneate, edge obscurely serrulate; nerves 7 pairs, 3·5 to 4·5 in. long, 1·25 to 2 in. wide; petioles ·35 in. long. Flowers ·15 in. wide greenish yellow, numerous on axillary tubercles. Calyx lobes short blunt. Petals broad elliptic blunt. Disc very convex. Stamens 3; filaments flat. *Hab.* Open jungle. Lankawi, Kwah (Curtis). *Distrib.* Mergui, Borneo.

(10) **S. flavescens** Kurz. Journ. As. Soc. Beng. xli. 300; Lawson, l.c. i. 627; King, l.c. 368. *S. ovalis* Lawson, l.c. 627. *S. Lawsoni* King, l.c. 369.

A scandent or sarmentose shrub or bush. Leaves opposite coriaceous bright green when dry oblong sub-acute, base rounded entire; nerves 6 to 9 pairs inarching far from edge, finely reticulate,

4 to 7 in. long, 1·25 to 2·5 in. wide; petioles ·2 in. long thick. Flowers orange or cherry red, ·15 in. across in axillary clusters, numerous, with numerous pale ovate bracts at base; pedicels slender ·2 in. long. Calyx-lobes ovate rugose acute. Petals twice as long elliptic. Disc lower rim thin wavy, upper part fleshy confluent with ovary. Stamens 3; filaments triangular. Fruit globular, 1·5 to 2 in. through, orange with sweet white pulp round the seeds. Forests and open country common. Leaves variable in size. var. *dumosa* King, is only a mountain or open country state. *Hab.* Singapore, Tanglin; Pulau Dammar; Bukit Timah. Johor, Gunong Pulai. Selangor or Batu Caves. Pahang, Tahan River. Dindings. Perak, Ulu Kerling and Ulu Bubong (Kunstler). Province Wellesley, Krian. Penang, Government Hill (Curtis) to 1500 ft. altitude. Adang islands, Pulau Rawei, Kedah, Yan. Lankawi, Kwah (Curtis). Kelantan, Channing Woods. *Distrib.* Tenasserim. *Native names*: Katimbong; Sedang.

(11) **S. Kunstleri** King, *l.c.* 368.

Scandent shrub. Leaves thin coriaceous entire oblong lanceolate narrowed to base; nerves 7 pairs, 3·5 to 5·5 in. long, 1·75 to 2·3 in. wide; petioles ·15 in. long. Flowers ·15 in. across, on long slender pedicels ·5 in. long, in fascicles of 3 to 6 on axillary tubercles, greenish yellow. Calyx lobes ovate-orbicular, edges ciliate. Petals oblong-orbicular. Disc thin annular. Filaments triangular. *Hab.* Not common in forests. Perak, Goping (Kunstler). Kelantan, Channing Woods (Ridley).

Very near *S. verrucosa*, but the leaves quite entire and pedicels much longer.

(12) **S. Wrayi** King, *l.c.* 367.

Stout climber. Leaves membranous broad elliptic cuspidate rounded or narrowed at base, below pale; nerves 6 or 7 pairs, 1·7 to 2·5 in. long, 1 to 1·35 in. wide; petioles ·3 to ·4 in. long. Flowers ·15 in. across in small cymes on a short ·1 in. long peduncle; pedicels ·15 in. long slender. Calyx lobes reniform ovate. Petals broadly oblong blunt. Disc cupular; filaments stout slightly flattened. Ovary 3-angled. Fruit globular 2 in. through orange corrugate; pedicel stout ·3 in. long. *Hab.* Perak, Kota (Wray).

Very near *S. Maingayi*, but the flowers are smaller and the inflorescence peduncled.

(13) **S. rubra** Lawson, *l.c.* i. 627.

Climbing shrub. Leaves elliptic cuspidate narrowed to base coriaceous; nerves 5 to 6 faint opposite, 3·5 in. long, 2 in. wide; petioles ·2 in. long. Flowers ·15 in. across in fascicles of 5 or 6; pedicels ·2 in. long. Calyx-lobes short blunt rugose. Petals lanceolate obtuse rather fleshy keeled on the back. Stamens 3 from the top of the disc; filaments short linear; anthers rounded elliptic. Disc tall thick. Ovary quite immersed. Fruit about

1 in. through rugose (when dry) bright red. *Hab.* On the borders of woods. Singapore, Garden Jungle. Malacca (Maingay).

Somewhat like *S. Wrayi*, but the leaves larger and the pedicels longer.

(14) **S. Maingayi** *Lawson, l.c.* i. 626; *King, l.c.* 363. *S. Lobbii* *Lawson, l.c.*

Climber 6 to 15 ft. long. Branches minutely warty. Leaves coriaceous ovate-elliptic cuspidate, base rounded; nerves prominent beneath, 5 to 7 pairs, 2.5 to 4.5 in. long, 1.25 to 2.05 in. wide; petioles .25 to .3 in. long. Flowers 1 or 2 in axils .45 in. across, greenish yellow; pedicels .3 in. long. Calyx lobes reniform. Petals oblong rounded. Disc deep glabrous. Stamens 3 attached to upper part of disc; filaments triangular. Ovary sunk in disc. Style none. *Hab.* Open jungle, hills, Perak, Larut Hills (Kunstler). Penang Hill (Maingay, Curtis).

S. Lobbii Laws. appears to be a form of this with more oblong leaves and longer pedicels.

ORDER XL. RHAMNEÆ.

Climbing shrubs, bushes, or small trees, often spiny. Leaves alternate rarely opposite, usually coriaceous, often tri-nerved and usually crenate or serrate. Flowers usually bisexual small green or yellowish in cymes axillary, or in false panicles. Calyx 4- or 5-lobed, lobes triangular. Petals 4 or 5 on the throat of the calyx tube, hooded or lobed, very small. Stamens 4 or 5 opposite petals. Disc filling or lining the calyx tube. Ovary free or immersed in the disc, 3- rarely 2- or 4-celled; ovules one in a cell; style simple or 2- to 4-cleft. Fruit a capsule, samara or drupe, 3- or 1- to 4-celled, free or half enclosed in the calyx tube. Species about 420, whole world.

Fruit superior drupaceous.

Spiny trees or shrubs; disc 5- to 10-lobed 1. ZIZYPHUS

Slender climber, not spiny; disc cup-shaped lining tube 2. SAGERETIA

Shrub or tree, unarmed; disc thin lining tube 3. OREORHAMNUS

Fruit half inferior dry; shrubs unarmed.

Fruit capsular 3-celled; 3 seeds; bush or tree erect 4. COLUBRINA

Fruit winged 1-celled; seed 1; climbers.

Fruit indehiscent sub-globose with one narrow wing 5. VENTILAGO

Fruit dehiscent oblong or ovate lanceolate flat 6. SMYTHEA

Fruit inferior 3-winged 7. GOUANIA

1. ZIZYPHUS, Juss.

Small trees, bushes or climbing shrubs with stipular straight or hooked prickles. Leaves alternate tri-nerved coriaceous. Flowers

fascicled or cymose. Calyx 5-fid keeled inside, tube obconic. Petals 5 cucullate. Disc 5- to 10-lobed, edge free. Stamens 5; ovary sunk in disc and confluent at base 2- to 4-celled; styles 2 to 4. Fruit a drupe; stone 1- to 4-celled, 1- to 4-seeded. Species 60, temperate regions of both worlds, tropical Asia and America.

Z. Jujuba Lam., the Jujube, Bidara of the Malays, a small tree with the leaves buff tomentose beneath, occurs in gardens chiefly in Malacca; it seldom fruits elsewhere.

Leaves pubescent beneath.

Spiny bush; leaves 1·5 to 2 in. long; fruit glabrous

(1) *Z. œnopia*

Climbers.

Leaves oblong thickly pubescent 5 by 2·5 in. long; fruit red-woolly 1 in. long

(2) *Z. Kunstleri*

Leaves ovate cuspidate pubescent on nerves only, 2·5 by 1 in. long; fruit glabrous, small

(3) *Z. elegans*

Leaves hairy above, 5 in. long, ovate acuminate

(4) *Z. pernettyoides*

Leaves quite glabrous.

Leaves ovate acuminate 2 in. long; cymes axillary

(5) *Z. Horsfieldii*

Leaves large oblong.

Cymes in thyrsoid panicles; fruit tomentose

(6) *Z. calophylla*

Cymes axillary; drupe glabrous

(7) *Z. affinis*

(1) *Z. œnopia* Mill. *Gard. Dict.* No. 3; *Hook. fil. F.B.I.* i. 634; *King, l.c.* 373.

A thorny bush. Branchlets rusty-pubescent. Leaves ovate-lanceolate often oblique, acute entire or crenate, glabrous above except nerves, white or red villous beneath; nerves 3 prominent with numerous transverse nervules, 1·25 to 2·25 in. long, 7 to 1·2 in. wide; petioles 2 to 3 in. long, tomentose. Cymes 2 in. long sub-sessile 12- to 15-flowered tomentose. Flowers 1 in. across, green. Calyx glabrescent. Disc with 10 lobes. Drupe globular black 25 in. through. *Hab.* Hedges and open country. Singapore, hedges in town. Pahang, Kwala Tembeling. Malacca (Griffith). Selangor, Rawang; Batu Caves. Negri Sembilan, Tampin. Perak, Larut (Kunstler); Kwala Kangsa. Province Wellesley, Tasek Gelugur. Penang. Kelantan, Chaning. Lankawi (Fox). Perlis, Besih Hangat. *Distrib.* Tropical Asia and Australia. *Native names*: Akar Kuku Tupai; A. Kuku Balam; Kukulang.

(2) *Z. Kunstleri* *King, l.c.* 373.

Climbing shrub, stout thorny. Shoots pubescent. Leaves coriaceous elliptic-oblong, sub-acute or blunt acuminate finely serrate, base rounded above, glabrous except nerves beneath, sparsely or densely tomentose, 4 to 6 in. long, 2 to 3 in. wide; petioles 15 to 2 in. long. Cymes 5- to 8-flowered, branched dense; peduncle 5 in. long, thick, densely tomentose. Flowers 25 in. across densely tomentose outside. Drupe ovoid, densely red-

tomentose, brown, 1 to 1·5 in. long, 75 in. through. *Hab.* Forests in low country, Johor, Castlewood. Province Wellesley (Kunstler). Dindings, Lumut, Perak, Larut Hills, Waterfall (Kunstler); Assam Kumbang (Wray). Penang, Mt. Elvira (Curtis).

(3) **Z. elegans** *Wall. Cat.* 4233; *King, l.c.* 374.

Slender climbing shrub, hairy. Leaves ovate acuminate blunt, membranous, minutely serrate, base rounded, glabrous above; nerves 3 or 4 pairs, hairy beneath; nervules faint, 2 to 3 in. long, 75 to 1·25 in. wide; petioles 25 to 35 in. long. Cymes 6 in. long, pubescent dichotomous, spreading. Flowers 1 in. across, white, pubescent outside. Drupe sub-globular compressed 3 in. across. *Hab.* Open woods and river-banks, Singapore (Wallich). Pahang, Tahan River. Malacca, Ayer Panas; Batu Tiga (Goodenough). Perak, Goping (Kunstler). *Distrib.* Sumatra.

(4) **Z. pernettyoides**, *Ridl.*

Creeping slender woody with scattered hairs on the branches and straight slender spines 25 in. long. Leaves ovate acuminate, base round obscurely crenulate, coriaceous, sparsely hairy on the edge; nerves 3, prominent and reticulations conspicuous when dry, 5 in. long, 25 in. wide; petioles very short, hairy. Flowers 1 in. across, greenish yellow in axillary fascicles of 3, in upper axils; pedicels very short, 1 in. long. Sepals 5, triangular-ovate with a few long hairs at the tips. Petals 5, spoon-shaped half as long. Stamens 5, wrapped in petals. Disc fleshy filling the tube. Ovary sunk in the disc. Stigmas 2, short. *Hab.* Lankawi, Dayong Bunting (Robinson).

(5) **Z. Horsfieldii** *Miq. Fl. Ind. Bat.* i. 643; *King, l.c.* 376.

Slender liane sparingly puberulous. Leaves ovate-elliptic to lanceolate, acuminate, base shortly narrowed, glabrous, thinly coriaceous; nerves 3, 2 outer with prominent laterals running to margin, 2·5 to 3 in. long, 1 to 1·75 in. wide; petioles 3 to 5 in. long. Cymes 4 in. long branched, pubescent or nearly glabrous. Drupe flattened, globose, minutely puberulous. *Hab.* Forests, not common. Singapore, Bukit Timah. Malacca (Maingay). *Distrib.* Java, Borneo.

(6) **Z. calophylla** *Wall. Cat.* 4230 and in *Roxb. Fl. Ind.* ii. 366; *Hook. fil. F.B.I.* i. 636; *King, l.c.* 374.

Powerful thorny climber. Leaves coriaceous glabrous shining light green elliptic to oblong, blunt cuspidate minutely crenate or not, base rounded; nerves 3 prominent, transverse; nervules very fine, 3 to 5 in. long, 1·5 to 2·5 in. wide; petioles 25 in. long. Cymes dense 2 in. across in axillary and terminal panicles, densely tomentose. Flowers 1 in. across, green. Drupe ovoid to globose, minutely brown tomentose, 6 in. long. *Hab.* Forests, common. Singapore, Garden Jungle; Selitar. Johor, Batu Pahat. Pahang, Sungei Chenei (Fox). Malacca (Griffith), Merlimau (Derry). Negri Sembilan, Seremban (Cantley). Selangor, Kwala Lumpur;

Ulu Selangor. Perak, Larut Hills (Kunstler). Penang (Wallich). Province Wellesley, Krian. *Distrib.* Borneo. *Native names* : Akar Jambu Kulalawo or Kelawar; Akar Onak; A. Pialu; Dawai-Dawai; Dedawei.

(7) **Z. affinis** Hemsl. *Ic. Pl. t.* 1544.

Strong climber resembling *Z. calophylla*, but quite glabrous. Leaves more acuminate, crenulate. Cymes 1 to 1.25 in. long, glabrous. Flowers green, nearly glabrous, .1 in. long; peduncle .5 in. long. Fruit ovoid glabrous .75 in. long, greenish brown, velvety. *Hab.* Forests. Perak, Changkat Serdang (Wray); Thaiping Hills to 1500 ft. altitude (Kunstler). Lankawi islands.

2. SAGERETIA, Brngn.

Straggling or climbing shrubs (sometimes armed). Leaves sub-opposite usually serrate or crenulate. Flowers very small sessile on terminal leafless parts of branches spicate or paniced. Calyx 5-lobed, tube hemispherical, lobes acute keeled inside. Petals 5 clawed and hooded. Stamens 5 as long. Disc cup-shaped lining the tube, edge 5-lobed. Ovary free from disc but sunk in it, 3-celled; styles 3-grooved. Stigmas 3. Fruit globose, 3-celled, 3-seeded indehiscent. Species 12, India, China, Java, N. America.

(1) **S. parviflora** Don, *Gen. Syst.* ii. 29.

Climber slender 30 to 50 ft. long. Branches black. Leaves ovate-lanceolate acuminate crenulate coriaceous glabrous smooth; nerves slender 5 pairs, 2 in. long, 1 in. wide; petioles .05 in. long. Spikes pubescent 2 in. long. Flowers very small sessile in small fascicles glabrous pale yellow. Fruit turbinate globose black. *Hab.* Open jungle on limestone hills, climbing over trees and bushes. Perak, Kwala Dipang (Kunstler). *Distrib.* India, Java.

3. OREORHAMNUS, Ridl.

Shrub or tree, buds red-hairy. Leaves thinly coriaceous glabrous, lanceolate acuminate shortly at both ends, serrate; nerves 6 pairs raised beneath, sunk above, reticulations fine conspicuous, petiolate. Flowers very small in pairs in upper axils, pubescent. Calyx campanulate 5-lobed. Petals in mouth of calyx very small spatulate bilobed enwrapping anther. Stamens 5; filaments short slender from top of disc; anthers ellipsoid, opposite petals. Ovary 3-lobed hairy; ovules 1 in each cell; styles short cylindric 3. Disc very thin lining the calyx tube. Fruit unknown. Species 1, Malay Peninsula.

(1) **O. serrulata** Ridl. *Journ. F.M.S. Mus.* xi. 32.

Leaves 3 in. long, 1 in. wide alternate; petioles hairy when young, .5 in. long. Calyx .1 in. long hairy outside, lobes triangular acute. Petals much shorter, spatulate bilobed clawed 5. Stamens

from edge of the thin disc. *Hab.* Kedah, Gunong Bintang (Kloss' collector).

4. COLUBRINA, Rich.

Shrubs or trees. Flowers in short axillary cymes. Calyx 5-fid, tube hemispheric. Petals 5 clawed hooded, insert at edge of disc. Ovary sunk, and confluent with disc 3-celled; style 3-cleft. Fruit sub-globose; pericarp membranous surrounded at base by calyx tube, cells 1-seeded dehiscent. Species 18, chiefly tropical American.

Sea-shore shrub; leaves ovate serrate (1) *C. asiatica*
Jungle tree; leaves oblong entire (2) *C. anomala*

(1) *C. asiatica* Brugn. *Ann. Sc. Nat. Ser. I.* x. 369; *Wight Ill.* i. 174; *Hook. fil. F.B.I.* i. 642; *King, l.c.* 377.

Shrub 6 or 10 ft. tall. Leaves ovate acute serrate, base rounded; nerves 3 pairs, 1·5 to 3 in. long, 1 to 2·25 in. wide; petioles ¼ in. long slender. Cymes many-flowered ½ in. long. Flowers ½ in. across greenish white. *Hab.* Sea-coast, common. Singapore (Wallich). Tanjong Katong; Gelang; Pulau Serapu. Pahang, Pulau Tioman; Pekan. Malacca. Perak (King). Penang, Telok Bahang (Curtis). Kelantan, Kwala Kelantan. Pulau Adang. Lankawi islands. *Distrib.* India, Malay isles, China. *Native name:* Periah Pantai.

(2) *C. anomala* King, *l.c.* 377.

Tree 30 to 40 ft. tall, 10 to 15 in. through. Shoots puberulous. Leaves membranous oblong-ob lanceolate, puberulous beneath entire; nerves 5 pairs prominent, 4 to 6 in. long, 1·1 to 2·25 in. wide. Cymes axillary many-flowered branching tomentose. Flowers ½ in. across light yellow. Fruit globular depressed ¼ in. through on a 1 in. peduncle. *Hab.* Forests at 300 to 500 ft. altitude. Perak, Larut Hills (Kunstler). *Native name:* Sena Hutan.

This is a fine timber tree, and extremely dissimilar to the common species.

5. VENTILAGO, Gaertn.

Woody climbers. Leaves sub-coriaceous or membranous, alternate ovate-oblong, base oblique, usually crenulate. Flowers small axillary fascicled or on cymes, slender shoots with small leaves often caducous so as to be paniculate. Calyx conic or campanulate with 5 acute lobes. Petals small bilobed. Stamens as long opposite. Ovary immersed in disc 2-celled; styles 2 recurved. Fruit a samara, nut round, half or not enclosed in the calyx tube; wing narrow oblong or lanceolate. Species about 10, Africa, Asia, Australasia.

Calyx tube half covering nut.

Wing oblong (1) *V. malaccensis*

Wing sword-shaped acute (2) *V. gladiata*

Calyx tube not covering nut.

Glabrous; leaves stiff coriaceous entire; wing
3 by .6 in. (3) *V. Maingayi*

Glabrous; leaves thinner serrate; wing 4 by
.5 in. (4) *V. oblongifolia*

Branches and nerves velvety; wings 2.5 by .6 in. (5) *V. velutina*



FIG. 46.—*Ventilago malaccensis*.

(1) *V. malaccensis* Ridl. *Journ. Roy. As. Soc. S. Br.* 75, p. 22. *V. leiocarpa* Lawson, in *Hook. fil. F.B.I.* i. 631; King, *l.c.* 380, not of Benth.

Leaves thinly coriaceous sub-membranous ovate acuminate to oblong blunt, serrate or nearly entire, base rounded; nerves 6 to 11 pairs; nervules fine conspicuous, 2.25 to 6 in. long, 2.5 in. wide; petioles .12 in. long. Bracts small hairy. Cymes .15 to .2 in. across. Flowers white glabrous except ovary, .1 in. across. Nut globose half covered by the cup-shaped calyx; wing yellow, linear-oblong blunt 2 to 2.5 in. long, .4 in. wide. *Hab.* Woods

and river-banks common. Singapore (Cantley); Garden Jungle. Malacca (Maingay); Ayer Panas (Goodenough). Perak, Larut (Kunstler). Penang, Telok Bahang; Chalet (Curtis). *Distrib.* Borneo. *Native names*: Akar Hitam; Akar Tukus.

(2) **V. gladiata** *Pierre, Fl. For. Cochinchine, t. 314C.*

Leaves lanceolate acuminate narrowed to the base, membranous, edge minutely serrulate; nerves 6 pairs; nervules conspicuous transverse, 2·6 to 3·3 in. long, 1 to 1·1 in. wide; petioles 1·5 in. long. Inflorescence axillary racemose; rachis puberulous. Cymes small. Fruit glabrous; pedicel 1 in. long, nut 2 in. long round enclosed for three-quarters its length in the enlarged calyx, narrowed at the base to the pedicel; wing lanceolate narrow to the base and acute at tip 2·5 in. long, 4 in. wide. *Hab.* Perak, Sungei Larut (Wray). *Distrib.* Cambodia.

The flowers are unknown.

(3) **V. Maingayi** *Lawson, l.c. i. 631; King, l.c. 379.*

Young branches and panicles softly hairy. Leaves thinly coriaceous drying pale glabrous oblong to lanceolate blunt entire, base shortly narrowed and rounded; nerves 8 to 11 pairs; transverse nervules visible on both sides, 2·5 to 4·5 in. long, 1·25 to 1·75 in. wide; petioles 1 to 2 in. long. Panicles narrow lax 8 in. long; branches slender. Flowers 1 in. wide, glabrous solitary or in threes; pedicels as long as flowers puberulous at base. Bracts very small pubescent. Calyx short goblet-shaped, lobes acute. Petals deeply bilobed spatulate, lobes truncate. Ovary glabrous. Fruit glabrous; nut 25 in. long; wing 1-nerved blunt mottled red, 3 to 3·5 in. long; calyx flat, not covering nut. *Hab.* Edges of forest and river-banks. Malacca (Maingay); Sungei Hudang (Derry). Pahang, Temerloh. Negri Sembilan, Tampin Hill. Perak (Scortechini). Penang Hill (Haniff). Lankawi, Pulau Segai. *Native names*: Akar Kamagan Antan; Kutapek.

(4) **V. oblongifolia** *Bl. Bijdr. 1144. Smythea macrocarpa var. pubescens King, l.c. 382.*

Stout climber. Leaves lanceolate gradually acuminate acute, base rounded usually oblique, serrate, membranous, glabrous on both sides or tomentose beneath; nerves 7 to 9 pairs strongly elevate beneath, 4 to 4·5 in. long, 1·5 to 1·75 in. wide; petioles very short 1 in. or less. Inflorescence axillary or terminal, rachis stout tomentose; branches 4 in. long with distant cymules. Flower-pedicels 1 in. long. Fruit glabrous; nut 2 in. long ovoid; calyx small not enclosing it, 1 in. long, 5 in. wide; wing linear-oblong, blunt, slightly narrowed at base, 5 in. long, 6 in. wide. *Hab.* Thickets and woods. Selangor, Batu Caves. Perak, Waterfall Hill (Wray, Scortechini). *Distrib.* Java, Philippines.

(5) **V. velutina** *Ridl. Smythea macrocarpa var. pubescens King, in part.*

Branches, petioles and nerves of leaves below velvety hairy. Leaves thinly coriaceous lanceolate-elliptic short acuminate obtuse, base cuneate, edge minutely serrulate, above sparsely hairy, 2 in. long, .7 in. wide; petioles .1 in. long. Cymes axillary small sessile, many-flowered. Bracts narrow acuminate glabrous. Fruit sparsely hairy; nut ellipsoid .4 in. long; calyx at base small cup-shaped ribbed; wing oblong, tip rounded 2 in. long, .6 in. wide. Pedicels very short. Flowers unknown. *Hab.* Perak (Scortechini).

6. SMYTHEA, Seem.

Woody climbers. Leaves sub-coriaceous or membranous. Flowers in axillary fascicles. Calyx lobes 5, hairy or pubescent, triangular. Petals very small bilobed. Stamens opposite them as long. Ovary bilocular; styles 2 recurved. Fruit oblong or ovate-lanceolate flat thin dehiscing down the centre, 1-celled, 1-seeded. Seed large round. Species 4, Burma, Malay Peninsula, Archipelago and Fiji.

Leaves elliptic-lanceolate entire; fruit lanceolate or ovate acute (1) *S. pacifica*

Leaves ovate-lanceolate or oblong serrate; fruit oblong obtuse (2) *S. macrocarpa*

(1) *S. pacifica* Seem. *Bonplandia* 1861, p. 255. *S. reticulata* King, l.c. 381. *Berchemia trichantha* Miq. *Fl. Ind. Bat. Supp.* 331.

Glabrous climber. Leaves elliptic acuminate or lanceolate base rounded entire coriaceous; nerves 3 to 5 pairs; nervules and reticulations conspicuous on both sides, 2 to 3.75 in. long, 1 to 1.5 in. wide; petioles .2 in. long. Flowers in fascicles of 9 in upper axils .1 in. across; peduncles .1 in. long hairy. Calyx lobes triangular acute hairy. Petals obtriangular bilobed, lobes rounded; ovary hairy. Fruit lanceolate or ovate acuminate 2 in. long, 1 in. wide, persistent calyx goblet-shaped ribbed. *Hab.* Seashores, climbing over trees. Singapore, Serangoon River; Bajau. Penang, Pulau Jerajah (Curtis). Province Wellesley, Kelumpang, Krian (Borgens). *Distrib.* Pulau Sangian, Borneo, Timor Laut, Aru, New Guinea, Philippines, Fiji islands. *Native name:* Bulang Akar.

(2) *S. macrocarpa* Hemsl. *Ic. Pl.* 1558; *King, l.c.* 381.

Branches puberulous. Leaves sub-coriaceous ovate-lanceolate or oblong-lanceolate acuminate serrate, base obtuse oblique; nerves 6 to 9 pairs, 3.5 to 5 or 7 in. long, 1 to 2 in. wide; petioles .2 in. long. Flowers 10 in a fascicle .15 in. across; pedicels as long. Calyx pubescent lobes triangular. Fruit oblong obtuse dehiscing along median line, 2.5 in. long, 1 in. wide. *Hab.* Open jungle. Perak, Waterfall Hill, Thaiping (Wray, Kunstler). Penang, Batu Feringhi (Curtis).

7. GOUANIA, Lam.

Climbers, rather slender woody cirrhiferous. Leaves alternate. Flowers very small in small cymes on long slender spikes. Calyx

tube obconic 5-lobed. Petals 5 insert below disc cucullate. Stamens 5 wrapped in petals. Ovary immersed in disc; style 3-fid. Fruit inferior crowned by calyx, 3-winged with round wings, 3-celled. Seeds one in a cell plano-convex obovate, small shining black. Species 30, chiefly S. American, some in tropical Asia, Africa and Polynesia.

Branchlets and flowers tomentose; racemes rather crowded

(1) *G. javanica*

Branches and flowers sub-glabrous; racemes elongate; flowers distant

(2) *G. leptostachya*

(1) *G. javanica* *Miq. Fl. Ind. Bat.* 1 (i.) 649; *King, l.c.* 383.

Branchlets and racemes red-tomentose. Leaves ovate acute crenate, base rounded above sparsely hairy or glabrous, hairy on nerves, beneath hairy; nerves red-tomentose 6 to 7 pairs, 1.5 in. to 2.5 in. long, 1.1 to 2 in. wide; petioles .5 in. long. Spikes 3 to 6 in. long with cirrhi at base. Flowers 2 to 4 in. in a cyme sub-sessile. Calyx woolly. Disc-lobes subulate. Fruit .3 in. long, .5 in. across. *Hab.* Open country and thickets. Malacca (Griffith). Pahang, near Raub (Machado). Selangor, Kwala Lumpur. Perak, road to Jor from Tapah; Sungei Rayah (Kunstler). Kelantan, Chaning. Perlis, Kanga. *Distrib.* Malay islands. *Native name:* Akar Sibueh.

(2) *G. leptostachya* *DC. Prodr.* ii. 40; *King, l.c.* 383.

Branchlets nearly or quite glabrous. Leaves ovate broad serrate or crenate above, glabrous except nerves sometimes puberulous, 1.75 to 3 in. long, 1 to 1.5 in. wide. Racemes slender pubescent, 6 to 12 in. long. Flowers in distant cymes of 3 to 4, sub-glabrous. Disc with 5 oblong truncate emarginate lobes. Fruit broader than long, rather broader than in *G. javanica*. *Hab.* Edges of tracks through forest. Pahang, Raub track (Machado). Perak, road to Jor. Perlis, Kanga. *Distrib.* India.

Very near *G. javanica*, and may be only a variety, but more glabrous with longer spikes.

ORDER XLI. AMPELIDEÆ.

Shrubs usually climbing by tendrils, bushes or rarely small trees (*Leca*). Stems angled or flattened or round. Leaves alternate simple, digitate or compound. Flowers small in umbellate cymes, or spicate, regular, bisexual. Calyx entire or 4- or 5-lobed. Petals 4 to 5, free or cohering valvate, often falling in a cap. Stamens 4 to 5 opposite, the petals insert at base of disc or between the lobes; filaments short; anthers 2-celled introrse. Disc free or adnate to petals or stamens. Ovary 2- to 6-celled; style short or 0; ovules

1 or 2 in a cell. Berry 1- to 6-celled. Seed often rugose. About 400 species, whole world.

Climbers with tendrils; ovary cells 2-ovuled.

- | | |
|-------------------------------------------------------|-----------------|
| Flowers spicate or cymose; rachis subterete | 1. VITIS |
| Flowers on a broad red flattened rachis | 2. PTERISANTHES |
| Erect, bushy shrubs; ovary cells 1-ovuled | 3. LEEA |

1. VITIS, Linn.

Climbing shrubs with tendrils. Leaves simple, trifoliate to 9-foliate, rarely pinnate. Flowers in umbellate cymes, or racemes, or spikes. Calyx entire or 4- or 5-toothed. Petals 4 or 5. Stamens 4 or 5. Ovary 2- rarely 3- or 4-celled; ovules 2 in a cell; style short or 0. Berry ovoid or globose; cells 1- or 2-seeded. About 375 species, in tropics of Asia, Africa, Polynesia, rare in America. This genus is often broken up into 3 or 4, which I prefer to keep as sections merely, as do Hooker and King.

i. AMPELOCISSUS. Flowers 4- to 5-merous; disc annular adherent to base of ovary; style conic; stigma minute; inflorescence thyrsoid or a panicle or spike of spikes pendent and usually red-hairy.

Inflorescence thyrsoid.

- | | |
|----------------------------------|-----------------|
| Stems bristly hairy | (1) V. Martini |
| Stems woolly tomentose | (2) V. Harmandi |

Inflorescence a panicle of very long racemes of flowers in clusters; leaves simple entirely glabrous

(3) V. macrostachya

Inflorescence a long raceme of short spikes.

Leaves simple.

- | | |
|--------------------------------------------------------------------------------------------------------------------|-----------------------|
| Leaves 3 by 2 in. sparsely pubescent beneath | (4) V. gracilis |
| Leaves 2 to 4 in. long red floccose beneath | (5) V. floccosa |
| Leaves 5 by 5.5 in., thickly red-tomentose beneath (some leaves trilobed) | (6) V. cinnamomea |
| Leaves 3- to 5-lobed always, densely red-hairy beneath; leaflets sub-coriaceous, very shortly petioluled | (7) V. elegans |
| Leaflets 4 or 5 red-tomentose beneath; petiolules 1 in. long | (8) V. compositifolia |
| Leaflets large long-petioluled, all glabrous | (9) V. polystachya |

ii. TETRASTIGMA. Flowers 4-merous expanding, disc adherent to base of ovary; style very short; stigma large lobed; cymes axillary corymbose erect. Whole plant glabrous and usually very large, woody-stemmed.

- | | |
|---------------------------------|----------------------|
| Leaves simple | (10) V. Scortechinii |
| Leaves trifoliate; corymbs lax. | |

Leaflets broad ovate; corymbs large spreading; fruit small red

(11) V. peduncularis

Corymbs slender much branched; flowers very small

(12) V. Curtisii

Corymbs very short, few branched 2 in. or less across.

Leaves stiff; cymes sub-sessile; fruit .5 in. through, yellow

(13) V. Lawsoni

Leaves thin; cymes slender peduncled, few-branched under 1 in. across; fruit red .25 in. long

(14) V. Wrayi

- Leaflets 3 to 5, oblong lanceolate; stem pustular; corymb 1 to 1·5 in. across . (15) **V. lanceolaria**
 Leaflets elliptic to ovate; cymes 2·5 by 2 in.; flowers rose pink (16) **V. Kunstleri**
- iii. AMPELOPSIS. Flowers 5-merous; disc cupular; style subulate; stigma entire; cymes leaf-opposed.
 Leaflets trifoliolate large (17) **V. semicordata**
 Leaflets bipinnate ovate cuspidate crenulate 1 in. long (18) **V. cantoniensis**
- iv. Cissus. Flowers 4-merous; petals falling off in a cap; disc 4-lobed; style subulate; stigma minute; inflorescence cymose corymbose, leaf-opposed.
 Leaves simple.
 Leaves red woolly beneath (19) **V. pyrrhodasys**
 Leaves glabrous; flowers not more than 1 in. long.
 Leaves rather thick fleshy, base shortly cuneate; fruit black (20) **V. furcata**
 Leaves thin herbaceous.
 Leaflets ovate-lanceolate truncate or cordate, spotted pink and white, red beneath . (21) **V. discolor**
 Leaflets broadly cordate green ovate; corymbs 1 in. wide (22) **V. repens**
 Leaflets ovate base truncate not cordate; corymbs 1 in. wide; flowers over 1 in. wide. (23) **V. diffusa**
 Leaflets oblong-ovate truncate slightly subcordate; fruit red 1 in. long (24) **V. glaberrima**
 Leaflets sagittate; stem succulent 4-angled white (25) **V. hastata**
 Leaves trifoliolate.
 Leaflets soft tomentose; fruit large transparent pink (26) **V. mollissima**
 Leaflets small ovate crenulate, glabrous . (27) **V. trifolia**
 Leaflets 3- to 5-foliolate ovate to lanceolate 1 to 2 in. long (28) **V. japonica**
 Leaflets 7 to 9, stiff, 6 to 9 in. long; petiolules 1·5 in. long (29) **V. novemfolia**

(1) **V. Martini Hort.** *V. barbata* var. *trilobata* King, l.c. 388.
Ampelocissus Martini Planch. DC. Mon. Phan. 373.

Stem red-hairy. Leaves cordate trilobed; lobes short broad, edges acute dentate, glabrous above, dense red-tomentose beneath, 4·7 in. long, 5·1 in. wide; petioles hairy 3 in. long. Panicles dense 3 in. long, 1·2 in. through; rachis red-hairy. Flowers dark red. Fruit globose purple, in dense bunches. *Hab.* Woods near limestone rocks. Kedah, Gunong Geriang (Kunstler). Jalor, Biserat (Gwynne Vaughan). *Distrib.* Cochinchina, Siam.

This is the Saigon Vine, which was at one time cultivated in Annam for its fruit, and wine was even made from it, but it did not prove a success.

(2) **V. Harmandi Ridl.** *Ampelocissus Harmandi Planch. l.c.* 378.

Stem reddish white-woolly. Leaves deeply cordate trilobed; lobes short broad acute, above glabrous, beneath arachnoid, woolly

on the nerves, 6·5 in. long, 8 in. wide; petioles 5 in. long woolly; tendrils long woolly branched. Panicle dense. Calyx pubescent. Petals oblong glabrous, .05 in. long. *Hab.* Lankawi, Terutau (Curtis). *Distrib.* Cochin-China.

(3) **V. macrostachya** *Miq. Ann. Bot. Mus. Lugd. Bat.* i. 94; *King, l.c.* 388. *Cissus spicifera* *Griff. Notulæ*, iv. 963. *Ampelocissus spicigera* *Planch. DC. Mon. Phan.* v. 406. = *Amel. spicifera* (Griff.) Merr.

Long pendent glabrous climber. Leaves coriaceous shining dark green ovate or oblong cuspidate, edges serrate spiny, base round; nerves 5 pairs, 3·5 to 6 in. long, 1·75 to 3 in. across; petioles 1 in. long. Spikes paniced slender very long pendent, some branches 9 to 14 in. long. Flowers green 1 in. long; pedicels as long, solitary or in fascicles. Fruit 3 in. long. *Hab.* Common on edges of forests and woods. Singapore, Tanglin; Bukit Timah. Pahang, Benta-Kwantan Road (Evans). Malacca (Griffith); Sungei Hudang; Ayer Panas (Derry). Selangor, Ulu Gombak; Rawang, Perak, Larut (Kunstler); Temengoh. Province Wellesley, Krian. *Distrib.* Sumatra.

(4) **V. gracilis** *Wall. Cat.* 6007; *Roxb. Fl. Ind. (ed. Carey)* ii. 477; *King, l.c.* 389. *Ampelocissus gracilis* *Planch. l.c.* 407.

Stems very slender red woolly-hairy. Leaves ovate cuspidate, base broad or cordate, edge spine-toothed, 3·5 in. long, 2·25 in. wide, glabrous on both sides except the woolly hairy nerves; petioles 1 in. long woolly. Panicles 6 in. long of slender distant spreading branches .5 in. long, red-woolly. Flowers scattered sessile .05 in. long glabrous; peduncles very slender 4 to 6 in. long. Fruit oblong. Seeds 2 plano-convex rugose. *Hab.* Common in lowland woods. Singapore, Chan Chu Kang; Krangi. Johor, Sedenah. Malacca, Ayer Panas (Griffith). Selangor, Bukit Kudah. Perak, Ulu Bubong (Kunstler). *Distrib.* Borneo, Sumatra. *Native names*: Akar Riang Riang Rimbah; A. Keladek Tanah. *Use*: Roots applied for Orchitis.

(5) **V. floccosa** *Ridl. Journ. Roy. As. Soc. S. Br.* 54, p. 37.

Stem slender densely covered with red tomentum. Leaves entire ovate-cordate acute; nerves 4 pairs, reticulations conspicuous glabrous above, densely red-tomentose beneath, 2 to 4 in. long and wide; petioles 1 in. long. Peduncles slender 2·5 in. long; branches distant .5 to 1 in. long. Flowers 10 to 12 on each .05 in. long, sessile on the tomentose, rachis 4-merous. Berry round oblong glabrous .5 in. long. Seeds 3 boat-shaped pustular. *Hab.* Roadsides, local. Johor, Gunong Pulai on the hedges and in thickets at the base (Ridley).

(6) **V. cinnamomea** *Wall. Roxb. Fl. Ind. (ed. Carey)*, ii. 483; *King, l.c.* 389. *Ampelocissus cinnamomea* *Planch. l.c.* 408.

Stems rather slender whitish-woolly or red-woolly. Leaves coriaceous ovate-cordate acuminate, or 3-lobed, outer lobes oblique, edge dentate bristle-pointed, above glabrous, beneath cinnamon-

tomentose; entire ovate leaves 5 in. long, 5·5 in. wide, trilobed as long, side lobes 1·75 in. across; petioles 2 in. long. Panicles slender 4 to 6 in. long; peduncles 4·5 to 6 in. slender, woolly; branches ·5 in. long, spreading woolly. Flowers small globose glabrous, 4-merous. Fruit elliptic red ·5 in. long. Seeds compressed ridged on inner face. *Hab.* Common in woods lowlands. Singapore, Bukit Timah. Malacca, Jus (Derry). Selangor, Rantau Panjang (Kloss). Perak, Asam Kumbang (Wray). Dindings, Lumut. Penang Hill (Curtis). *Native names:* Akar Keladek Ingan; Akar Pudin Rimbah. *Use:* Leaves for poulticing sore legs.

(7) **V. elegans** Kurz. *Nat. Tijds. Ned. Ind.* xxviii. 166; *King, l.c.* 392.

Stems, petioles, tendrils, inflorescence densely red-tomentose. Leaves trifoliate or 5-foliate, central lobe oblanceolate 5 to 6 in. long, 2·75 in. wide, laterals oblique ovate narrowed at base; petiolules winged, 4·5 in. long, 2·75 in. wide, outer edges spine-toothed coriaceous glabrous above except nerves, densely red-woolly beneath; petioles 1 to 1·4 in. long. Panicles 8 to 12 in. long; branches ·5 to 1·5 in. long; peduncle stout 5 to 6 in. long. Flowers glabrous pink tipped green. Disc green; filaments pink. Fruit ellipsoid fleshy purple. *Hab.* Common on edges of woods in the south. Singapore, Tanglin; Selitar. Johor, Pinerong (Cantley); Serom; Tanjong Merawan. Malacca (Griffith). Dindings, Telok Sera.

(8) **V. compositifolia** Lawson, in *Hook. fl. F.B.I.* i. 659; *King, l.c.* 391.

Stem and petioles covered with dense red tomentum. Leaves coriaceous quinate; leaflets oblanceolate, outer ones oblique, bases narrowed, edge sparsely spine-toothed above (except nerves) glabrous, beneath red-tomentose, 8 in. long, 3·5 in. wide; petioles 5 to 8 in. long, stout; petiolules 1·2 in. long. Inflorescence 12 in. long on a peduncle 6 in. long, woolly except the very small distant flowers; spikes 1 to 2·5 in. long red woolly. Fruit oblong ·5 in. long. Seeds flat elliptic keeled on the inner side, acute at both ends, ·3 in. long, ·2 in. wide. *Hab.* Woods. Malacca (Maingay). Perak, Sungei Rayah (Kunstler). Penang (Phillips).

(9) **V. polystachya** Wall. *Cat.* 6028; *King, l.c.* 390. *V. nitida* Lawson, *l.c.* i. 662. *V. polythyrsa* King, *l.c.* 390. *V. thyrsoflora* King, *l.c.* 391, not of Miquel.

Old stem corky. Leaves 5- to 9-foliate; leaflets coriaceous glabrous except a little hair on the petioles, elliptic-oblong cuspidate, base cuneate, dentate; nerves 7 to 10 pairs, 4 to 8 in. long, 1·5 to 4 in. wide; petiolules ·5 to ·75 in. long; petioles 3 to 4 in. long. Panicle 1 ft. or more long, sparsely hairy. Fruit globose-oblong often in large bunches, purple or green, quite eatable. *Hab.* Not rare in dense jungle. Johor, Gunong Pulai; Kota Tinggi. Malacca (Griffith); Selandor (Cantley). Selangor, Kwala Lumpur; Petaling. Perak, Maxwell's Hill; Goping (Kunstler). Gunong

Batu Putih (Wray). Penang (Wallich). *Native names*: Akar Kayah Asam; Akar Chabang Tujoh.

(10) **V. Scortechinii** King, *l.c.* 392.

Slender climber 20 to 40 ft. long. Leaves coriaceous simple oblong-ovate deep green acuminate, base round minutely cordate, edge undulate, above glabrous, beneath pubescent or tomentose; nerves 6 to 8 pairs, 4.75 to 8 in. long, 2.5 to 4.5 in. wide; petioles 1.25 in. long. Cymes 1 in. long, 1.5 in. across, lax few-flowered; peduncles 1 in. long, pubescent. Flowers green 4-merous minutely tomentose. Fruit globose waxy white .25 in. across. Seed 1. *Hab.* Woods. Selangor, Batu Caves (Curtis). Perak, Goping (Kunstler).

(11) **V. peduncularis** Wall. *Cat.* 6024; King, *l.c.* 393.

Stem woody warty flattened, young part rusty pubescent. Leaves trifoliate; leaflets coriaceous ovate or elliptic, lateral ones oblong acuminate, base cuneate spinous-serrate glabrous; nerves 6 to 8 pairs elevate beneath, 3 to 5 in. long, 2 to 3 in. wide; petiolules .5 to .75 in. long; petioles 3 to 6 in. long. Cymes from old wood 2 to 3 in. long; peduncles 2.5 in. long rather slender, much branched pubescent. Flowers very small 4-merous fragrant. Petals pubescent. Fruiting cymes up to 8 in. long and wide; fruit pea-shaped red. *Hab.* Hill-forests. Johor, Gunong Pantai. Malacca (Main-gay). Negri Sembilan, Bukit Angsi; Tampin Hill. Selangor, Kwala Lumpur. Perak, Larut (Kunstler); Gunong Inas, base (Yapp). Penang (Wallich); Penara Bukit (Curtis). *Distrib.* Sumatra, Borneo.

(12) **V. Curtisii** Ridl. *Journ. Roy. As. Soc. S. Br.* 75, p. 24.

Stem smooth black. Leaves trifoliate; leaflets coriaceous glabrous entire obovate cuspidate narrowed to base; nerves 8 pairs; nervules and reticulations as prominent, 2.5 to 3.6 in. long, 1.3 to 1.9 in. wide; petiolules .2 in. long, mid-one .4 in. long; petioles .5 in. long. Cymes .3 in. long, graceful spreading compound puberulous. Flowers .1 in. long, on pedicels as long. Calyx very short cup-shaped. Petals 4 oblong, tips recurved. Ovary globose free. Stigma large conic lobed. *Hab.* Penang Hill (Curtis).

(13) **V. Lawsoni** King, *l.c.* 394. *Vitis tuberculata* Lawson, *l.c.* i. 656, *not of Wallich*.

A stout tall liane glabrous, upper parts tuberculate. Leaves trifoliate; leaflets sub-coriaceous oblanceolate cuspidate, base cuneate, sparingly spine-toothed; nerves 5 pairs inarching slender, 3.5 to 5 in. long, 1.5 to 2 in. wide; petiolules, central one .2 to 1 in., lateral ones .2 to .4 in. long; petioles 1 to 1.5 in. long. Cymes 1 in. across dense sub-sessile or on peduncles .25 to 1 in. long. Flowers .1 in. long. Petals 4 white. Fruit globose 1 in. through, yellow eatable. Seeds 3 to 4. *Hab.* Lowland woods, climbing high on trees. Singapore, Garden Jungle; Bukit Timah. Perak, Simpang (Wray); Thaipang Hills 2500 to 3000 altitude (Kunstler); Goping (Kunstler); Penang Hill 1200 ft. altitude (Curtis). *Distrib.* Burma.

(14) **V. Wrayi** King, *l.c.* 394.

Stems slender puberulous. Leaves trifoliate; leaflets membranous oblong lanceolate, mid-one much the longest, 5 in. long, 1·5 in. wide; cuspidate acuminate, base cuneate, coarsely serrate or sub-entire; nerves 5 to 6 pairs; petiolules terminal one ·5 in. long, lateral ones ·1 in. long; petioles 2·5 in. long. Flowers ·1 in. wide greenish yellow. Fruiting cyme 4 in. long; fruit white waxy to red ·45 in. through. Seeds 2 to 3 oblong 3-sided. *Hab.* Hills up to 3000 ft. altitude. Johor, Gunong Pantai. Selangor, Batu Caves; Dusun Tua. Negri Sembilan, Gunong Berumban; Bukit Danang (Cantley); Tampin Hill (Burkill). Dindings, Gunong Tungul; Pangkor (Curtis). Perak, Thaiping Hills (Scortechini); Blanda Mabok (Wray). *Native names*: Akar Riang Riang Rimbah; Akar Chiarek.

(15) **V. lanceolaria** Wall. *Cat.* 6013; King, *l.c.* 395.

Whole plant except inflorescence glabrous. Stem flat, lower part tubercled. Leaves 3- rarely 5-foliate; leaflets fleshy coriaceous oblong to elliptic-oblong caudate-acuminate, base narrowed, teeth remote shallow; nerves 6 to 10 pairs winged beneath, 4·5 to 6 in. long, 1·75 to 2·75 in. wide; petiolules ·4 to ·75 in. long; petioles 2 to 5 in. long. Cymes puberulous spreading ·5 to 1 in. long and wide; peduncles ·4 in. long. Flowers 4-merous white. Fruiting cyme 1·5 in. long. Berry globose as large as a cherry, white. Seed 1 or 2. *Hab.* River-banks and woods. Pahang, Pulau Chengei, Pahang River. Negri Sembilan, Bukit Klanang and Bukit Sulu (Cantley). Selangor, Batu Caves. Perak, Plus River (Wray); Temengoh. Penang (Curtis). Perlis, Tebing Tinggi. *Native names*: Kankong Gajah; Akar Chabang Limah. *Use*: Poultice of the leaves for ague.

(16) **V. Kunstleri** King, *l.c.* 396.

Stem stout warted. Whole plant glabrous except inflorescence. Leaves 5-foliate; leaflets oblong-lanceolate to broad ovate acute, base shortly narrowed, obscurely coarsely crenate; nerves 7 to 9 pairs slender prominent, 2·5 to 4·5 in. long, 1·1 to 1·75 in. wide; petiolules ·25 to ·5 in. long, terminal one 1 in. long; petioles 4 in. long. Peduncles red-tomentose ·5 in. long. Cymes 1·5 in. long, 2 in. wide, spreading many-flowered. Flowers 4-merous, puberulous rose pink. Fruit globular ·35 in. through. Seeds 2 obovoid. *Hab.* River-banks, Pahang, Pulau Chengei and Pasir Loyang, Pahang River. Perak, Tapah; Larut (Kunstler); Batang Padang (Kunstler).

(17) **V. semicordata** Wall. 6020; Roxb. *Fl. Ind.* i. 481. *var.* Scortechinii King, *l.c.* 396.

Glabrous. Leaves trifoliate; leaflets coriaceous, median obovate, laterals oblique elliptic acuminate crenate serrate, base cuneate; nerves 6 to 7 pairs, 4 to 5 in. long, 2·5 to 3·5 in. wide; petiolules lateral ·1 to ·2 in. long, median ·2 to ·4 in. long; petioles 3·5 to

5 in. long. Cymes umbellate paniced 2 to 2·5 in. across; peduncle 1·5 to 2 in. long. Flowers ·15 in. across, 5-merous. Fruit ovoid black ·25 in. long. Seeds 2 to 3. *Hab.* Perak (Scortechini). *Distrib.* India, Burma, Java.

This is very different from the Burmese form, but it is rare here, and possibly further collections of it may show it to be distinct.

(18) **V. cantoniensis** *Seem. Bot. Herald.* 370; *Lawson, l.c.* i. 663; *King, l.c.* 397.

A slender glabrous vine. Leaves unequally pinnate, lower pair of leaflets often compound, all glaucous beneath, lanceolate or ovate acuminate, serrate in upper part, base entire cuneate; nerves 3 to 4 pairs faint, ·75 to 2·4 in. long, ·5 to 1 in. wide; petiolules ·1 to ·2 in. long. Cymes umbellate cymose ·75 in. across; peduncles 1·5 to 2 in. long. Flowers ·1 in. across, yellow. Berry obovoid ·25 in. long, white. Seeds 3 or 4. *Hab.* Roadsides and waste ground. Johor, Batu Pahat. Malacca (Hervey). Selangor, Petaling. Negri Sembilan, Perhentian Tinggi. Perak, Hermitage Hill at 3000 ft. altitude (Curtis); (Scortechini). *Distrib.* China and Cochin-China.

This does not seem to be very common. The Perak plants have quite entire leaflets; they are rounded elliptic in the Hermitage Hill plant.

(19) **V. pyrrhodasys** *Miq. Fl. Ind. Bat. Supp.* 517.

Slender vine. The shoots, back of leaves and inflorescence densely red-tomentose. Leaves simple ovate-cordate acute, bristleserrate, glabrous above except the 5 pairs of nerves, 2·25 to 5 in. long, 1·75 to 4 in. wide; petioles ·75 to 2·25 in. long. Cymes corymbose; peduncles ·5 in. long. Flowers small white. Calyx hairy. Berry pea-shaped black small. *Hab.* Roadsides and thickets. Johor, Gunong Pantai. Malacca (Griffith); Machap (Derry). Perak, Larut (Kunstler). Penang (Phillips). Kelantan, Kwala Lebir. *Distrib.* Sumatra, Borneo, Java. *Native name:* Akar Pakan Paya.

(20) **V. furcata** *Lawson, l.c.* i. 646; *King, l.c.* 399.

Glabrous vine. Leaves simple fleshy coriaceous ovate acuminate to lanceolate, base blunt narrowed or broad, serrate; nerves 4 to 5 pairs, 2 to 4 in. long, 1·1 to 2·5 in. wide; petioles ·4 to 1·1 in. long. Cymes 1 to 1·75 in. long lax, 1 in. across; peduncle short. Flowers cream-colour 4-merous. Panicles ·5 to ·75 in. long of 5 branches, cymes ·25 in. long; pedicels ·15 in. long, red. Berry black. Seeds 1. *Hab.* Common in woods. Singapore, Chua Chu Kang; Bukit Timah. Johor, Castlewood. Malacca (Maingay). Selangor, Batu Caves. Perak, Larut (Kunstler); Gunong Batu Putih (Wray).

var. *pubescens* *King, l.c.*

Branches, underside of leaves and cymes more hairy. *Hab.* Perak, Larut, Goping (Kunstler).

(21) **V. discolor** Dalz. Hook. Kew. Journ. ii. 39; King, l.c. 399. *Cissus discolor* Bot. Mag. t. 4763.

Slender climber, Stems red. Leaves simple ovate-lanceolate to lanceolate acuminate, deeply cordate or rounded or cuneate at base membranous glabrous dark green variegated with red and white, purple beneath; nerves 5 to 7 pairs, 2·5 to 4 in. long, ·85 to 2 in. across; petioles ·2 to 1·25 in. long. Cymes umbellate lax pubescent or compact ·5 to ·6 in. wide. Flowers ·1 in. long, pale yellow. Fruit pyriform ·2 in. through, red. *Hab.* Limestone rocks in the north. Perak (Scortechini). Pulau Adang. Perlis and Setul. *Distrib.* Indo-Malaya, Cochin-China.

This pretty vine is often cultivated for its foliage.

(22) **V. repens** Wight and Arnott, Prod. Fl. Pen. Ind. 124; Lawson, in Hook. fl. F.B.I. i. 646; King, l.c. 400.

Glabrous climbing herb. Leaves simple ovate-cordate acuminate serrate 2·5 to 3·5 in. long, 2·4 to 2·7 in. wide; petioles slender 1·5 to 2 in. long. Cymes lax 1 in. long, 1·5 in. wide; peduncles 1 to 1·5 in. long, wide pubescent, 2 in. long in fruit. Flowers ·1 in. across. Calyx pubescent. Corolla yellowish. Fruit globose or obovoid ·25 in. through, black. *Hab.* Common in hedges. Singapore, Fort Canning (Hullett). Pulau Tiuman. Negri Sembilan, Seremban (Cantley). Selangor, Kwala Selangor. Perak, Tapah (Wray). Penang, Penara Bukit (Curtis). Kelantan, Kwala Aring (Yapp); Yan. *Distrib.* Java, India. *Native name:* Akar Lakom Bulan.

(23) **V. diffusa** Miq. Ann. Mus. Bot. Lugd. Bat. i. 83.

Glabrous. Stem slender woody. Leaves ovate, acuminate sub-acute and blunt, base broad sparsely serrate spinulose, edge wavy; nerves 3 pairs fleshy membranous, 2·5 to 2·75 in. long, 1·75 to 2·6 in. wide; petioles 1 in. long. Cymes ·5 in. long, glabrous. Flowers few, green, umbellate ·1 in. across; peduncle ·1 in. long. Fruit globose, black, 1- to 2-seeded ·4 in. through. Seed ·2 in. long. *Hab.* Common in waste ground, whole plant foetid. Singapore (Cantley); Paya Goyang. Malacca (Griffith). Penang (Curtis). *Distrib.* Borneo, Celebes, Christmas Isle.

(24) **V. glaberrima** Wall. Cat. 5991; Roxb. Fl. Ind. (ed. Car.) ii. 476; not of King. *V. cerasiformis* var. *Wallichii* King, l.c. 400.

Tall glabrous vine. Branches above terete or bluntly angled. Leaves herbaceous elliptic cuspidate, base broad rounded or shortly cuneate, sparsely serrulate; nerves 4 pairs 3 to 3·25 in. long, 2 in. wide; petioles ·75 in. long. Cymes many-flowered 2 in. through; peduncle ·2 to 1 in. long; branches rather stout. Flowers nearly ·2 in. long, umbellate; pedicels stout as long. Calyx entire saucer-shaped. Petals long oblong sub-acute ·1 in. long. Fruit pisiform ·2 in. through on a pedicel ·4 in. long, claret pink. *Hab.* Forests, not common. Singapore (Kunstler); Bukit Mandai; Bukit Timah.

Johor, Castlewood. Selangor, Batu Caves. Perak (Scortechini). Penang (Wallich). *Distrib.* Andamans.

The lower part of the stem of this vine is flat and green, with a thick corky edge on both sides.

(25) **V. hastata** *Miq. Ann. Mus. Bot. Lugd. Bat.* i. 85; *Ridl. Journ. Roy. As. Soc. S. Br.* 75, p. 24. *V. sagittifolia* *Lawson, l.c.* i. 646. *V. glaberrima* *King, l.c.* 401, *not of Wallich.*

Herbaceous climber. Stems winged 4-angled glaucous white; tendrils red. Leaves simple herbaceous sagittate denticulate acuminate 3 in. long, 1·5 in. wide at base; petioles 1·5 to 2 in. long. Cymes rather large, 1 to 1·5 in. wide; peduncles red, 2 in. long. Flowers cowslip-scented. Calyx cup-shaped. Petals oblong reddish shoe-shaped excavate eventually reflexed. Anthers oblong yellow edged red. Disc flat undulate. Pistil immersed. Fruit ellipsoid ·25 in. long, black. *Hab.* Common in open country, climbing over bushes. Singapore, Gardens. Pahang, Pekan. Malacca, Bukit Bruang (Derry). Selangor, Kwala Kubu; top of Batu Caves. Province Wellesley, Permatang Bertam. Perak, Temengoh. Penang (Phillips). Lankawi (Curtis). *Distrib.* Borneo, Java.

(26) **V. mollissima** *Wall. in Roxb. Fl. Ind.* 482; *King, l.c.* 402.

Stem long stiffly hairy. Leaves trifoliate, central leaflet elliptic, lateral lobes oblique ovate serrate acute softly hairy, 3 to 4 in. long, 2 in. wide; petiolules lateral ·2, median ·6 in. long; petioles 2 in. long hairy. Corymbs wide-spreading 3 in. across; peduncles 2 in. long pubescent. Flowers ·2 in. across, dull bluish green. Fruit globose as large as a pigeon's-egg, semi-transparent pink. *Hab.* Common on forest edges. Singapore, Garden Jungle, Johor, Serom. Pahang, Pekan. Malacca, Ayer Panas (Maingay); Bukit Bruang (Derry). Selangor, Kwala Lumpur; Sungei Buluh. Dindings, Lumut. Perak, Larut and Goping (Kunstler); Ipoh (Curtis). Penang, Muka Head (Curtis). Perlis, Besih Hangat. Lankawi (Curtis).

(27) **V. trifolia** *Linn. Sp. Pl.* 203; *King, l.c.* 403. *Cissus carnosus* *Roxb. Fl. Ind.* i. 409.

Glabrous herbaceous. Leaves trifoliate; leaflets ovate, elliptic ovate, sometimes cuspidate, base broad or shortly narrowed, coarsely rounded, serrate, glabrous or pubescent; nerves 5 to 6 pairs, 1·5 to 2·5 in. long, ·8 to 1·25 in. wide; petiolules ·2 in. long (lateral), terminal one ·4 in. long; petioles 1·5 to 2 in. long. Cymes 1·5 in. across; peduncle 2 in. long. Flowers rather numerous crowded glabrous or puberulous white ·1 in. long. Fruit pisiform, ·25 in. through. *Hab.* Lowland country, Singapore (Hullett); Reservoir. Malacca (Griffith); Perak (Scortechini). *Distrib.* India, Java.

(28) **V. japonica** *Thunb. Fl. Jap.* 104; *King, l.c.* 403.

Slender climber. Leaves membranous 3- to 5-foliate; leaflets

ovate to oblanceolate acuminate or acute, narrowed to base, edge serrate, softly pubescent on the back or quite glabrous; nerves 7 to 9 pairs, 1·5 to 2 in. long, ·85 to 1 in. wide; petiolules ·2 in. long (lateral) to ·4 in. long terminal; petioles 1·2 in. long. Cymes 1 to 2 in. across; peduncles 1·25 to 1·5 in. long puberulous. Flowers few puberulous. Calyx cup-shaped. Fruit pisiform. *Hab.* Open country, villages, etc. Malacca, foot of Ophir (Hullett); Ayer Panas (Griffith). Negri Sembilan, Port Dickson. Selangor, Rantau Panjang; Rawang (Kloss). Penang (Curtis). *Distrib.* Java, Australia, Japan, China.

(30) **V. novemfolia** Wall. *Cat.* 6030; *King, l.c.* 403.

Long rather slender vine glabrous except the inflorescence. Leaves membranous of 7 to 9 lanceolate acuminate leaflets, the outer pair shorter oblique coarsely serrate, narrowed to the base, 4 to 4·5 in. long, 1·2 in. wide; nerves fine 5 pairs, reticulations conspicuous; petiolules 2 in. long or less; petioles 2·2 in. long. Cymes large and lax about 2 in. long; branches stout on a peduncle 4 in. long. Flowers rather few green ·15 in. wide; pedicels ·2 in. long. Calyx cup-shaped. Drupe ·75 in. through, globose dull green. Seeds 2 to 4. *Hab.* Thick lowland forests. Singapore, Tanglin; Selitar. Pahang, Kwala Tembeling and Pulau Tawar. Malacca, Rim (Griffith). Negri Sembilan, Bukit Tumiang (Cantley). Dindings, Bruas. Perak, Maxwell's Hill. *Distrib.* Andamans. *Native name*: Lakom Tubaro.

2. PTERISANTHES, Bl.

Slender wiry climbers rather short. Leaves simple or trifoliate. Flowers sunk in a flat broad undulating and often lobed rachis, at first green, later becoming red, pendent on a slender peduncle with a number of usually female or neuter flowers on slender stalks from the edge. Calyx cupular obscurely toothed. Petals 4 ovate. Stamens 4. Stigma capitate on a short conical style. Berry globose 1- to 4-seeded sessile on the red rachis. Species about 12, Malay Peninsula and islands.

Leaves simple glabrous.

Leaves membranous; rachis 3 to 5 in. long by ·6 to 1·5 in. wide (1) **Pt. coriacea**

Leaves coriaceous; rachis 6 by ·4 in. (2) **Pt. Beccariana**

Leaves simple woolly beneath (3) **Pt. eriopoda**

Leaves trifoliate glabrous; pedicels of flowers very long (4) **Pt. glabra**

Leaves trifoliate tomentose beneath.

Leaflets linear-lanceolate (5) **Pt. Dalhousiæ**

Leaflets lanceolate bullate above under 1 in. wide (6) **Pt. pulchra**

Leaflets oblong-obovate smooth over 1 in. wide (7) **Pt. cissoides**

Leaves 3- to 5-foliate arachnoid beneath; leaflets 3 in. long, 1·5 in. wide (8) **Pt. pedata**

Leaflets 4 in. long, 2·5 in. wide; red tomentose beneath (9) **Pt. rufula**

(1) *Pt. coriacea* Korth. in *Miq. Ann. Mus. Bot. Lugd. Bat.* i. 95; *King, l.c.* 407. *Pt. polita* Lawson, in *Hook. fil. F.B.I.* i. 633; *Hook. fil. Bot. Mag. t.* 7561.

Slender climber. Leaves simple ovate or elliptic acuminate minutely cordate; nerves 4 pairs, sparsely toothed, glabrous, 3·25 to 4·5 in. long, 1·5 to 2·75 in. wide; petioles ·75 to 1·25 in. long. Peduncles 5 in. long slender with a tendril at half its length.



FIG. 47.—*Pterisanthes coriacea*.

Rachis downy 3 to 5 in. long, ·6 to 1·5 in. wide, red. Immersed flowers yellowish. Petals ovate spreading, pedicellate flowers female or neuter on pedicels ·3 in. long. Fruit pisiform black ·2 in. through, on rachis. *Hab.* Forests in the low country. Singapore, Bukit Mandai; Bukit Timah. Johor, Castlewood; Gunong Pantai and Gunong Pulau. Selangor; Sungei Buluh; Rawang. Dindings, Lumut. Perak, Thaiping Hills; Blanja (Wray); Gunong Keledang. *Distrib.* Borneo, Sumatra. *Native name:* Akar Jangut Baong.

(2) **Pt. Beccariana** *Planch. DC. Mon. Phan. l.c. 418. var. Angustifolia* Ridl.

Glabrous except the petiole. Leaves rigidly coriaceous elliptic cuspidate, base minutely cordate, edge sinuate, shining, strongly reticulate on both sides; nerves 4 pairs, 4.25 in. long, 1.6 in. wide; petioles .2 in. long arachnoid. Peduncles 2.3 in. long, rachis narrow linear over 6 in. long, .4 in. wide. Male flowers in the type on very long peduncles 1 in. long. *Hab.* Mountain forests at 3000 to 4000 ft. altitude. Pahang, Gunong Tahan at Wray's Camp (Ridley). *Distrib.* Of type form, Borneo.

(3) **Pt. eriopoda** *Planch. DC. Mon. Phan. l.c. 417. Pt. coriacea* King, var. *araneosa* l.c. 408.

Slender climber. Leaves simple oblong cuspidate or ovate, base rounded minutely or distinctly cordate, edge entire, above glabrous, beneath red-woolly, 5 in. long, 2.6 in. wide; petioles .4 in. long woolly. Peduncles 1.5 to 4 in. long; rachis 6 in. long, .75 in. wide, very undulate and winged down the face. Fruit globose black .3 in. through. *Hab.* Woods in the northern part. Perak, Goping (Kunstler); Thaiping Hills. Province Wellesley, Krian. Penang Hill at 1800 ft. altitude (Curtis). *Distrib.* Sumatra.

(4) **Pt. glabra** *Ridl. Trans. Linn. Soc. iii. 287.*

Very slender glabrous vine. Leaves trifoliate; leaflets thin lanceolate acuminate, narrowed at base, dentate at tip; nerves 3 pairs, 3 in. long, 1 in. wide, lateral leaflets oblique inæquilateral; petiolules .5 in. long; petioles 1 in. long. Peduncles 3 to 4 in. long, slender; rachis flat, not lobed, horseshoe-shaped, 3 to 4 in. long, 1 in. wide. Flowers on edge on long slender pedicels 1 in. long or more, globose, sessile flowers immersed. *Hab.* Very rare. In thickets by the river. Pahang, Tahan River (Ridley).

(5) **Pt. Dalhousiæ** *Planch. l.c. 419.*

Slender climber covered with easily-rubbed-off red tomentum. Leaves thin membranous trifoliate; leaflets narrow linear-lanceolate acuminate with few conspicuous teeth on the outer side of the lateral ones and apex of the median leaflet, above glabrous, beneath red-tomentose; nerves 4 pairs, 4 in. long, .4 to .5 in. wide; petiolules of laterals .1 in. long, of median .2 in. long; petioles 1.5 in. long, all covered with wool. Peduncles 2.5 in. long; rachis 3 to 4 in. long, tapering to tip, irregularly 7-lobed rose pink. Berry .4 in. long black. *Hab.* Penang, West Hill 2500 ft. altitude (Curtis). Also a drawing, probably by Lady Dalhousie, in Kew Library.

var. *major* Ridl.

Leaves broad lanceolate 5 in. long, 1.5 in. wide; peduncles 9.5 in. long; rachis 6 in. long, 1.2 in. wide, margins and keel pubescent. Male flowers on pedicels .4 in. long, pubescent. *Hab.* Perak, Hermitage Hill (Curtis).

Planchon described this species from a plant collected by Lady Dalhousie with no locality given. Doubtless she got it in Penang.

(6) **Pt. pulchra** *Ridl. Journ. Roy. As. Soc. S. Br.* 61, p. 2.

Stem slender arachnoid. Lower leaves trifoliate lanceolate acuminate, laterals oblique, central one 2·5 in. long, 7·5 in. wide, upper leaves cordate acuminate 2 in. long, 1·25 in. wide, deep green bullate above, red-hairy beneath, edges undulate; petioles ·5 in. long. Peduncles 1·25 in. long arachnoid; rachis flat sinuate 4-lobed, ·5 in. long, ·25 in. wide, green or reddish hairy. *Hab.* Creeping on rocks at about 300 ft. altitude. Selangor, Sempang Mines on rocks, Semangkok Pass (Ridley).

(7) **Pt. cissoides** *Bl. Bijdr.* 193; *King, l.c.* 408. *Embamma cordigera* *Griff. Notulæ* iv. 694; *Ic. Pl. As. t.* 646.

Stem glabrous. Leaves trifoliate oblong or obovate acuminate, narrowed to base, 3 to 6 in. long, 1·5 to 3 in. wide, arachnoid on both sides when young, glabrous except nerves beneath in adults; petiolules ·5 to 1·5 in. long; petioles 1 to 3·5 in. long. Peduncle 4 to 8 in. long; rachis 3 to 6 in. long, 1 to 2 in. wide, irregularly broadly lobed, red brown. Male pedicels 1 in. long slender. Flowers ·1 in. across. *Hab.* Woods. Johor, Hulu Semborong (Kelsall). Malacca, Ayer Panas (Griffith); Sungei Hudang. Selangor, Labu River; Dusun Tua. Dindings, Lumut. Perak, Batang Padang (Kunstler). *Distrib.* Java. *Native name*: Akar Gamat. *Use*: Leaves used as a poultice to swollen legs.

(8) **Pt. pedata** *Lawson, l.c.* i. 664; *King, l.c.* 409.

Stem arachnoid. Leaves 3- to 5-foliate membranous; leaflets oblong-lanceolate acute, base rounded or cuneate, laterals with round oblique base, sparsely denticulate, above glabrous except the arachnoid nerves, beneath arachnoid; nerves 5 pairs elevate, 1·5 to 3·5 in. long, ·75 to 1·5 in. across; petiolules ·1 to ·4 in. long; petioles 1 in. long. Peduncles 2 in. long; rachis 2·5 in. long, ·9 in. wide, irregularly lobed acuminate with a central wing, glabrous. *Hab.* Forest edges. Johor, Mount Austin. Malacca (Maingay); Sungei Hudang; Negri Sembilan, Berumban (Cantley). Selangor, Sungei Buluh; Petaling; Batu Caves. *Native name*: Akar Kachang Gurnang.

(9) **Pt. rufula** *Planchon, l.c.* 419. *Pt. heterantha* *Lawson, l.c.* i. 664.

Stems tomentose when young. Leaves trifoliate, side lobes lanceolate or oblong oblique, median lanceolate or obovate sparsely toothed narrowed more or less at base, membranous glabrous except nerves above, densely red-tomentose beneath, 5 to 7 in. long, 1·5 to 2·5 in. across; petioles red woolly 2·5 in. across; peduncles 1·5 in. long; rachis 2·5 in. long, ·5 in. wide, green irregularly lobed, keel and edge red-tomentose. Male pedicels ·5 in. long tomentose. Berries black. *Hab.* Edges of forests. Malacca (Maingay); Alor Gajah (Griffith); Selendor (Cantley). Perak, Goping (Kunstler). *Distrib.* Sumatra. *Native name*: Akar Subunkak. *Use*: The tubers used for rubbing on swellings.

3. LEEA, Linn.

Erect shrubs, rarely trees or herbs. Leaves alternate simple or 1- to 3-pinnate often very large; petiole often dilate at base. Stipules sheathing. Inflorescence corymbose or cymose, opposite the leaves sub-terminal. Flowers small red or green. Calyx 5-toothed. Petals 5 connate at base, adhering to staminal tube. Stamens connate into a tube; filaments between the 5 lobes of the tube. Ovary on the disc 3- to 8-celled; ovules 1 to 2 in a cell; style short. Stigma swollen. Berry 3- to 8-celled, pulp scanty, pyrenes wedge-shaped. About 50 species, in tropical Asia, Africa and Polynesia.

Leaves simple; shrublet with few very large leaves . (1) **L. simplicifolia**

Leaflets 3; shrublet 12 in. tall; cyme very small few-flowered .

Leaves bi- or tri-pinnate; leaflets glabrous; shrubs large. (2) **L. pauciflora**

Leaflets elliptic 6 by 3 in.; corymb 6 to 24 in. wide

Leaflets narrow oblong, 9 by 3 in.; corymb 9 in. wide

Leaflets elliptic cuspidate with few rounded serratures, 4.5 by 2 in.; flowers large, .25 in. wide . (3) **L. gigantea**

Leaflets elliptic-lanceolate 2 by 1.25 in. or longer; tree spiny

Leaflets lanceolate 3 by 1 in.; low bush; corymbs 2 in. wide, bright red . (4) **L. sambucina**

Leaves hairy on back nerves.

Leaflets lanceolate 6 to 12 in. by 3 in. . (5) **L. Curtisii**

Leaflets pubescent beneath lanceolate cuspidate 5 by 1.5 in.; peduncles short .

Leaflets pubescent beneath oblong acuminate; peduncles long, 6 by 4 in. . (6) **L. angulata**

Leaflets hairy beneath, with discoid glands . (7) **L. rubra**

Herb nearly stemless; nerves hairy beneath; flowers capitate . (8) **L. sunaica**

(9) **L. javanica**

(10) **L. robusta**

(11) **L. æquata**

(12) **L. saxatilis**

(1) **L. simplicifolia** Zoll. *Natur en Geneesk. Arch.* ii. 577; King, *l.c.* 411.

Dwarf unbranched shrub glabrous. Leaves simple elliptic or obovate shortly acuminate, base narrowed minutely cordate, entire; nerves 9 to 12 pairs, reticulations distinct, 6 to 12 in. long, 5 to 6 in. across; petioles .5 to 1.5 in. long winged. Cymes capitate dense .75 in. through. Flowers numerous white. Peduncles .5 in. long or much less. Fruit sub-globular .3 to .4 in. across. *Hab.* Forests near river-banks, Perak, Larut 2000 to 2500 ft. altitude (Kunstler); Temengoh (Ridley). *Distrib.* Sumatra.

(2) **L. pauciflora** King, *l.c.* 412.

Shrublet 12 to 15 in. tall. Leaves 3 to 5 pinnate 2 or 3 coriaceous oblong to obovate blunt, cuspidate, base rounded, edge sparsely serrate, glabrous; nerves 8 pairs, 4.5 to 7 in. long, 1.5 to 3.2 in. wide; petiolules .4 in. long (lateral) to .9 in. long (terminal);

petioles 1·5 in. long. Cymes dense few-flowered 35 in. through. Fruit globular 4 in. through, white. *Hab.* Perak, Sungei Rayah (Kunstler).

(3) *L. gigantea* Griff. *Notulæ* iv. 697; *Ic. Pl. As. t.* 645; *King, l.c.* 412.

Large bush like an elder. Branchlets puberulous. Leaves several feet long 3- to 5-pinnate, pinnae a foot or more long, with 4 to 6 leaflets coriaceous glabrous shining green, coarsely serrate elliptic oblong, base shortly cuneate, acuminate; nerves 8 to 13 pairs; nervules fine connecting, 5 to 10 in. long, 2·25 to 4 in. wide;



FIG. 48.—*Leea sambucina*.

petiolules 3 to 75 in. long; petioles 6 in. long. Cymes large and spreading 9 in. to 2 ft. across, minutely puberulous or glabrous. Flowers 25 in. wide. Fruit globular, black. *Hab.* Common in low open country. Singapore, Thomson Road. Johor. Genuang; Sedenah. Pahang, Tahan Woods, Pulau Tioman. Malacca (Griffith); Bukit Bruang (Holmberg). Selangor, Batu Caves. Negri Sembilan, Perhentian Tinggi. Perak, Plus River (Wray); Temengoh, Penang Hill, Ayer Hitam. *Native name*: Giring.

(4) *L. sambucina* Willd. *Sp. Pl.* i. 1777; *King, l.c.* 414.

Big shrub about 12 ft tall. Branchlets puberulous. Leaves 15 to 20 in. long, 2- to 3-pinnate; leaflets about 9 to a pinna, thinly

coriaceous, oblong or elliptic acuminate acute serrate, base slightly cuneate; nerves 7 to 12 pairs prominent beneath, 3 to 9 in. long, 1.5 to 3 in. wide; petiolules .2 to .4 in. long, terminal one much longer. Cymes on peduncles 6 in. long, 8 to 9 in. across, spreading. Flowers apple green. Staminal tube white. *Hab.* Common in damp open spots. Singapore, Tanglin. Johor, Serom, Pahang, Pekan. Malacca (Griffith). Dindings, Lumut. Tringganu, Bundi (Rostado). Adang islands, Pulau Rawei. Kedah, Alor Sta. *Distrib.* India, Andamans, Bangka.

(5) **L. Curtisii** King, *l.c.* 416.

Shrub 4 to 5 ft. tall. Leaves pinnate. Leaflets 9 oblong-elliptic crenate, sharply acuminate, base cuneate, with silver grey variegations on either side of midrib 3.5 to 4.5 in. long, 1.5 to 2 in. wide; petiolules lateral .3 in. long, terminal one 1.5 in. long. Cymes umbellate 8 in. long, 7 in. wide; peduncles thick, 1.5 in. long, reddish brown, pubescent. Flowers large .2 in. long; calyx and pedicels hairy. Petals whitish yellow. *Hab.* Woods, but local. Perak, Waterloo (Curtis); Lenggong (Ridley).

(6) **L. angulata** Korth. in *Miq. Ann. Mus. Bot. Lugd. Bat.* i. 97. *L. horrida* Teysmann and Binnendijk. *Cat. Hort. Bog.* 169.

A thorny tree about 20 to 30 ft. tall. Leaves 12 in. long, 2- to 3-pinnate; leaflets 5 to 7 on a pinna elliptic or oblong-lanceolate acuminate, serrate crenate, base rounded or shortly narrowed glabrous, laterals inequilateral, 2 to 3.5 in. long, 1.1 to 1.5 in. across; petiolules .1 in. long (lateral) to 1 in. long (terminal); petioles 2 in. long winged at base. Cymes 3 in. long, including peduncle 1.5 in. long. Flowers white. Berries lead-grey .35 in. through. *Hab.* Open country, usually in sandy heath districts. Singapore, Pasir Panjang. Negri Sembilan, Bukit Tampin. Pahang, Pulau Tawar; Kwala Tembeling. Selangor, Rawang. Perak, Kampong. Kota (Wray); Kampar River (Kunstler); Temengoh. Kelantan, Kwala Aring (Gwynne Vaughan). *Distrib.* Java. *Native names*: Toi; Malli-Malli. *Use*: This tree is supposed to have the property of warding off attacks from tigers. It is the most truly arboreous of our tree-vines.

(7) **L. rubra** Bl. *Bijdr.* 197; King, *l.c.* 416.

Shrub about 3 to 5 ft. tall, nearly glabrous. Leaves 2- to 3-pinnate; leaflets 5 to 7 membranous, dark green, ovate or oblong acuminate serrate, base cuneate, sub-sessile; nerves 6 to 10 pairs, winged and crisped, 2 to 3.75 in. long, 1 in. wide; petioles .2 in. long. Cymes dense 2 in. across, dark red on 1 in. long peduncle. Flowers crimson lake. Stamens white. *Hab.* Tidal rivers, common. Singapore, Tanglin; King Road. Pahang, Pulau Manis, Pahang River. Penang, Penara Bukit 1000 ft. altitude (Curtis). Kedah, Alor Sta abundant. Kelantan (Dr. Gimlette). *Distrib.* Java.

(8) **L. sundaica** Miq. *Fl. Ind. Bat.* i. (2), 610.

Small tree 15 to 20 ft. tall. Stem 2 to 3 in. through. Leaves

pinnate or bipinnate; leaflets oblong, long-acuminate serrate, base rounded; nerves 12 to 16 eleviate beneath, 6 to 12 in. long (terminal one largest), 3 to 5 in. wide; petiolules .2 in. long lateral, to .4 in. long terminal, one hairy. Cymes spreading 6 in. across, hairy; peduncles short .1 in. long. Calyx pubescent. Fruit .2 in. through, globose depressed, dark blue. *Hab.* Dense rocky jungle, 500 to 800 ft. altitude. Perak, Gunong Bubu (Kunstler). *Distrib.* Java, Celebes, Papua.

(9) **L. javanica** *Bl. Bijdr.* 197; *King, l.c.* 418.

Large shrub. Leaves pinnate minutely deciduously tomentose; leaflets about 7 oblong to elliptic-oblong short acuminate, serrate, base rounded or cuneate, glabrous above except nerves puberulous, pubescent beneath, especially on nerves; nerves 10 to 12 pairs prominent beneath, 3.5 to 6 in. long, 1.75 to 2.5 in. wide; petiolules .2 in. long; petioles 4 in. long. Cymes wide 5 in. across; peduncles 1 to 2.5 in. long, puberulous tomentose. Flowers greenish white. Fruit globular black. *Hab.* Singapore (Schomburgk). Province Wellesley, Permatang Bertam (Ridley). *Distrib.* Java, Celebes.

I am not very certain about this. Schomburgk's locality is doubtful, and the specimens look like a pubescent form of *L. sambucina*.

(10) **L. robusta** *Roxb. Hort. Beng.* 183; *Fl. Ind. (ed. Carey)* ii. 468; *King, l.c.* 407.

Shrub 5 to 6 ft. tall. Branches coarsely rusty pubescent. Leaves pinnate to tripinnate; rachis and petioles angled; leaflets oblong acuminate remotely serrate; nerves 8 to 12 pairs, sparsely strigose both sides and pubescent beneath, 6 in. long by 4 in. wide or less. Cymes long peduncled tomentose. Flowers green, lobes of stamens tube not bifid. Fruit black. *Hab.* Very rare on open rocky islands. Singapore, Pulau Brani. *Distrib.* India, Andamans.

(11) **L. æquata** *Linn. Mantissa* 124; *King, l.c.* 418.

Shrub 4 to 10 ft. tall pubescent. Leaves bipinnate; rachis angled; leaflets narrow oblong acuminate distantly serrate, above with scattered bristles upon midrib and nerves, beneath bristly pubescent with circular glandular discs; nerves 7 to 12 pairs, 3 to 7 in. long, 1 to 1.75 in. wide. Cymes sessile on peduncles 1.5 in. long tomentose. Flowers white, teeth of stamens tube bifid. Fruit depressed globular black. *Hab.* Perak and Kedah (Kunstler), fide King. *Distrib.* India, Java, Sumatra.

I have seen no specimen from the peninsula.

(12) **L. saxatilis** *Ridl. Journ. Roy. As. Soc. S. Br.* 75, p. 26.

Herb nearly stemless. Leaves pinnate; petioles 1.6 ft. long; blade 2 ft. long; rachis sparsely hairy when young; leaflets 9, oblong long acuminate, base rounded, serrate, above glabrous, beneath midrib and 12 to 13 pairs of nerves tomentose hairy, 4 to 7 in.

long, 2 in. wide; petiolules .4 to .6 in. long. Flowers capitate on a hairy peduncle 5 to 1.5 in. long, much shorter than leaves. Head many-flowered .75 in. through, red-hairy. Fruit round flat at top, 5-lobed red .3 in. across on a peduncle 3 in. long and cyme-branches 1 in. long. *Hab.* Limestone rocks in damp forest. Selangor, Batu Caves. Pahang, Tahan River. Perak, Kwala Dipang. Lankawi (Curtis).

ORDER XLII. SAPINDACEÆ.

Trees, shrubs, rarely climbing herbs. Leaves alternate (rarely opposite), pinnate or simple; leaflets entire or toothed. Flowers small, usually unisexual and irregular. Calyx 4- or 5-lobed, or of 4 or 5 sepals, often unequal. Petals equal or not, 4 or 5 or suppressed, often bearded or scaled at the base. Disc annular or unilateral. Stamens 5 to 10, inserted inside, outside or on the disc; anthers 2-celled; filaments often pubescent, rarely connate. Ovary sometimes excentric, entire or lobed, 1- to 3-celled, 1 to 2 ovules in cell affixed to axis of ovary, ascending. Fruit capsular or drupaceous, entire or lobed, rarely winged. Seed globose or compressed, arillate or not, usually exalbuminous. About 800 species, whole world.

Ovules 1 in each cell.

Leaves trifoliolate.

Slender climber with tendrils; fruit capsular inflated

Shrubs usually erect; fruit a drupe

Leaves equally pinnate (except 1 species *Aphania* simple).

Fruit indehiscent.

Seeds not arillate.

Sepals and petals oblong 4 or 5; fruit 1- to 3-lobed, only 1 lobe developed

Sepals and petals 3; stamens 6; fruit bilobed

Sepals orbicular; petals obovate; fruit 1- to 3-lobed; lobes oblong; panicles terminal

Sepals orbicular; petals smaller; fruit lobes divergent, 1- to 3-lobed. Racemes axillary

Fruit sulcate, not lobed, 3-angled; petals scaled crested

Fruit baccate, scales not crested; basal leaflets stipule-like

Fruit angled; petals 0; disc lobed

Seeds arillate.

Sepals petaloid imbricate; stamens within disc

Sepals small, valvate; petals often absent

Calyx cup-shaped, 4- to 5-lobed, valvate; fruit smooth, hard

1. CARDIOSPERMUM

2. ALLOPHYLUS

3. SAPINDUS

4. CURTISINA

5. ERIOGLOSSUM

6. APHANIA

7. LEPISANTHES

8. OTOPHORA

9. TRISTIRA

10. XEROSPERMUM

11. NEPHELIUM

12. POMETIA

- Fruit unknown; sepals and petals 4; stamens
outside disc; stigma discoid 13. NAPEODENDRON
- Fruit dehiscent.
Sepals imbricate in 2 rows; fruit 3-winged
or lobed 14. GUIOA
- Calyx gamosepalous toothed; fruit pear-
shaped, 3-angled, large 15. TRIGONACHRAS
- Calyx cup-shaped; fruit cocci separate
divaricate.
Aril enclosing seed 16. ARYTERA
- Aril with 2 spurs at base; fruit 3-lobed 17. MISCHOCARPUS
- Leaves unequally pinnate; fruit globose, woody,
tubercled spiny; no aril 18. PARANEPHELIUM
- Ovules 2 or more in ovary-cell.*
Leaves simple; capsule membranous 19. DODONÆA
- Leaves pinnate; petals large; fruit inflated;
seeds arillate 20. HARPULLIA

1. CARDIOSPERMUM, Linn.

Slender climbing herbs. Leaves thin alternate, biternate; leaflets coarsely toothed. Racemes axillary, on a long slender peduncle; flowers small white. Sepals 4, imbricate, 2 outer ones small. Petals 4, in unequal pairs, with scales at base. Disc unilateral. Stamens 8, excentric, 4 nearest to disc glands the shortest. Ovary 3-celled; style short trifid; ovules solitary. Capsule membranous, 3-celled and valved inflated. Seeds globose, arillate. Species 30, chiefly tropical America and Africa.

(1) *C. Halicacabum* Linn. *Sp. Pl.* 366; *King, l.c.* 421.

Two or 3 ft. or more long. Leaflets deltoid, acuminate, 1·5 to 2 in. long, 3 to 5 in. wide with 5 acute lobes, glabrous or sparsely pubescent. Racemes 1·5 to 3·5 in. long with a few flowers at the tip and below them, 2 tendrils. Flowers 11 in. wide. Fruit 1 in. long and wide. *Hab.* Common in cultivated ground and near the sea, whole peninsula, from Singapore to Lankawi. *Native names:* Peria bulan; Uban Kayu. *Use:* As a pot-herb.

2. ALLOPHYLUS, Linn.

Shrubs, or small trees, rarely climbers. Leaves 3-foliate rarely simple; leaflets serrate rarely entire. Racemes axillary simple or branched. Flowers small numerous globose irregular white. Sepals 4 in opposite pairs hooded imbricate, inner ones larger. Petals 4 small naked or with a shaggy scale above the claw. Disc one-sided with 4 glands opposite the petals. Stamens 8 within the disc. Ovary 2-lobed, 2-celled; ovules solitary. Fruit a red drupe often bilobed. Species many, all the tropics. All our species have been reduced to *A. Cobbe* Bl. by Hooker and King, but though very similar in the flower, the habits of the plants are so totally different that it is advisable to separate at least the most distinct forms. Radlkofer *Sitzung der Math. Phys. Klasse Kgl.*

Bayer. Ak. Wissensch. xxxviii. (2), 201, has given short diagnoses of the various species.

Erect shrubs or small trees.

Leaves glabrous.

Low shrub; leaflets crenate dentate to 3·25 in.

long (1) *A. ternatus*

Small tree; leaflets entire or nearly, 6 to 9 in.

long (2) *A. glaber*

Leaves pubescent or tomentose on back.

Treelet; leaflets pubescent beneath (3) *A. fulvinervis*

Shrub; leaflets villous tomentose beneath (4) *A. villosus*

Woody climber; leaflets coriaceous entire obovate (5) *A. scandens*

(1) *A. ternatus* *Loureiro, Fl. For. Cochinchine* 232.

A low shrub 3 to 10 ft. tall. Stem lenticellate; branches and petioles finely pubescent, otherwise nearly glabrous. Leaves trifoliate small; leaflets elliptic crenate-dentate, glabrous except the midrib on back blunt, 1·5 to 3·5 in. long, 7 to 1·5 in. wide (the middle one largest); petioles slender 2 in. long. Racemes 1·5 to 3 in. long puberulous. Flowers 1 in. long, white numerous. Fruit elliptic or globose pulpy red, 25 in. long. *Hab.* In tidal mud, common. Singapore, Tanjong Penjuru; Selitar; River Valley Road; Toas. Johor, Scudai River. Pahang River near mouth. Selangor, Klang. Malacca (Maingay). Penang. Province Wellesley (Brooks). Lankawi (Curtis). *Distrib.* Tenasserim, Cambodia, Malay Isles, Polynesia. *Native names:* Chonkol; Tumbit Kayu; Chungkil.

(2) *A. glaber* *Roxb. in Wall. Cat.* 8057.

Small tree nearly glabrous. Leaves trifoliate; leaflets sub-coriaceous elliptic narrowed to base and tip, blunt, laterals oblique at base, nearly or quite entire, 6 to 9 in. long, 2 to 3·75 in. wide; petioles 3·5 to 5 in. long. Racemes branched; peduncle 3 in. long; branches 1·5 to 4 in. long, puberulous. Flowers rather large. *Hab.* Forests, Johor, Serom; Gunong Pulai. Malacca, Merlimau. Selangor, Menuang Gasing (Kloss); Sungei Buluh (Cantley). Penang (Wallich), Moniot's Road. Perak, Maxwell's Hill (Scortechini); Goping (Kunstler). *Native name:* Terentang Bukit.

(3) *A. fulvinervis* *Bl. Rumphia* iii. 183.

Treelet. Branches velvety-pubescent, as is panicle. Leaves trifoliate; leaflets elliptic acuminate, base rounded or shortly narrowed distantly serrate; midrib, nerves above and also surface beneath (often) pubescent, 4·5 to 5 in. long, 1·5 to 2 in. wide; petioles 1·5 to 2·5 in. long. Racemes simple or 3-branched, often rather stout puberulous. Flowers small 05 in. wide. *Hab.* Forests, Malacca (Hervey) a rather glabrous form. Pahang, Telom, Selangor, Ginting Bidai; Rantau Panjang (Kloss). *Distrib.* Java, Sumatra, Tenasserim.

(4) **A. villosus** Radlk. *l.c.* 228.

Shrub 3 to 6 ft. tall. Stem, petioles and back of leaves villous-tomentose. Leaves trifoliate elliptic-lanceolate acuminate, edge denticulate narrowed to base, 3.5 to 4.5 in. long, 1 to 2 in. across; petioles 3 in. long; petiolules .1 in. long. Racemes simple 2 to 3 in. long tomentose. Flowers hardly .1 in. long. *Hab.* Dense jungle. Dindings, Lumut. Perak, Telor Pinang. Penang Hill at 1200 ft., altitude (Curtis). *Distrib.* India.

(5) **A. scandens** Ridl. *Journ. Roy. As. Soc. S. Br.* 75, p. 26.

Woody climbing shrub. Branches thickly lenticellate brown. Leaves trifoliate; leaflets coriaceous glabrous entire obovate, narrowed to base, apex short blunt acuminate; nerves 8 to 10 pairs, 4 to 6 in. long, 2 to 3 in. wide; petiolules .2 in. long; petioles 1.75 in. long. Inflorescence of 2 racemes (rarely 1 or 3) pubescent widely divaricate 1 to 1.5 in. long, on a peduncle 1 to 1.5 in. long. Flowers crowded rather small on slender pedicels. Bracts minute. Sepals glabrous sub-orbicular. Petals shorter. *Hab.* In wet forest climbing on trees. Singapore, Bukit Panjang (Ridley). *Distrib.* Borneo.

3. SAPINDUS, Linn.

Trees. Leaves alternate pinnate coriaceous; leaflets numerous. Panicles terminal. Sepals 5 oblong round unequal. Petals 4 oblong concave tomentose outside, scale large obovate villous crested. Disc semilunar wider on one side. Stamens 8 at base of ovary; filaments villous. Ovary 3-lobed; ovules solitary. Fruit 1- to 3-coccos, 2 lobes smaller fleshy. Seed globose. Species about 20, tropics.

(1) **S. rarak** DC. *Prodr.* i. 608; *Bl. Rumphia* iii. 93, t. 197. *Dittelasma rarak* Hook. *fil. Gen. Pl.* i. 396; *King, l.c.* 424.

Tree 50 to 60 ft. tall. Leaves 10 to 18 in. long; leaflets 6 to 12 pairs, oblong-lanceolate acute, base cuneate, glabrous, 3 to 4 in. long, .75 to 1.5 in. wide; petiolules hardly .1 in. long. Panicle many-branched, many-flowered, 5 to 6 in. long and 4 to 8 in. wide pubescent. Flowers .2 in. across yellow or white, yellow-pubescent. Fruit sub-globose or twin .75 in. long. *Hab.* Malacca (Griffith and Maingay), perhaps planted. *Distrib.* Burma, Cochin-China, Java.

4. CURTISINA, Ridl.

Tree. Leaves imparipinnate; leaflets 9 in distant pairs, coriaceous elliptic-oblong, bases broad. Panicle terminal. Flowers small sessile or sub-sessile. Calyx 3-lobed. Petals coriaceous oblong 3-valvate. Stamens 6 outside the disc; filaments short thick; anthers longer oblong. Disc annular fleshy. Pistil sunk in it but free. Ovary 2-celled; ovules 1 in a cell; style very short conic. Stigma capitate. Fruit indehiscent bilobed 2-seeded. Species 1.

(1) **C. penangensis** Ridl. *Journ. Roy. As. Soc. S. Br.* 82, p. 180.

Tall tree. Leaf 12 in. long; leaflets oblong; nerves 8 pairs raised beneath as are the wide reticulations, 4·5 in. long, 2 in. wide; petiolules lateral ½ in. long, terminal one 1 in. long. Panicles 4 in. long; branches 1·5 in. long or less. Flowers 1 in. long sessile or pedicels very short. Stamens shorter than petals. Fruit red, pulpy bilobed ½ in. wide. *Hab.* Penang Hill at 2200 ft. altitude (Curtis).



FIG. 49.—*Erioglossum edule*.

5. ERIOGLOSSUM, Bl.

Tree. Leaves unequally pinnate; leaflets entire opposite. Panicles large terminal erect; branches racemose. Flowers irregular white. Sepals 5 unequal orbicular imbricate. Petals 4 unequal obovate clawed, scale hairy with a lobed appendage at the top. Disc lobed one-sided. Stamens turned to one side, unequal hairy. Ovary stipitate and obcordate 3-lobed and 3-celled; style slender. Stigma 3-lobed. Fruit drupaceous 1- to 3-lobed, lobes oblong. Species 4, Asia 3, Africa 1.

(1) **E. edule** *Bl. Bijdr.* 229; *King, l.c.* 425 (Fig. 49, p. 491).

A big tree, more or less pubescent. Leaves 8 to 20 in. long; leaflets 4 to 13 oblong-lanceolate to elliptic acute, base cuneate slightly oblique, above more or less pubescent; midrib and underside usually tomentose; nerves 6 to 10 pairs, 2.5 to 7 in. long, .75 to 2.25 in. wide. Panicles 6 to 12 in. long, pubescent dense-flowered. Flowers white .2 in. across. Fruit lobes .4 in. long, .15 in. through, pubescent astringent sweet, red then black. *Hab.* Common in villages and open country. Singapore to Penang and Perlis and Kelantan. *Native names*: Mertajam; Terajang (Kelantan); Kulat Layo; Kulalayo. *Use*: The small astringent fruits are beloved by children. A decoction of the root for fever. *Distrib.* Malaya.

6. APHANIA, Bl.

Trees or shrubs. Leaves pinnate (rarely simple); leaflets 1 to 6 pairs. Flowers paniced or racemose. Sepals 4 to 6 imbricate. Petals 4 to 6, small with bases infolded or with a scale. Disc regular slightly lobed. Stamens 5, rarely 3. Fruit deeply 2- (or 3)-lobed; endocarp thin cartilaginous or crustaceous. About 12 species, African and Asiatic.

(1) **A. paucijuga** *Radlk. Sitzb. Akad. Math. Phys.* ix. 239; *King, l.c.* 425. *Otophora paucijuga* *Hiern, in Hook. fil. F.B.I.* i. 680.

Tree 60 ft. tall. Leaves 5 to 8 in. long; leaflets 2 to 4 oblong-lanceolate or elliptic acuminate much narrowed at base, glabrous coriaceous; nerves 6 to 8 pairs fine, 3.5 to 8.5 in. long, 1.2 to 3 in. wide; petiolules .2 in. long; petioles 1.25 in. long. Racemes axillary slender puberulous 6 to 8 in. long. Flowers globular .15 in. across, red. Sepals orbicular imbricate. Petals smaller, edges infolded at base. Stamens 8; filaments hairy at base. Disc pentagonous. Ovary stalked ovate; styles short sub-connate. Fruit deeply 2-lobed; lobes obovate round .35 in. long with style between. *Hab.* Forests, Selandor (Cantley). Malacca (Maingay). Perak (Scortechini). Selangor, Rawang (Kloss). Weld's Hill (Murdoch). Sungei Ujong, Bukit Danan (Cantley). Penang, Penara Bukit (Curtis). *Native names*: Kelat Julong Putih; Puket Jantan; Sutingga; Mumjilai. *Use*: Timber, hard flexible, heavy used in building.

7. LEPISANTHES, Bl.

Shrubs or trees. Leaves pinnate alternate; leaflets entire. Inflorescence axillary or lateral in paniced spikes. Flowers small unisexual white or pink. Sepals 5 or 4 imbricate in 2 rows. Petals 5 or 4 equal with 1 or 2 wide inflected scales at base. Disc annular or semilunar. Stamens 8 or 10 within disc. Ovary sessile 3-sided, 3-celled; ovules solitary. Fruit 3-celled, 3-sided or ovoid not lobed. Seed solitary. About 16 Asiatic species.

- Tree; panicle 9 to 12 in. long (1) **L. Kunstleri**
 Shrubs; panicles 1 to 3 in. long; leaves glabrous.
 Leaflets 4 to 9 in. long; fruit ovoid (2) **L. cuneata**
 Leaflets 12 to 18 in. long; fruit tomentose only,
 3-angled (3) **L. Scortechinii**
 Fruit soft echinate and tomentose (4) **L. longifolia**
 Whole plant except upper side of leaves softly hairy (5) **L. hirta**

(1) **L. Kunstleri** King, *l.c.* 427.

Tree 30 to 60 ft. tall. Leaves 30 to 40 in. long, glabrous; leaflets 12 oblong or elliptic-oblong cuspidate, base rounded, reticulate; nerves 9 to 13 pairs, 6 to 12 in. long, 2.5 to 3.5 in. wide; petiolules .3 to .4 in. long, stout. Panicles 9 to 12 in. long unisexual erect few-branched; branchlets cymose 3- to 5-flowered tomentose. Flowers .4 in. long. Sepals 5 concave tomentose. Petals 5 silky inside at base, scale glabrous bifid. Stamens 8; filaments silky. Fruit sub-globose greenish yellow with 2 or 3 rounded angles, tomentose 1.5 in. through. Seeds 3. *Hab.* Perak, near Gunong Bubu at 500 to 800 ft. altitude (Kunstler).

(2) **L. cuneata** Hiern, in Hook. *fil. F.B.I.* i. 680; King, *l.c.* 428.

A shrub or slender tree 20 to 25 ft. tall, 2 to 3 in. through. Leaves 20 to 30 in. long; leaflets 10 to 14 thinly coriaceous oblong cuspidate, base narrowed, reticulate; rachis and bases of leaves beneath slightly puberulous; nerves 8 to 14 pairs, prominent beneath, 4 to 9 in. long, 1.5 to 2.75 in. wide; petiolules .25 to .35 in. long; petioles 5 in. long. Panicles on stem below leaves spike-like 3 to 5 together, 1 to 3 in. long, dense. Flowers .1 in. across greenish white. Sepals round puberulous. Petals glabrous with a scale at base. Fruit ovoid compressed with a vertical groove, minutely tomentose .25 in. long and as broad. *Hab.* Dense jungle near streams in low country. Pahang, Sungei Chenei (Fox). Sungei Ujong, Gunong Beremban (Cantley). Perak, Larut (Kunstler); Jenah (Wray); Tambun. Dindings, Tanjong Hantu. Penang, near Waterfall (Curtis). *Native name*: Perupoh.

(3) **L. Scortechinii** King, *l.c.* 429.

Tree. Leaves 2 to 3 ft. long; leaflets about 8 elliptic-oblong shortly acuminate, base shortly cuneate, glabrous except midrib and nerves 12 to 14 pairs elevate beneath puberulous, 12 to 18 in. long, 5 to 7 in. wide; petiolules .75 to 1 in. thick. Panicles narrow axillary 2 in. long pubescent. Bracts and bracteoles narrow .25 in. long; pedicels hairy. Flower-buds .3 in. across pink. Sepals 5 concave. Petals 5 with a recurved scale on base. Disc glabrous. Stamens 8; filaments hairy. Fruit sharply 3-angled, densely rusty-tomentose 1 in. long and as broad. *Hab.* Very rare in forests. Perak (Scortechini). Kedah, Yan.

var. *hirta* Ridl.

Leaves very hairy on the back. Flowers white. *Hab.* Johor, Serom. Dindings, Lumut.

This variety may be distinct specifically.

(4) **L. longifolia** Radlkofer. *Über die Sapindaceen Hollandsch-Indiens* i. 35; *King, l.c.* 429. *Hemigyrosa longifolia* Hiern, in *Hook. fil. F.B.I.* i. 671.

Shrub 8 to 20 ft. tall. Young parts and inflorescence tomentose. Leaves 2 to 2·5 ft. long; leaflets 6, narrow oblong acuminate or acute, base narrowed, glabrous coriaceous; nerves 14 to 18 pairs, 12 to 15 in. long, 2 to 4 in. wide; petiolules 4 to 8 in. long puberulous. Racemes solitary or crowded, sometimes branched, 2 to 3 in. long. Flowers 5 in. long tomentose pink and white. Bracteoles subulate 15 in. long. Petals 5 obovate, scales hairy entire or bifid. Fruit depressed globular trigonous softly echinate rusty-tomentose 1 in. long, 8 in. wide. *Hab.* Dense jungle low ground, not common, Johor, Kuala Sembrong (Kelsall); base of Gunong Pantai. Malacca (Griffith and Maingay). Perak, Larut (Kunstler). Penang. Balik Pulau (Curtis).

(5) **L. hirta** Ridl. *Journ. F.M.S. Mus.* x. 132.

Small tree-like shrub, entirely softly hairy except the upper side of the leaves. Leaves 2 ft. long or more; leaflets 10, alternate elliptic-lanceolate shortly acuminate; nerves 18 pairs, membranous, 12 in. long, 4 in. wide; petiolules 15 in. long. Panicles axillary; branches few distant. Flowers 1 in. wide racemose. Sepals 5 orbicular pubescent, edge ciliate. Petals 4 glabrous ovate rounded nearly twice as long, scales at base oblong densely white-woolly. Stamens 3 short. Disc undulate. Pistil densely hairy. *Hab.* Kelantan, Chaning Woods (Ridley). A plant on the Pehi stream had much smaller leaves, the leaflets 5 by 2 in., oblong and quite blunt.

8. OTOPHORA, Bl.

Trees or shrubs. Leaves alternate simple or pinnate stipulate at base of petiole; leaflets entire. Inflorescence axillary and terminal. Flowers regular bisexual. Sepals 4 or 5 imbricate. Petals 5 (or 4) smaller squamate by inflection of auricular base. Disc annular complete. Stamens 6 to 9 (rarely 5) within disc very short included. Ovary ovate 2- to 3-celled; ovules solitary. Stigma sessile 3- to 4-rayed. Fruit baccate not lobed 3- or 4-celled (to 1-celled). Seeds arillate. Species 12, Malay Peninsula and islands.

Leaves simple (1) **O. Hullettii**

Leaves pinnate.

Leaflets sessile oblong 12 by 4 in. (2) **O. sessilis**

Leaflets sub-sessile linear acuminate 8 by 1·5 in. (3) **O. resecta**

Leaflets sessile oblong-lanceolate 4 by 1 in. (4) **O. imbricata**

Leaflets petioled lanceolate 8 by 3 in. (4) **O. erythrocalyx**

(1) **O. Hullettii** Ridley. *Capura Hullettii* Ridl. *Journ. Roy. As. Soc. S. Br.* 54, p. 36.

Shrub? Leaves simple lanceolate long acuminate, base shortly

narrowed; nerves 6 pairs, 5 in. long, 2 in. wide; petioles 1 in. long. Stipules ovate round petioled .5 in. long. Panicles lax 3 to 4 in. long; branches few 2 in. long. Flowers small .2 in. long; pedicels .25 in. long pubescent. Sepals 4 ovate acute pubescent. Petals 4 linear-oblong stellate-pubescent. Stamens 8. Disc small annular. Ovary pubescent. *Hab.* Malacca, Mt. Ophir (Hullett), only once found.

(2) *O. sessilis* King, *l.c.* 430.

Shrub or treelet 6 to 10 ft. tall. Leaves 30 to 40 in. long; rachis and petiole stout; leaflets 10 to 12 sessile coriaceous broad elliptic shortly cuspidate, base shortly narrowed, glabrous; nerves 9 to 15 pairs, prominent beneath, 8 to 12 in. long, 2.75 to 4 in. wide. Stipules at base of petiole ovate round 2 to 2.5 in. long. Panicles axillary 8 to 10 in. long of 2 or 3 raceme-like branches. Flowers .25 in. long. Sepals 4, obovate. Petals 4 pink, dark red outside, elliptic, bases inflexed scale-like silky. Stamens 6, glabrous. Fruit ellipsoid glabrous not lobed 1 in. long, .5 in. wide. *Hab.* Dense rocky jungle, Perak, Larut 600 to 800 ft. altitude (Kunstler). Penang Hill (Curtis). Lankawi (Curtis).

(3) *O. resecta* Radlk. *Rec. Bot. Surv. Ind.* iii. 347.

Small tree. Leaves glabrous 30 in. long; leaflets 20 sub-sessile linear acuminate sub-acute unequal at base, 7.8 to 8.4 in. long, 1.2 in. wide membranous-chartaceous. Stipules sub-orbicular. Panicle 13 in. long; branches thyrsoid 2 to 14 in. long. Flowers red. Sepals 4 or 5 ovate. Petals 4 or 5 elliptic much smaller, edges ciliate, pilose at base outside, scales emarginate pilose. Stamens 8; filaments villous. Fruit small ovoid flattened .5 in. long. *Hab.* Woods and forests. Pahang, Pekan; Pulau Plah (Fox). Penang, Penara Bukit. *Native name:* Stengok.

(4) *O. imbricata* Bl. *Rumphia* iii. 144.

Small tree. Leaves 2 ft. or more long; leaflets numerous over 30, narrow lanceolate-oblong acuminate, base round, 4 in. long, 1 in. wide, sessile; nerves very fine and numerous. Stipules sub-orbicular. Panicle over 12 in. long lax with few branches 6 in. long, and distant branchlets .5 in. long, puberulous. Flowers small globose puberulous greenish yellow or white. Male flowers, calyx 5-lobed, inner 3 lobes larger. Petals 5, small, semi-orbicular. Stamens 8, short. Female flowers, ovary globose sub-trigonus hairy. Stigma large sessile. Fruit globose triquetrous 1 in. long puberulous. Seeds completely white arillate ellipsoid-oblong. *Hab.* In secondary jungle, Pahang, Cheneh Reserve (Burn-Murdoch). *Distrib.* Labuan, Borneo.

Motley in *Herb. Kew* says it is called Kayu Matahari in Borneo, and that the leaves come out white, changing through light purple to red, conspicuous from a vast distance. Wood very hard and used for making hooks to catch crocodiles.

Petals 4.

Leaflets one pair (3) **X. echinulatum**

Leaflets 2 pairs or more.

Fruit sharply muricate (4) **X. intermedium**

Fruit rough not muricate (5) **X. Wallichii**

(1) **X. lævigatum** Radlk. Sitz. Bayer. Akad. Math. Phys. 1878, p. 305; King, l.c. 431.

A large tree, glabrous. Leaves 4 in. long; leaflets 2, elliptic acuminate, base cuneate; nerves 5 pairs faint, 2·25 to 3 in. long, 1 to 1·25 in. wide; petiolules slender, ½ to ¼ in. long; petioles 1·5 in. long. Racemes or panicles terminal and axillary 2 to 4 in. long, slender. Flowers 1·5 in. across. Sepals 4, round. Petals 5, limb woolly, claw slender. Stamens 5, filaments woolly. Disc annular waved. Ovary tomentose. Fruit usually 1-lobed, obovate ellipsoid compressed, 1·35 in. long, ½ in. across sharply muricate. *Hab.* In forests, Pahang, Kwala Tenok, Tahan River. Perak (Scortechini). Penang, Waterfall, the spout (Curtis).

(2) **X. unijugum** Radlk. Rec. Bot. Surv. Ind. iii. 351.

Tree 60 to 80 ft. tall. Leaves 3·9 to 6 in. long including petiole ¼ in. long; leaflets one pair, elliptic to oblong lanceolate, acute or acuminate, bases narrowed, shining smooth glabrous, 3·6 to 5 in. long, 1·4 to 2·2 in. wide. Panicle 1·2 to 4·8 in. long. Sepals glabrous. Petals 5, spatulate, densely villous. Stamens villous at base. Fruit ½ in. long, ¼ in. through ellipsoid acutely muricate. *Hab.* Forests, Selangor, Klang (Keheding). Perak at 100 ft. altitude (Kunstler).

I have not seen either of these specimens, and do not see how this species differs from *lævigatum*, except in the number of the sepals.

(3) **X. echinulatum** Radlk. Rec. Bot. Surv. Ind. iii. 350.

Tree 50 to 70 ft. tall, 15 to 20 in. through. Branchlets, petioles and inflorescence puberulous. Leaflets one pair elliptic-lanceolate shortly acuminate, base acute; nerves 5 pairs elevate beneath, 3·5 to 7 in. long, 1·25 to 3·5 in. wide; petiolules ½ in. long. Panicles racemiform 1 to 2 in. long. Flowers sub-sessile 1·5 in. long. Sepals 4, edge ciliate. Petals 4, villous on both sides. Stamens villous. Fruit obovoid flattened, very sharply muricate 1 in. long, ½ in. through, dark green. *Hab.* Hill Jungle 500 to 800 ft. altitude. Perak, Ulu Kerling (Kunstler).

(4) **X. intermedium** Radlk. Bot. Surv. Ind. iii. 349. **X. muricatum** King, l.c. 431, not of Radlkofer.

Glabrous tree 50 to 80 ft. tall. Leaves 4 to 9 in. long; leaflets one or two pairs elliptic-oblong acuminate, base acute; nerves 7 to 9 pairs, prominent beneath, 3 to 6 in. long, 1·35 to 2 in. wide; petiolules ⅓ in. long. Racemes axillary, sometimes branched. Flowers ½ in. across. Sepals 4 round, edges ciliate. Petals 4, shorter villous. Stamens 8; filaments pubescent. Fruit obovoid sharply muricate 1·25 in. long, ⅓ in. through, yellow. *Hab.*

Lowland forests, Singapore, Tanglin. Malacca, Ayer Panas (Griffith). Negri Sembilan, Tampin. Selangor, Kwala Lumpur (Foxworthy); Pahang, Rumpin (Foxworthy); Dindings, Lumut (Curtis). Perak (Scortechini). *Distrib.* Burma. *Native names*: Rambutan Pachat; Gigi Buntal; Kikir Buntai.

(5) **X. Wallichii** King, *l.c.* 432.

Glabrous tree 30 to 40 ft. tall, 5 to 7 in. through. Leaves 12 to 18 in. long; leaflets 2 pairs elliptic or obovate-elliptic shortly blunt-cuspidate, narrowed to base; nerves 5 to 7 pairs elevate beneath, 4·5 to 8 in. long, 2·25 to 4 in. wide; petiolules stout ·25 to ·45 in. long. Racemes 2 to 4 together, axillary 1 to 2·5 in. long. Flowers ·15 in. long, green. Sepals 4, round, edges ciliate. Petals 4, smaller round, claws short woolly. Stamens 8; filaments woolly. Ovary pubescent. Fruit sub-globose or elliptic usually 1-coccous, rough but not muricate, rusty brown to black 1·25 in. long, ·75 in. wide. *Hab.* Forests, dense hilly jungle, Singapore (Wallich); Bukit Mandai. Pahang River, Perak, Ulu Bubong, Ulu Kerling and Ulu Kal (Kunstler), Temengoh. *Native name*: Balong Ayam.

11. NEPHELIUM, Linn.

Trees. Leaves alternate pinnate; leaflets entire. Panicle terminal and in terminal axils rarely racemose. Flowers regular small unisexual (or bisexual). Calyx 4- to 5-lobed. Petals small, white, villous rarely with 2 scales, sometimes 0. Stamens 6 to 8 within the fleshy disc; filaments usually pubescent. Ovary pubescent, warted or setose 1- to 2- (rarely 3-)lobed; lobes 1-celled, 1-ovuled. Fruit 1- or 2-coccous drupaceous oblong or globose echinate or tubercled rarely smooth. Seed ellipsoid with sweet or acid white pulpy aril. About 20 species, Malayan. Several are well-known fruit trees.

Leaves glabrous on both sides.

- | | |
|----------------------------------------------------------------------------------------|----------------------------|
| Leaflets broad elliptic, 5 by 2·5 in.; fruit warty,
base gibbous; petals 0 | (1) N. glabrum |
| Leaflets narrow lanceolate; petals 5 or 6; fruit
globose sparsely warty | (2) N. longana |
| Leaflets broad elliptic; petals 0; fruit red-
tomentose | (3) N. lappaceum |
| Leaflets oblong-elliptic; petals 5; fruit sparsely
muricate | (4) N. rubescens |
| Leaflets narrow lanceolate coriaceous; fruit
spiny all over; petals 3 to 5 glabrous | (5) N. Herveyi |
| Leaflets lanceolate caudate coriaceous; petals
villous | (6) N. caudifolium |
| Leaves glaucous and minutely puberulous beneath;
fruit spiny. | |
| Petals 5. | |
| Leaflets broad elliptic coriaceous | (7) N. costatum |
| Petals 0. | |
| Leaflets elliptic thin coriaceous | (8) N. tuberculatum |

- Leaflets lanceolate 4 by 1·5 in.; spines on fruit
not conical (9) **N. mutabile**
Leaflets lanceolate more coriaceous; spines on
fruit conical (10) **N. hamulatum**
Leaflets red-tomentose beneath; fruit covered
with short soft spines (11) **N. ophiodes**
Petals 5.
Leaflets hairy beneath; fruit globose tessellate (12) **N. malaiense**
Leaves very long; flower and fruit racemes long
pendulous; fruit spiny (13) **N. eriopetalum**

(1) **N. glabrum** *Noronh. Batav. Genootsch. Verh.* v. 80; *King, l.c.* 433. **N. Maingayi** *Hiern, in Hook. fil. F.B.I.* i. 608.

Tree 60 to 80 ft. tall, glabrous. Leaves 7 to 11 in. long; leaflets 4 to 6 coriaceous elliptic shortly acuminate or blunt, base cuneate; nerves 8 to 10 pairs, 3 to 4·5 in. long, 1·5 to 2·25 in. wide; petiolules 4 to 6 in. long. Panicles lax puberulous 8 in. long. Flowers less than 1 in. across unisexual. Males, sepals 5 round pubescent. Petals 0. Stamens 6 or 7 pubescent exsert. Female, calyx 5-toothed. Stamens very short. Ovary obovate pubescent. Fruit oblong gibbous on one side, wrinkled not spiny 1 in. long, 6 to 7 in. wide. *Hab.* Lowland forests. Singapore, Garden Jungle; Selitar. Malacca, Batu Tiga; Ayer Panas; Merlimau (Derry). Perak, Tapa (Wray); Chanderiang (Kunstler).

var. *sufferrugineum*. **N. sufferrugineum** *Radlk. Uber. Sapind. Holl. Ind.* 77; *King, l.c.* 439.

Inflorescence and backs of leaves rusty tomentose. Malacca (Griffith, Maingay). The fruit described as belonging to this by Radlkofer is not attached to the specimen, and probably did not belong to it. *Native names*: Redan; Redin.

(2) **N. longana** *Camb. Mem. Mus. Par.* xviii. 30; *Hiern, F.B.I.* i. 688.

Tree 30 to 40 ft. tall. Leaves 4 to 18 in. long; leaflets elliptic-lanceolate acuminate or blunt glabrous rather stiff; nerves 13 pairs, 4 in. long, 1·25 to 1·75 in. wide; petiolules 1·5 in. long; petioles 3·5 in. long; panicle pubescent. Flowers yellowish white 12 to 25 in. wide. Calyx tomentose. Petals 5 or 6 pubescent. Fruit globose 5 to 75 in. through, reddish or purple, tubercles wrinkled or smooth. *Hab.* Terutau island (Curtis).

Often cultivated in India and China and wild in India. The fruit resembles that of the Mata Kuching (*N. malaiense*), which name Curtis gives it, but the foliage is quite different.

(3) **N. lappaceum** *Lim. Mantissa* i. 125; *Hiern, l.c.* i. 687; *King, l.c.* 436.

Tree about 30 to 50 ft. tall. Branchlets puberulous. Leaves 4 to 10 in. long; leaflets 4 to 6 elliptic or oblong obtuse, thinly coriaceous, 2·5 to 6 in. long, 1·25 to 3 in. wide; petiolules 2 in. long. Panicles 6 in. long terminal and axillary lax spreading.

Flowers 1 in. across white often unisexual in cymose fascicles. Sepals 4 to 6. Petals 0. Stamens 5 to 8 exsert. Ovary 2- to 3-lobed echinate. Fruit 1- or 2-lobed ellipsoid densely covered with long soft spines yellow to bright red, 1.5 in. long, .5 in. through, *Hab.* Cultivated everywhere, and often occurring in forests as an escape, or in abandoned cultivations. The Rambutan.

(4) **N. rubescens** *Hiern, l.c. i. 688.* *N. rufescens* *King, l.c. 435.*

A tree 50 to 60 ft. tall, 8 to 10 in. through. Leaves 6 to 12 in. long; leaflets 6 to 10 coriaceous narrow oblong acuminate, base cuneate or round glabrous; nerves 8 to 14 pairs faint, 3 to 5.5 in. long, 1.5 to 1.65 in. wide; petiolules .15 to .25 in. long. Panicles axillary and terminal puberulous. Flowers .2 in. across, white. Calyx lobes 5, ovate acute pubescent. Petals 5, narrow lanceolate hairy. Disc small. Stamens exsert 8; filaments pubescent. Fruit with 1 or 2 lobes oblong with short conic tubercles red, 1.25 in. long, .5 in. through; seed-pulp thin acid. *Hab.* Common in woods. Singapore (Wallich); Chan Chu Kang. Johor, Batu Pahat. Malacca (Maingay). Perak, Larut (Kunstler).

(5) **N. Herveyi** *Ridl. Journ. Roy. As. Soc. S. Br. 82, p. 180.*

Tree. Leaves narrow lanceolate blunt acuminate, base shortly acute, coriaceous glabrous; nerves about 18 pairs, shining above, sub-glaucous beneath, 3 to 3.5 in. long, 1.5 in. wide; petiolules .18 in. long. Panicles 4 to 6 in. long densely tomentose. Calyx-lobes appressed tomentose, ovate. Petals 3 to 5 very small narrow glabrous. Stamens glabrous. Fruit 1.25 in. long, red, covered with short flat blunt spines widest at base .12 in. long. *Hab.* Malacca, Alor Gajah (Griffith, Hervey, Maingay). Dindings, Pangkor (Curtis).

This closely resembles *N. rubescens* Hiern, and has been confused with it. The leaves are narrower and more rigid, and the fruit is totally different, bearing flat triangular blunt spines close together.

(6) **N. caudifolium** *Ridl.*

Leaves 5 in. long with 5 pairs of leaflets, quite glabrous; petioles 2 in. long. Leaflets coriaceous, smooth, lanceolate, bluntly caudate acuminate, base shortly cuneate, finely reticulate above; nerves fine, very inconspicuous, 10 pairs, 3.5 in. long, 1 in. wide; petiolules .12 in. long. Panicles 5 in. long (base 3 in. long, nude); branches 1.25 in. long, pubescent. Flowers numerous crowded; pedicels .1 in. long, pubescent. Sepals 5, lanceolate blunt, silky on both sides. Petals 5, little longer, narrow linear-lanceolate, silky villous. Stamens much longer; filaments villous. Ovary bilobed, tubercular, hairy; style rather stout. Fruit (unripe) of 2 equal spreading lobes covered with short conic tubercles, glabrous. *Hab.* Selangor, Kelambu Forest, Klang (Foxworthy). *Native name:* Gigi Buntal.

(7) **N. costatum** Hiern, *l.c.* i. 608; King, *l.c.* 436. *N. longana* var. *hypoleucum* King, *l.c.* 435 (*in part*).

Tree 50 to 60 ft. tall. Leaves 6 to 12 in. long; leaflets 4 to 10, coriaceous oblong lanceolate or elliptic acute or short acuminate, base narrowed round beneath glaucous and slightly puberulous; nerves 10 to 18 pairs, 2.75 to 5.5 in. long, 1.25 to 1.75 in. wide; petiolules .25 in. long. Panicles axillary and terminal 4 to 6 in. long puberulous. Flowers .2 in. across. Sepals 5 round tomentose outside, pubescent inside. Petals 5 smaller spatulate villous. Disc large. Stamens 8 to 12 hairy at base. Ovary ovate 2-lobed coarsely villous. Fruit of 1 or 2 lobes with long puberulous blunt setae. *Hab.* Malacca (Maingay). Perak (Scortechini). *Native name*: Rambutan Passeh.

(8) **N. tuberculatum** Radlk. *Rec. Bot. Surv. Ind.* iii. 352.

Tree 60 to 80 ft. tall, 2 to 3 ft. through. Branches, panicle and petiole grey-puberulous. Leaves 8 to 14 in. long; leaflets 2 to 6 pairs, oblong blunt coriaceous, base rounded; nerves 7 to 9 pairs elevate, sparsely pubescent glaucescent beneath, 6 in. long, 2.5 in. wide. Panicle 8 in. long terminal dense-flowered. Flowers .2 in. across. Calyx of 5 blunt whitish pubescent lobes. Petals 0. Disc hairy. Stamens short not exert glabrous. Fruit 1 to 2 in. long elongate ellipsoid bright green hoary, covered with glabrous pyramidal tubercles (I have seen no fruit). *Hab.* Perak (Scortechini).

(9) **N. mutabile** Bl. *Rumphia* iii. 104. *N. chryseum* King, *l.c.* 437, *not of Blume*.

Tree usually about 30 ft. tall. Leaves 6 to 12 in. long; rachis puberulous; leaflets 4 to 8 sub-coriaceous oblong to elliptic-oblong acuminate or acute, base narrowed, glaucous beneath; nerves 9 to 12 pairs, 2.5 to 5 in. long, 1.25 to 1.75 in. wide; petiolules .15 in. long. Panicles axillary 3 to 4 in. long; flowers white .15 in. across, clustered. Calyx shortly bluntly 5- or 6-lobed tomentose. Petals 0. Stamens 7 or 8 short pubescent. Ovary reniform bilobed pubescent. Fruit usually lobed about 2 in. long covered with truncated spines dark purple. *Hab.* Commonly cultivated, the Pulasan.

Blume distinctly says he intended the Pulasan by this name. *N. chryseum* Bl. with a yellow fruit and soft spines like a rambutan, may be a variety of *N. lappaceum* Linn.

N. pallens Radlk. *Rec. Bot. Surv. Ind.* iii. 352, *N. mutabile* var. *pallens* Hiern, *F.B.I.* i. 687 (exclusive of the fruiting specimen Maingay 1629, which is *N. lappaceum*) is a form of the Pulasan.

(10) **N. hamulatum** Radlk. *Uber. Sapind. Holl. Ind.* 78; King, *l.c.* 437.

Tree. Branchlets puberulous. Leaves 10 to 15 in. long; rachis puberulous; leaflets 6 to 10 oblong acuminate blunt, base cuneate, glabrous above midrib puberulous, beneath sub-glaucous minutely

pubescent; nerves 16 to 24 pairs raised, 2·5 to 4·5 in. long, 1 to 1·75 in. wide; petiolules 1·5 in. long. Panicles terminal and axillary; branches few racemose tomentose. Flowers 1 in. across numerous. Calyx tomentose, 4 broad blunt lobes. Petals 0. Stamens 6 or 7 exsert; filaments pubescent. Fruit red ovoid covered with woody puberulous spines with bulbous bases 1·5 in. long, 1 in. through. *Hab.* Forests, Malacca, Bukit Kayu Arang (Cantley); Kesang (Goodenough). Selangor, Kwala Lumpur (Foxworthy). Dindings, Pangkor. *Native name*: Sunggol Lotong.

(11) **N. ophiodes** Radlk. *l.c.* 78; *King, l.c.* 438.

Tree 50 to 80 ft. tall, 10 to 15 in. through. Branchlets and panicles rusty-puberulous. Leaves 12 to 18 in. long; leaflets 6 to 10, stiff coriaceous oblong short blunt acuminate, base shortly narrowed blunt oblique, beneath scaly red puberulous; nerves 15 to 18 pairs strongly elevate beneath, 6 to 8 in. long, 2 to 2·5 in. wide; petiolules 2 to 2·5 in. long. Panicles axillary or terminal 8 to 16 in. long. Flowers 1·5 in. across yellow and white. Calyx tomentose acutely 5- or 6-lobed. Petals 0. Stamens 6 pubescent short. Ovary ovoid setose tomentose. Fruit ovoid-globose with dense puberulous setae, 1·5 in. long, 1 in. wide, blood-red. *Hab.* Malacca, Tebong (Griffith). Perak, Larut (Kunstler). *Native name*: Pulassan tukul.

(12) **N. malaiense** Griff. *Notulæ* iv. 549; *King, l.c.* 439.

Tree about 50 ft. tall. Branches scurfy pubescent. Leaves 10 to 14 in. long; rachis tomentose; leaflets 6 to 8 thinly coriaceous elliptic cuspidate, base rounded smooth above; nerves 14 to 18 pairs raised and pubescent beneath, 3·5 to 5 in. long, 2 to 2·5 in. wide; petiolules 1·5 in. long. Panicles terminal tomentose 6 to 9 in. or more long; branches numerous. Flowers fascicled 2·5 in. across. Calyx pubescent; lobes 5 round blunt. Petals 5 as long obovate villous inside. Stamens 8 short. Fruit globose smooth brown 6·5 to 7·5 in. through. Seed globular with thin pulp. *Hab.* Common in villages, a well-known fruit tree. *Native name*: Mata Kuching.

(13) **N. eriopetalum** Miq. *Fl. Ind. Bat. Supp.* 508; *Hiern, F.B.I.* i. 689; *King, l.c.* 438. *N. obliquinerve* Radlk. *Rec. Bot. Surv. Ind.* iii. 354.

A tree about 80 ft. tall. Young parts, rachis, under-side of leaflets and panicle red-tomentose. Leaves 12 to 24 in. long; leaflets 6 to 10 thick coriaceous oblong sub-acute narrowed at rounded or cuneate base; nerves 16 to 24 pairs, 4 to 12 in. long, 1·65 to 4 in. wide; petiolules 2·5 to 3·5 in. long stout. Racemes pendent in axils lengthening in fruit 4 to 10 in. long or more. Flowers in tufts 2·5 in. wide. Calyx-teeth 5 triangular acute pubescent outside. Petals 5 or fewer narrow spatulate pubescent. Disc lobed pubescent. Stamens 10 pubescent. Fruit ellipsoid densely covered with soft spines, 2 in. long, 1·5 in. through, crimson red.

Hab. Woods in lowlands, Singapore, Garden Jungle; Changi. Malacca, Merlimau (Cantley); Brisu (Derry). Selangor, Kwala Lumpur. Dindings, Bruas (Burn-Murdoch). Perak (Scortechini). *Distrib.* Sumatra. *Native names:* Gumpo; Tungku Lotong; Tingam Balam; Sanggol Lotong.

DOUBTFUL SPECIES

N. ECHINULATUM Ridl. *Euphoria echinulata* Radlk. *Rec. Bot. Surv. Ind.* iii. 347.

Tree. Branchlets, petioles and inflorescence stellate-hairy. Leaves 5 to 6 in. long; leaflets 4 to 6 lanceolate acute or long acuminate, base cuneate, sub-coriaceous; nerves sparsely hairy, 3·5 to 7 in. long, 1·25 to 2 in. wide. Panicles terminal. Fruit covered with short conic processes. *Hab.* Perak (Scortechini). I have not seen this plant.

N. SETOSUM Ridl. *Euphoria setosa* Radlk. *Rec. Bot. Surv. Ind.* iii. 347.

Tree 40 to 60 ft. tall. Branchlets, petioles and nerves stellate-pubescent with setæ. Leaves 7 to 8·5 in. long; leaflets oblong lanceolate short acuminate, base obtuse chartaceous coriaceous, 2·25 to 4·25 in. long, 1 to 1·5 in. wide. Panicles terminal elongate 8 in. long. Calyx lobes blunt stellate-pubescent, inside puberulous. Petals narrow spatulate acute, strigose villous. Disc with fascicled hairs. Stamens pilose. *Hab.* Larut 1000 to 2000 ft. altitude (Kunstler). I have not seen this plant.

12. POMETIA, Forst.

Trees tall or medium. Leaves alternate pinnate. Leaflets sub-opposite dentate or entire, lowest pair stipule-like. Racemes paniced or simple. Flowers small regular bisexual fascicled. Calyx cup-shaped 4- to 5-lobed. Petals 0 or 4 to 5 small. Disc entire annular. Stamens usually 6 or 5 (rarely less or more) within disc exsert. Ovary 2- or 3-coccos and -celled; ovules solitary; style elongate. Fruit of 1 to 3 globose or oblong, lobes smooth. Seed with a thin pulpy aril. Species 4, Malaya, Ceylon, Australasia.

Calyx and leaflets glabrous (1) *P. macrocarpa*

Calyx and inflorescence pubescent.

Leaves 12 to 24 in. long, sub-glabrous (2) *P. pinnata*

Leaves 3 to 8 in. long, hairy beneath (3) *P. alnifolia*

(1) *P. macrocarpa* Kurz. *Journ. As. Soc. Beng.* xlv. (2), 205; *King, l.c.* 440.

Glabrous tree. Leaves 9 to 12 in. long; leaflets coriaceous oblong to elliptic acuminate remotely denticulate, base round; nerves 15 to 18 pairs prominent beneath, 4·5 to 6 in. long, 1·75 to 2 in. wide; petiolules 2 in. long. Panicles axillary 8 to 12 in. long with several racemose dense-flowered branches. Flowers 1 in.

long, glabrous. Calyx 5-lobed. Petals 0. Stamens 5; filaments pubescent. Fruit ovoid 1·5 to 2 in. long. *Hab.* Malacca (Maingay). Apparently very rare, as it never seems to have been collected again.

(2) ***P. pinnata* Forst. Char. Gen. 110.**

A pubescent tree 30 to 60 ft. or more tall. Leaves 12 to 36 in. long; leaflets 4 to 12 pairs thinly coriaceous oblong or oblanceolate-oblong acute serrate, base rounded sub-cordate (lowest leaflets small and round), 4 to 12 in. long, 1·75 to 4 in. wide; petiolules 1·5 in. long, glabrous or puberulous upon the nerves. Panicles 12 in. or more long; pubescent flowers 1 in. across. Calyx pubescent; teeth triangular 4 or 5. Petals 4 or 5 small. Disc fleshy lobed glabrous. Stamens 5 to 6, bases pubescent. Fruit ellipsoid black 75 to 1·25 in. long. *Hab.* Banks of streams common, in the lowland country, conspicuous from the young red leaves. Johor, Bukit Soga. Malacca (Maingay). Pahang River. Selangor, Dusun Tua. Perak, Batang Padang (Kunstler). Plus River (Wray). Penang Road to Balik Pulau (Curtis). *Native names:* Kasai; Asam Kwang. *Distrib.* Malay Isles and Polynesia.

(3) ***P. alnifolia* Radl. Uber. Sapind. Holl. Ind. 30; King, l.c. 442. *P. gracilis* King, l.c. 441.**

A small tree 20 to 60 ft. tall, 8 to 18 in. through. Leaves 3 to 8 in. long; rachis pubescent; leaflets thinly coriaceous oblong or oblanceolate-oblong acuminate, base rounded or cuneate, edge denticulate or nearly entire, sparsely hairy beneath; nerves numerous little elevate; upper leaflets 3 to 4 in. long, 9 to 1·25 in. wide, lower ones smaller. Panicles pubescent axillary terminal 8 in. long; flowers numerous dense, less than 1 in. long, green. Calyx-lobes 5 triangular pubescent. Petals 5 oblong or rounded very small and often absent. Stamens 5 long or short exerted glabrous. Fruit usually simple oval obtuse greenish yellow, 75 to 1 in. long on a short thick pedicel. *Hab.* Common in forests. Singapore, Tanglin; Bukit Mandai. Selangor, Weld's Hill (Foxworthy). Perak, Goping and Batang Padang (Kunstler); Tapah (Wray). Penang, Telok Bahang (Curtis).

I cannot separate King's *P. gracilis* from this species. King also, l.c. 443, gives the MSS. names of *P. Curtisii* and *P. Ridleyi* to two plants from Penang and Negri Sembilan respectively which are not fully described, and which I do not know.

13. NAPEODENDRON, Ridl.

Tree glabrous. Leaves alternate pinnate; leaflets coriaceous 2 pairs. Panicle large erect. Flowers small. Sepals 4 ovate. Petals longer 4. Stamens 8; filaments short thick hairy; anthers ovoid oblong shortly apiculate. Ovary sunk in disc 2-celled, 2-ovuled; style short stout. Stigma large discoid. Fruit unknown. Species 1, Malay Peninsula.

(1) **N. altissimum** *Ridl. Journ. Roy. As. Soc. S. Br.* 82, p. 179.

A big tree. Leaves alternate glabrous; petioles 2·5 in. long; leaflets 4 alternate or sub-opposite coriaceous glaucescent beneath, elliptic acute, base blunt; nerves eleviate beneath 12 pairs, 3·5 to 5 in. long, 1·75 to 2·5 in. wide; petiolules ·2 in. long. Panicles axillary terminal 8 in. long, basal half nude; branches 1·5 in. long. Flowers on short cymes at the branch-ends ·1 in. long, shortly pedicelled. Sepals 4 ovate puberulous. Petals 4 longer oblong puberulous. Stamens 8 outside the disc; filaments broad oblong hairy; anthers ovoid terminal apiculate. Disc deep annular, edge thick. Style short thick; ovary partly free from disc 2-celled; ovules 1 in each. Stigma large discoid. Fruit not seen. *Hab.* In dense forest in the hill ranges, Selangor, Ulu Gombak (Ridley).

14. GUIOA, Cav.

Small trees or shrubs. Leaflets 1 to 8 pairs, lanceolate oblique entire sub-coriaceous. Flowers small white in simple or branched racemes, axillary. Sepals 5 ovate round thick, imbricate in 2 rows, edges pubescent. Petals 5 each with 2 pectinate scales. Disc entire annular or crescentic. Stamens 8. Ovary 3-angled; style 1 curved. Stigma 3-lobed. Fruit obcordate oblique 3-winged. Seeds arillate. About 33 species, Malayan and Australian.

Rachis of leaves winged.

Leaflets glaucous beneath (1) **G. pleuropteris**

Rachis of leaves terete.

Leaflets glabrous not glaucous beneath. (2) **G. squamosa**

Leaflets glabrous glaucous beneath (3) **G. pubescens**

Leaflets puberulous.

Midrib pubescent (4) **G. fuscidula**

Rachis, midrib, petioles tomentose (5) **G. microphylla**

(1) **G. pleuropteris** *Radlk. Sitz. Bay. Akad. Math. Phys.* ix. 611; *King, l.c.* 444. *Cupania pleuropteris* *Bl. Rumphia* iii. 158.

Large shrub or small tree, pubescent. Leaves 4 to 7 in. long; rachis narrow, winged; leaflets 3 to 7 ovate-lanceolate or oblanceolate acute, base cuneate, glaucous beneath sparsely hairy, 2·5 to 4·5 in. long, 1 to 1·75 in. wide; petiolules ·1 in. long. Racemes branched 2 to 4 in. long. Flowers white. Fruit ·75 in. broad; wings rounded, base contracted to a short stalk. *Hab.* Common in woods and hedges, open country, Singapore. Johor, Pulau Tinggi (Kelsall). Pahang, Rumpin River. Malacca, Bukit Bruang (Derry). Dindings. Province Wellesley, Kubang Ulu (Curtis). Penang, Ayer Hitam (Curtis). Kelantan, Kota Bharu.

var. *bijuga* King, l.c.

Leaflets 2 pairs; rachis dilated at top. Common, Singapore, Pasir Panjang; Chan Chu Kang; Bukit Timah Road (Hullett). Malacca, Penang, Moniot's Road (Curtis). *Distrib.* Cochinchina, Borneo, Sumatra. *Native names*: Sempayan Ulur; Pena-Pena.

(2) **G. squamosa** Radlk. *l.c.* 609; *King, l.c.* 444. *Cupania glabrata* Hiern, in *Hook fl. F.B.I.* i. 676.

Small tree 20 to 30 ft. tall. Leaves 6 to 10 in. long; leaflets 4 to 8 pairs, lanceolate to ovate-lanceolate short acuminate sub-falcate, base narrow oblique, glabrous not glaucous beneath; nerves 8 to 10 pairs. Panicles racemose 2 to 3 in. long puberulous or nearly glabrous. Fruit 1 in. across; wings broad oblong rounded, abruptly narrowed to a stalk. Style persistent. *Hab.* Woods and open forests. Singapore, Selitar; Bukit Timah. Malacca, Brisu (Holmberg). Penang, Government Hill (Curtis, Wallich) at 1500 to 2000 ft. altitude.

(3) **G. pubescens** Radlk. *l.c.* 612; *King, l.c.* 445. *Cupania pallidula* Hiern, *l.c.* i. 676. *C. Griffithiana* Kurz, *Journ. As. Soc. Beng.* xliv. (2), 188.

A small tree about 20 ft. tall. Branchlets puberulous. Leaves 6 to 9 in. long; rachis not winged; leaflets 4 or 5 pairs, glabrous, lanceolate to oblong-lanceolate falcate glaucous beneath, acuminate, base cuneate oblique; nerves slender 5 to 7 pairs, 2·5 to 4·5 in. long, 1 in. wide. Panicles 4 in. long pubescent. Flowers white. Sepals green edged white. Petals and stamens white. Anthers brown. Disc green. Style yellow. Fruit 6 in. wide; wings narrow blackish. Seed black nearly covered by a yellow aril. *Hab.* Common in hedges and woods, open country, Singapore, Tanglin; Bukit Mandai. Johor, Gunong Pulai. Malacca, Sungei Hudang; Bukit Bruang (Derry). Selangor, Bukit Kudah. Negri Sembilan, Bukit Kayu Arang (Cantley). Dindings, Lumut. *Distrib.* Bangka, Java, Sumatra. *Native names:* Nilau; Kelilayan Putih.

(4) **G. fuscidula** Radlk. *l.c.* 609; *King, l.c.* 445. *Cupania fuscidula* Kurz, *Journ. As. Soc. Beng.* xli. (2), 302; *Hiern, l.c.* i. 677.

Tree 30 to 40 ft. tall. Leaves 4 to 12 in. long; leaflets 3 to 4 pairs, elliptic sub-acute, base slightly narrowed oblique, sparsely puberulous on both sides, midrib above pubescent (occasionally glabrous, var. *glabrescens* King), not glaucous beneath; nerves 6 or 7 pairs, 2 to 3 in. long, 1 to 1·5 in. wide; petiolules 2 in. long. Racemes shortly branched 2 in. long pubescent. Fruit 5 in. across, lobes broader than long, rounded, gradually narrowed to a basal stalk. *Hab.* Dindings. Perak, Larut Hills (Kunstler). *Distrib.* Tenasserim.

(5) **G. microphylla** Radlk. *Rec. Bot. Surv. Ind.* iii. 354.

Tree pubescent. Leaves 4 to 6 in. long; rachis, petioles, midrib tomentose; leaflets alternate 6 pairs coriaceous lanceolate acuminate, base cuneate oblique, 1·5 in. long, 4 in. wide; petiolules 1 in. long. Panicles little branched below leaves 2·5 in. long pubescent. Flowers 2 in. across. Petals round. *Hab.* Perak, Hermitage Hill (Curtis), only known locality.

15. TRIGONACHRAS, Radlk.

A small tree. Leaflets many coriaceous glabrous lanceolate acuminate, base oblique falcate. Panicles racemose terminal and axillary. Calyx cupular pubescent with 5 imbricate lobes. Petals 5, each with 2 pectinate scales. Disc annular. Stamens 8. Fruit large woody orange pyriform tomentose 3-angled, 3-celled, 1-seeded. One species.

(1) **T. acuta** Radlk. *Sitz. Bay. Akad. Math. Phys.* ix. 672; *King, l.c.* 445.

Leaves 8 to 12 in. long; leaflets 11 to 15, oblong-lanceolate; nerves 8 to 10 pairs, 2 to 3.5 in. long, .6 to .8 in. wide; petiolules .2 in. long. Racemes paniced tomentose; flowers rather long-pedicelled. Ovary elongate conic pubescent. Fruit 2 in. long, 1.2 in. wide. *Hab.* River-banks in open country and woods. Singapore (Wallich); Bukit Timah. Malacca, Pulau Besar (Main-gay). Pahang, Pekan. *Distrib.* Malay Islands.

16. ARYTERA, Bl.

Trees or shrubs. Leaflets 1 to 5 pairs elliptic-lanceolate. Panicles axillary or terminal. Calyx cupular 5-lobed imbricate. Petals 5 with 2 pectinate scales. Disc annular. Stamens 8. Fruit 2- or 3-celled lobed, lobes elliptic obcordate divaricate; pericarp woody inside. Seed arillate. Species 20, Malaya, China, Australia.

(1) **A. littoralis** Bl. *Rumphia* iii. 170; *King, l.c.* 446. *Cupania adenophylla* Planch. in *Hook. fl. F.B.I.* i. 677.

Tree 25 to 70 ft. tall. Branchlets and rachis puberulous. Leaves 6 to 13 in. long; leaflets 2 to 6 pairs acuminate, base cuneate glabrous thinly coriaceous, nerves 8 to 10 pairs conspicuous, 3 to 6 in. long, 1.5 in. wide; petiolules .25 in. long, stout. Panicles axillary much-branched tomentose pubescent. Flowers very small. Calyx pubescent. Petals slightly longer cuneate emarginate pubescent above. Stamens hairy. Fruit coriaceous 2-lobed, lobes compressed oblong blunt orange. Seed black, aril red. *Hab.* Tidal swamps and river-banks. Singapore, Chua Chu Kang. Malacca, Bukit Panchor (Goodenough). Pahang River, Temerloh. Muar, Sungei Segal (Fox). Perak, Sungei Rayah (Kunstler). Selangor, Kwala Lumpur. *Distrib.* Burma, Malay Isles. *Native names:* Kulalayo Hitam; Bedara Amping.

17. MISCHOCARPUS, Bl.

Tree. Leaflets 1 to 5 pairs ovate-lanceolate or elliptic. Racemes axillary simple or branched. Calyx cup-shaped with 5 imbricate segments. Petals 5 with 2 large pectinate scales or absent. Disc annular. Stamens 8. Fruit pyriform blunt 3-angled or rounded,

pedicelled, 3-celled. Seed with a thin aril with 2 basal spurs. Species 10, Malaya, Australia.

Petals 5 minute (1) *M. sumatranus*
 Petals none or 3 (2) *M. Lessertianus*

(1) *M. sumatranus* *Bl. Rumphia* iii. 168; *King, l.c.* 448.
Cupania fuscescens *Bl. King, l.c.* 447.

Tree 30 to 70 ft. tall, glabrous except inflorescence. Leaves 9 to 12 in. long; leaflets 4 to 6 elliptic-oblong or oblong-lanceolate acuminate coriaceous finely reticulate, base cuneate; nerves 12 to 15 pairs elevate beneath, 4 to 8 in. long, 1·5 to 2 in. wide; petiolules 2·5 in. long thick. Panicles erect 12 in. long; branches few racemose. Petals 5 minute pale yellow. Disc hairy. Fruit pyriform 4 in. long with a pseudo-stalk 2·5 in. long. *Hab.* Woods in lowlands, Singapore, Bukit Panjang; Pulau Ubin. Selangor, Kwala Lumpur. Perak, Thaiping. Penang, Moniot's Road (Curtis) at 1200 ft. altitude. *Distrib.* Malay Isles, Cochin-China and India.

If the plants identified as *M. fuscescens* *Bl.* by King are really what Blume intended, these two species seem identical, except that *M. fuscescens* has five rudimentary petals.

(2) *M. Lessertianus* *Ridl.* *M. sundaicus* *King, l.c.* 447, *not of Blume.* *Cupania Lessertiana* *Camb. Hiern, F.B.I.* i. 678.

Tree 25 to 50 ft. tall. Leaves 6 to 10 in. long; leaflets 3 to 6 elliptic oblong or oblong-lanceolate acuminate, base cuneate glabrous coriaceous; nerves 8 to 10 pairs faint, 2·5 to 6 in. long, 1·5 to 2 in. wide; petiolules 1·5 in. long. Panicles of a few dense racemose branches, puberulous. Calyx pubescent yellow. Petals 0 or 3. Fruit globular pyriform 3-angled when young, 2·5 in. long, pseudo-stalk 4 in. long. *Hab.* Sea coasts, river-banks. Singapore, Serangoon; Changi Road. Johor, Minyak Buku. Malacca, Bukit China Road (Maingay). Pahang, Rumpin River and Pekan (Evans). Penang, Coast (Curtis). Setul. Tringganu, Sai Chao, Bukit Besar (Yapp). *Distrib.* S. Siam. *Native names:* Ludai Bulan; Medang Serai; Perapat Bukit; Tasai.

Distinguished from *M. sundaicus* *Bl.* by the smooth rounder leaves and the form of the fruit, the base of which is rounded, and not decurrent to the pseudo-stalk. Blume's plant has also a much larger pear-shaped, strong-angled fruit.

18. *PARANEPHELIUM*, Miq.

Tree often vast, with the habit of *Pometia*. Leaves unequally pinnate; leaflets usually dentate. Flowers paniced regular bisexual. Calyx 4- to 6-lobed. Petals 5, small with a larger scale. Disc entire deep. Stamens 6 to 10 glabrous. Ovary 3-celled, 3-angled. Fruit a woody, spiny or tubercled capsule 3-valved, 1- to 3-seeded. Seed large or angled globose. Species 3 or 4, Burma, Cambodia, Malaya.

- Leaves 18 to 20 in. long; fruit with short thick spines . . . (1) *P. macrophyllum*
 Leaves 12 in. or more long; fruit with long stiff acuminate spines . . . (2) *P. muricatum*
 Leaves 15 to 18 in. long; fruit lobulate scurfy . . . (3) *P. nitidum*

(1) *P. macrophyllum* King, l.c. 450.

A tree 30 to 100 ft. tall and 5 or 6 ft. through with buttresses, glabrous. Leaves 18 to 20 in. long; leaflets 5 to 9 coriaceous shining oblong cuspidate, edges remotely serrate, base cuneate; nerves 18 to 28 pairs prominent beneath, 6 to 15 in. long, 2·5 to 4·5 in. wide; petiolules 35 in. long. Panicles erect spreading 12 in. long crimson. Flowers 2 in. across. Sepals pink. Petals little longer white flushed pink. Disc large and conspicuous olive yellow hairy. Stamens pink. Fruit globular woody covered with thick spines, brown. *Hab.* In dense forests, Singapore, Bukit Timah. Perak, Larut and Kinta (Kunstler); Kwala Kangsar; Temengoh (Ridley).

(2) *P. muricatum* Pierre, *Fl. For. Cochinchine*, t. 328. *Delpya muricata* Pierre, l.c.

A small tree 18 to 30 ft. tall. Leaves 12 in. or more long; petioles tomentose; leaflets 2 pairs, coriaceous elliptic-oblong acuminate, base unequal narrowed, edge distantly coarsely serrate; nerves about 12 pairs; upper leaflets 10 in. long, 4 in. wide; petiolules thick 2 in. long. Panicles 6 to 12 in. long. Sepals oblong lanceolate velvety outside. Fruit sub-globose with numerous stiff acuminate spines. *Hab.* Open heathy country. Perlis, Chupeng (Ridley). *Distrib.* Siam.

I suppose this specimen (only in fruit) is what Pierre intended, though its leaves are quite glabrous, as are petioles and fruit. He describes these parts as velvety. The panicle is, however, pubescent.

(3) *P. nitidum* King, l.c. 450.

Tree 40 to 60 ft. tall, 15 to 20 in. through, glabrous. Leaves 15 to 18 in. long; leaflets 5 to 9 coriaceous oblong-lanceolate acuminate entire, base much narrowed; nerves 14 to 16 pairs, 4·5 to 6·5 in. long, 1·5 to 1·75 in. wide; petiolules 25 in. long. Panicles 3 to 4 in. long lax. Flowers 2 in. wide white. Fruit woody lobulate globular scurfy rusty-brown, 3-seeded, 75 in. long, 1 in. wide. *Hab.* Dense rocky jungle. Selangor, Ulu Selangor (Goodenough). Perak, Gunong Bubu (Kunstler).

19. DODONÆA, Linn.

Shrubs (or trees). Leaves simple alternate. Cymes lateral. Flowers small green unisexual. Sepals 2 to 5. Petals none. Stamens 5 to 10, usually 8. Disc obsolete, or very small. Ovary 3- to 6-seeded and celled; ovules 2. Capsule thin flat sub-orbicular emarginate papery 2-valved, valves winged on the back, 1- or

2-seeded. Seeds sub-globose small. About 65 species, mostly Australian.

(1) *D. viscosa* Jacq. *Enum. Pl. Carib.* 19; *King, l.c.* 451. *D. Burmanniana* DC. *Prodr.* i. 616.

A glabrous bush 4 to 6 ft. tall or less. Leaves oblanceolate acute or blunt, base much narrowed shining, thinly coriaceous, many-nerved, viscid, 1·75 to 4 in. long, ·5 to 1·5 in. wide; petioles ·1 in. long. Cymes 1 in. long spreading axillary. Flowers ·25 in. wide. Sepals oblong. Capsule ·75 in. long and little broader. *Hab.* Sand-hills on the seashore. Johor, Pulau Tinggi (Fielding). Pahang, Kwala Pahang; Rumpin River (Evans). Malacca (Griffith, Maingay). Dindings, Pangkor near the old Dutch Fort (Curtis). Penang, Telok Bahang (Curtis). Lankawi, Burau Bay. Kelantan, Kwala Kelantan. *Distrib.* Tropics generally. It is never cultivated in the Malay Peninsula, as King suggests. The species is very variable in many parts of the world, if the plant usually so named is not a mixture of several species. There is only one form in the Malay Peninsula, the sand-hill bush. In Java this species forms a tree 60 ft. tall, grown as a woodland tree. *Native names*: Kayu Bertih; Seringan Laut.

20. HARPULLIA, Roxb.

Trees. Leaves pinnate; leaflets alternate glabrous. Flowers uni- or bi-sexual racemed or paniced. Sepals 4 or 5 imbricate. Petals 4 or 5 obovate longer, no scales. Stamens 5 to 8. Disc obscure. Ovary pubescent 2-celled; ovules 2 in a cell; style elongate. Stigma linear. Capsule coriaceous usually 2-lobed, 2-valved. Seeds globose arillate. Species 6, Madagascar, India, Australia.

(1) *H. confusa* Bl. *Rumphia* iii. 176.

Small tree about 20 ft. tall. Leaves 6 to 18 in. long; leaflets 6 to 10 membranous shortly cuspidate oblong or elliptic, base round or shortly cuneate; nerves fine 8 to 10 pairs, 4·5 to 8 in. long, 2·5 to 3 in. wide; petiolules ·1 in. long. Panicles 8 in. long with few distant short branches, puberulous. Sepals ovate round pubescent. Petals oblong not clawed blunt. Capsule ovoid beaked mealy pubescent ·6 in. long and as wide. *Hab.* On forests rare. Pahang, Pulau Tawar; Kwala Lipis (Foxworthy). Negri Sembilan, Tampin. *Distrib.* Java. *Native name*: Kesema.

I think the Perak specimens mentioned by King, are this and not *H. cupanioides*, but his description, *l.c.* 451, is that of the Indian *cupanioides*.

ORDER XLIII. STAPHYLEACEÆ.

Trees or shrubs. Leaves opposite, compound. Flowers small white regular paniced. Sepals 5. Petals 5. Stamens 5 outside the flat or ring-like disc. Ovary 2- to 3-lobed; styles 3, free or connate. Fruit a drupe or berry 3-celled. Seeds few or many. Genera 22, species 5, Europe, N. America, Asia.

1. TURPINIA, Vent.

Glabrous trees. Leaves pinnate 3- to 5-foliate sub-coriaceous opposite. Panicles axillary, and falsely terminal, lax of small white

FIG. 50.—*Turpinia trifoliata*.

flowers bisexual. Calyx 5-lobed imbricate. Petals 5 imbricate. Stamens 5 insert outside the lobed disc. Ovary sessile 3-lobed, 3-celled; styles 3 free or not. Fruit sub-globose green fleshy, 3-celled. Styles 2 or 3 distinct at tip. Species about 12, India and Malaya and America.

Leaflets 3.

Flowers $\frac{1}{3}$ in. across in a short panicle 2 to 3 in. long. (1) *T. trifoliata*

Leaflets 5.

Flowers $\frac{1}{5}$ in. across in lax panicle 8 in. long. (2) *T. latifolia*

Flowers $\frac{1}{10}$ in. across, panicle; 15 in. long very lax. (3) *T. laxiflora*

(1) *T. trifoliata* Ridl. Journ. Roy. As. Soc. S. Br. 82, p. 178.

Tree. Leaflets 3 distant elliptic blunt or cuspidate acuminate crenulate or blunt serrate sub-equal, 6 in. long, 3 in. wide; central

petiolule 2 to 3 in. long, laterals .5 in. long; petioles .2 in. long. Panicle 2 to 3 in. long axillary with short condensed branches about 1.25 in. long; flowers subumbelled. Bracts minute ovate. Pedicels short. Sepals oblong, tip round .15 in. long. Petals white about as long. Stamens shorter; filaments short; anthers large oblong. Ovary conic grooved. Fruit ovoid (eventually globose) with the remains of the styles as conic processes with a depression between each, .25 in. through. *Hab.* Forests. Malacca, Nyalas (Goodenough). Selangor, Sempang Mines, Semangkok Pass (Ridley).

(2) **T. latifolia** Wall. Cat. 4939; *Ridl. l.c.* *T. pomifera* King, *l.c.* 452, not of DC.

Tree about 30 to 40 ft. tall, glabrous. Leaves over a foot long, of 5 stiff dark shining green leaflets ovate-elliptic shortly cuspidate or blunt, base round, quite entire or minutely serrulate, 4 in. long, 3 in. wide or less; petiolules, terminal one 2 in. long, laterals .25 to .5 in. long; petioles 3 in. long. Panicles terminal and axillary very lax spreading, 8 in. long and as wide; flowers cymose and racemed at the branch-ends. Sepals ovate blunt .06 in. long. Petals oblong blunt longer white. Fruit globose fleshy green .5 in. through. *Hab.* Common in woods in the low country. Singapore, Tanglin; Bukit Mandai. Muar, Bukit Keyara (Fox). Malacca. Selangor, Sungei Buluh; Bukit Kutu. Perak, Larut (Kunstler); Togoh (Wray). Penang Hill; Telok Bahang (Curtis, Wallich). *Native names*: Giramong; Geritta; Merbong Jantan.

(3) **T. laxiflora** *Ridl. l.c.* 179.

Very big tree 80 ft. or more tall. Leaves 9 to 10 in. long; leaflets 5 ovate elliptic blunt or acuminate entire or minutely crenulate, 4 in. long, 3 in. wide; petiolules, terminal one 1.75 in. long, lateral ones .15 to .2 in. long; petioles 2 in. long. Panicles very lax slender spreading, 15 in. long, 5 in. or more wide; peduncle and secondary peduncles 4 in. long. Flowers sub-racemose distant; pedicels .08 in. long; upper part of panicle pubescent. Sepals ovate .05 in. long. Petals little longer. *Hab.* Forests, Singapore, Garden Rockery, a big tree. Pahang, Bukit Beserah, Kwantan (Foxworthy). Perak, Larut (Kunstler). *Native name*: Kapan Bukit.

A much bigger tree with much more lax panicles, which usually appear after leaf-shedding. King has written the plant up as *pomifera* var. *sphærocarpa*, but it is quite different from the Javanese *sphærocarpa* Hassk.

ORDER XLIV. SABIACEÆ.

Climbing shrubs or small to large trees. Leaves alternate, simple or compound. Flowers small or minute, bisexual (rarely unisexual) usually paniced. Calyx 4- to 5-lobed, lobes imbricate.

Petals 4 or 5, imbricate, equal or unequal, opposite or alternate. Disc annular. Stamens 4 or 5, opposite petals, all or only two perfect, and 3 sterile filaments clavate or subulate; anther-cells distant, bursting transversely or with a cap. Ovary 2- to 3-celled, compressed or 2- to 3-lobed; styles 2 or 3, connate or free or 0; ovules 1 or 2 in a cell. Fruit 1- or 2-carpelled, drupaceous. Seeds compressed or globose ex-albuminous. About 35 species, chiefly Indian.

Climbers; stamens 4 to 5 perfect or equal	.	.	.	1. SABIA
Trees; stamens 5, unequal	.	.	.	2. MELIOSMA

1. SABIA, Colebr.

Climbing or sarmentose shrubs, sub-glabrous. Leaves simple, entire. Flowers axillary, solitary, cymose, racemose or paniced, small green or purplish, 2-bracteate. Calyx 4- or 5-partite. Petals 4 or 5. Disc annular, 5-lobed. Stamens 4 or 5, from base of disc. Carpels 2 (or 3); styles 2; ovules 2 in a carpel. Fruit of 1 or 2, gibbous carpels dry or drupaceous. Seed reniform, testa coriaceous. About 16 species, Indo-Malayan.

Flowers solitary, axillary	.	.	.	.	(1) <i>S. sumatrana</i>
Flowers racemose or paniced	.	.	.	.	(2) <i>S. limoniacea</i>

(1) *S. sumatrana* Bl. *Ann. Mus. Bot. Lugd. Bat.* i. 370; King, l.c. 454.

Leaves ovate-lanceolate or elliptic acuminate, base cuneate, membranous, minutely puberulous beneath; nerves 5 pairs, elevate beneath, reticulations wide conspicuous, 3.5 to 7 in. long, 1.25 to 3.5 in. wide; petioles .35 to .75 in. long. Peduncles .35 in. long, lengthening in fruit. Sepals triangular, edges pubescent. Petals longer, lanceolate. Stamens nearly as long. Fruit ovoid compressed .5 in. long, white spotted blue. *Hab.* Rare in mountain forests. *Hab.* Perak, Larut Hills at 1800 ft. altitude (Kunstler). *Distrib.* Sumatra.

(2) *S. limoniacea* Wall. *Cat.* 1000; Hook. *fl. F.B.I.* ii. 3; King, l.c. 454.

Leaves coriaceous, oblong or lanceolate acute or blunt, base cuneate or rounded, glabrous; nerves 5 or 6 pairs, faint, 2.5 to 6 in. long, 1 to 1.75 in. wide; petioles .6 in. long. Flowers .15 in. wide in racemes, 2 to 6 in. long, distant. Sepals 5, oblong blunt. Petals 5 obovate. Stamens included. Fruit solitary or paired, oblique orbicular or elliptic .5 in. long. *Hab.* Rare in hill forests. Perak (Scortechini). Penang, Sungei, Penang Road (Curtis). *Distrib.* India.

2. MELIOSMA, Bl.

Trees, often small. Leaves simple or unequally pinnate. Flowers small or minute, white or yellow in large branched terminal panicles

usually bisexual. Bracteoles and sepals 5 to 9, forming a persistent whorl round the petals. Petals 5, 3 large orbicular, 2 smaller behind the fertile stamens, sometimes reduced to a bifid scale adnate to filament. Stamens 5, 2 fertile, top expanded into a cup with 2 globose cells dehiscing transversely, 3 deformed, cells empty. Disc cupular or annular with 2 to 5 teeth. Ovary 2- (or 3-)celled; style simple or bifid; ovules 2 in a cell. Stigma 1. Drupe small, globose, oblique; stone crustaceous. Seed globose. Species about 34, tropical Asia and S. America.

Leaves simple.

Petals 5.

Flowers .05 in. across	.	.	.	.	(1) <i>M. elliptica</i>
Flowers .1 in. across	(2) <i>M. monophylla</i>

Petals 0.

Flowers .1 in. across	(3) <i>M. lancifolia</i>
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Leaves pinnate, glabrous.

Leaves 30 to 40 in. long	(4) <i>M. levis</i>
Leaves 12 to 18 in. long	(5) <i>M. nitida</i>
Leaves 6 to 8 in. long	.	.	.	.	(6) <i>M. elegans</i>

Leaves pinnate hairy beneath.

Flowers clustered, sessile	.	.	.	.	(7) <i>M. lanceolata</i>
Flowers solitary, pedicelled	.	.	.	.	(8) <i>M. Ridleyi</i>

(1) *M. elliptica* Hook. *fl. F.B.I.* ii. 5; *King, l.c.* 456.

Small tree 20 to 30 ft. tall. Branches, petioles, midribs above and under-side of leaves densely red-tomentose. Leaves simple, elliptic or oblanceolate, caudate-acuminate, entire or serrate, widest in middle, coriaceous; nerves 10 pairs, elevate beneath, 4 to 9 in. long, 1.25 to 3 in. wide; petioles .5 to 1.5 in. long. Panicle terminal, spreading 6 in. long; branches 3 in. long. Flowers crowded, sessile, .05 in. across. Sepals 4 orbicular, ciliate. Petals 5, orbicular. Fertile stamens 2 to 4. Fruit sub-globular, dark red, .2 to .25 in. long. *Hab.* Dense damp forest, lowlands, Singapore, Chanchukang; Malacca, Bukit Bruang (Derry). Selangor, Kwala Lumpur. Perak, Larut and Ulu Bubong (Kunstler). *Native names:* Buah Tipus; Medang Berhulu; Buah Palu.

(2) *M. monophylla* Ridl. *Journ. Roy. As. Soc. S. Br.* 54, p. 40.

Leaves simple, elliptic acuminate, point long, base narrowed, thin glabrous; nerves 7 pairs slender, 6 to 8 in. long, 3 to 3.5 in. wide; petioles slender, 1.5 to 2 in. long. Panicles axillary or terminal, 2 to 3 in. long; peduncles 1 in. long, glabrous; branches few short. Flowers .1 in. long. Sepals 5, orbicular, unequal, ciliate. Petals 5, 3 orbicular, 2 small irregular. Stamens 2 fertile, 3 sterile lobed. Ovary glabrous. *Hab.* Rare in hill forests, Perak, Hermitage Hill (Ridley).

(3) *M. lancifolia* Hook. *fl. F.B.I.* ii. 5; *King, l.c.* 456.

Tree 20 to 40 ft. tall. Branches and panicles red-villous. Leaves thinly coriaceous, oblanceolate acuminate, gradually narrowed from middle to base; nerves 20 to 24 pairs, elevate, 12 to 18 in.

long, 3·5 to 4 in. wide; petioles ·75 in. long. Panicles 10 in. long; branches 3 in. long distant. Flowers crowded ·1 in. across sessile. Sepals 4, ovate glabrous. Petals none. Stamens 2 to 3, short. Fruit ovoid-globose, ·3 in. long. *Hab.* Hill forests, Penang Hill (Maingay, Curtis). Perak (Scortechini).

(4) *M. levis* King, *l.c.* 457.

Tree 40 to 50 ft. tall, 15 to 20 in. through. Leaves pinnate, 30 to 40 in. long; leaflets 10 to 12 pairs, coriaceous, oblong-lanceolate caudate-acuminate, base cuneate, glabrous; nerves 14 to 16 pairs, slender raised, 5 to 7 in. long, 1 to 1·25 in. wide; petioles ·35 in. long. Panicles 18 in. long; branches distant racemose, lower ones 5 in. long, upper ones shortening, shortly hairy. Flowers less than ·1 in. across, sessile, pale yellow. Sepals 2, orbicular, puberulous outside. Petals 5, 3 outer large, 2 inner small. Stamens 2 to 3; connective of anther hooded. *Hab.* Dense wet jungle, 200 to 300 ft. altitude, rare. Perak, Batang Padang district (Kunstler).

(5) *M. nitida* Bl. *Rumphia* iii. 202, *t.* 169; King, *l.c.* 457. *M. sumatrana* Hook. *fil.* *F.B.I.* ii. 6.

Small tree or erect shrub about 10 to 20 ft. tall, nearly glabrous. Leaves pinnate, 12 to 18 in. long; leaflets coriaceous, 7 to 13 elliptic-ovate or lanceolate, acuminate, base cuneate, glabrous; nerves 7 to 10 pairs and reticulations prominent beneath, 4 to 12 in. long, 1·75 to 4·25 in. wide; petiolules ·35 to ·75 in. long. Panicles terminal axillary strict, 8 to 12 in. long, red-scurfy; branches short. Flowers ·1 in. across, white, pedicelled. Sepals rounded 4. Petals 5, 3 outer round enclosing the two small inner ones. Stamens 2; anthers hooded with 2 round lobes. Fruit oblique to ovoid round, 1 in. long, ·8 in. across, orange. *Hab.* Woods low country up to 2500 ft. altitude. Pahang, Bentong (Foxworthy). Malacca, Rim (Griffith); Nyalas. Johor, Kota Tinggi; Merlimau (Cantley). Selangor, Petaling; Ulu Gombak (Murdoch). Perak, Gunong Harom Parah (Scortechini) up to 2500 ft. altitude; Hermitage Hill. Dindings, Lumut. Penang, Government Hill. *Native names*: Pinang Pelandok; Mata Gajah; Tahi Gigi. Mengading. *Use*: Fruit eaten by Jakuns.

(6) *M. elegans* Ridl.

Small tree 20 to 30 ft. tall. Leaves pinnate 6 to 8 in. long; leaflets opposite, 6 to 10 pairs, lanceolate acuminate, base cuneate, glabrous except a few reddish hairs on petiolules and midrib, 2 in. long, 1 in. wide; petiolules ·25 in. long. Panicle lax, 12 in. long, hairy; branches remote, 6 in. long; branchlets 1 to 2 in. long. Flowers sub-sessile, pink fragrant. Calyx-lobes 4 to 5 lanceolate obtuse ciliate. Petals glabrous, 5 outer ones orbicular, inner ones oblong hooked. Stamens 3, with a bilobed cup surrounding anther. Drupe pisiform, ·25 in. long. *Hab.* Forest hill ranges. Selangor, Semangkok Pass (Curtis).

(7) **M. lanceolata** *Bl. Rumphia* iii. 203, t. 168; *King, l.c.* 458.

Small little-branched treelet about 20 ft. tall. Branchlets and young parts rusty-tomentose. Leaves 12 to 24 in. long; leaflets 13 to 17, stiff, coriaceous, glabrous, shining above; nerves 12 pairs with reticulations deeply impressed above, elevate beneath, more or less tomentose beneath, 3 to 6 in. long, 1.25 to 2 in. wide; petiolules .2 to .35 in. long. Panicles very large, drooping, much-branched; branches 2 ft. long; branchlets 8 in. long. Flowers in



FIG. 51.—*Meliosma lanceolata*.

small clusters, sessile, 1 in. across, cream colour. Sepals 3, orbicular-triangular, blunt. Petals 5; 3 outer larger orbicular. Stamens 2. Fruit sub-globular, compressed, .3 to .4 in. across. *Hab.* Damp forest edges. Singapore, Chua Chu Kang; Jurong. Johor, Bukit Soga; Gunong Pulai. Malacca, Mount Ophir (Maingay); Sungei Hudang (Goodenough). *Distrib.* Java, Sumatra, S. Siam. *Native name:* Medang Siri.

var. *pubescens* Hook. *F.B.I.* ii. 7, is a more tomentose state of the plant.

(8) **M. Ridleyi** *King, l.c.* 458.

Slender little branched tree 25 ft. tall. Leaves 15 in. long; rachis, midribs, nerves beneath red-tomentose; leaflets 11 to 15

thinly coriaceous, oblong to lanceolate acuminate, base obliquely shortly cuneate, smooth above, red-tomentose beneath; nerves 7 to 8 pairs, reticulations distinct, 2·5 to 5 in. long, '9 to 1·2 in. wide; petiolules '1 to '2 in. long. Panicles axillary and terminal, 5 to 12 in. long, red-tomentose; branches spreading. Flowers solitary, spicate, oblong under '1 in. across, white. Fruit globose, '25 in. through, black. *Hab.* Southern woods of the peninsula, Singapore, Garden Jungle; Bukit Timah. Johor, Castlewood. Malacca (Griffith).

ORDER XLV. ANACARDIACEÆ.

Trees, often vast, rarely shrubs, with a clear resin which turns black on exposure, very poisonous. Leaves usually simple, coriaceous or pinnate, alternate, rarely opposite. Flowers small or minute, white, yellow or pink, uni- or bi-sexual in panicles in the uppermost axils. Calyx 3- to 5-lobed or spathaceous (*Gluta*) or calyptrate (*Melanorrhæa*). Petals 3 to 5. Disc flat cupular or annular or lobed. Stamens many as petals or fewer or more, some often abortive insert beneath, rarely on, disc. Ovaries 1 or 4 to 6, apocarpous or 2 to 5 syncarpous; ovules solitary, pendulous. Styles 1 to 5, or stigma sub-sessile. Fruit drupaceous, 1-celled and 1 seed or a stone 2- to 5-celled. Seed exalbuminous. About 430 species, chiefly tropical. (King, *Journ. As. Soc. Beng.* lxiv. ii. 459.)

Spondias dulcis, Willd., the Hog plum, is occasionally planted. There are trees at Grit in Perak. It is a big tree with caducous leaves, long leaflets and greenish yellow plum-like fruit.

i. ANACARDIÆ. Ovary 1-celled; leaves simple; carpels 1 to 5, only 1 fertile; style lateral or from base of ovary.

Petals not accrescent; stamens in 1 whorl, sometimes reduced to 1; fruit a drupe.

Stamens 10; carpels 5 (4 or 6) 1. BUCHANANIA

Carpel 1.

Leaves opposite 2. BOUEA

Leaves alternate.

Stamens 1 to 5; calyx 4- to 5-partite 3. MANGIFERA

Stamens 8 to 10; drupe reniform on a fleshy peduncle 4. ANACARDIUM

Calyx spathaceous; drupe corky, fleshy often tubercled 5. GLUTA

Petals accrescent.

Calyx calyptrate; drupe sessile 6. MELANORRHÆA

Calyx 5-partite; drupe stalked 7. SWINTONIA

ii. RHODEÆ. Carpels 1 or 3 united; ovary 1-celled; stamens in 1 to 2 whorls; fruit 1-celled, 1-seeded; leaves usually pinnate.

Leaves simple.

Flowers 5-merous; stamens 6 to 10 8. CAMPNOSPERMA

- Leaves pinnate.
 Sepals accrescent in fruit 9. *PARISHIA*
 Sepals not accrescent in fruit.
 Stamens 5 with 5 staminodes.
 Stigma erect 3-lobed 10. *MICROSTEMON*
 Stigma flat not 3-lobed, bent 11. *PENTASPADON*
 Stamens 4 to 10, no staminodes; drupe
 small 12. *RHUS*
- iii. *SEMECARPEAE*. Ovary 1-celled of 3 carpels united; ovule 1; stamens in 1 row; styles 3 or 1; drupe large, connate with a fleshy peduncle; leaves simple.
 Petals valvate; style 1; calyx enlarged adherent
 to drupe 13. *MELANOCHYLA*
 Petals imbricate; styles 3; drupe on a large
 fleshy receptacle 14. *SEMECARPUS*
- iv. *SPONDIÆ*. Ovary and drupe 2- to 5-celled; leaves imparipinnate.
 Flowers bisexual; drupe large globose; flowers
 5-merous, stamens 10; drupe 5-celled 15. *DRACONTOMELUM*

1. *BUCHANANIA*, Roxb.

Leaves alternate, simple. Flowers bisexual, white. Calyx short 3- to 5-toothed, imbricate. Petals 4 to 5, oblong, imbricate. Disc orbicular 5-lobed. Stamens 8 to 10 from base of disc. Carpels 5 to 6, one fertile. Style short. Stigma truncate. Drupe small, ovoid, compressed; stone bony, 2-valved. Seed gibbous. About 25 species, Asia and Australasia.

- Leaves round or blunt at tip; panicle glabrous (1) *B. lucida*
 Leaves acute; panicle pubescent (2) *B. sessilifolia*

(1) *B. lucida* *Bl. Ann. Mus. Bot. Lugd. Bat.* i. 184; *Hook. fil. F.B.I.* ii. 24. *B. florida* var. *lucida* *King, l.c.* 464; *Engler, DC. Mon. Phan.* 189 (not *B. florida* *Schauer*). *B. petiolaris* *Miq. Fl. Ind. Bat.* i. (2), 637.

Tree about 40 to 60 ft. tall. Leaves coriaceous, oblong-lanceolate or obovate blunt rounded, narrowed from below middle to the long-winged petiole, shining; nerves 12 pairs fine, reticulations distinct, 3 to 5.5 in. long, 1.5 to 1.75 in. wide; petioles .5 to .75 in. long. Panicles axillary at branch-ends, lax, spreading, 6 in. long, 2 in. across. Flowers greenish white .25 in. across; pedicels .1 in. long. Sepals 4 to 5, orbicular. Petals 4 or 5, elliptic. Stamens 8; anthers elongate cordate. Pistils 3 to 4. Drupe ovoid or subglobose, .25 in. long. *Hab.* Common in woods. Singapore to Penang and Kedah and Lankawi. *Distrib.* Burma, Sumatra, Labuan, Siam. *Native names*: Arga; Kelompang Kras (Kedah).
 var. *laxiflora* *Ridl.*

Leaves oblanceolate, quite blunt, rounded. Panicle 6 in. long, very lax; branchlets (lower) 1.5 in. long; peduncle .7 in. long; pedicels .2 in. long, slender; buds oblong .1 in. long. *Hab.* Pulau Adang.

Engler's var. *petiolaris* is merely based on a state of the foliage, the leaves being smaller and rounder.

(2) **B. sessilifolia** *Bl. Ann. Mus. Bot. Lugd. Bat.* i. 184; *King, l.c.* 463. *B. acuminata* *Hook. fil. F.B.I.* ii. 24.

Tree about 30 or 60 ft. tall. Leaves thinly coriaceous, lanceolate or oblanceolate, abruptly acute, narrowed to base, glabrous except sometimes the puberulous midrib beneath; nerves 13 to 15 pairs, elevate beneath, 3·5 to 7 in. long, 1·5 to 2·5 in. wide; petioles 1 to 1·6 in. long. Panicles 8 to 9 in. long, peduncled, spreading 4 in. across. Flowers crowded at tips, greenish white 1·5 in. across. Sepals 5, round. Petals 5 to 6, oblong, blunt. Stamens 8 to 10, white; anthers sagittate. Drupe sub-cordate round compressed, 3·5 in. long. *Hab.* Common all over the peninsula in woods. Singapore, Pahang, Johor, Malacca, Perak, Penang. *Distrib.* Burma and Malay islands. *Native names:* Pauh pipit (Sparrow mango); Medang Hudang; Kurutak Hudang; Otak Hudang; Poko Hudang; Kuluk Hudang; Katawu Hudang (in Sumatra Katidang and Katudang); Temohong; Gulawai.

In some forms the buds and inflorescence are more or less hairy.

2. BOUEA, Meissn.

Trees medium size. Leaves simple, opposite glabrous. Flowers, small, yellow, bisexual. Sepals 3 to 5, valvate. Petals 3 to 5, imbricate, keeled on inner face. Stamens 3 to 5, insert within the small disc. Style short, terminal. Stigma 3-lobed. Drupe fleshy, yellow like a small mango; stone thin fibrous, 1-celled, 1-seeded. Species 5, Asiatic.

Leaves 5 to 8 in. long.

Sepals puberulous; fruit 1·6 to 1·75 in. long . . . (1) **B. microphylla**

Leaves 5 to 8 in. long.

Sepals tomentose; fruit 2 in. long . . . (2) **B. macrophylla**

(1) **B. microphylla** *Griff. Pl. Cantor* 15; *Notulæ* iv. 423; *Hook. fil. F.B.I.* ii. 21. *B. burmanica* var. *microphylla* *Engl. l.c.* 240; *King, l.c.* 465.

A bushy tree 30 to 80 ft. tall. Leaves deep green coriaceous, oblong-lanceolate blunt acuminate, base cuneate; nerves 10 to 15 pairs fine, depressed above, faintly raised beneath, 2·5 to 3 in. long, 1·5 to 1 in. wide; petioles 1·4 in. long. Panicles dense 1 to 1·25 in. long. Flowers crowded, yellow 1 in. long. Sepals 4 ovate, puberulous. Petals 4, oblong obtuse, much longer. Stamens 3 or 4, shorter, red; anthers linear. Drupe oblong, 1 in. long, orange, like a small plum. *Hab.* Villages and woods. Singapore, Pahang, Malacca, Perak, Penang, often in orchards, but I think wild also. It occurred in the Garden Jungle apparently quite wild. *Native names:* Rumeniya betul; Rumia; Plum mango. *Use:* A good fruit, rather acid, but good for cooking.

(2) **B. macrophylla** Griff. Pl. Cantor, 15; *Notulæ* iv. 420; *Hook. fil. F.B.I.* ii. 21; *King, l.c.* 465.

Large bushy tree about 30 ft. tall. Leaves dark green, shining, coriaceous, oblong-lanceolate, bluntly acuminate, base cuneate or round; nerves 18 to 20 pairs, 5 to 8 in. long, 1·65 to 2·65 in. wide; petioles ·75 to 1 in. long. Panicles axillary, dense, 2 to 3 in. long; branches 1 in. long or less. Flowers yellow 1 in. long; pedicels finely tomentose. Sepals 3 to 4 ovate tomentose. Petals 3 to 4 oblong blunt glabrous. Stamens 3 to 4; anthers ovate. Drupe oblong as long as an egg, yellow pulpy. *Hab.* Villages. Singapore, Malacca to Biserat, Jalor (Yapp). *Native names*: Gondongan; Kondongan. *Use*: Fruit eatable and quite good.

3. MANGIFERA, Linn.

Large to vast trees. Leaves simple alternate. Panicles in terminal axils, usually large. Flowers small, green, white, pink or violet, bisexual. Sepals 4 to 5 imbricate. Petals 4 to 5 imbricate. Stamens 1 to 5, rarely 8, one perfect with the others abortive or absent, within or on disc. Ovary 1-celled, oblique; style lateral. Drupe large, pulpy; stone compressed, fibrous. Seed large, flat or convex. About 30 species, tropical Asia, few Africa, chiefly Malayan.

The Mango (*Mangifera indica*) is often planted, and to be seen round villages, but not native. Several of the other well-known cultivated species, such as the Binjai, are probably not native in the peninsula. *Native names* of Mango: Mampelam; Ampelam; Hampelam; also Buah Mangga. The name Pauh is applied also to many species.

Disc fleshy, swollen.

Sepals and petals 4; stamen 1.

Panicles pubescent.

Petiole 1 to 1·25 in. long; leaves 4 in. long or more

(1) **M. Griffithii**

Petiole ·25 to ·4 in. long; leaves elliptic, sub-coriaceous

(2) **M. microphylla**

Petiole ·25 to ·4 in. long; leaves broad elliptic, stiff, coriaceous

(3) **M. sclerophylla**

Panicles glabrous.

Leaves 6 by 2 in.; nerves fine, blunt; petiole ·5 in. long

(4) **M. Maingayi**

Leaves 11 by 3·5 in., acute; petiole 2·5 in. long

(5) **M. longipetiolata**

Leaves 6 by 2 in.; panicles stout

(6) **M. quadrifida**

Sepals and petals 5.

Stamens 5 fertile

(7) **M. pentandra**

Stamens 3 fertile, 2 staminodes

(8) **M. lanceolata**

Stamen 1 perfect.

Panicle tomentose

(9) **M. indica**

Panicle glabrous.

Leaves very coriaceous

(10) **M. oblongifolia**

Leaves thinly coriaceous, oblong 5 to 8 in. long

(11) **M. longipes**

Leaves elliptic-lanceolate 3 to 4 in. long . (12) **M. gracilipes**

Disc minute or absent.

Panicle glabrous.

Flowers .25 in. long, yellow, edged rose . (13) **M. odorata**

Flowers .35 in. long pink, showy; panicle
blood-red . (14) **M. foetida**

Flowers .3 in. long; leaves linear-oblong (15) **M. macrocarpa**

Panicles puberulous.

Flowers purple; stamens 5 or 6, perfect;
fruit bottle-shaped . (16) **M. lagenifera**

Panicles tomentose; petals adnate to a
cylindric torus.

Flowers .3 in. long; leaves sessile or nearly;
panicle 20 to 30 in. long . (17) **M. kemanga**

Flowers showy, pale lavender; panicle 12
to 15 in. long . (18) **M. cæsia**

Flowers .75 in. long with large concave
bracts . (19) **M. superba**

(1) **M. Griffithii** Hook. *fil. Trans. Linn. Soc.* xxii. 168;
F.B.I. ii. 14; *King, l.c.* 468.

Tree 80 to 100 ft. tall. Leaves stiffly coriaceous elliptic or oblong to obovate blunt, narrowed to base; nerves 16 to 17 pairs slightly elevate beneath, 4 to 7 in. long, 1.5 to 2.5 in. wide; petioles 1 to 2.5 in. long. Panicles rough pubescent, 3 to 6 in. long; terminal branches few. Flowers less than .1 in. across. Sepals 4, ovate pubescent. Petals 4, obovate, little longer with one or two thickened ridges near base. Stamen 1, on a 4-lobed disc. Fruit oblong-obovoid, 1.5 in. long, greenish yellow. Stone less than 1 in. long. *Hab.* Open rocky jungle in low country, Malacca (Griffith). Perak, Larut 300 to 500 ft. altitude (Kunstler).

(2) **M. microphylla** Griff. in Hook. *fil. F.B.I.* ii. 17.

A small tree with a dense head. Leaves coriaceous, elliptic acuminate, base narrowed, blunt; nerves 10 to 12 pairs, 2 to 4 in. long, .5 to 1.5 in. wide; petioles slender, .3 in. long. Panicles 3.5 in. long; branches very short, dense-flowered, pubescent. Flowers .2 in. across, white, short-pedicelled. Sepals 4, ovate pubescent. Petals 4, twice as long, oblong, 3-ridged. Stamen 1. Ovary globose puberulous. Drupe green as big as an egg and egg-shaped. *Hab.* In orchards, Malacca, Chabau (Griffith). Pahang, Kwantan, Dalam (Foxworthy). *Native names:* Rabba-Rabba; Rawa.

(3) **M. sclerophylla** Hook. *fil. F.B.I.* ii. 15; *King, l.c.* 469.

Gigantic tree. Leaves very coriaceous, broad elliptic-obovate, apex sub-acute; nerves 12 pairs, thick, 2.5 to 5 in. long, 1.5 to 2.75 in. wide; petioles stout, .25 to .75 in. long. Panicles terminal, 9 in. long; branches few, lowest 3 in. long, pubescent, sometimes racemose fascicled. Flowers .1 in. across, sessile in the axil of an ovate bract longer than it. Sepals 4, ovate pubescent. Petals 4, about as large. Stamen 1. Drupe green ovoid, 1.5 in. long. *Hab.* In forests, Singapore, Changi. Malacca (Maingay). Perak (Wray).

(4) **M. Maingayi** Hook. fil. *F.B.I.* ii. 17; *King, l.c.* 469.

A vast glabrous tree. Leaves coriaceous, elliptic-oblong acute or obtuse, base cuneate; nerves 15 pairs, reticulations inconspicuous, 4 to 9 in. long, 1·5 to 3·5 in. wide; petioles ·8 to 2 in. long. Panicle glabrous, pyramidal, 8 to 9 in. long with slender branches. Flowers ·12 in. across, rather scattered; pedicels slender. Sepals 4, ovate, blunt. Petals 4, oblong, twice as long, with 3 to 5 ridges. Stamen 1. *Hab.* Open country, Malacca, Bukit Sabukor. Muar, Sungei Pauh (Fox). *Native name*: Sepum.

(5) **M. longipetiolata** King, *l.c.* 470.

Tree 40 to 60 ft. tall, glabrous. Leaves coriaceous, oblong acuminate, long narrowed to base; nerves 16 to 20 pairs, prominent especially beneath, slender, both sides reticulate, 7·5 to 10 in. long, 2·25 to 3·75 in. wide; petioles 2 to 4·5 in. long. Panicles glabrous, axillary and terminal lax, branching from base; branches few with 8 to 12 flowers at the tip. Flowers ·15 in. across, white; pedicels slender. Sepals 4, ovate-lanceolate. Petals 4, elliptic, ridges near base 3, broad vertical. Stamen 1, shorter. *Hab.* Dense forests on mountains; Perak, Larut Hills, 2500 to 3000 ft. altitude (Kunstler).

(6) **M. quadrifida** Jack. in Roxb. *Fl. Ind.* (ed. Carey) ii. 440.

Tree 40 to 60 ft. tall, glabrous. Leaves coriaceous, elliptic-oblong to lanceolate sub-acute tapering to base; nerves 16 to 18 pairs, slightly prominent, 5 to 7 in. long, 1·75 to 2·5 in. wide; petioles ·75 to 2·5 in. long. Panicle in upper axils 6 to 7 in. long with short branches; branchlets very short, cymose. Flowers ·15 in. across, white. Sepals 4, ovate obtuse. Petals 4, twice as long, elliptic, 3 ridges in lower half, mid-one thickened at tip. Stamen 1, shorter than petals from inner side of one of the 4 disc lobes. *Hab.* Forests, Perak, Gunong Bubu and Thaiping 300 to 1500 ft. altitude (Kunstler). Penang (Jack).

(7) **M. pentandra** Hook. fil. *F.B.I.* ii. 14; *King, l.c.* 472.

A big tree 60 to 80 ft. tall. Leaves coriaceous, oblong or oblong-lanceolate rounded or acutely acuminate, base almost rounded; nerves about 14 pairs, reticulations fine, distinct, 4 to 6 in. long, 1·5 to 2 in. wide; petioles ·4 to ·6 in. long. Panicles 6 to 8 in. long, densely hairy. Flowers very numerous, cream white, densely clustered. Sepals 5, ovate obtuse, hairy. Petals little longer 3-nerved in front. Stamens 5, much shorter, unequal. Disc lobed. Fruit green, oblong compressed. *Hab.* Lowland country, woods near the sea. Singapore, Changi. Malacca (Maingay). Kedah, Alor Sta. *Native names*: Mampelam; Manga Dodol.

(8) **M. lanceolata** Ridl. *Journ. Roy. As. Soc. S. Br.* 59, p. 90.

A tree. Leaves coriaceous, lanceolate obtuse, base narrowed; nerves 12 to 13 pairs, 5 in. long, 1·5 in. wide; petioles 1 in. long, much thickened towards base from middle. Panicles 6 in. long, 5 in. across terminal; rachis pubescent. Flowers ·12 in. long,

white; pedicels as long. Sepals 5 ovate-lanceolate, pubescent. Petals twice as long, linear-oblong; nerve 1 trifid at tip. Stamens fertile 3, 2 staminodes. Disc lobed. Ovary papillose. Fruit elliptic, about 1.5 in. long (not ripe). *Hab.* Kedah at Alor Sta in open country (Ridley).

(9) **M. indica** *Linn. Sp. Pl.* 200; *Hook. fl. F.B.I.* ii. 13.

Tree about 60 ft. tall. Leaves coriaceous, narrow oblong to oblong-lanceolate, acute or acuminate, dark green, base cuneate; nerves 12 to 20 pairs, 5 to 10 in. long, 1.5 to 3 in. wide; petioles .5 to 2 in. long. Panicles 12 in. long or more minutely tomentose. Flowers yellowish green, .2 in. wide. Sepals ovate, pubescent. Petals oblong with 3 stout nerves. Stamen 1, from between 2 of the 5 lobes of the disc. Ovary obliquely ovoid. Drupe fleshy green or orange, obliquely pear-shaped or ovoid flattened 3 to 4 in. or in cultivated forms 12 in. long. Stone large, fibrous-coated hard. Cultivated in orchards, abandoned villages, etc. Originally from India. *Native names:* Mangga; Mampelam.

(10) **M. oblongifolia** *Hook. fl. F.B.I.* ii. 16; *King, l.c.* 473.

Large glabrous tree. Leaves stiffly coriaceous, linear-oblong blunt, base rounded; nerves 18 to 25 pairs slightly elevate on both sides, reticulate above, pale smooth beneath, 6 to 9 in. long, 1.75 to 2.75 in. wide; petioles 1 to 1.5 in. long. Panicles 9 in. long, many branched, sub-terminal, glabrous. Flowers .15 in. long, on pedicels as long. Sepals 5, orbicular. Petals 5, twice as long, elliptic-oblong with 3 to 5 short ridges confluent at base. Stamens 5 (all antheriferous), one fertile longer. Fruit unknown. *Hab.* Malacca (Griffith and Maingay), not seen of late years. *Native name:* Maingay gives Quenee, but that is *M. odorata*.

(11) **M. longipes** *Griff. Notulæ* iv. 419; *Hook. fl. F.B.I.* ii. 15; *King, l.c.* 473.

Tree 80 ft. or more tall. Leaves thinly coriaceous, oblong or elliptic-oblong, shortly acuminate, base narrow cuneate; nerves 16 to 20 pairs distinct on both sides, 5 to 8 in. long, 1.5 to 2 in. wide; petioles slender, .75 to 1.75 in. long. Panicles terminal, long, slender lax spreading, glabrous. Flowers nearly .2 in. across in ultimate cymules, with longer pedicels. Sepals 5, ovate acute, hairy on the midrib on back. Petals 5, longer, linear-oblong, tips reflexed, 1 ridge at base. Stamen 1, longer; staminodes several. *Hab.* Forests in south. Singapore on Bukit Timah. Malacca (Griffith). Pahang, Kwantan (Foxworthy). *Native name:* Machang Api.

(12) **M. gracilipes** *Hook. fl. F.B.I.* ii. 16; *King, l.c.* 474.

Large glabrous tree, slender branched. Leaves thin coriaceous, elliptic-lanceolate cuspidate, base long narrowed acute; nerves 10 to 12 pairs, slightly raised on both sides, 3 to 4 in. long, 1 to 1.5 in. wide; petioles .75 to 1 in. long, very slender. Panicles glabrous slender 5 to 6 in. long, terminal; branchlets very short.

Flowers 2 in. across; pedicels slender as long. Sepals 5, ovate. Petals 5, lanceolate, longer, ridges 3 to 5. Stamen 1, shorter; staminodes 4, short. *Hab.* Malacca (Maingay).

A very distinct plant from its small clove-like leaves, but apparently very scarce; no one seems to have found it again.

(13) **M. odorata** Griff. *Notulæ* iv. 417; Hook. *fil. l.c.* 16; King, *l.c.* 474.

A big tree nearly 100 ft. tall. Leaves coriaceous, oblong or elliptic-lanceolate acute and acuminate, reticulate on both sides, base cuneate; nerves prominent, 20 pairs, 6 to 9 in. long, 2 to 4 in. wide; petioles 1.25 to 1.75 in. long. Panicles 8 in. long with branches 4 in. long terminal, red. Flowers less than .25 in. wide; pedicels slender. Sepals 5, ovate-oblong, red. Petals 5, 3 times as long, oblong, yellow edged rose, ridges 3 confluent, yellow. Stamens 2 nearly as long, white; anthers black; staminodes short, white tipped rose. Fruit oblong, yellowish green, flesh yellow. *Hab.* Orchards. Singapore and Malacca, usually in rather sandy spots. *Use*: The fruit is rather poor eating. *Distrib.* Malay Isles. *Native name*: Kwini.

Blume holds the Kwini to be a variety of *M. foetida*, Jack. It seems to me distinct.

(14) **M. foetida** Lour. *Fl. For. Cochinchine*, 160; Hook. *fil. F.B.I.* ii. 19.

Large tree 60 to 80 ft. tall. Leaves very coriaceous, elliptic-oblong obtuse or sub-acute, base narrowed; nerves 16 to 18 pairs, very bold and nearly horizontal, 8 to 12 in. long, 3.5 to 6 in. long; petioles .75 to 2.25 in. long. Panicles stout 8 to 9 in. long, blood red. Flowers .35 in. across, pink; pedicels very short. Sepals 5, ovate-lanceolate, subacute. Petals 5, linear-oblong, acute, twice as long, clawed; nerve 2- to 3-fid thickened at the base. Disc cylindric. Stamen 1, perfect; staminodes rather long. Drupe oblong, green, 3 to 4 in. long. *Hab.* Orchards and villages. Singapore; Malacca, and most of the southern part of the peninsula. *Distrib.* Siam, Malay islands. *Native name*: Bachang or M'bachang.

Fruits much used, especially in curries. Very conspicuous in flower, from its bright red panicles.

(15) **M. macrocarpa** Bl. *Bijdr.* 1158; *M. fragrans*, Maing. in Hook. *fil. F.B.I.* ii. 18; King, *l.c.* 475.

Glabrous tree. Leaves narrow linear-lanceolate acuminate undulate, base acute; nerves 25 to 35 pairs, slender, 6 to 10 in. long, 1.25 to 1.5 in. wide; petioles 1 to 2 in. long. Panicles 6 to 7 in. long, stout, terminal, spreading. Flowers .3 in. long; pedicels thickened upwards. Sepals 5, ovate-lanceolate. Petals 5, linear-oblong, ridges 1 to 3. Stamens 1 fertile, 4 sterile. Drupe oblong-globose, oblique, yellow-fleshed. *Hab.* Rare and probably introduced. Malacca (Maingay). *Distrib.* Malay Isles.

(16) **M. lagenifera** Griff. *Notulæ* iv. 414, t. 567, fig. 3; *Hook. fil. F.B.I.* ii. 18; *King, l.c.* 476.

A superb tree 80 to 100 ft. tall. Leaves deep green, very coriaceous, oblanceolate blunt, gradually narrowed to base; nerves 16 to 20 pairs, faint, 3 to 6 in. long, 1 to 1.75 in. wide; petioles flat, .5 to .9 in. long. Panicles erect, puberulous reddish, 6 in. long, stout, lax. Flowers .35 in. long, deep violet; pedicels short. Sepals 5 or 6 ovate, pubescent. Petals 5 or 6 much longer, erect, oblanceolate, puberulous. Stamens 5 to 6, all perfect, as long as petals, violet. Drupe 6 in. long, pear-shaped, green, tinted brown or purple. *Hab.* Common in orchards and villages, whole peninsula and islands. The fruit is coarse and not much liked even by Malays. *Native name:* Lanjut.

(17) **M. kemanga** Bl. *Ann. Mus. Bot. Lugd. Bat.* i. 202. *M. polycarpa* Griff. *Notulæ* iv. 416, t. 567, fig. 2; *Hook. fil. F.B.I.* ii. 20.

Big tree 80 ft. high. Leaves crowded at branch-tips, sessile coriaceous, oblanceolate or obovate-oblong, bluntly acuminate, base narrowed to base of petiole; nerves 20 to 22 pairs, conspicuous and raised on both sides, 9 to 15 in. long, 2.5 to 4 in. wide. Panicles 20 to 30 in. long, stout, pubescent, much-branched. Flowers .25 in. long, pinkish purple; pedicels short. Sepals 5, linear-lanceolate. Petals 5, linear-lanceolate, not twice as long, with 1 median ridge. Stamen 1, shorter. Drupe oblong, base gibbous, brown; stone lanceolate. *Hab.* Orchard and villages. Singapore and Malacca. *Distrib.* Malay islands. *Native name:* Kemang.

(18) **M. cæsia** Jack in *Roxb. Fl. Ind.* ii. 441; *Hook. fil. F.B.I.* ii. 19; *King, l.c.* 478.

About 60 ft. tall. Leaves thickly coriaceous, lanceolate to elliptic-lanceolate short acuminate, narrowed at base, midrib stout; nerves 20 to 25 pairs, prominent, 6 to 12 in. long, 2 to 3.5 in. wide; petioles thick, .35 to .5 in. long. Panicles over 12 in. long, much-branched, pubescent, dense-flowered. Flowers .3 in. long, pale lilac. Sepals 5, lanceolate pubescent. Petals 5, twice as long, linear with central ridge. Stamen 1, shorter; staminodes minute. Drupe 6 in. or more long, thick, dirty white. *Hab.* Common in villages and orchards. *Native name:* Binjai. A popular fruit with natives, and a very handsome and showy tree in flower. *Distrib.* Malay islands.

(19) **M. superba** Hook. *fil. F.B.I.* ii. 19; *King, l.c.* 478.

A very large tree. Leaves very coriaceous cuneate-oblanceolate, obtuse, narrowed to base of petiole; nerves 30 pairs, prominent, midrib very short, 10 to 16 in. long, 3 to 5 in. wide; petioles .5 to 1 in. long very stout, often winged to base. Panicle terminal over 8 in. long, stout; branches few. Flowers .75 in. long, lilac, crowded in heads at the tips of the branches; pedicels very short. Bracts numerous, large lanceolate. Sepals 5, ovate-lanceolate, pubescent, .35 in. long. Petals twice as long, lanceolate, acuminate

with a thickened ridge at base. Stamen 1; staminodes very small. Style very long, filiform. *Hab.* Malacca (Maingay). Only his specimens known.

4. ANACARDIUM, Rottb.

Shrubs or trees. Leaves alternate simple, coriaceous. Panicle terminal. Flowers medium-size. Calyx deeply 5-lobed, lobes narrow. Petals 5, linear-lanceolate. Disc filling calyx-tube. Stamens 8 to 10; filaments connate, adnate to disc. Ovary oblique-ovoid; style filiform, excentric; ovule 1. Nut reniform on a large fleshy pear-shaped body formed of disc and top of peduncle. Seed reniform. A few American species.

(1) *A. occidentale* Linn. *Sp. Pl.* 548; *King, l.c.* 479.

Straggling low tree about 20 ft. tall. Leaves coriaceous, obovate, blunt or retuse, base cuneate; nerves 10 to 12 pairs, 4 to 9 in. long, 3 to 5 in. wide; petioles .5 to .75 in. long. Panicle 6 or 8 in. long, branched, puberulous. Flowers .5 in. long, white turning pink. Fruit about 1 in. long, grey; peduncle 4 in. long, 2 in. wide at top in good fruit, usually very much smaller in the wild form, yellow, flushed pink. *Hab.* Thoroughly established in sandy spots by the sea. Singapore. Pahang River. Tringganu. Setul. *Native names:* The Cashew-nut; Bua Gajus; Janggus; Kaju; Jambu Monyet.

It is rarely, if ever, cultivated now here, but appears to have been introduced from South America in the sixteenth century, and has run wild in sandy places. The peduncle and kernel of seed are eaten.

5. GLUTA, Linn.

Trees or shrubs. Leaves oblong, simple. Panicles in terminal axils. Flowers medium-size, white or pink, bisexual. Calyx spathaceous, splitting irregularly, caducous. Petals 4 to 6, imbricate. Disc elongate. Stamens 4 to 6, on disc. Ovary sessile or stipitate, oblique, 1-celled; style lateral. Stigma simple. Drupe large or small, usually fleshy, brown and tubercled or smooth very resinous. About 6 species, Burmese and Malayan. Very poisonous trees, latex clear becoming varnish-like black and producing in many people a severe erysipelas-like poisoning. (See Gimlette, *Malay Poisons*, p. 47, Ridley, *Malay Medical Journal*, ix. 7.)

Petals four times as long as the calyx, white; tree . (1) *G. Benghas*
 Petals twice as long as calyx.

Leaves broad, often cordate at base; shrub; fruit
 brown, warty (2) *G. coarctata*

Leaves narrowed to base.

Leaves 3 by 1.25 in.; panicle dense; fruit globose,
 black (3) *G. lanceolata*

Leaves 5.5 by 2.5 in. or less; fruit oblong flattened,
 black (4) *G. elegans*

- Panicle lax; leaves stiffly coriaceous, elliptic;
 fruit oblong red (5) **G. Wrayi**
 Leaves elliptic-lanceolate, 9 by 3 in.
 Fruit obovoid, brown (6) **G. virosa**

(1) **G. Benghas** Linn. *Mantiss*, p. 293; *King, l.c.* 480. *G. Renghas*, *Engl. DC. Mon. Phan.* iv. 226, *t.* 6, *figs.* 1 to 6.

Large tree 60 ft. tall. Leaves dark, shining green, oblanceolate-oblong, tip rounded, gradually narrowed to base; nerves 18 to 20 pairs, 4 to 7 in. long, 1·6 to 2·25 in. wide; petioles 3 to 6 in. long. Panicles axillary, puberulous, lax, 6 in. long, 4 in. across; pedicels 3 in. long. Flowers white, 5 in. across. Calyx very short. Petals elliptic, four times as long. Stamens 5, half as long as petals. Gynophore short. Drupe irregular globose or elliptic, warty brown, 1·5 to 2 in. through. Seed 1·5 in. through. *Hab.* Rare on river-banks in open country. Pahang, Rumpin River. *Distrib.* Malay islands. *Native name*: Jitong.

(2) **G. coarctata** Hook. *fil. F.B.I.* ii. 22; *King, l.c.* 482.

Large branching shrub, glabrous except the puberulous inflorescence. Leaves stiffly coriaceous, oblong or oblanceolate obtuse or sub-acute, narrowed to the blunt often cordate base, dark green (red when young); nerves 13 to 20 pairs, faint, 5 to 9 in. long, 1·75 to 3·5 in. wide; petioles 1 to 2 in. long, thick. Panicles axillary 3 to 4 in. long; branches few, short. Flowers white, 4 in. long. Calyx 2 in. long, bilobed, tomentose. Petals 5, oblanceolate, puberulous. Stamens 5, shorter. Drupe light brown, sub-globose, slightly compressed, tubercled. *Hab.* Abundant in tidal rivers, forming dense thickets, conspicuous by its bright red young leaves. Whole plant very poisonous. Johor, Scudai and Sempang Kanan Rivers; Kota Tinggi. Pahang, Rumpin (Foxworthy). Malacca (Griffith). Selangor, Klang (Foxworthy). Perak, Teluk Anson. Kedah, Gunong Geriang River. *Distrib.* Sumatra, Borneo, Tenasserim.

(3) **G. lanceolata** Ridl. *Journ. Roy. As. Soc. S. Br.* 49, p. 17.

A big tree. Leaves narrow lanceolate blunt, narrowed to a long petiole, coriaceous; nerves 12 to 14 pairs, faint, 6 in. long, 2 in. wide; petioles 1·5 to 3 in. long. Panicles 4 in. long, dense-flowered axillary and terminal. Calyx half as long as corolla, tubular split on one side, pubescent. Petals linear-oblong obtuse, pubescent, hairy on inner face, 4 in. long. Stamens longer. Ovary glabrous. Fruit globose, glabrous, black. *Hab.* Penang, Balik Pulau (Ridley).

(4) **G. elegans** Kurz, *Fl. For. Burma*, i. 310; *King, l.c.* 481.

Small tree about 10 to 30 ft. tall, glabrous except inflorescence. Leaves coriaceous, oblong-lanceolate or elliptic-lanceolate acuminate, base cuneate; nerves 10 to 14 pairs, faint, 3 to 6 in. long, 1 to 2 in. wide; petioles 6 to 1 in. long, slender. Panicles 1·5 to 2 in. long, red. Calyx tubular, split on one side, 2-toothed. Petals

2 to 5, linear-lanceolate, twice as long. Stamens 4 to 5, as long. Gynophore long. Drupe oblong flattened gibbous, 1·5 in. across, black. *Hab.* Forests in hills about 2000 ft. altitude. Perak (Kunstler, fide King). Penang Hill, abundant. *Distrib.* Tenasserim. *Native name*: Rengas Ayam.

(5) **G. Wrayi** King, *l.c.* 482; *Ridl. Journ. Roy. As. Soc. S. Br.* 49, p. 16.

Tree, glabrous except inflorescence. Leaves stiff coriaceous, elliptic sub-acute, narrowed to base; nerves 12 to 14 pairs, invisible above, faint or slightly elevate beneath, 4 to 6·5 in. long, 1·6 to 2·5 in. wide; petioles ·6 to ·7 in. long. Panicles in upper axils 3 in. long, pubescent. Flowers numerous, ·4 in. long. Calyx half as long as petals, pink. Petals 5, oblong blunt, base clawed, puberulous outside, white. Stamens 5, longer. Fruit oblong, laterite red 4 to 5 in. long, 3 in. thick, elliptic smooth. *Hab.* Forests, Dindings, Lumut. Perak, Sungei Larut (Wray).

(6) **G. virosa** Ridl. *Journ. Roy. As. Soc. S. Br.* 75, p. 27.

A large branching tree 50 to 70 ft. tall. Leaves coriaceous lanceolate, 9 in. long, 2·75 in. wide, acuminate at both ends, blunt; nerves about 18 pairs, slightly raised beneath, reticulations fine, visible; petioles 2 in. long. Panicles axillary towards the branch-tips, 3 to 4 in. long. Calyx-tube spathaceous, red, ·2 in. long, split on one side. Petals twice as long, linear-oblong, white. Ovary pubescent. Fruit obovoid, smooth, not polished, rough light brown, 2·5 to 5 in. long and nearly as wide. *Hab.* Damp forests, Selangor, Rantau Panjang. Perak, Gunong Pondok (Kunstler). Dindings, Simpit. Penang, Telok Bahang and Penara Bukit (Curtis); Moniot's Road. *Native name*: Rengas Kerbau Jolang.

Reputed as exceptionally poisonous. The fruit is often as large as an Indian mango, and has a scurfy-brown skin like that of *G. coarctata* and *Bengas*, but not tubercled.

6. MELANORRHŒA, Wall.

Trees, very large, resinous and poisonous. Leaves alternate, simple. Panicles in terminal axils. Flowers medium, white flushed pink, unisexual. Sepals united into a cap, deciduous. Petals 5 to 8, linear-oblong, imbricate. Disc hemispheric or columnar. Stamens 5 to 10 or very numerous; filaments slender. Ovary stalked, oblique lenticular, 1-celled; style lateral. Fruit, a dry drupe, sessile or on a long pedicel with the petals developed into long spreading pink wings. About 6 species, Indo-Malayan.

On the poisonous properties of *Melanorrhæa*, see Gimlette, *Malay Poisons*, p. 44.

Petals accrescent in fruit into long pink wings.

Calyx spathaceous falling off like a cap.

Stamens 5; bracts small, deciduous . . . (1) **M. Wallichii**

Stamens 5; bracts large, persistent . . . (2) **M. Woodsiana**

- Stamens 10 (3) *M. Curtisii*
 Stamens numerous; fruit wings short.
 Drupe small, long stalked; leaves oblong
 obovate, hairy beneath (4) *M. pubescens*
 Drupe large, 1·5 in. through; wings very
 short, caducous; leaves lanceolate,
 glabrous (5) *M. macrocarpa*
 Calyx withering and persistent as a collar (6) *M. torquata*
 Petals not accrescent in fruit.
 Petals oblongeolate; leaves 6 to 15 in. long (7) *M. aptera*
 Petals elliptic; leaves 4 to 5 in. long (8) *M. inappendiculata*



FIG. 52.—*Melanorrhœa Wallichii*.

(1) *M. Wallichii* Hook. *fil.* *F.B.I.* ii. 25; *King, l.c.* 484. *M. Maingayi* Hook. *fil.* *l.c.*; *King, l.c.*

Tree 80 to 100 ft. tall. Leaves coriaceous, elliptic-obovate obtuse or rounded, narrowed to base, glabrescent; nerves 12 to 16 pairs, prominent on both sides, 3·5 to 6 in. long, 2 to 3 in. wide; petioles 1 to 1·25 in. long. Panicles terminal and axillary at the branch ends, over a foot long, white, softly hairy; branchlets few-flowered. Flowers 5 in. across, white; pedicels 3 in. long. Petals lanceolate, white woolly, disc black. Stamens 5. Fruit oblong, black sessile

in the corolla wings, which are linear-oblong blunt, papery, 2·1 in. long, ·5 in. across, bright red. *Hab.* Common in forests. Singapore, Bukit Timah; Chan Chu Kang. Johor, Tebing Tinggi. Malacca, Merlimau. Muar (Fox). Pahang, Kuantan (Foxworthy). *Distrib.* Borneo. *Native name*: Rengas Manuk.

An extremely poisonous tree. Timber good, dark red, veined black, and known as Singapore mahogany.

(2) **M. Woodsiana** *Scort. in King, l.c.* 485.

Tree 60 to 100 ft. tall. Branchlets, inflorescence, midrib and nerves beneath ferruginous-velvety. Leaves thickly coriaceous, elliptic-oblong blunt, round or emarginate above, base round glabrous reticulate beneath, tomentose; nerves 15 to 24 pairs, prominent beneath, 4 to 5·5 in. long, 1·75 to 3·5 in. wide; petioles 1 to 1·35 in. long, deep-channelled. Panicles 9 in. long (peduncles 4 in.), densely tomentose. Flowers sub-sessile ·25 in. long, enveloped in bud in ovate tomentose bracts. Petals 5 oblong. Stamens 5. Drupe elliptic, sessile, petal-wings narrow elliptic 1·5 in. long, ·75 in. broad, red. *Hab.* Forests, rare. Perak, Batang Padang (Kunstler).

(3) **M. Curtisii** *Oliver, Hook. Ic. Pl. t.* 1513; *King, l.c.* 486.

Tree 40 to 80 ft. tall, glabrous. Leaves coriaceous, oblong-lanceolate or oblanceolate blunt, narrowed at base; nerves faint 12 to 16 pairs, 3 to 5 in. long, 1·25 to 2 in. wide; petioles ·5 to ·75 in. long slender. Panicles 4 to 7 in. long; branches 3 in. or less, slender remote puberulous, few-flowered at tip. Flowers ·25 in. long; buds narrow. Calyx conic acute calyprate ·1 in. long. Petals 5 linear acute. Stamens 10 shorter. Drupe depressed, globose ·5 to ·75 in. long on a stalk ·35 in. long, black; petal-wings linear, narrowed to the base, 2·25 in. long, ·4 in. across, red. *Hab.* Forests in the north. Reputed very poisonous. Perak, Larut Hills 800 to 1000 ft. altitude (Kunstler). Penang, Government Hill 700 to 800 ft. altitude (Curtis). Kedah Peak. *Native name*: Rengas.

(4) **M. pubescens** *Ridl.*

Tree. Branchlets pubescent. Leaves elliptic to obovate, blunt, coriaceous, glabrous above except midrib, pubescent beneath, especially on midrib and 13 pairs of nerves, base narrowed, cuneate, 5 to 6·5 in. long, 2·5 to 2·75 in. wide; petioles pubescent, not winged, 1 in. long. Panicle pubescent with only 1 or 2 1-flowered branches, 4 in. long. Flowers not seen. Stamens numerous, hairy. Fruit globose ·3 in. long, on a ·6 in. peduncle; petal-wings coriaceous ·5 in. long, 1 in. wide, strongly veined, linear-oblong with the base of the peduncle sparsely hairy. *Hab.* Malacca, Machang Tebung Road (Derry 1010); only once collected and that in fruit. *Native name*: Kayu Merah K'lueng.

(5) **M. macrocarpa** *Engl. DC. Mon. Phan. l.c.* 236.

Tree, glabrous. Leaves thinly coriaceous, lanceolate acuminate,

blunt, base long narrowed, glabrous; nerves about 17 pairs, visible above, elevate beneath, 5 in. long, 1·75 in. wide; petioles (and midribs) puberulous, ¼ in. long, winged half-way or more. Panicles few, in axils below leaves, in fruit 5 to 6 in. long, puberulous. Fruit transversely elliptic, flattened at both ends, 1 in. long, 1·25 in. wide; gynophore ¼ in. long; petal wings deciduous, ½ in. long, ½ in. wide, coriaceous. *Hab.* Hill forests. Perak, Thaiping Hills at 3000 to 4000 ft. altitude (Curtis 3722). *Distrib.* Borneo.

The leaves are more lanceolate than in the type, but I think this is Engler's plant. The reticulations of the leaves are fine, but conspicuous beneath. I have only seen fruiting specimens.

(6) ***M. torquata* King, l.c. 486.**

A vast tree 100 ft. tall, 2 to 4 ft. through. Leaves sessile stiff coriaceous obovate, tips broad round, glabrous, narrowed to base of petiole; nerves 22 to 26 pairs, prominent beneath, 7 to 11 in. long, 4 to 6·25 in. wide. Panicles terminal, stout, tomentose, 6 to 8 in. long branching from base; branchlets crowded at tips, dense-flowered. Flowers ¼ in. long; pedicels 1 to ½ in. long. Calyx short tubular, 3-toothed, withering and hanging round the pedicel. Petals 5, elliptic ½ in. long, white tomentose. Stamens 5 shorter. *Hab.* Wet swampy forests. Leafless when flowering. Dindings, Lumut. Perak, Larut within 100 ft. altitude (Kunstler).

(7) ***M. aptera* King, l.c. 487.**

Glabrous tree 40 to 70 ft. tall, 1½ to 2 ft. through, very resinous. Leaves stiffly coriaceous, obovate apex rounded, base narrowed to base of winged petiole; nerves 18 pairs, slender, prominent beneath, as are reticulations, 8 to 15 in. long, 3 to 6 in. wide. Panicles stout, crowded in the upper axils, 9 in. long, few and short to 1·5 in. long branches. Flowers 1 in. across pale red and white. Calyx ½ in. long. Petals 5 to 6, imbricate, lanceolate, silky outside, not persistent. Stamens about 50 on a conic gynophore. Ovary ovoid 1-celled. Drupe not winged depressed-globose with numerous fine ridges, 1·5 in. through, dark brown. *Hab.* Open forests near water, low country. Perak, Larut (Kunstler). Penang, Telok Bahang (Curtis).

(8) ***M. inappendiculata* King, l.c. 488.**

Glabrous tree 50 to 60 ft. tall, 10 to 15 in. through. Leaves coriaceous, oblong-oblancheolate blunt rounded or retuse, base narrowed cuneate; nerves 15 to 18 pairs, slender elevate beneath, 3 to 5 in. long, 1·5 to 2 in. wide; petioles winged above, ¾ to 1 in. long. Panicles 4 to 7 in. long in upper axils, nude below; flowers ¾ in. long in short (1 in. long or less) branches. Petals narrow elliptic, white flushed pink at base. Stamens numerous pink; anthers green. Drupe globular 1 to 1·5 in. through, dark green. *Hab.* Dense wet jungle lowland up to 1500 ft. altitude on Penang Hill. Perak, Larut (Kunstler). Penang, Government Hill (Curtis); Batu Feringhi (Fox).

7. SWINTONIA, Griff.

Glabrous trees. Leaves alternate, long-petioled. Panicles in terminal axils, large and wide. Flowers small bi- or uni-sexual. Calyx small, lobes 5, rounded, imbricate. Petals 5 white, adnate to disc, linear-oblong, imbricate. Stamens 5 on top of disc. Ovary sessile, ovoid, 1-celled; style slender. Stigma capitellate. Drupe ovoid smooth, coriaceous, winged with the greenish enlarged linear-oblong 9 reflexed petals. Species 4 or 5, Malay Peninsula and Sumatra.

Bracts in flower-buds large imbricate.

Flowers .2 in. wide (1) *S. spicifera*

Bracts small.

Flowers .5 in. wide, puberulous (2) *S. puberula*

Flowers .25 in. wide; wings of fruit shorter than drupe (3) *S. Robinsonii*

Flowers very small .12 in. wide, panicle lax; wings of fruit 1 in. long (4) *S. penangiana*

Flowers under .12 in. wide; wings of fruit 2 in. long; leaves thin (5) *S. Schwenkii*

Flowers under .12 in. wide; leaves stiff coriaceous (6) *S. lurida*

(1) *S. spicifera* Hook. *fil. F.B.I.* ii. 27; King, *l.c.* 490.

A big tree 30 to 100 ft. tall. Leaves thickly coriaceous, elliptic-lanceolate or oblanceolate acute or blunt, smooth, pale beneath; nerves 13 to 20 pairs, prominent beneath, 3.25 to 4.5 in. long, 1.5 to 1.75 in. wide; petioles .6 to 1.25 in. long. Panicles crowded at tips of branches, rather stout peduncled; branches articulate trichotomous, puberulous. Flowers .2 in. long, white. Bracteoles ovate, puberulous. Calyx fleshy, tubular, 5-lobed, puberulous. Petals twice as long, obovate-oblong. Stamens shorter. Drupe ovoid or oblong, green, .75 in. long; wings 2.5 in. long, .4 in. wide. *Hab.* Forests on hills. Malacca, Gunong Mering, Mt. Ophir; Ayer Panas. Perak, Larut Hills 500 to 1000 ft. altitude (Kunstler). Negri Sembilan, Bukit Kayu Arang (Burkill). Kedah, Pulau Song-Song. Penang, Government Hill 1000 ft. altitude (Curtis). *Native name:* Mupus.

(2) *S. puberula* Pearson, *Kew Bulletin* 1906, p. 3.

A very lofty tree. Leaves sub-coriaceous, elliptic-lanceolate acuminate blunt, base cuneate; nerves slender 12 to 20 pairs, 2 to 6 in. long, 1.5 in. wide; petioles slender 1.5 in. long. Panicles 6 in. long, rather stout, spreading, puberulous. Flowers white .3 in. across. Calyx obconic. Petals oblong-ovate, puberulous on both sides. Stamens as long. *Hab.* Forests on the top of a mountain, rare. Perak, top of Bujong Malacca (Ridley).

(3) *S. Robinsonii* Ridl. *Journ. Roy. As. Soc. S. Br.* 54, p. 37.

Tree. Leaves stiffly coriaceous lanceolate, narrowed slightly at both ends; nerves about 15 pairs, 6 in. long, 2 to 2.25 in. wide; petioles 1.5 in. long. Panicles 3 in. long in flower, 6 in. long in

fruit; peduncles and pedicels angled grooved, pubescent. Sepals ovate-round, pubescent. Petals oblong-lanceolate blunt, pubescent within, .12 in. long. Stamens, filaments slender. Fruit pisiform, enlarged petals .25 in. long. *Hab.* Mountains at 5500 ft. altitude. Pahang, Gunong Tahan (Robinson).

(4) **S. penangiana** King, *l.c.* 490.

A tall tree with slender branches. Leaves thinly coriaceous, oblong-lanceolate blunt cuspidate, base cuneate; nerves 10 to 12 pairs, 3 to 4.5 in. long, 1.1 to 1.4 in. wide; petioles .75 to 1.25 in. long, slender. Panicles in terminal axils, lax, spreading. Flowers in cymes of 3 at tips of branches; pedicels longer. Calyx campanulate, lobes 5 broad. Petals longer, 5 oblong minutely tomentose. Disc cylindric. Drupe globular .5 in. through; wings narrow oblong, sub-acute 1.35 in. long, .3 in. wide. *Hab.* Penang, Waterfall (Curtis).

(5) **S. Schwenkii** Teysm. and Binn. *Cat. Hort. Bog.* (1866), p. 230; King, *l.c.* 489.

Tree with slender branches. Leaves sub-coriaceous, oblong-lanceolate or narrow elliptic blunt or shortly acuminate, base narrowed, blunt; nerves slender 14 to 18 pairs, slightly elevate beneath, 3 to 6 in. long, 1.25 to 1.6 in. wide; petioles slender 1.5 to 2 in. long, dilate at base. Panicles in upper axils slender 4 in. long, peduncled lax spreading. Flowers .1 in. across, shortly pedicelled. Sepals united at base. Petals oblong obtuse, pubescent both sides. Drupe oblong .75 in. long, wings reflexed, linear-oblong 2.25 in. long, .4 in. wide. *Hab.* Malacca (Griffith, Maingay). Pahang, Kwala Lipis (Foxworthy). *Distrib.* Burma, Cambodia, Sumatra. *Native names:* Balau betina; Membatu.

(6) **S. lurida** King, *l.c.* 491. *Semecarpus?* *lurida* Hook. *fil. F.B.I.* ii. 34.

Small tree. Leaves thinly coriaceous, narrow elliptic-oblong, abruptly bluntly acuminate, base cuneate, glaucous beneath; nerves 22 to 24 pairs, fine and faint, 6 to 8 in. long, 1.5 to 2.25 in. wide; petioles thick .6 to .75 in. long. Panicles in terminal axils, slender, 4 to 12 in. long; basal branches 6 in. long. Flowers very small in small cymes, about .1 in. across, greenish yellow. Calyx cupular, teeth 5 triangular. Petals 5, twice as long, oblong-elliptic, glabrous. Disc 5-lobed. Stamens inserted outside. *Hab.* Malacca (Maingay). Perak, Kota (Wray).

8. CAMPNOSPERMA, Thw.

Big trees with pale bark, hardly resinous. Leaves alternate, coriaceous simple (very large in young trees, smaller in old ones). Racemes in terminal axils simple or little branched. Flowers sessile very small, unisexual. Calyx 3- to 4-lobed, lobes imbricate. Petals 3 to 6, sub-orbicular, imbricate. Disc urceolate. Stamens

6 to 10, at disc base. Ovary sessile, ovoid; style very short. Stigma capitate. Drupe small, ovoid, fleshy. Stone hard falsely 2-celled; cells horseshoe-shaped. Species about 5, Asiatic.

Leaves petioled; big trees.

Male flowers sessile; leaves over 12 by 6 in. . . . (1) **C. Griffithii**

Male flowers pedicelled; leaves 6 by 3 in. with small auricle at base (2) **C. auriculata**

Leaves sessile oblanceolate, winged to base of petiole.

Panicle very lax; small tree (3) **C. oxyrachis**

(1) **C. Griffithii** *Marchand, Rev. Anacard. 174; King, l.c. 494, not of Hook. fil. C. macrophylla Hook. fil. F.B.I. ii. 41.*

Rather a large tree about 80 ft. tall, spreading. Leaves coriaceous, elliptic obtuse, narrowed at base, tip round or emarginate; nerves elevate beneath, 24 to 26 pairs, glabrous above, midrib channelled, pubescent or glabrous beneath, 7 to 15 in. long, 3.5 to 5.5 in. wide; petioles flattened channelled above, pubescent, 1 to 2.5 in. long. Panicles in terminal axils, spreading 12 in. long (shorter in female trees), tomentose. Flowers small, green in clusters, .05 in. across sessile. Fruit ovoid oblique, green .35 in. long. *Hab.* Common in damp forests. Singapore, Bukit Timah; Jurong. Malacca, Alor Gajah (Griffith). Perak, Larut (Kunstler). *Native name*: Poko Kelinting.

The leaves of young plants of this are extremely large, often 4 ft. long and oblanceolate.

(2) **C. auriculata** *Hook. fil. F.B.I. ii. 41; King, l.c. 495.*

Lofty tree 80 ft. tall. Leaves coriaceous, obovate or oblanceolate-oblong, tip round tapering down the petiole till it ends bluntly with 2 auricles, glabrous on both sides; nerves 9 to 18 pairs, fine elevate beneath, 4 to 9 in. long, 1.75 to 3 in. wide; petioles below the auricles .1 to .2 in. long. Male panicles 10 to 14 in. long axillary, tomentose. Flowers .15 in. across, pedicellate. Fruit ovoid-round, tomentose, .6 in. through, green, speckled white. *Hab.* Damp swampy lowland forest, common, Singapore, Bukit Timah; Jurong. Johor, Ulu Batu Pahat (Kelsall). Malacca (Griffith). Selangor, Kwala Lumpur (Foxworthy). *Distrib.* Borneo.

var. *Wallichii*. *C. Wallichii* *King, l.c. 497. C. Griffithii Hook. fil. F.B.I. ii. 41, not of Marchand.*

Leaves larger, 14 in. long, 7 in. wide; petioles 2 in. long. Fruit small, .2 to .25 in. long. *Hab.* Singapore, Toas; Tanglin; Bukit Timah. Malacca, Ayer Panas; Sungei Hudang (Cantley). Selangor, Kwala Lumpur (Foxworthy). Penang Hill (Curtis). *Native name*: Terentang.

(3) **C. oxyrachis** *Engl. Mon. Phan. 319; Ridl. Journ. Roy. As. Soc. S. Br. 54, p. 38.*

A small straight little-branched tree. Leaves oblanceolate, winged to the base sessile, coriaceous, shortly cuspidate, 15 to 42 in. long, 4.5 to 7 in. wide, glabrous; nerves 30 pairs, elevate, as

are reticulations beneath. Panicle male large; branches 18 in. long, lax spreading hairy. Flowers under 1 in. long, green in short cymes. Bracts linear hairy. Calyx lobes 5, ovate, pubescent. Petals 5, valvate oblong blunt, glabrous. Stamens shorter glabrous. Ovary conic, hairy. Fruit unknown. *Hab.* In low open country not rare, but very rarely flowering. Malacca near Mount Ophir (Hullett). Pahang, Tahan River; Kwala Lipis (Machado). Negri Sembilan, Tampin Hill. *Distrib.* Sumatra. *Native name:* Mulumut.

9. PARISHIA, Hook. fil.

Trees often vast, usually flowering without leaves, unisexual. Leaves pinnate alternate; leaflets coriaceous, usually oblique at base. Panicles large. Male flowers small. Calyx cupular 4-lobed, lobes ovate valvate. Petals 4, oblong imbricate, yellow or pink. Disc annular 4-lobed. Stamens 4, from below disc edge. Female as in male, but ovary sessile, ovoid, 1-celled; style terminal trifid. Stigmas capitate. Fruit globose or conic, hairy, the calyx developed into long linear-oblong wings, usually much longer than drupe. Species 5, Burmo-Malayan.

Wings of fruit 4·6 to 6 in. long.

Leaves glabrous; leaflets narrow, oblong . . . (1) **P. Maingayi**

Leaves pubescent beneath; leaflets elliptic-oblong . . . (2) **P. pubescens**

Wings 2·5 to 3 in. long; leaflets ovate acuminate, glabrous . . . (3) **P. insignis**

Wings linear much longer than fruit; leaflets ovate, sub-sessile . . . (4) **P. rosea**

Wings 1·5 in. long, hardly longer than the oblong, beaked red-tomentose fruit; leaflets very coriaceous . . . (5) **P. paucijuga**

(1) **P. Maingayi** Hook. fil. *F.B.I.* ii. 30; *King, l.c.* 493.

A tall tree about 60 to 80 ft. tall. Leaves 12 to 15 in. long; leaflets very coriaceous, elliptic-oblong sub-acute or blunt, base rounded or cuneate, glabrous above, slightly puberulous on the back; nerves 15 to 20 pairs, slender, faint, 2·5 to 3·5 in. long, 1 to 1·25 in. wide; petioles 2 in. long. Panicles pedunculate, 8 to 10 in. long, few-branched; branches 2 to 4 in. long, distant; branchlets 1 in. long pubescent. Flowers 3 in. long. Calyx urceolate, lobes broad ovate blunt pubescent, yellow. Petals linear-oblong, twice as long, creamy yellow. Stamens shorter. Ovary hairy. Drupe ovoid acuminate bristly; wings oblong-linear, tip rounded 7 in. long, 1 in. wide, pubescent. *Hab.* Forests, Singapore, Garden Jungle by rockery. Malacca (Maingay).

(2) **P. pubescens** Hook. fil. *F.B.I.* ii. 30; *King, l.c.* 493.

A lofty tree. Leaves 12 to 18 in. long; branches and petiole pubescent; leaflets thickly coriaceous, 5 to 7 pairs, sub-sessile, glabrous above, pubescent tomentose beneath, oblong acute or acuminate; nerves strongly elevate, 12 to 16 pairs, 4·5 to 5·5 in. long, 1·5 in. wide. Panicles over 12 in. long with numerous densely fasciated tomentose branches. Flowers 5 in. across. Drupe ovoid

apiculate, .5 in. long, tomentose, wings oblong-linear, blunt, glabrous or nearly so, 4.5 to 5 in. long, .5 in. wide. *Hab.* Malacca (Maingay).

(3) *P. insignis* Hook. *fil. Trans. Linn. Soc.* xxiii. 170, t. 26.

Gigantic tree 180 ft. tall. Leaves 12 to 20 in. long; leaflets 6 to 9 pairs, thinly coriaceous, obliquely oblong-lanceolate acute, base rounded sub-cordate unequal, glabrous or pubescent beneath; nerves 8 to 12 pairs, 3 to 5 in. long, 1.2 to 2 in. wide; petiolules .1 to .2 in. long. Male panicles 18 in. long, 12 in. across, much branched, tomentose. Flowers .2 in. across, light yellow. Calyx pubescent, lobes triangular, unequal. Petals longer oblique ovate, blunt. Fruit conic, hairy, .5 in. across; wings narrow oblong sub-acute, 2.5 to 3 in. long, .4 in. across glabrous. *Hab.* Forests, probably not rare, but inaccessible. It flowers when leafless. Singapore, Balaclava, Tanglin, 180 ft. tall. Pahang River. Malacca, Selandor. Penang, Waterfall (Curtis), 20 to 30 ft. tall. Lankawi, Kwah, only 25 ft. tall (Curtis). *Native names*: Suryan; Sepul.

(4) *P. rosea* Ridl. *Journ. Roy. As. Soc. S. Br.* 59, p. 90.

Large tree 50 to 60 ft. tall. Leaves 12 in. or more long; leaflets thinly coriaceous ovate or oblong-ovate obtuse, base rounded minutely cordate sessile, 4 to 4.5 in. long, 2.5 in. wide. Panicles from upper axils long, slender, 18 in. long with few distinct branches glabrous. Flowers sessile, .1 in. long, pink. Calyx lobes 4, oblong blunt pubescent. Petals longer, oblong. Fruit-wings (very young) linear-pubescent, much longer than fruit. *Hab.* Lankawi, Pulau Segai (Haniff).

(5) *P. paucijuga* Engler, *DC. Mon. Phan. l.c.* 309.

A big tree 50 to 60 ft. tall. Leaves 6 in. long; leaflets 5, very coriaceous, glabrous, elliptic, shortly blunt acuminate, base rounded; nerves fine faint, about 12 pairs, 3.25 in. long, 1.5 in. wide; petiolules .5 in. long; petioles 3.5 in. long. Panicles 6 to 8 in. long or shorter, axillary and terminal, woody tomentose. Drupe oblong long-beaked, rugose golden hairy, 1.5 in. long, 1 in. through, wings about as long .3 in. wide, coriaceous pubescent. *Hab.* Dense forests. Singapore (Maingay). Bukit Timah. Johor, Pinerong (Cantley). Dindings, Lumut. Penang, Pantai Acheh (Curtis).

10. MICROSTEMON, Engler

Trees often vast. Leaves unequally pinnate. Flowers very small, bisexual in terminal axils in peduncled many-branched panicles. Calyx-lobes 5, imbricate. Petals 5, much larger, obovate imbricate. Disc annular 10-toothed. Stamens 5, alternating with 5 staminodes; filaments very short, thickened towards base. Ovary globose immersed in disc; style terminal, short, thick. Drupe oblique, oblong-ovoid, compressed, 1-seeded. Species 3, 1 Bornean.

Leaves tomentose beneath (1) **M. velutina**
 Leaves glabrescent beneath. (2) **M. Curtisii**

(1) **M. velutina** *Engl. DC. Mon. Phan. l.c. 294; King, l.c. 498.*
Pentaspadon ? velutinus Hook. fil. l.c. ii. 28.

A big tree 80 to 100 ft. tall, 2 to 3 ft. through. Leaves (young claret colour) 6 to 10 in. long; rachis, petioles and undersides of leaflets as well as panicle softly pubescent-tomentose; leaflets 7 to 11, membranous, oblong-lanceolate, acuminate, base rounded or cuneate; nerves 12 to 16 pairs, 2 to 4 in. long, .8 to .15 in. wide; petiolules .15 in. long. Panicles numerous, sub-terminal on peduncles, 3.5 in. long tomentose, much-branched, 3 in. long and as wide. Flowers very small, sessile, white. Calyx glabrous. Petals glabrescent outside, tomentose inside. Fruit narrow oblong compressed scurfy; pericarp leathery. *Hab.* Dense forests on rocky streams. Malacca (Maingay). Negri Sembilan. Bukit Tampin (Goodenough). Pahang River. Selangor, Ginting Bidai. Perak, Gunong Bubu 300 to 500 ft. altitude (Kunstler); Sungei Njing, Plus Reserve (Murdoch); Gunong Kerbau (Haniff).

(2) **M. Curtisii** *King, l.c. 498.*

A medium-sized tree. Leaves 5 to 7 in. long; rachis puberulous; leaflets 7 membranous, oblong-lanceolate acuminate base round and oblique glabrescent, with scattered hairs at base and tufts of white hairs in the nerve-axils; nerves 13 to 17 pairs, 1.75 to 3 in. long, .75 to .9 in. wide; petiolules .1 in. long. Panicles sub-terminal axillary, peduncled, puberulous. Flowers less than .1 in. long, on short pedicels, solitary or 2- to 4-clustered. Calyx puberulous. Petals elliptic, blunt. *Hab.* Lankawi, by the lake (Curtis).

11. PENTASPADON, Hook. fil.

Big trees. Leaves unequally pinnate; leaflets opposite. Panicles in upper axils, peduncled, branched, slender. Flowers minute bisexual. Calyx-lobes 5, imbricate. Petals oblong-ovate, imbricate. Stamens 5 minute at disc-base with 5 small subulate staminodes, alternating. Disc cupular, 10-lobed. Ovary on disc, 1-celled; styles short, stout. Stigma bent to one side. Species 2, 1 Bornean.

Panicle 3 in. long, 4 in. wide; flowers .05 in. wide . . . (1) **P. officinalis**
 Panicle 6 in. long lax; flowers .1 in. wide . . . (2) **P. Motleyi**

(1) **P. officinalis** *Holmes, in King, l.c. 499; Journ. Pharm. Soc. lii. 389.*

Tree 60 to 100 ft. tall, 18 to 36 in. through. Leaves 4 to 8 in. long; leaflets 7 to 9, very thinly coriaceous, oblong or elliptic-lanceolate, shortly blunt-acuminate, glabrous except tufts of hairs in the axils; nerves 6 to 9 pairs, raised beneath, 1.75 to 2.75 in. long, .8 to 1.25 in. wide; petiolules .15 in. long. Panicles 3 to 4 in. long; peduncle 4 in. long, minutely tomentose; branches

lax 3 in. long. Flowers white .05 in. long, pedicelled, numerous. Calyx-lobes round. Petals obovate round. Drupe elliptic compressed, fleshy-scurfy grey. *Hab.* Open rocky forest, Perak, Larut at 300 ft. altitude (Kunstler). Ulu Selama (Wray). Selangor, Kwala Kubu, Negri Sembilan, Ulu Bendol. *Native names*: Poko Minyak Plang; Pelong. *Use*: The oil used in skin disease.

(2) **P. Motleyi** Hook. *fil. Linn. Trans.* xxiii. 168.

Very large tree. Leaves 12 in. long, glabrous; leaflets 9 to 12, lanceolate oblong, very oblique at base when young, coriaceous, 5 in. long, 1.5 in. wide; nerves 9 pairs. Panicle 6 in. wide, lax with short branches, glabrous. Flowers white. 1 in. wide. Sepals ovate. Petals oblong-obovate. Drupe reniform. *Hab.* Woods among limestone rocks, Perlis, Bukit Lagi. *Distrib.* Borneo.

I am somewhat doubtful of the identification. The tree was leafless except for a tuft or two of very young leaves, which were sprinkled with pale hairs. It bore a quantity of unripe fruit .3 in. long. If not this species it must be an undescribed one.

12. RHUS, Linn.

Trees or shrubs. Leaves alternate, simple or pinnate. Flowers small in terminal and axillary panicles. Calyx 4- to 6-lobed, imbricate. Petals 4 to 6, imbricate. Stamens 4, 5, 6 or 10 free at base of disc; filaments subulate. Ovary ovoid or globose, 1-celled, 1-ovuled; styles 3. Stigmas simple or capitate. Drupe dry compressed. About 114 species, both hemispheres.

(1) **R. perakensis** Scott. *in King, l.c.* 500.

Slender climber 10 to 30 ft. long. Leaves 8 to 12 in. long; leaflets 6 to 8, thinly coriaceous oblong acuminate blunt, base slightly oblique rounded; nerves 16 to 20 pairs, prominent beneath, 2.5 to 3.5 in. long, 1 to 1.4 in. wide; petiolules .1 to .15 in. long, terminal one longer. Panicles axillary and terminal; peduncle 2 to 6 in. long, inflorescence 6 in. long. Flowers yellow less than .1 in. long, numerous crowded on short branchlets, racemose. Calyx-lobes 5, unequal, oblong. Petals longer, elliptic blunt. Stamens 5. Drupes compressed, reniform-orbicular .2 in. across, greenish grey. *Hab.* Open rocky jungle 300 to 800 ft. altitude. Local, Perak, Larut (Kunstler). Pahang, Pengkalan Manggis, Temerloh (Foxworthy). *Native name*: Jahor.

13. MELANOCHYLA, Hook. fil.

Very resinous big trees. Leaves very coriaceous. Panicles in terminal axils. Flowers unisexual, males very small, females larger. Calyx-tube cupular, 5-lobed. Petals on disc-edge coriaceous, villous on inner face. Stamens 5 on edge of disc, villous. Ovary globose, 1-celled; style short. Stigmas 3. Drupe globose, fleshy, resinous; stone hard. Seed oblong. Species 12, Malay Peninsula and islands.

Leaves hairy beneath.

Leaves oblong broad blunt, tomentose all over back

(1) *M. densiflora*

Leaves oblong-lanceolate, acute; petioles and nerves tomentose

(2) *M. tomentosa*

Leaves narrow, lanceolate, long-acuminate 6 by 1·5 in., backs glaucescent; nerves hairy

(3) *M. Kunstleri*

Leaves oblanceolate 6 by 2·25 in., slightly pubescent on back

(4) *M. Maingayi*

Leaves quite glabrous.

Leaves narrow sub-lanceolate; petioles winged to base.

Leaves 14 by 4 in. oblanceolate

(5) *M. auriculata*

Leaves 9 by 2 in., linear-lanceolate cuspidate

(6) *M. rugosa*

Leaves oblong-lanceolate; petiole not winged.

Leaves 4 by 1·5 in.; inflorescence with large bracts, dense

(7) *M. bracteata*

Leaves 7 by 2 in.; inflorescence very lax; no bracts

(8) *M. angustifolia*

Leaves elliptic, narrowed at base 6 by 2·5 in.; panicle lax

(9) *M. nitida*

(1) *M. densiflora* King, l.c. 503.

Tree 60 to 80 ft. tall, 2 to 3 ft. through. Branches thick, underside of leaves and panicle densely brown-tomentose. Leaves oblong-elliptic blunt, base rounded slightly unequal; nerves strongly elevate beneath 20 to 25 pairs, 6 to 8·5 in. long, 2·5 to 3·5 in. wide; petioles ·05 to 1 in. long, thick. Panicle dense, 5 in. long. Male flowers ·2 in. long, coffee-brown outside, yellow inside, sessile. Calyx campanulate tomentose; lobes acute. Petals twice as long as lobes, thick elliptic, obtuse. Stamens villous. *Hab.* Very rare, open hilly jungle, Perak, Larut 500 to 1000 ft. altitude (Kunstler).

(2) *M. tomentosa* Hook. fil. *F.B.I.* ii. 38; King, l.c. 503.

Tree. Branches, petiole and midrib beneath panicle red-tomentose. Leaves elliptic-oblong acutely acuminate, base rounded, beneath glabrescent except base of midrib; nerves 20 to 30 pairs, elevate beneath, 6·5 to 14 in. long, 2·75 to 4 in. wide; petioles ·35 in. long, thick. Panicles 10 in. long lax; branches slender, puberulous, spike-like. Male flowers ·1 in. across. Calyx segments ovate, puberulous outside. Petals thick oblong, pubescent outside, villous inside. Drupe sub-globose, pubescent, orange, 1 to 1·5 in. long. *Hab.* Forests, Johor, Pengerang (Cantley). Malacca (Maingay). *Native name:* Laga. *Distrib.* Java.

var. *glabrescens* Koorders. Leaves narrow, 2 in. wide, nearly glabrous. Selangor, Bukit Cheraka, Klang (Foxworthy). Perhaps a distinct species.

(3) *M. Kunstleri* King, l.c. 504.

Tree 80 to 100 ft. tall, 3 to 4 ft. through. Leaves dark glossy-green lanceolate to elliptic-oblong acuminate cuspidate blunt, base narrowed, glabrous except midrib and 18 to 20 pairs of nerves elevate adpressed hairy, 2·75 to 5 in. long, 1 to 1·5 in. wide; petioles

·35 in. long, scurfy. Panicles 6 to 7 in. long, minutely tomentose; branches spreading 2 in. long, racemose. Male flowers ·15 in. long. Calyx minutely tomentose, dark brown cupular; lobes ovate acute. Petals thrice as long, narrow elliptic, pubescent outside, villous inside, yellow. Stamens shorter slightly villous. *Hab.* Perak, Larut 500 to 1000 ft. altitude (Kunstler).

(4) **M. Maingayi** *Hook. fil. F.B.I. ii. 39; King, l.c. 504.*

Tree. Branches scurfy-puberulous. Leaves oblong-lanceolate or elliptic narrow, shortly bluntly acuminate, base narrowed acuminate, glabrous above, slightly pubescent beneath; nerves 18 to 24 pairs, 5 to 8 in. long, 1·25 to 2·25 in. long; petioles ·5 to ·6 in. long, channelled, slender. Panicle 6 in. long, brown-tomentose; branches short. Male flowers ·1 in. across, pedicelled, rusty-tomentose. Calyx of 5 ovate lobes. Petals elliptic blunt, edges only glabrous. Females ·25 in. long. Calyx urceolate. Ovary hairy. *Hab.* Malacca (Maingay).

(5) **M. auriculata** *Hook. fil. F.B.I. ii. 39; King, l.c. 505.*

Stout tree 80 ft. tall, 2 ft. through, glabrous except inflorescence. Leaves sessile, oblanceolate-oblong, abruptly acuminate, deep shining green; base narrowed auricled; nerves 30 pairs slender, 12 to 18 in. long, 3·75 to 4·75 in. wide. Panicles terminal, 10 in. long; branches many, 7 in. long. Flowers on short branchlets. Male flowers ·1 in. long. Females ·2 in. long on thick pedicels as long. Calyx pubescent, grooved; lobes acute green. Petals oblong, villous outside and in, except the glabrous edges, pubescence white. Drupe globose flattened, 12-grooved, greenish brown tomentose, 1·25 in. through. *Hab.* Low damp country in forest swamps. Singapore, Gardens; Kranji; Chanchukang. Malacca (Maingay); Sempang Jus (Derry). *Native name*: Mumpian.

(6) **M. rugosa** *King, l.c. 505.*

Large tree. Branches pubescent and hairy. Leaves narrow oblong caudate, base cordate, auricled, above glabrous, beneath sparsely hairy on midrib; nerves 25 to 30 pairs, 7 to 15 in. long, 1·6 to 3·25 in. wide; petioles ·35 in. long pubescent, thick. Male flowers unknown. Female panicles 6 in. long rusty-pubescent; branches few, short. Flower ·3 in. across, sessile. Calyx tomentose, lobes orbicular-ovate acuminate. Petals 5, little longer, triangular pubescent, villous at base inside. Ovary conic, tomentose. Drupe globose, ovoid, red-tomentose, 1 in. long, ·9 in. through. *Hab.* Perak, Tapah (Wray).

(7) **M. bracteata** *King, l.c. 506.*

Tree 50 to 80 ft. tall, glabrous except pubescent inflorescence. Leaves oblong-lanceolate, acuminate at both ends; nerves 10 to 12 pairs, 4 to 6 in. long, 1 to 1·6 in. wide; petioles ·5 to ·75 in. long. Racemes or few-branched panicles terminal, pubescent dense-flowered with large ovate bracts. Male flowers ·25 in. long. Calyx-lobes ovate. Petals lanceolate acuminate, a villous tuft

on the base inside. Stamens shorter, villous. Drupe ovoid, minutely tomentose .75 in. long, greenish yellow. *Hab.* Rare in low ground forest, Perak, Larut below 100 ft. altitude (Kunstler).

(8) *M. angustifolia* Hook. *fil.* *F.B.I.* ii. 39.

Tree 30 to 70 ft. tall. Stem 2 to 3 ft. through; branchlets rather slender, thinly tomentose. Leaves oblong or lanceolate-oblong, glabrous, shortly acuminate, base long cuneate; nerves 12 to 16 pairs, prominent beneath, 4.5 to 10 in. long, 1.5 to 4 in. wide; petioles .75 to 1.5 in. long, slender. Panicles (male) axillary and terminal very slender, much-branched, .45 to 18 in. long, 8 in. across or less, minutely tomentose. Flowers yellow, less than .1 in. long. Calyx tubular-campanulate, lobes acute. Petals oblong much longer, pubescent outside, villous inside. Stamens villous. Drupe globose-ovoid, .75 in. long, minutely tomentose. *Hab.* Forests, Malacca (Maingay). Perak, Larut (Kunstler). Penang, Telok Bahang (Curtis).

(9) *M. nitida* King, *l.c.* 507.

Tree 80 to 100 ft. tall, spreading, over 3 ft. thick. Leaves oblong-elliptic abruptly blunt, acuminate, base narrowed, glabrescent beneath; nerves 12 to 16 pairs slightly prominent, 4 to 11 in. long, 2.25 to 3.25 in. wide; petioles 1 to 2 in. long, bases thickened. Panicles terminal, minutely tomentose, 9 in. long; branches few, ascending. Flowers (male) in sessile cymules on spike-like branches, .1 in. long, sessile. Calyx brown-tomentose, campanulate; lobes triangular acute. Petals triangular-oblong, pubescent outside, white with tuft of hairs inside. Stamens villous. Females .2 in. long, pedicelled. Ovary hemispheric, tomentose. *Hab.* Open hill woods, Perak, Larut 1000 to 1500 ft. altitude (Kunstler). Penang, near Cooly lines at 200 ft. altitude; Highlands; Telok Bahang (Curtis).

14. SEMECARPUS, Linn. fil.

Trees. Leaves alternate, simple, entire. Flowers small, unisexual in terminal or axillary panicles. Calyx 5- or 6-lobed, lobes deciduous. Petals 5 to 6, imbricate. Disc broad, annular. Stamens 5 or 6 at disc-base. Ovary 1-celled; styles 3. Drupe fleshy, oblong or sub-globose, oblique on a fleshy receptacle formed of disc and calyx acrid resinous. Species about 40, tropical Asia and Australia.

- | | |
|---------------------------------------------------------|-------------------------------|
| Leaves tomentose beneath | (1) <i>S. velutina</i> |
| Leaves with nerves red-hairy beneath, obovate | (2) <i>S. glomerulata</i> |
| Leaves yellow-hairy beneath, oblanceolate | (3) <i>S. cochinchinensis</i> |
| Leaves glabrous 13 to 16 in. long | (4) <i>S. Curtisii</i> |
| Leaves glabrous 4 to 7.5 in. long. | (5) <i>S. lucens</i> |

(1) *S. velutina* King, *l.c.* 508.

Tree 50 to 60 ft. tall, 10 to 15 in. through. Bark pale; branches

pubescent. Leaves thick obovate-elliptic or oblanceolate, glabrous above, densely pubescent beneath; midrib depressed above; nerves 20 to 24 pairs, prominent as are reticulations beneath, 6 to 13 in. long, 2·5 to 5 in. wide; petioles ·5 to 1·25 in. long. Panicles (male) 5 in. long, red-tomentose; branches 2 in. long. Flowers ·1 in. across, pale greenish yellow, densely crowded. Calyx cupular, flat; lobes 5, triangular acute, pubescent. Petals 5, longer elliptic acute. Stamens 5, longer. Female panicle larger; branches fewer; flowers fewer and larger. Petals and sepals more pubescent. Drupe transversely oblong, ·35 in. long, ·6 in. wide, compressed tomentose, light green. *Hab.* In lowland forests. Johor, Tanjong Bunga, Selangor, Klang Gates (Burn-Murdoch). Perak, near Gunong Bubu (Kunstler).

(2) ***S. glomerulata*** *Ridl. Journ. Roy. As. Soc. S. Br.* 54, pp. 39, 59 and 91.

Tree of medium size with grey bark. Leaves obovate rounded, base narrowed, glabrous above; nerves 10 pairs, elevated and red-hairy, as are reticulations beneath, 4 to 8 in. long, 2·5 to 5 in. wide; petioles pubescent, thick, ·25 to 5 in. long. Panicle (male) 8 to 12 in. long; branches many, 4 to 6 in. long, velvety-pubescent. Flowers in distant clusters, ·1 in. across; pedicels pubescent. Calyx-lobes 5, pubescent ovate. Petals glabrous ovate-lanceolate. Stamens glabrous. Disc hairy. Drupes pisiform, ·2 in. through, glabrous; peduncles rather long. *Hab.* Open woods and roadsides in the north, Lankawi, Pulau Niur Stali (Curtis). Perlis, Telor Jambu Kanga (Ridley).

(3) ***S. cochinchinensis*** *Engler DC. Mon. Phan. l.c.* 489.

Small tree 20 to 30 ft. tall. Leaves coriaceous, oblanceolate, shortly acuminate or blunt rounded, edge obscurely crenate at tip, above glabrous, beneath hairy especially on the nerves, 17 pairs, slender elevate and conspicuous reticulations, 9 in. long, 2·75 in. wide; petioles 1 in. long. Panicle lax, spreading, over 12 in. long, thickly hairy; branches long, slender. Flowers in small compact sessile heads, distant on the branches, hairy; pedicels 0, or very short. Sepals ovate acute. Petals oblong, ·1 in. across, glabrous. *Hab.* Setul, Bukit Wang (Haniff). *Distrib.* Cochin-China.

The only leaf I have seen is shortly acuminate, the older leaves in Pierre's Cochin-China specimens are thicker and quite rounded.

(4) ***S. Curtisii*** *King, l.c.* 509.

Small tree, glabrous. Leaves oblanceolate-oblong, shortly blunt-acuminate, base narrowed gradually, blunt; nerves 18 to 20 elevate as are reticulations beneath, 13 to 16 in. long, 4 to 5 in. wide; petioles 1·25 to 2 in. long, thick. Panicles terminal, puberulous. Male flowers ·15 in. across. Calyx cupular; lobes 5 ovate, minutely tomentose. Petals much longer, elliptic minutely tomentose. Female flowers larger. Drupe transversely elliptic oblique,

·5 in. long, 1 in. wide; swollen peduncle cup-shaped, ·25 in. long.
Hab. Open country, Selangor, Ulu Selangor (Ridley). Setul.
Distrib. Puket.

(5) **S. lucens** King, *l.c.* 510.

Tree 40 to 70 ft. tall, 10 to 15 in. through, glabrous. Leaves elliptic, tip rounded or shortly abruptly acuminate, base rounded or shortly cuneate, slightly oblique, edges thickened; nerves 10 to 16 pairs, broad elevate beneath yellow and reticulations conspicuous, 4 to 7·5 in. long, 2 to 3·25 in. wide; petioles ·75 to 2 in. long. Panicles terminal lax, peduncled, 10 in. long; branches slender, 4·5 in. long; branchlets ·5 in. long. Flowers yellow ·15 in. across, pedicelled, glabrous except disc. Males, calyx cupular flat, teeth 5 ovate acute. Petals 5 ovate-lanceolate acute. Females larger, fewer on smaller panicles. Drupe obliquely ovoid, compressed, rusty-puberulous, about ·5 in. across. *Hab.* Hill forests, Perak, Larut from below 100 to 3000 ft. altitude (Kunstler).

15. DRACONTOMELUM, Bl.

Trees, moderately large. Leaves unequally pinnate. Panicles in terminal axils, long, much-branched. Flowers medium-sized bisexual. Sepals 5, imbricate. Petals 5, sub-valvate. Disc large cup-shaped crenulate. Stamens 10 at disc base. Ovary sessile, 5-celled; styles 5, connate at tips; ovules solitary in cells. Drupe globose, fleshy; stone hard, 2- to 5-celled. Seeds compressed. About 5 species, tropical Asia and Polynesia.

(1) **D. mangiferum** Bl. *Ann. Mus. Bot. Lugd. Bat.* i. 231, fig. 42; *Hook. fil. F.B.I.* ii. 43; *King, l.c.* 513.

A spreading tree, 30 to 100 ft. tall. Branches tomentose. Leaves 12 to 20 in. long; leaflets 5 to 8 pairs, thinly coriaceous, light green, elliptic-oblong acuminate, lower ones ovate-oblong, shorter, glabrous except for the midrib, sometimes puberulous beneath with tufts of hair in the nerve-axils; nerves 9 to 12 pairs, 4 to 9 in. long, 1·75 to 2·75 in. wide; petiolules ·2 in. long. Panicles 2 ft. long or less, pubescent. Flowers ·3 in. long, white. Stamens brown. Drupe depressed-globose, 1 in. through, green. *Hab.* Low ground by rivers, Malacca (Griffith, Maingay); Panchur; Ayer Panas (Derry); Perak, Ulu Bubong and Chanderiang (Kunstler). Pahang, Raub (Foxworthy). Temengoh, river-bank. Penang Hill (Maingay) possibly planted here. *Distrib.* Indo-Malaya. *Native names:* Poko Sakai; Bua Chan Kuang; Sangkuang. *Use:* The fruit is eaten by Malays with fish. It may have been planted in some of these localities, but I think it is indigenous in most localities given.

ORDER XLVI. CONNARACEÆ.

Scandent shrubs with pinnate leaves, or trees with simple leaves (one leaflet) (*Ellipanthus*). Flowers small in axillary racemes, panicles or cymes, rarely unisexual. Calyx 5-lobed, usually persistent, often pink. Petals 5, linear or oblong, white, imbricate. Stamens 5 or 10, those opposite petals shorter and imperfect; filaments connate at base or free. Disc 0 or small. Pistils 5, rarely more or fewer, ovoid, hairy, 1-celled; ovules 2; styles filiform. Fruit 1 to 3; follicles often stalked dehiscent on lower edge, usually red. Seed 1 (rarely 2) arillate. All tropics (*King, Journ. As. Soc. Beng.* lxi. (2), p. 1).

Pistil 1.

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|------------------------------------|----------------|
| Leaves pinnate; climbers | 1. CONNARUS |
| Leaflets 1; trees | 2. ELLIPANTHUS |

Pistils 5, 1 only perfect; leaves pinnate.

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|-------------------------------------------------------|---------------|
| Calyx lobes persistent, accrescent imbricate in fruit | 3. ROUREA |
| Calyx lobes not accrescent or imbricate | 4. ROUREOPSIS |

Pistils 2 to 5, perfect.

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|----------------------------------------------------------|----------------|
| Calyx imbricate; follicles rugose or tubercled | 5. AGELÆA |
| Calyx valvate; follicles smooth | 6. TÆNIOCHLÆNA |

Pistils 5 to 7; follicles 1 to 3	7. CNESTIS
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1. CONNARUS, Linn.

Sarmentose or scandent shrubs. Leaves unequally pinnate; leaflets 5 or 3, rarely more, coriaceous. Panicles terminal or axillary. Flowers small, numerous, white or pink. Sepals 5, imbricate. Petals 5, linear. Stamens 10, 5 shorter, and usually antherless. Ovary 1, pubescent; style slender. Stigma capitate; follicle oblique, stipitate, broadest at the tip, red or yellow, often pubescent inside. Seed 1, flat, oblong, arillate. Species about 80, tropical Asia, Africa and America.

Leaves beneath pubescent.

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|--------------------------------------------------------------------------------------|-----------------------------|
| Leaves above pubescent, beneath densely red-pubescent; follicles tomentose | (1) <i>C. ferrugineus</i> |
| Leaves above and follicles glabrous; petals glabrous. | (2) <i>C. semidecandrus</i> |
| Leaves more rigid; petals tomentose | (3) <i>C. Griffithii</i> |

Leaflets quite glabrous, ovate to elliptic lanceolate, 2 to 4 in. long.

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| Follicles sub-cylindric narrowed to base 1·5 by 2·5 in.; leaflets ovate stiff. | (4) <i>C. oligophyllus</i> |
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|----------------------------------------------------------------------------------------------------|------------------------|
| Follicles flat, rounded, oblong, 1·25 by 1 in.; leaflets elliptic cuspidate, rather thin | (5) <i>C. villosus</i> |
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Leaves over 6 in. long.

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| Panicles lax, over 9 in. across; leaflets rather thin; fruit 2 in. long, obovoid, tip recurved. | (6) <i>C. ellipticus</i> |
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| Panicle about 7 in. long; leaflets stiff coriaceous; pod oblanceolate, tip blunt not recurved, 2 in. long | (7) <i>C. grandis</i> |
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(1) *C. ferrugineus* Jack. *Mal. Misc.* 2, vii. 37; *Hook. fil. F.B.I.* ii. 51; *King, l.c.* 3.

A sarmentose shrub or climber. Branchlets, leaves, except upper surface, and inflorescence red-tomentose. Leaves 8 to 16 in. long; leaflets 5 to 11, oblong-lanceolate, coriaceous, short acuminate, narrowed to rounded base; nerves 6 to 7 pairs, prominent beneath, 3 to 6 in. long, 1.25 to 2 in. wide; petioles .1 to .15 in. long. Panicles stout, 12 in. long, woody, peduncled; branches 4 in. long. Flowers .3 in. long; pedicels short. Sepals tomentose, oblong-ovate. Petals linear-oblong glabrous. Stamens 10, alternately long and short.



FIG. 53.—*Connarus semidecandrus*.

Ovary tomentose. Follicle obovoid-oblong, crimson or golden yellow tinged red, tomentose, woody, silky inside, 1.75 to 2.25 in. long, .8 to 1.25 in. wide. Seed oblong, 1 in. long, .6 in. wide, black, half covered with a yellow aril. *Hab.* Open country and borders of woods. Singapore; Bukit Mandai. Malacca, Merlimau; Tanjong Kling (Derry); Chabau. Selangor, Rantau Panjang. Perak, Batang Padang and Ulu Kerling (Kunstler). Penang (Jack). *Distrib.* Sumatra. *Native names:* Akar Tengeh Kuau; A. Sundrup; A. Merah; A. Sakellet; Semilat Bapan; Akar Pulau Hantu; A. Pulis Antan. *Use:* Fruit used for poisoning dogs.

(2) **C. semidecandrus** Jack. *Mal. Misc.* 2, vii. 39; *Hook. fil. F.B.I.* ii. 52; *King, l.c.* 4.

Sarmentose shrub. Branchlets puberulous. Leaves 6 to 9 in. long; rachis and underside puberulous or glabrous; leaflets 5 to 7 thinly coriaceous, oblong to elliptic-lanceolate, light green, short blunt acuminate, base rounded or cuneate; nerves 6 to 7 pairs, slender, prominent beneath, 2·5 to 4 in. long, '9 to 2·5 in. wide; petiolules '15 in. long. Panicles terminal 6 to 10 in. long, much-branched, many-flowered. Sepals lanceolate, straw-colour dotted with red glands. Petals lanceolate blunt, white tinted pink, with glandular hairs and red glands on the back, not tomentose. Follicle flattened obovoid '6 in. long, red, smooth. Seed black, aril yellow, fleshy lobed. *Hab.* Open country common. Scented of hay and meadow-sweet. Singapore, Cluny Road; Bukit Mandai. Pahang, Tahan and Pahang Rivers; Sungei Jelai (Machado). Malacca, Sungei Hudang (Goodenough); Merlimau (Derry). Selangor, Rawang; Kwala Lumpur. Perak, Kwala Wok (Wray); Ulu Kerling (Kunstler); Temengoh. Penang (Jack); Penara Bukit. Tringganu, Bundi (Rostado). Lankawi, Kwah (Curtis). Kelantan, Kampong Kota (Gimlette). *Distrib.* Sumatra, Mergui, Siam. *Native names*: Akar Kuaya; A. Tanga Burong; A. Tukor; Poko Nyamok; A. Tupai-Tupai; Hisap mana (Kelantan). *Use*: Root decoction for fever.

(3) **C. Griffithii** Hook. *fil. F.B.I.* ii. 52.

A bush. Young parts and midrib on back of leaf minutely tomentose. Leaves 6 to 8 in. long; petiole three-quarters of the length; leaflets 5 thinly coriaceous, elliptic, shortly acuminate blunt, base rounded above, smooth beneath; nerves 5 pairs, fine elevate, 3 to 4·5 in. long, '75 to 2 in. wide; petiolules '2 in. long, thick, tomentose. Panicle lax 6 to 8 in. long, tomentose; branches slender. Flowers '1 in. long. Sepals oblong, acute. Petals as long, all minutely tomentose. *Hab.* In open country in the north; perhaps only a variety of *C. semidecandrus*, but the leaves are stiff and the petals tomentose. Lankawi, Kwah (Curtis). Perlis, Chupeng. Setul. *Distrib.* Mergui.

(4) **C. oligophyllus** Wall. in *Planchon, Linnæa* xxiii. 427.

Scandent, glabrous except on the inflorescence. Leaves 6 to 8 in. long; leaflets 3 to 5, thinly coriaceous but stiff, elliptic-lanceolate sub-acute or shortly acuminate, base cuneate round; nerves 4 to 5 pairs, slightly prominent beneath, 2·25 to 4 in. long, 1 to 2 in. wide; petiolules '25 to '3 in. long. Panicle much-branched, minutely pubescent, 8 in. long. Flowers '35 in. long, sub-sessile. Sepals ovate-lanceolate acute, yellowish hairy. Petals oblong, blunt, puberulous much longer, yellowish white. Follicle elliptic narrowed to base, tip round, not compressed, rose pink, silky inside, 1·5 to 2 in. long, '75 in. through. Seed black or dark brown, aril red, thick. *Hab.* Forest edges and open country. Singapore,

Changi; Siglap; Bukit Mandai. Pahang River, Kwala Berar. Selangor, Batu Caves. Perak, Asam Kumbang (Wray); Thaiping (Kunstler). Penang (Wallich).

var. Maingayi Ridl. *C. Maingayi*, *Hook. fil. l.c.* 53, *not of King*.

Leaves more distinctly reticulate and stiffer, otherwise quite similar. Malacca (Maingay). *Native name* : Akar Tulang Dayeng.

King's *C. Maingayi* was apparently based on a Perak plant with minute petals. I have seen no specimen.

(5) ***C. villosus* Jack. Mal. Misc.** 2, vii. 38. *C. odoratus Hook. fil. Trans. Linn. Soc.* xxiii. 172. *C. hebecephalus King, l.c.* 5.

Big climber. Branchlets and panicles red-scurfy tomentose. Leaves 6 to 12 in. long, glabrous; leaflets 9 thin coriaceous, oblong or elliptic caudate, base rounded; nerves 4 to 5 pairs, prominent beneath, 2.25 to 4 in. long, 1 to 2 in. wide; petiolules wrinkled, .25 to .3 in. long. Panicles 6 to over 12 in. long, densely red tomentose, much-branched. Flowers .35 in. long, white. Sepals oblong, half as long as petals, tomentose. Petals glabrous. Follicles broad, oblong rounded both ends flat, 1.25 in. long, 1 in. wide, rose pink. *Hab.* In open forest 800 to 1000 ft. altitude. Perak, Thaiping Hills (Kunstler). *Distrib.* Borneo, Sumatra.

(6) ***C. ellipticus King, l.c.* 7.**

A stout sarmentose shrub, glabrous except branchlets and inflorescence. Leaves 8 to 15 in. long; leaflets 3 to 5 coriaceous, elliptic oblong short acuminate, base rounded; nerves 5 pairs, prominent beneath, 6 in. long, 3 in. wide; petiolules .2 in. long. Panicles very large, spreading 2 ft. long. Branches distant, 3 in. long. Flowers crowded at the ends, .1 in. long. Sepals lanceolate, tomentose. Petals glabrous, linear, about twice as long, acute white. Follicles woody, obliquely obovoid, dorsal suture straight ending in a short point on the back, ventral suture longer, 2.5 in. long, 1.5 in. wide. Seed oblong, flat. *Hab.* Common in open country up to 4200 ft. altitude. Singapore, Chanchu Kang; Bukit Mandai Road. Johor, Sedenah; Ulu Sembong (Kelsall). Selangor, Kwala Lumpur. Perak, Thaiping Hills (Kunstler), 300 to 4200 ft. altitude. Penang, Waterfall (Curtis). *Native name* : Akar Chinchin.

(7) ***C. grandis Jack. Mal. Misc.* 2, vii. 40; *Hook. fil. F.B.I.* ii. 328.**

A stout climber with stiff coriaceous leaves of 5 leaflets .8 in. long. Leaflets oblong obtuse acuminate, very coriaceous, base rounded; nerves 9 to 10 faint, 6 in. long, 2.5 in. wide; petiolules 2 in. long, thick. Inflorescence 4 to 8 in. long, yellow tomentose rather dense. Flowers sessile .25 in. long. Sepals linear-oblong, blunt, cream colour. Petals twice as long, linear, glabrescent, white tipped with yellowish hairs. Follicles oblanceolate, rounded, woody, 2 in. long, .75 in. wide, narrowed abruptly into a thick stalk, .4 in. long. *Hab.* Common in open country. Singapore, Changi; Pulau Ubin. Malacca, Chabau; Merlimau (Cantley);

Sungei Hudang. Perak, Ulu Slim (Kunstler). Penang Hill 1000 ft. altitude (Curtis). *Distrib.* Tenasserim. *Native name*: Akar Tulang Dayang Padang.

2. ELLIPANTHUS, Hook. fil.

Trees. Leaves of one leaflet, elliptic-acuminate. Racemes or cymes axillary, short, few-flowered. Flowers small, white. Sepals 5, valvate. Petals longer, oblong, pubescent. Stamens 10, 5 shorter; filaments short; connate at base. Ovary 1, pubescent. Follicles stalked, oblique, usually beaked, brown velvety, valves glabrous within. Seed arillate. Species 12, Malayan.

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|-------------------------------------------------------|----------------------------|
| Leaves glabrous | (1) E. Scortechinii |
| Leaves hairy beneath. | |
| Leaflets oblong-lanceolate; flowers paniced | (2) E. Curtisii |
| Leaflets ovate to elliptic. | |
| Flowers racemed | (3) E. Griffithii |
| Flowers in dense cymes | (4) E. gibbosus |

(1) **E. Scortechinii** King, l.c. 8.

Small tree. Leaves thinly coriaceous, narrow elliptic oblong, base narrowed, apex caudate, glabrous; nerves 4 pairs, prominent beneath 4·5 to 7 in. long, 1·25 to 2 in. wide; petioles 1 to 1·5 in. long. Cymes tomentose. Calyx lobes ovate, tomentose. Petals little longer. Follicle oblique, elliptic, blunt, abruptly shortly stalked, tomentose, 5 in. long, 3 in. wide; pericarp thick. Seed oblong. *Hab.* Perak (Scortechini).

(2) **E. Curtisii** King, l.c. 9.

Tree. Leaves rather stiffly coriaceous, oblong-lanceolate long acuminate, base cuneate, above glabrous, shiny beneath, pubescent, midrib tomentose; nerves 7 to 8 pairs, prominent beneath, 2·5 to 3·5 in. long, 8 to 1·5 in. wide; petioles 3 in. long tomentose. Panicles 4 to 7 in. long, silky. Flowers 2 in. long, white. Calyxlobes ovate-lanceolate, tomentose. Petals more than twice as long, narrow oblong, pubescent. Ovary silky. *Hab.* Penang Hill, road to West Hill and Chalet (Curtis).

(3) **E. Griffithii** Hook. fil. *F.B.I.* ii. 56; King, l.c. 10.

Small tree about 30 to 60 ft. tall. Branchlets tomentose. Leaves thin coriaceous, elliptic caudate acuminate, base rounded above glabrous, shining beneath pubescent, midrib and 9 to 10 pairs; nerves beneath tomentose, 4 to 5 in. long, 1·5 to 2 in. wide; petioles 2 to 2·5 in. long. Racemes 25 in. long, branched, hairy. Flowers 2 in. across cream white. Sepals ovate hairy. Petals oblong, hairy outside. Follicle compressed curved, hardly beaked 1 in. long, 4 in. thick, narrowed to base into a stalk 2 in. long, sienna brown tomentose, 75 in. long. *Hab.* Dense woods, Singapore, Garden Jungle. Malacca (Griffith); Ayer Panas (Foxworthy). *Use*: Wood hard and durable, squares to 6 or 10 in.

(4) **E. gibbosus** King, *l.c.* 10.

Small tree 10 to 16 ft. tall, 2 to 3 in. through. Leaves membranous, oblong-elliptic shortly caudate-acuminate, base cuneate edge undulate; nerves 7 to 8 pairs prominent beneath, 4·5 to 6·5 in. long, 1·75 to 2·75 in. wide; petioles 5 to 6 in. long, tomentose. Cymes dense, short, few-flowered, 4 in. long, hairy. Calyx-lobes lanceolate. Petals little longer tomentose outside. Follicle oblong, compressed with a long conical beak, base gibbous above and contracted into a curved stalk, tomentose, 1 to 1·5 in. long, 4 in. wide; stalk 1 in. long. *Hab.* Hill forests; Johor, Gunong Pantai; Perak, Gapis (Curtis); Ulu Kerling; Ulu Slim and Kinta (Kunstler); Tapah (Wray); Waterloo (Curtis).

3. ROUREA, Aubl.

Large woody lianes. Leaves unequally pinnate; leaflets rarely 1, often numerous, coriaceous. Racemes or panicles axillary, numerous. Flowers small, white; pedicels slender. Sepals 5, orbicular enlarged in fruit. Petals 5, linear-oblong. Stamens 10; filaments connate at base; ovaries 5, 4 usually imperfect; style slender; follicle sessile, curved. Seed arillate. Species about 50, all tropics.

Leaflets not more than 11, petiolulate ovate.

Leaflet usually 1, rarely 3 (1) **R. anomala**

Leaflet 3 to 9, rarely 11.

Leaflets glaucous beneath (2) **R. acuminata**

Leaflets not glaucous.

Leaves 3 to 7 in. long; leaflets ovate-lanceolate; flowers 2·5 in. long (3) **R. pulchella**

Leaves 3·5 to 5 in. long; leaflets 3 (or 5) broad ovate (4) **R. humilis**

Leaflets very numerous, small, oblong, sessile.

Leaflets blunt acuminate, 2 to 3·25 in. long, pubescent beneath (5) **R. rugosa**

Leaflets broad at tip, bifid, 5 to 7·5 in. long, sparsely pubescent beneath (6) **R. similis**

Leaflets broad round-tipped.

Beneath rusty-silky (7) **R. fulgens**

Beneath glabrous (8) **R. concolor**

(1) **R. anomala** King, *l.c.* 11.

Big liane, glabrous. Leaves with 1 to 3 leaflets, coriaceous, ovate-elliptic shortly blunt caudate-acuminate, base round broad; nerves 6 pairs, 3 to 4·5 in. long, 1·6 to 2·2 in. wide; petiolules 2 in. long or less. Racemes slender, lax, 3 in. long, several together. Flowers 3·5 in. long, red and white on pedicels as long. Calyx-lobes ovate-orbicular, puberulous outside. Petals linear-oblong, three times as long. Follicle oblique ovoid blunt, yellow tinted red, 1 in. long. Seed-aril red. *Hab.* Perak, Sungei Rayah, Goping (Kunstler).

(2) **R. acuminata** Hook. *fil. F.B.I.* ii. 48; *King, l.c.* 12.

A lofty liane, glabrous. Leaves 3 to 9 in. long; leaflets 5 to 11, thinly coriaceous, oblong-lanceolate to obovate caudate-acuminate, base round or cordate; nerves 5 pairs, faint, 1·5 to 2·25 in. long, .65 to .9 in. wide; petiolules under .1 in. long. Racemes very slender, lax, several together, 3 in. long. Flowers .3 in. long; pedicels slender as long. Sepals ovate round, pink. Petals oblong, white. Follicle narrow ovate, curved pointed, .75 in. long, red. *Hab.* In dense forests on trees; Singapore (Wallich, *Cnestis acuminata* 8533), Bukit Timah. Perak, Goping and Ulu Bubong (Kunstler).

(3) **R. pulchella** Planch. *Linnæa* xxiii. 419; *Hook. fil. F.B.I.* ii. 48; *King, l.c.* 13.

Lofty glabrous liane. Leaves 3 to 7 in. long; leaflets 3 to 7, thin coriaceous, ovate caudate, base round reticulate; nerves 4 to 5 pairs, faint, 1·5 to 3 in. long, .75 to 1·2 in. wide; petiolules .15 in. long slender. Racemes crowded, slender, many-flowered, 2 to 3 in. long. Flowers .25 in. across. Sepals ovate acute, ciliate. Petals twice as long, linear. Pistils 5. Follicles oblong, curved, .6 in. long, red. *Hab.* Forests. Singapore, Garden Jungle; Changi. Malacca, Bukit Bharu (Maingay); Sungei Hudang. Selangor, Bukit Hitam. Perak, upper (Wray). Penang, Balik Pulau.

Allied to *R. humilis*, but the leaves are much smaller.

(4) **R. humilis** Bl. *Ann. Mus. Bot. Lugd. Bat.* i. 262; *King, l.c.* 13.

Slender, glabrous climbing liane. Leaves 3·5 to 6 in. long; rachis slender; leaflets 3 (rarely 5), coriaceous, broad ovate caudate-acuminate, base round; nerves 4 pairs, faint, 1·5 to 3 in. long, 1 to 2·25 in. wide; petiolules .2 in. long. Racemes clustered, slender, few-flowered 2 to 3 in. long; flowers .15 in. long. Sepals sub-orbicular. Petals short broad oblong. Follicle cylindric pointed, glabrous, .75 in. long. *Hab.* Forests in lowlands. Pahang River, Sungei Chenei (Fox). Perak, Goping (Kunstler). Penang, Moniot's Road (Curtis). *Distrib.* Sumatra, Borneo. *Native name:* Asam Nyamok.

(5) **R. rugosa** Planch. *Linn.* xxiii. 422; *Hook. fil. F.B.I.* ii. 46; *King, l.c.* 14.

Stout climber. Branchlets tomentose. Leaves 12 to 15 in. long; rachis tomentose; leaflets 8 to 15 pairs, sub-sessile oblong shortly blunt-acuminate, base broad, coriaceous, above smooth, beneath reticulate; nerves and reticulations raised, hairy; nerves 8 to 10 pairs, prominent, 2 to 3·25 in. long, .6 to 1·25 in. wide. Panicles 2 to 3 in. long, dense-flowered. Flowers .2 in. long. Sepals round pubescent; follicles .75 in. long, lanceolate obtuse, upcurved, glabrous. *Hab.* Common, climbing on trees in forests. Singapore, Changi. Pahang, Sungei Jelai, Kwala Lipis (Machado).

Malacca, Ayer Panas (Cantley); Sungei Hudang; Brisu (Derry). Negri Sembilan, Gunong Berumbun, and Bukit Danan (Cantley), Tampin Hill. Dindings, Lumut. Perak, Goping and Gunong Bubu (Kunstler); Asam Kumbang (Wray); Temengoh. Penang (Porter); base of Government Hill (Curtis). Tringganu, Bundi (Rostado). *Native names*: Akar Prieh; A. Semilat putih; Keluntut Kra; Kelintek Nyamok.

(6) **R. similis** *Bl. Ann. Mus. Bot. Lugd. Bat.* i. 264; *Hook. fil. F.B.I.* ii. 50. *R. parallela* *Planch. l.c.* 421 and *R. sororia* *Planch. l.c.*

A lofty liane. Branchlets pubescent. Leaves 2 to 6 in. long; rachis pubescent; leaflets sessile, coriaceous, 10 to 22 pairs, opposite, oblong tip broad, retuse, base cordate, shining above, pubescent beneath; nerves 6 pairs, elevate, .5 to .75 in. or more long, .25 to .3 in. wide. Racemes 3.5 to 5 in. long. Flowers white, scattered, many, .2 to .35 in. across, pedicelled. Sepals ovate blunt hairy, pink. Petals oblanceolate, white; follicle obovoid blunt, red, .6 to .7 in. long. Seed elliptic. *Hab.* Common in woods. Singapore, Bajau; Sungei Buluh; Changi; Kranji. Pahang, Telom. Perak, Thaiping (Kunstler). Kedah, Pulau Song-Song. Penang (Wallich). *Distrib.* Sumatra, Borneo.

(7) **R. fulgens** *Planch. Linnæa* xxiii. 423; *Hook. fil. F.B.I.* ii. 46; *King, l.c.* 15.

Woody climber, minutely tomentose. Leaves 3 to 5 in. long; rachis and underside of leaflets tomentose; leaflets 12 to 24 pairs, thin coriaceous, oblong blunt, base rounded above glabrous, reticulate; nerves faint, .4 to .65 in. long, .15 to .25 in. wide. Racemes solitary, pubescent; follicles .75 in. long, curved, oblanceolate obtuse. *Hab.* Singapore (Wallich and Maingay).

This seems to be rare; I have never met with it.

(8) **R. concolor** *Bl. Ann. Mus. Bot. Lugd. Bat.* i. 264; *Hook. fil. F.B.I.* ii. 49; *King, l.c.* 15. *R. parvifolia* *Planch. l.c.* 420.

A woody liane 3 in. through, very lofty. Branchlets pubescent. Leaves 1 to 4 on rachis tomentose densely crowded, young ones rose pink, adults shining light green; leaflets 4 to 15 pairs, coriaceous, sub-sessile, oblong blunt, base cordate, glabrous, back reticulate, .3 to .5 in. long, .15 to .3 in. wide. Racemes slender, 2 in. long, tomentose. Sepals orbicular. Petals white .1 in. long, oblong; follicles red, lanceolate, curved, sub-acute .4 in. long. *Hab.* Common in woods climbing on high trees. Singapore, Chan Chu Kang; Changi; Kranji; Bukit Timah; Garden Jungle. Johor, Kwala Kahang. Malacca, Batu Tiga (Griffith). *Distrib.* Sumatra, Borneo. *Native name*: Semilat. *Use*: Decoction for colic.

4. ROUREOPSIS *Planch.*

Scandent shrubs. Leaves unequally pinnate with few leaflets. Flowers in axillary racemes, large for the order; pedicels slender

bracteolate. Sepals oblong, enlarged in fruit, not clasping it. Petals linear-oblong. Stamens 10, alternate ones larger. Ovaries 5; styles slender; follicle oblong slightly or not curved. Seed ovoid, arillate. Species 3 or 4, Malayan. Near *Rourca*, but with fruit but little curved and free persistent sepals not clasping the fruit-base; flowers larger.

Leaves small, pubescent beneath (1) **R. pubinervis**
 Leaves larger, glabrous (2) **R. Scortechinii**

(1) **R. pubinervis** *Planch. Linnæa* xxiii. 424; *Hook. fil. F.B.I.* ii. 50.

Woody climber. Branches pubescent. Leaves 2·5 to 5 in. long; rachis pubescent; leaflets membranous, 5 to 9, terminal one largest, ovate-elliptic, tapering at both ends, glabrous above, midrib puberulous; nerves 4 to 5, slightly prominent beneath, 7 to 17 in. long, 5 to 75 in. wide. Racemes slender, crowded, 1 in. long. Flowers white, few on long pedicels, 35 in. long. Sepals oblong obtuse, pilose at tip. Petals linear-oblong. Follicles ovate 5 to 6 in. long, slightly curved, persistent sepals 3 in. long, lanceolate. *Hab.* In forests, climbing on trees usually low down. Malacca, Sungei Hudang; Batu Tiga; Bukit Bintang (Goodenough). Selangor, Dusun Tua; Sungei Buluh; Semangkok Pass; Kwala Lumpur (Curtis). Sungei Ujong (Cantley). Perak, Batang Padang (Kunstler). Penang (Wallich); Batu Feringhi (Curtis). *Native names*: Akar Kalche; A. Kachang betina. *Use*: Leaves for poulticing in fever.

(2) **R. Scortechinii** *King, l.c.* 16.

Slender climber, glabrous except inflorescence. Leaves 6 to 10 in. long; leaflets 7 to 9, thinly coriaceous, ovate-lanceolate long acuminate; nerves 4 pairs, faint, 2·35 to 3 in. long, 1 to 1·25 in. wide; petiolules 1 in. long, terminal leaf much larger. Racemes slender lax, 1 to 2 in. long, pubescent. Flowers 25 in. long; pedicels slender. Sepals ovate blunt, hairy inside. Petals lanceolate, yellowish. Pistils 5. Follicle ovoid, straight, 1 in. long. *Hab.* Perak (Scortechinii).

5. AGELÆA, Soland.

Big scandent lianes. Leaves 3- rarely 5-foliate. Panicles or racemes short, about 1 in. long, tufted hairy, axillary. Calyx 5-lobed not clasping fruit. Petals lanceolate or ligulate, white. Stamens 5 or 10. Pistils 2 to 5; follicles 1 to 3, coriaceous, rugose or warty, velvety, scarlet. Seed arillate. Species 12 or more, African and Asiatic.

All parts more or less pubescent; stamens 5.

Leaves smaller; nerves 2 to 9 pairs (1) **A. vestita**
 Leaves larger; nerves 7 to 10 pairs (2) **A. pinnata**

All parts except inflorescence glabrous; stamens 10.

Leaves smaller; nerves 2 to 3 pairs (3) **A. Wallichii**
 Leaves larger; nerves 7 to 10 pairs (4) **A. Hullettii**

(1) **A. vestita** Hook. *fil. F.B.I.* ii. 46; *King, l.c.* 17.

A big liane. Branchlets tomentose. Leaves 5 to 6 in. long; petiole, rachis and underside tomentose; leaflets 3 membranous, laterals ovate or elliptic acuminate, base oblique, 2·5 to 3·5 in. long, 1·4 to 2·4 in. wide, terminal one nearly twice as big, glabrous above, tomentose beneath; nerves and reticulations elevate; petiolules 1 to 4 in. long (terminal one). Panicles extra-axillary, under 1 in. long, tomentose. Flowers under 2 in. long, pedicelled. Sepals free, linear, tomentose, unequal. Petals linear, white. Follicles 1, rarely 2, ovoid beaked rugose tubercled, velvety scarlet, 6 to 8 in. long. Seed ovoid, black 4 in. long. *Hab.* Very common all over the peninsula in forests. Flowers fragrant. Singapore, Serangoon (Murton); Bukit Timah. Johor, Gunong Pulai. Pahang, Kwantan (Foxworthy). Malacca, Ayer Panas; Merlimau (Derry). Negri Sembilan, Bukit Sulu (Cantley). Dindings, by river (Curtis). Perak, Goping (Kunstler); Batu Togo (Wray). Adang islands, Pulau Rawei. Kelantan, Kwala Lebir. *Distrib.* Sumatra, Borneo. *Native names*: Akar Makachang hitam; A. Kankachang; A. Tulo Bujuk; A. Rusa-Rusa; A. Nyamok.

(2) **A. pinnata** King, *l.c.* 18.

Big liane. Branchlets pubescent. Leaflets 3 to 5, thinly coriaceous, elliptic caudate, base round, above glabrous except midrib, beneath pubescent; midrib and nerves elevated, hairy, 7 to 10 pairs, prominent, 6 to 8 in. long, 3 to 3·5 in. wide; petiolules short, thick. Panicles densely crowded, axillary, under 1 in. long; tomentose. Flowers 3 in. long; pedicels 15 in. long. Sepals free 5, linear acuminate, tomentose. Petals linear acuminate, purple-magenta outside, white inside. *Hab.* Open jungle at below 500 ft. altitude. Perak, Larut (Kunstler). Rare.

(3) **A. Wallichii** Hook. *fil. F.B.I.* ii. 47; *King, l.c.* 18.

Stout liane. Leaves about 6 in. long. Leaflets coriaceous, glabrous 3, elliptic to ovate-acuminate, bases round; nerves 2 to 3 pairs slightly raised, 2 to 4·5 in. long, 1·5 to 2·25 in. wide; petiolules thickened. Panicles under 1 in. long, densely pubescent. Flowers 25 in. long, pedicelled. Sepals connate at base to ovate-lanceolate, pubescent. Petals linear, longer and narrower, white. Pistils 5. Follicle usually 1, ovoid, curved beaked tubercled tomentose, red, 6 in. long. Seed oblong black, aril two-thirds of length, red. *Hab.* Very common in forests. Singapore, Changi. Malacca, Bukit Bruang; Merlimau (Derry). Pahang, Tahan River. Dindings, Pangkor (Curtis). Perak, Plus River (Wray). Penang Hill (Curtis). *Distrib.* Sumatra.

(4) **A. Hullettii** King, *l.c.* 19.

Big climber. Branchlets tomentose; leaflets 3 coriaceous, glabrous, elliptic-oblong, tip sub-acute or blunt; nerves 7 to 8 pairs, prominent beneath, reticulations visible, 6 to 9 in. long, 2 to 2·25 in. wide. Panicles under an inch long, tomentose, dense.

Flowers .2 in. long; pedicels longer. Sepals free for two-thirds of length lanceolate, tomentose. Petals linear-oblong. Follicles 1 to 3 ovoid beaked, tubercled, pubescent. Seed sub-cylindric black. *Hab.* Forests, not common. Singapore, Changi (Hullett). Perak, Chanderiang (Kunstler).

6. *TENIOCHLÆNA*, Hook. fil.

Sarmentose shrub. Leaves unequally pinnate, glabrous; leaflets 3, coriaceous. Panicles axillary short. Flowers small, bisexual. Calyx-tube short hemispheric; segments 5, enlarged in fruit. Petals 5, longer, linear. Stamens 10, alternate ones shorter, nearly free. Ovaries 5. Follicles 1 to 3, ovoid, pubescent, glabrous within. Seed oblong arillate. Species 4, Burma and Borneo.

(1) *T. Griffithii* Hook. fil. *F.B.I.* ii. 55; *Ic. Pl.* 2392; *King, l.c.* 20.

Branchlets and inflorescence only puberulous. Leaflets elliptic to ovate, tips blunt bifid, base round; nerves 4 to 5 pairs, prominent beneath, 3.5 to 6 in. long, 1.5 to 2 in. wide, terminal largest; petioles .15 in. long. Panicles 1 to 3 in. long, fascicled, hairy. Flowers .33 in. across. Follicles .5 to 1 in. long. *Hab.* In thickets; Johor, Kota Tinggi. Malacca, Pulau Besar (Griffith); Brisu; Bukit Bruang; Bukit Sadanen. Tomoh (Machado). *Native names*: Akar Kachang Betina; Akar Kachang Purai; Akar Sesudu; Akar China; Akar Berimbong.

7. *CNESTIS*, Juss.

Sarmentose shrubs. Leaves unequally pinnate; leaflets 19 to 31, oblong. Flowers fascicled, racemose, small, unisexual. Sepals 5, oblong. Petals 5, similar. Stamens 10, free. Ovaries 5 to 7, sessile. Follicles 1 to 3, curved pyriform, velvety scarlet; pericarp thick, woody, silky inside. Seed broad arillate. Species 17, Africa and Asia.

(1) *C. ramiflora* Griff. *Notulæ* iv. 432; Hook. fil. *F.B.I.* ii. 54; *King, l.c.* 21. *C. flaminea* Griff. *l.c.* 433. *Connarus igneus* Wall. *Cat.* 8528.

Branches, rachis, underside of leaves, inflorescence tomentose. Leaves (young pink) 8 to 15 in. long; leaflets obtuse or sub-acute, base round, 1.25 to 3 in. long, .4 to 1.5 in. wide. Racemes 2 in. long. Female flowers .35 in. across, males smaller. Sepals pubescent both sides, pink. Petals white. Follicles 1.5 to 1.75 in. long, .8 in. wide. *Hab.* Common in open country, very attractive from its pink young leaves and scarlet pears. Singapore, Cluny (Hullett); Bukit Timah. Pahang, Temerloh; Kuala Tembeling. Malacca, Sungei Hudang; Jasin. Negri Sembilan, Bukit Tampin. Perak, Tapah (Wray); Larut (Kunstler); Trong (Wray). Penang Hill (Curtis); Kedah, Yan. *Distrib.* Burma, Malay islands. *Native names*: Akar Semilat Merah; Akar Semilat Papan; Akar Gesing-Gesing Merah. Akar Perjep. *Use*: Roots boiled and applied as a poultice for colic.

ORDER XLVII. LEGUMINOSÆ.

Herbs, shrubs often climbing, and trees. Leaves stipulate usually alternate, pinnate or digitate, rarely simple; rachis in climbers often ending in a tendril. Inflorescence axillary, leaf-opposed or terminal, racemose or paniced, with bracts and bracteoles. Flowers usually irregular, bisexual. Sepals 5, connate or free, often unequal. Petals 5, fewer to 0, by abortion, usually free, unequal. Stamens normally 10, rarely fewer or indefinite, perigynous or nearly hypogynous; filaments free or connate. Ovary free; ovules 1 to many on the ventral suture; style simple; stigma capitate or oblique. Pod usually dry, dehiscent, or indehiscent, 1- to many-seeded, rarely baccate. Species about 8000, whole world, divided into 3 sub-orders, (A) **Papilionaceæ**, (B) **Cæsalpinieæ** and (C) **Mimoseæ** (*Prain, Journ. As. Soc. Beng. lxi. (2), No. 1, p. 21*).

(A) **Papilionaceæ**. Herbs, climbing or erect, shrubs or trees. Flowers irregular. Calyx gamosepalous beyond the disc. Petals imbricate, upper one erect, spreading (standard), 2 lateral free parallel horizontal (wings), 2 lower connate into a boat-shaped organ (keel). Stamens 10. Disc turbinate or cylindric.

i. VICIÆ. Climbers, slender.

Leaves even-pinnate; flowers racemose; stamens 9 and 1 abortive; pod dehiscent; seeds red with a black spot 1. ABRUS

ii. GENISTEÆ. Shrublets or herbs. Stamens monadelphous; pod dehiscent not jointed; leaves simple or trifoliate.

Anthers uniform; keel-petals scarcely cohering; prostrate annual 2. ROTHIA

Erect shrubby herbs; anthers dimorphous; keel-petals firmly cohering; racemes terminal; pods turgid 3. CROTALARIA

iii. CAJANEÆ. Shrubs or climbers. Leaves gland-dotted below; leaves trifoliate (except *Flemingia* and *Eriosema* unifoliate). Upper stamen free.

Climbers; seeds 3 to 8.

Pods with 6 to 8 seeds, not depressed between seeds 4. DUNBARIA

Pods with 3 to 6 seeds, depressed between each 5. ATYLOSIA

Shrubs; pods 1- to 2-seeded, turgid.

Slender twiggy plant; leaves 1-foliate narrow linear; corolla exsert 6. ERIOSEMA

Bushes; leaves 1- to 3-foliate, broad; corolla not exsert 7. FLEMINGIA

iv. PHASEOLEÆ. Leaves trifoliate not gland-dotted; petals equal; stamens diadelphous.

Style bearded below stigma; slender climbers, rarely bushes; pod many-seeded.

Stigma oblique.

Keel spiral 8. PHASEOLUS

- Keel not spiral; style filiform, corolla yellow or purple 9. VIGNA
- Keel not spiral; style flat upwards; corolla blue-violet 10. PACHYRHIZUS
- Stigma terminal; petals very unequal 11. CLITORIA
- Style not bearded below stigma; petals sub-equal; stamens monadelphous.
- Stamens alternate, 5 abortive, 5 fertile; flowers small; pod linear 12. TERAMNUS
- Pod oblong turgid, 1 to 2 seeds; woody liane 13. DIOCLEA
- Pod linear, flat; many seeds; wiry climber 14. PUERARIA
- Upper lip of calyx projecting; herbaceous climber; pod turgid; flowers large, pink 15. CANAVALIA
- Pod 1-seeded, winged; lianes 16. SPATHOLOBUS
- v. ERYTHRINEÆ. Leaves trifoliate; petals very unequal; style beardless; flowers showy; pods usually several-seeded.
- Climbers; keel longer than wings and standard.
- Flowers yellowish to purple 17. MUCUNA
- Trees; standard longer than keel; flowers red 18. ERYTHRINA
- vi. GALEGEÆ. Leaves odd (rarely even)-pinnate; leaflets numerous, except *Psoralea*; stamens 10, 9 united in a sheath split above; pod not jointed bivalved; shrubby plants or herbs.
- Anthers apiculate 19. INDIGOFERA *
- Anthers blunt:—
- Pod many-seeded; racemes leaf-opposed 20. TEPHROSIA
- Pod many-seeded; racemes axillary 21. SESBANIA
- Pod 1-seeded; leaves simple, broad 22. PSORALEA
- vii. MILLETTIÆ. Lianes or trees; leaves imparipinnate or simple.
- Ovary not stipitate; pods narrow, flat; seeds 3 or more.
- Flowers axillary racemose 23. MILLETTIA
- Flowers in slender racemes from old wood or fascicled 24. FORDIA
- Ovary stipitate, 2-ovuled; pods indehiscent oblong or ovate, flat, thick.
- Inflorescence dense terminal; pod rather thin 25. ADINOBOTRYS
- Inflorescence lax; pod thick, woody 26. PADEBRUGGEA
- viii. DALBERGIEÆ. Lianes or trees. Leaves odd-pinnate. Pods 1-seeded indehiscent usually thin and winged.
- Leaflets alternate.
- Flowers small, white or pink; pod linear-oblong 27. DALBERGIA
- Flowers yellow; pod orbicular; tree 28. PTEROCARPUS
- Leaflets opposite.
- Pod woody ovoid-oblong, flat; tree 29. PONGAMIA
- Pod thin, winged, oblong; climbers or trees 30. DERRIS
- Pod thin, not winged, oblong; climbers 31. KUNSTLERIA
- ix. HEDYSAREÆ. Pod jointed; leaves pinnate; herbs or slightly shrubby at base.
- Leaves not stipellate; stamens monadelphous.
- Leaflets 4; bracts large, ciliate reniform 32. GEISSASPIS
- Leaves odd-pinnate; joints of pods 2 to 6 muricate; bracts ovate acute 33. ZORNIA
- Stamens in 2 bundles of 5.
- Pod twisted 34. SMITHIA
- Pod straight exsert 35. ÆSCHYNOMENE

Leaves stipellate.

- Pods twisted up; shrublets 36. URARIA
 Pod not twisted.
 Pod flat ovate indehiscent 1-ovuled, climber . . . 37. PHYLACIUM
 Pod joints turgid; erect or prostrate herb . . . 38. ALYSICARPUS
 Pod joints flat; herbs or shrubs 39. DESMODIUM

x. SOPHOREÆ. Stamens free nearly to base.

- Shrub; pod moniliform; seeds numerous . . . 40. SOPHORA
 Trees; pod short, broad thick; seed 1 41. ORMOSIA

(B) **Cæsalpinieæ**. Trees or shrubs climbing or erect. Calyx segments free to disc (rarely gamosepalous, some *Bauhinias*). Petals imbricate 5 to 0, sub-regular, no standard or keel. Stamens nearly always free.

Anthers basifixed.

- Petals 5; leaves even-pinnate; shrubs or trees;
 fruit a pod 42. CASSIA
 Petals 5; stamens 5; leaves odd-pinnate;
 flowers regular; gigantic trees; fruit a
 samara 43. KOOMPASSIA
 Petals 2 or 0; stamens 2; fruit baccate globose
 or ovoid; big trees 44. DIALIUM

Anthers versatile.

Leaves bilobed or nearly entire.

- Petals 5, showy; fruit a pod 45. BAUHINIA
 Leaves odd pinnate; trees.
 Petals 5; cymes small; fruit fleshy; trees . . 46. CYNOMETRA

Leaves even-pinnate.

- Petals 3; leaflets numerous; tree 47. TAMARINDUS
 Petal 1; sepals sub-valvate; pod orbicular
 often spiny; seed 1 48. SINDORA
 Petal 1; sepals imbricate; pod smooth,
 oblong; seeds 2 or more 49. AFZELIA
 Petals 0; calyx showy red or orange pink;
 stamens 3 to 8 50. SARACA
 Petals 2, small; stamens 2 51. LEUCOSTEGANE

Leaves odd-pinnate.

- Petals 0 52. CRUDIA
 Petals 5.
 Fruit a samara, winged all round; tree, lower
 sepal large, hooded 53. PELTOPHORUM
 Fruit a samara, winged on upper edge; thorny
 climber 54. MEZONEURON
 Fruit a samara, winged at tip only 55. PTEROLOBIUM
 Thorny climbers (or bushes); a pod 56. CÆSALPINIA

(C) **Mimoseæ**. Flowers regular 4- to 5-merous; stamens twice as many or numerous.

Leaves bipinnate.

- Flowers in balls pendent on long peduncles;
 tree 57. PARKIA
 Flowers yellow, capitate; aquatic herb . . . 58. NEPTUNIA
 Flowers racemose; tree; pods small; seeds red . 59. ADENANTHERA
 Flowers racemose; climber; pod very large . . 60. ENTADA

Flowers capitate; pod opening whole length; bush	61. LEUCÆNA
Flowers capitate; pod with persistent sutures, valves segmented	62. MIMOSA
Stamens indefinite, often very numerous, free	63. ACACIA
Stamens connate in a tube at base.	
Flowers large; pod septate between seeds fleshy	64. SERIANTHES
Flowers small; pod thin flat	65. ALBIZZIA
Flowers medium; pod curved, red or brown coriaceous	66. PITHECOLOBIUM

(A) PAPILIONACEÆ (Genera 1-41).

1. ABRUS, Linn.

Slender climber. Leaves of numerous membranous leaflets. Flowers small, in dense axillary peduncled racemes. Calyx campanulate; teeth very short. Corolla much exsert, standard ovate acute, adhering below to the staminal tube; wings narrow, keel curved. Stamens 9, united in a slit tube; anthers uniform. Ovary sub-sessile, many-ovuled; style short, beardless. Pod oblong, flat or turgid. Seed globose, red or red and black.

Pod oblong, turgid, 3- to 5-seeded	(1) A. precatorius
Pod linear, flat 8- to 12-seeded	(2) A. pulchellus

(1) **A. precatorius** Linn. *Syst. Veg. ed.* xii. 472; *Baker, in Hook. fil. F.B.I.* ii. 175; *Prain, l.c.* 34.

Much-branched slender climber, glabrous or thinly silky. Leaves 2 to 3 in. long; leaflets 10 to 20 pairs, glabrous above, silky beneath, ligulate-oblong .35 to .65 in. long, .15 to .2 in. wide. Racemes many-flowered 2 in. long. Calyx .1 in. long silky. Corolla .5 in. long, white tinted pink. Pod oblong, turgid, 1 to 1.5 in. long, .4 to .5 in. wide, 3- to 5-seeded. Seed scarlet with black hilum (rarely white). *Hab.* Seashores and hedges in dry spots. Common. Singapore, Telok Kurau; Changi, Pahang, Pekan. Malacca, Selangor; Pengkalan Minyak (Cantley). Sungei Ujong. Dindings, Pangkor (Scortechini). Penang, Batu Feringhi (Curtis). Perlis, Kanga. *Distrib.* Whole world. *Native names*: Akar Belimbing; Akar Saga betina.

(2) **A. pulchellus** Wall. *Cat.* 5819; *Baker, l.c.* 175; *Prain, l.c.* 35.

Slender climber. Leaves 3 to 4 in. long; leaflets 12 to 16 pairs ligulate-oblong silky beneath, .75 to 1.25 in. long, .25 to .35 in. wide. Racemes lax, long-peduncled, 7 in. long, rather stout. Calyx .1 in. long. Corolla .5 in. long pale pink. Pod linear flat incurved, 2 to 2.5 in. long, .5 in. wide; valves thin 8- to 12-seeded. *Hab.* Hedges. Pahang, Labong Endau (Evans). Selangor, Batu Caves. Negri Sembilan, Seremban. Perak, Tapah. Lankawi, Kwah (Ridley). *Distrib.* South Africa and S.E. Asia. *Native name*: Akar Kachang Inai. *Use*: Roots used in colic.

2. ROTHIA, Pers.

Diffuse annuals. Leaves trifoliate. Flowers numerous minute axillary. Calyx-tube turbinate, teeth as long as tube 2 upper broader, arched. Corolla hardly exsert. Petals narrow clawed. Filaments in a tube slit along top; anthers uniform. Ovary sessile linear; ovules many; style short, filiform. Pod linear, slender, compressed. Seeds 20 or more. Species 2, 1 African.

(1) *R. trifoliata* Pers. *Dec. Prod.* ii. 282; *Baker, in Hook fil. F.B.I.* ii. 63; *Wight, l.c. t.* 199.

Silky, much-branched. Branches 1 ft. long. Leaves 1 in. long; petioles .5 in. long; leaflets silky, elliptic narrowed at base, minutely mucronate, .5 in. long, .2 in. wide, glabrous. Flowers 1 to 4. Calyx .05 in. long. Corolla very small, silky, yellow, inconspicuous. Pods 1.5 to 2 in. long, silky. *Hab.* Sandy fields. Province Wellesley, Tasek Gelugur; seashore, Telok Ayer Tawar. *Distrib.* India, Ceylon, Australia.

3. CROTALARIA, Linn.

Herbs or under-shrubs. Leaves simple, trifoliate or 5- to 7-foliate. Flowers showy in terminal or leaf-opposed racemes. Calyx tube short, teeth free or connate in 2 lips. Corolla as long or longer, standard round or ovate short clawed; wings obovate or oblong shorter; keel as long, its petals united, incurved, beaked. Stamens monadelphous in a sheath split dorsally; anthers dimorphous, alternately on short filaments versatile and on long filaments basifixed. Ovary sessile or stipitate linear, many-ovuled. Pod sessile or stalked oblong or linear, turgid 2- to many-seeded. About 250 species, tropics and sub-tropics.

Leaves simple.

Stem winged by decurrent stipules; yellow flowers

(1) *C. alata*

Stem not winged.

Pod not longer than calyx; racemes elongate; flowers blue and white

(2) *C. sessiliflora*

Flowers few in heads, pale yellow

(3) *C. chinensis*

Pods much longer than calyx; glabrous.

Diffuse silky plant; racemes lateral; flowers yellow

(4) *C. ferruginea*

Erect stout plants; leaves blunt; bracts and stipules small; flowers yellow

(5) *C. retusa*

Erect stout plant; leaves acute, 2 to 6 in. long; stipules large, leafy

(6) *C. sericea*

Slender; leaves silky narrow linear or oblanceolate

(7) *C. albida*

Stout plants; leaves broad rhomboid.

Pod hairy; robust bushy herb; flowers light blue; stipules large

(8) *C. verrucosa*

Pod pubescent; stipules small; flowers yellow

(9) *C. semperflorens*

Leaves compound, trifoliate; flowers all yellow.

Procumbent herb; pods sub-globose pubescent
2-seeded.

Erect stout shrubs; pods cylindric, 20 to 30
seeds. (10) *C. uncinella*

Pods hairy. (11) *C. incana*

Pods glabrous cylindric, sub-sessile. (12) *C. saltiana*

Pods glabrous, swollen oblong, stalked. (13) *C. laburnifolia*

Leaves 5-foliate or more. (14) *C. quinquefolia*

(1) *C. alata* Ham. Roxb. Hort. Beng. 98; Baker in Hook. fil. F.B.I. ii. 69; Prain, Journ. As. Soc. Beng. l.c. 36.

Shrubby herb, 1 to 2 ft. tall. Stem and leaves beneath silky. Leaves simple oblong-ovate sub-acute, membranous, 1 to 3 in. long, .5 to 1 in. wide. Stipules with a triangular point, forming a wing to the stem below for the whole length. Flowers 2 to 3 on peduncles lateral about 2 in. long, with often one or two ovate leaves on it. Calyx .35 in. long silky; tube campanulate. Corolla as long, yellow. Pod stalked, linear-oblong, 1.25 to 1.75 in. long. Seeds 30 to 40. *Hab.* Sandy places. Singapore, near Serangoon; Changi. Johor, Sungei Tebrau. *Distrib.* Indo-Malaya. *Native name*: Kachang Hantu Darat.

(2) *C. sessiliflora* Linn. Sp. Pl. ed. 2, 1004; Baker, in Hook. fil. F.B.I. ii. 73; Prain, l.c. 36.

Annual 1 to 2 ft. tall, simple or little branched. Stem and leaves beneath silky. Leaves simple linear-lanceolate, herbaceous, 2 to 6 in. long, .24 in. wide. Stipules setaceous, very small. Racemes terminal, 5- to 20-flowered, 1 to 8 in. long. Bracts long, setaceous. Flowers close set. Calyx silky long-haired, campanulate with long acute teeth, .35 to .5 in. long. Corolla as long, blue and white (rarely yellow). Pod sessile, .5 in. long, oblong. Seeds 10 to 15. *Hab.* Rare on sandy heaths. Pahang River, Pulau Tawar. Province Wellesley, Tasek Gelugur. *Distrib.* Indo-Malaya, China and Japan.

(3) *C. chinensis* Linn. Sp. Pl. ed. 2, p. 1003; Baker, in Hook. fil. F.B.I. ii. 73; Prain, l.c. 37.

Annual 1 to 2 ft. tall, branched. Branches ascending, red-haired. Leaves simple, linear to lanceolate, base round, tip sub-acute, .75 to 2.25 in. long, .1 to .5 in. across, appressed-hairy all over. Racemes short dense, of few flowers, 3 to 6 terminal. Bracts lanceolate acuminate. All appressed red-hairy. Calyx-tube short, lobes acute, upper lanceolate, lower linear. Corolla pale yellow as long. Pod sessile, glabrous, oblong 15- to 20-seeded. *Hab.* Rocks in rivers, local. Perak, Kwala Temengoh. Setul. *Distrib.* Indo-Malaya, China.

(4) *C. ferruginea* Grah. in. Wall. Cat. 5398; Baker, l.c. 68; Prain, l.c. 37.

Perennial branching herb, 1.5 to 2 ft. tall, hairy. Leaves herbaceous, simple, 1.5 to 2 in. long, .5 to .75 in. across, ovate-

oblong, blunt; petioles .15 in. long. Stipules foliaceous, deflexed, .25 in. long. Racemes 2- to 8-flowered, leaf-opposed 2 to 4 in. long. Bracts linear .2 in. long. Calyx silky, .5 in. long, upper teeth lanceolate, lower linear. Corolla yellow, not longer. Pod 1 to 1.25 in. long, stalked glabrous. Seeds 20 to 30. *Hab.* Very rare. Open heathy country. Pahang, Pekan (Ridley). *Distrib.* Indo-Malaya and China.

(5) *C. retusa* Linn. *Sp. Pl.* 715. *Baker, l.c.* ii. 75; *Prain, l.c.* 38.

A branched glabrous under-shrub about 2 to 4 ft. tall. Leaves fleshy herbaceous, puberulous beneath, oblong-oblong, simple blunt, 1.5 to 3 in. long or retuse, base cuneate. Stipules subulate very small. Racemes terminal elongating 6 to 8 in. long, 12- to 20-flowered. Calyx .35 to .5 in. long, tube campanulate, teeth lanceolate. Corolla .8 in. long, yellow tinged purple, showy. Pod oblong, thick 1 to 1.5 in. long, .5 in. wide, stalked. Seeds 15 to 20. *Hab.* Seashore. Singapore, Changi. Pahang, Pulau Tawar. Malacca, town and Tanjong Kling. Dindings, Lumut. Penang, Tanjong Tokong (Ridley). *Distrib.* Whole world. *Native name:* Giring Landak.

(6) *C. sericea* Retz, *Obs.* v. 26; *Baker, l.c.* ii. 75; *Prain, l.c.* 38.

An under-shrub like the last, but leaves 2 to 6 in. long, oblong-lanceolate, silky beneath, sub-acute. Stipules large, leafy. Racemes 10 to 12 in. long, 20- to 50-flowered. Bracts ovate leafy; pedicels longer than calyx. Corolla showy, large, .8 in. long, yellow tinged purple. Pod 1.75 in. long, swollen, .6 in. wide, stalked. Seeds 20 to 30. *Hab.* Rare. Malacca (Griffith). *Distrib.* India, Indo-China.

(7) *C. albida* Heyne, in *Roth. Nov. Sp. Pl.* 333; *Baker, l.c.* ii. 71; *Prain, l.c.* 39.

Slender under-shrub branched from base, 6 to 12 in. tall, silky. Leaves simple linear-oblong, blunt silky beneath, 1 to 1.5 in. long, .2 in. wide; petioles .1 in. long. Stipules 0. Racemes terminal, 6- to 20-flowered, 2 to 4 in. long; bracts linear very small. Calyx turbinate, .25 in. long, 2 upper teeth broad, 3 lower linear, silky. Corolla .3 in. long, pale yellow. Pod glabrous sessile oblong-cylindric, .5 to .6 in. long. Seeds 6 to 12. *Hab.* Very rare in open spaces. Selangor, roadsides at Kwala Selangor (Ridley). *Distrib.* Indo-China.

(8) *C. verrucosa* Linn. *Sp. Pl.* 715. *Baker, l.c.* ii. 77; *Prain, l.c.* 39; *Hook. Bot. Mag. t.* 3034.

Stout bushy herb about 2 ft. tall. Branches angular soon glabrous. Leaves 2 to 6 in. long, 1.5 in. wide, simple, rather thin, ovate blunt, base deltoid. Stipules leafy semilunar. Racemes terminal 6 in. long, 12- to 20-flowered; bracts linear minute. Calyx short campanulate, .3 in. long, teeth lanceolate. Corolla .75 in. long, blue and white, or white, showy. Pods oblong, faintly

hairy, 1 to 1·5 in. long, stalked, 10 to 15 seeds. *Hab.* Common, roadsides. Pahang River, Pulau Chengel. Negri Sembilan, Gunong Berumbun (Cantley). Perak, Temengoh. Lankawi. *Distrib.* Indo-Malaya, Australia. *Native name*: Poko Gingiling Jantan or Gigeling. *Use*: Leaves as a poultice for headaches.

(9) **C. semperflorens** Vent. *Hort. Cels.* 17.

A herb about 3 ft. tall. Stem not flattened nor winged. Stipules ·12 in. long, linear acuminate. Leaves simple rhomboid ovate narrowed at top, mucronulate, base narrowed cuneate glabrous; nerves 8 pairs, 3·25 in. long, 1·25 in. wide; petioles ·12 in. long. Racemes 2 to 6 in. long; peduncles 1·5 in. long. Flowers large yellow; pedicels ·25 in. long. Calyx lobes lanceolate acuminate. Standard ·5 in. long. Wings oblong corrugate above, keel prominently gibbous. Pod swollen oblong pubescent 1·5 in. long, ·3 in. wide, mucronate. Seeds reniform with an incurved beak olive brownish black polished. *Hab.* Open roadsides. Malacca (Griffith). Negri Sembilan, Bukit Tangga Pass (Ridley). *Distrib.* S. India, Java, Sumatra.

(10) **C. uncinella** Lam. *Encyc. Meth.* ii. 200.

A procumbent herb or under-shrub. Branches spreading, 1 to 2 ft. long slender. Leaves trifoliolate glabrous above, puberulous beneath; leaflets 1 to 1·5 in. long, ·5 to ·75 in. wide, elliptic blunt. Stipules small acute. Racemes lateral and terminal, 2 in. long (lengthening in fruit to 4 in.). Flowers 20 to 25 small, yellow. Calyx hairy ·15 in. long. Corolla ·25 in. long yellow exsert. Pod oblique globose pubescent, 2-seeded, ·2 in. long. *Hab.* Sea coasts, not rare on the East Coast. Singapore, Pulau Blakang Padang. Malacca (Derry, Goodenough). Pahang, Pekan; Kwala Meang and Kwala Pahang. Tringganu (Yapp). Kemaman, Kwala Kemaman (Rostado). Kelantan, Kota Bharu. *Distrib.* China.

(11) **C. incana** Linn. *Sp. Pl.* 716; *Baker, l.c.* ii. 83; *Prain, l.c.* 40.

Erect herbaceous shrub, 2 to 4 ft. tall. Branches downy. Leaves trifoliolate; petioles 2 to 3 in. long; leaflets membranous, hairy beneath, elliptic to obovate, median largest, rounded, base cuneate, 1·5 to 2 in. long, 1 to 1·4 in. wide or smaller. Stipules minute setaceous. Racemes terminal, 6 to 10 in. long, 12- to 20-flowered elongating downy. Calyx ·25 in. long, teeth lanceolate. Corolla ·6 in. long exsert, yellow. Pod sub-sessile cylindric, 1 to 1·25 in. long, pubescent, 20 to 30 seeds. *Hab.* Penang (Curtis). An alien. Rare. *Distrib.* Of American origin, now over the whole world.

(12) **C. Saltiana** Andr. *Bot. Rep.* t. 648; *Prain, l.c.* 41. *C. striata* DC. *Prodr.* ii. 131.

An erect shrub nearly glabrous, about 2 ft. tall or more. Leaves trifoliolate; petioles 2 to 3 in. long; leaflets membranous, obovate obtuse, base cuneate, 1·5 to 2·5 in. long, 1·5 in. wide or less. Stipules cuneate. Racemes terminal, 1 to 1·25 ft. long. Flowers 20 to 30.

Calyx .25 in. long, silky, teeth lanceolate. Corolla .6 in. long exsert, yellow striped purple. Pod sub-sessile, cylindric, 1.5 in. long, .2 in. wide. Seeds 20 to 30. *Hab.* Common on seashores and waste ground. Singapore, Galang, etc. Malacca, Hill; Selandor (Derry). Pahang, Pekan. Selangor, Kwala Lumpur. Dindings, Pangkor. Perlis, Chupeng. Kelantan, Kampong Kota (Gimlette). *Distrib.* Africa, Indo-Malaya. *Native names*: Kachang Sekuchok (Kelantan); Giring-Giring; Gurang-Gurang; Rang-Rang.

(13) *C. laburnifolia* Linn. *Sp. Pl.* 715; Baker, *l.c.* ii. 84; Prain, *l.c.* 41.

Erect branched shrub, 2 to 4 ft. tall, glabrous. Leaves trifoliolate; petioles 2 to 3 in. long; leaflets fleshy-membranous, 1 to 2 in. long, 1.25 in. wide or less, elliptic to obovate acute, cuneate. Stipules 0. Racemes terminal and lateral, 6 to 12 in. long with few large flowers. Calyx .3 to .4 in. long turbinate, teeth lanceolate. Corolla 1 in. long, exsert, keel large, yellow, tip red. Pod cylindric, 1.5 in. long, .5 in. wide; stalk as long. Seeds 20 to 30. *Hab.* Seashores. Local. Malacca, Pulau Besar (Griffith, Maingay). *Distrib.* India and Malaya.

(14) *C. quinquefolia* Linn. *Sp. Pl.* 716; Baker, *l.c.* ii. 84; Prain, *l.c.* 42.

Annual herb, 1 to 2 ft. tall. Branches strict, glabrous, grooved silky. Leaves digitate, 5- (3- to 7-) foliate; petioles 1 to 3 in. long; leaflets herbaceous, glabrous above, silky beneath, linear or oblanceolate blunt, central 2 to 4 in. long, .3 in. wide, the others shorter. Stipules linear. Racemes terminal, base 6 to 8 in. long. Flowers 8 to 20. Calyx .5 in. long, campanulate, teeth lanceolate. Corolla 1 in. long, yellow. Pod shortly stalked oblong inflated, 2 in. long, .5 in. wide. Seeds 30 to 40. *Hab.* Paddy-fields and waste ground. Singapore, Krangi. Johor, Pulau Aor (Feilding). Malacca (Maingay). Negri Sembilan, Port Dickson. Kedah (Kunstler). Perak, Teluk Anson. Jalor, at Biserat (Gwynne-Vaughan). Perlis, Kanga. *Distrib.* India, Indo-China, Malaya.

4. DUNBARIA, Wight and Arnott.

Herbaceous or woody climbers. Leaves trifoliolate, gland-dotted beneath. Flowers racemose. Calyx-teeth narrow, lower longest. Corolla exsert, keel beaked or not. Stamens diadelphous; anthers uniform. Ovary many-ovuled; style inflexed beardless. Pod linear flat. Seeds sub-strophiolate. Species 12, East Asia, Japan, Australia.

(1) *D. Scortechinii* Prain, *l.c.* 44.

Slender climber 10 to 20 ft. long. Branches grey canescent. Leaves 6 in. long; leaflets trapezoid cuspidate, narrowed to round base, laterals oblique, puberulous above, grey pubescent beneath, 2 to 2.5 in. long, 1.75 to 2 in. wide; petioles 1.5 to 4 in. long.

Stipules lanceolate 1 in. long. Racemes 2 to 3 in. long; peduncles 4 to 6 in. long; pedicels geminate, 2 in. long. Calyx grey pubescent, streaked red, 3 in. long, campanulate, lower tooth lanceolate twice as long as the deltoid connate upper pair. Corolla 5 in. long, standard outside purple 6 in. wide orbicular; keel green, the rest yellow. Pod 2.5 in. long, .25 in. wide, linear, grey, 6- to 8-seeded. *Hab.* Open places, Pahang, Pekan (Evans). Perak, Dipang (Scortechini); Ulu Bubong (Kunstler). Province Wellesley, Sungei Krai. Perlis, Bukit Lagi, Kanga. *Distrib.* South Siam.

5. ATYLOSIA, Wight.

Herbs or shrublets erect or twining. Leaves trifoliate, gland-dotted beneath. Flowers axillary, racemed. Calyx teeth distinct, lowest longest. Corolla exsert; keel not beaked. Stamens diadelphous. Ovary sessile; ovules 3 or more; style incurved glabrous. Pod linear or oblong, turgid with deep horizontal grooves between the seeds, hairy. Seeds conspicuously strophiolate. About 25 species, Mauritius to Australia.

Leaves 2 in. long pinnate.

Flowers .75 in. long (1) *A. crassa*

Leaves .5 to 1.5 in. long, digitate.

Flowers .4 in. long (2) *A. scarabæoides*

(1) *A. crassa* *Prain, l.c.* 45.

Twinner tomentose. Leaves 3 to 6 in. long, trifoliate pinnately; leaflets trapezoid cuspidate-acuminate, laterals oblique, base narrowed blunt, 2 to 3 in. long, 1.75 to 2.25 in. wide; nerves prominent, reticulations conspicuous, puberulous beneath; petioles 1.5 to 2.5 in. long, pubescent. Racemes 2 to 3 in. long, lax; peduncles short. Bracteoles large, round, red, 6 in. long. Calyx grey-downy, 4 in. long. Corolla .75 in. long, yellow. Pod 1.5 in. long, .5 in. wide, viscid puberulous, 3- to 5-seeded. *Hab.* Open heath country. Perlis, near Kanga (Ridley). *Distrib.* India, Burma, Cambodia.

(2) *A. scarabæoides* *Benth. Pl. Jungh.* 243; *Prain, l.c.* 46.

Slender downy twiner. Leaves trifoliate digitately, 1 in. long; leaflets obovate or elliptic, .5 to 1.5 in. long, downy all over, .2 to .6 in. (median one) wide; petioles .4 in. long. Flowers 1 to 6 in a raceme; peduncles .3 to .4 in. long. Calyx grey-downy, .25 in. long. Corolla .4 in. long, yellow. Pod .75 to 1 in. long, .25 in. wide, brown silky depressed between the 4 to 5 seeds. *Hab.* Sandy seashores; rare. Malacca, Pulau Besar (Griffith, Maingay). *Distrib.* Mascarenes, Indo-Malaya, Cambodia, China.

6. ERIOSEMA, DC.

Under-shrubs or herbs. Leaves 1- to 3-foliate. Flowers solitary or racemed axillary. Calyx campanulate; teeth 5, as

long as tube. Corolla exsert, standard orbicular, base auricled; wings and beaked keel shorter. Stamens diadelphous; anthers uniform. Ovary sessile; ovules 2; style filiform glabrous. Pod oblong, turgid 1- to 2-seeded. Seeds oblique. Species 50, Africa, Malaya.

(1) **E. chinense** Vogel. *Pl. Meyen.* 31; Baker, in Hook. *fil. F.B.I.* ii. 219; Prain, *l.c.* 44.

Shrub 1 to 1·5 ft. tall, branched, pubescent. Leaves 1 to 2 in. long, 3 to 1·4 in. wide, 1-foliate, linear-oblong to linear-lanceolate, sub-coriaceous sparsely hairy above, grey-tomentose beneath; nerves brown-tomentose. Stipules linear, ½ in. long. Flowers 1 to 2 axillary, sub-sessile or on pedicels ½ in. long. Calyx pilose, ½ in. long. Corolla yellow, ¼ in. long, hairy outside. Pod oblong, ¼ in. long pubescent with red hairs. *Hab.* Rare, possibly an alien. Malacca (Griffith). Perak (Wray). *Distrib.* Tropical Asia, Australia.

7. FLEMINGIA, Roxb.

Slender shrubs. Leaves 1- to 3-foliate, gland-dotted below. Inflorescence various. Calyx-tube short, teeth narrow, acuminate lowest longest. Corolla hardly exsert. Stamens diadelphous. Ovary sub-sessile; 2 ovules; style filiform, glabrous. Pod oblong, turgid, 2-seeded. Seeds not strophiolate. Species 25, tropical Africa and Asia.

Leaves 1-foliate.

Flowers in small cymes in large folded bracts in long terminal racemes

(1) **F. strobilifera**

Leaves 3-foliate.

Flowers in axillary racemes; bracts small

(2) **F. congesta**

(1) **F. strobilifera** R. Br. in Ait. *Hort. Kew* (ed. ii.) iv. 350; Baker, in Hook. *fil. F.B.I.* ii. 227; Prain, *l.c.* 42.

Shrublet 2 to 4 ft. tall. Branchlets velvety. Leaves 4 in. long; petioles ½ in. long; leaflet 1, sub-coriaceous, glabrous above, silky beneath, ovate acute, base rounded or truncate; nerves 10 to 12 pairs, 3½ in. long, 1 to 2 in. wide. Stipules lanceolate, ⅓ in. long. Inflorescence of terminal racemes 3 to 6 in. long; rachis zigzag pubescent. Bracts deeply cordate cuspidate, 1 in. long, 1·25 in. wide, pale green turning brown. Cymes shorter, hidden. Calyx ⅓ in. long, pilose green. Corolla, standard green lined pink, keel green lined pink, tip crimson, wings crimson. Pod ⅓ in. long, downy. *Hab.* Common in dry open spots, roadsides, etc. Singapore, Changi. Johor, Kota Tinggi; Tanjong Surat (Feilding). Pahang, Pekan. Negri Sembilan, Permatang Bertam. Selangor, Kwala Lumpur. Perak, Temengoh. Penang, common. Tringganu, Ismail Rantau (Down). Kelantan, Kwala Lebir. Perlis, Kanga. *Distrib.* Indo-Malaya. *Use*: Leaves beaten on children's legs to strengthen them. *Native name*: Seringan.

(2) **F. congesta** Roxb. *Hort. Beng.* 56; *Baker, l.c.* ii. 288; *Prain, l.c.* 43.

Shrublet 4 to 5 ft. tall. Branchlets silky. Leaves trifoliate, 2·5 to 3·5 in. long; leaflets membranous, ovate acute, obliquely round (terminal one cuneate) at base, puberulous above, silky beneath, 3 to 5 in. long, 1·5 to 3 in. wide; petiolules ·25 in. long. Stipules scarious velvety, ·4 in. long. Racemes dense 1 or more in axils 2 in. long. Bracts lanceolate, ·25 in. long or less, silky. Calyx ·35 in. long, silky. Corolla white striped pink; wings purple, ·4 in. long. Pod oblong, ·5 in. long, ·25 in. wide tomentose. *Hab.* Common; open dry country. Malacca, Bukit China; Panchur (Derry). Pahang, Pekan; Kwala Tembeling. Dindings, Pangkor. Perak, Kampong Kota (Wray); Temengoh. Penang, Pulau Betong, etc. (Curtis). Kelantan, Kampong Kota (Gimlette), Setul and Perlis. *Distrib.* India, Cambodia, Siam, Java. *Native name* : Serengan.

8. PHASEOLUS, Linn.

Herbaceous twiners rarely sub-erect. Leaves trifoliate. Flowers in axillary racemes yellow or purple. Calyx campanulate, lowest tooth longer than the connate upper two. Corolla much exsert, keel prolonged into a long beak ending in a spiral. Stamens diadelphous; anthers uniform. Ovary sessile, many-ovuled; style filiform twisted with keel bearded beneath. Pod linear (rarely oblong) sub-terete or compressed, septate. Species 60, tropics.

P. lunatus Linn. *Sp. Pl.* 724; *Prain, l.c.* 48. The haricot bean, Kachang China, Kachang Serinding, with greenish yellow flowers and a pod 3 in. long, is occasionally cultivated.

Stem twining; flowers yellow.

Pods glabrous (1) **P. calcaratus**

Pods hairy (2) **P. Mungo**

Pods glabrous; flowers rose pink, keel yellow 1 in.

long

. (3) **P. adenanthus**

Sub-erect with deep purple flowers (4) **P. semi-erectus**

(1) **P. calcaratus** Roxb. *Hort. Beng.* 54; *Baker, in Hook. fil. F.B.I.* ii. 203; *Prain, l.c.* 50.

A twining annual or perennial, pubescent 6 to 10 ft. tall. Leaves 4 to 5 in. long; leaflets 3, membranous sparsely pubescent all over, ovate to lanceolate acute or acuminate, rarely faintly repand, base of terminal leaflet acute, laterals truncate or lobed, 2 to 4 in. long, 1 to 2·5 in. wide; petioles 2 to 4 in. long. Stipules ·2 to ·25 in. long, lanceolate. Racemes ·75 to 1·5 in. long, on peduncles 5 to 8 in. long pubescent. Flowers 2 or 3 together in distant groups. Calyx ·15 in. long, teeth deltoid. Corolla yellow, ·5 to ·75 in. long. Pod 2·5 to 3 in. long, ·2 in. wide, recurved glabrous. Seeds 10 to 12. *Hab.* Open country.

var. *typica*. Stems pubescent. Perak, Batu Kurau (Curtis). Perlis, Tebing Tinggi. Kelantan, Kota Bharu.

var. *gracilis*. Stems glabrous. Flowers brown and yellow. Open country, Pahang, Pekan. Perak, Goping; Sungei Batang (Kunstler); Lahat near Ipoh. Perlis near Kanga, Setul (Ridley). *Distrib.* S.E. Asia.

(2) **P. Mungo** Linn. *Mantissa* i. 101; *Prain*, l.c. 50.

Annual pubescent, 6 to 10 ft. tall. Leaves 8 to 10 in. long; leaflets membranous ovate acute, base truncate, lateral ones oblique pubescent both sides, 3 to 5 in. long, 2½ to 4 in. wide; petioles 5 in. long, hairy. Racemes dense; flowers few, yellow; peduncles 4 in. long, pubescent. Calyx 1½ in. long; teeth triangular, except the lowest lanceolate. Corolla ½ in. long. Pods erect densely hairy 1½ to 2 in. long, ¼ in. wide, compressed, 6- to 8-seeded. Seed flat oval, 1½ in. long. *Hab.* Occurs occasionally as an alien, much cultivated in India. Province Wellesley, Prai Dock (Curtis). Perak, Goping (Kunstler). *Distrib.* Old World.

(3) **P. adenanthus** G. W. Mey, *Prim. Flor. Esseq.* 239; *Prain*, l.c. 48.

Slender long climber, sub-glabrous. Leaflets stiffly membranous, broad lanceolate, lateral ones broad oblique-based, 2½ to 4 in. long, 1¼ to 2 in. wide; petioles 2½ in. long. Stipules ovate appressed. Racemes axillary with numerous flowers, but one or two only open at once. Calyx ¼ in. long, campanulate, teeth lanceolate half as long as tube. Corolla 1 in. long, rose pink, keel yellow. Pod 4 to 6 in. long; sutures rather thick sub-torulose. Seeds 10 to 16, brown, ⅓ in. long. *Hab.* Rare on bushes in open country, Kelantan, Tumpat, Kota Bharu (Ridley). *Distrib.* Tropics generally.

(4) **P. semi-erectus**. L. *Mantiss*, i. 100; *Baker*, l.c. ii. 201; *Jacq. Coll. Pl. Rar.* iii. 558.

Erect shrubby plant about 2 ft. tall. Branches hairy or glabrescent. Stipules lanceolate setaceous. Leaflets membranous glabrescent, ovate to lanceolate, 1½ to 1¾ in. long, ¼ in. wide, bases deltoid; petioles 1½ in. long. Peduncles 12 in. long. Racemes lax 6 in. long. Calyx tubular campanulate. Corolla ½ in. long, deep brown purple. Pods 3 to 4 in. long, 12 in. through, narrow acuminate. *Hab.* Province Wellesley on paths in rice-fields, Nibong Tebal, no doubt introduced. *Distrib.* Indo-Malaya, tropical America. Probably an introduction from America.

The figure in *Bot. Reg.* t. 743, if really of this plant, is quite unrecognisable.

9. VIGNA, Savi.

Twiners. Leaves trifoliate. Racemes many-flowered; bracteoles conspicuous. Calyx campanulate, upper teeth often connate. Corolla exsert yellow; keel truncate or exsert not spiral. Stamens

diadelphous. Ovary sessile many-ovuled; style filiform, bearded along inner face. Pod linear septate sub-terete. Species 40 to 50, tropical.

V. Catjang Walp. *Linnaea* xiii. 533. With very long cylindric pods as much as 2 ft. long, .3 to .4 in. through, is often cultivated. *Native name* : Kachang P'rut Ayam.

Leaves hairy; flowers purple; leaflets lanceolate acuminate. (1) *V. pilosa*

Leaflets hairy on nerves; stems hairy; leaflets smaller ovate rhomboid; flowers yellow. (2) *V. hirtella*

Leaves glabrous; flowers yellow.

Leaflets orbicular ovate blunt; flowers .5 in. long. (3) *V. retusa*

Leaflets lanceolate to ovate acute; flowers .25 in long (4) *V. parviflora*

(1) *V. pilosa* Baker, in Hook. fil. *F.B.I.* ii. 207; *Prain*, l.c. 53.

Twinner hairy. Leaves 5 to 8 in. long; leaflets downy all over, ovate acute, 3 to 6 in. long, 1.5 to 2.5 in. wide, base truncate, lateral leaflets oblique; petioles 2 in. long. Stipules .1 in. long lanceolate. Racemes 2 to 3 in. long; peduncles .5 to 2 in. long; pedicels .1 in. long, downy. Calyx campanulate oblique silky, .3 in. long, lower tooth lanceolate. Corolla purple, .75 in. long. Pod 4 to 5 in. long, sub-cylindric, .25 in. wide, hairy septate. Seeds 8 to 12 sub-reniform truncate black. *Hab.* Lankawi, Kwala Kwah (Haniff). *Distrib.* India, Indo-China.

(2) *V. hirtella* Ridl. *Journ. F.M.S. Mus.* x. 132.

Stem slender, hairy. Leaves, petioles 2 in. long, hairy; leaflets ovate acute, lower ones rhomboid and often slightly lobed; nerves beneath hairy, 2 in. long, 1 to 1.5 in. wide; petiolule of upper one .5 in. long. Peduncles slender hairy, 2.5 in. long; pedicels very short. Flowers .5 in. long, yellow. Bracts at base linear acute. Calyx campanulate with very short broad teeth. Corolla, standard obovate round broad, with two short points at base; wings broadly rounded at tip; keel short broad, curved. Style plumed below tip on lower edge; ovary glabrous. Pod narrow linear glabrous, 2 in. long, .1 in. wide. Kelantan; bank of river, Chaining. *Distrib.* Timor Laut.

Description of pod taken from the Timor Laut plant, which, I think, is the same, but the pod is unripe.

(3) *V. retusa* Walp. *Rep.* i. 778; *Prain*, l.c. 51. *V. lutea* Gray Bot. Wilkes Exped. i. 452; Baker, l.c. ii. 205.

Trailing and twining perennial, glabrous. Leaves 3 to 4 in. long; leaflets ovate, thinly fleshy obtuse or retuse, base cuneate or round, 2 in. long, 1.5 in. wide; petioles 1.5 in. long; petiolules .15 in. long. Racemes 12- to 20-fid; peduncles 2 to 6 in. long. Flowers 1 or 2 together. Calyx campanulate puberulous, .12 in. long. Corolla yellow, .5 in. long. Pod 1.5 in. long, .4 in. wide, .25 in. thick, glabrous. Seeds 4 to 8. *Hab.* Sea coasts; common. Singapore, Telok Kurau; Blakang Mati. Johor, Jambu Larang

(Feilding); Pahang, Kwala Pahang. Malacca, Pulau Besar. Dindings, Pangkor. *Distrib.* All tropical sea coasts.

(4) **V. parviflora** *Ridl. Journ. Roy. As. Soc. S. Br.* 82, p. 181.

Stems slender. Leaflets lanceolate to ovate acute, tip narrowed, base of lateral ones oblique membranous, 2 in. long, .5 in. across; petiolules .1 in. long or less, hairy; petioles slender, 1.5 to 2 in. long. Peduncles 1 in. long, slender. Flowers few, crowded at tip, .25 in. long; pedicels .1 in. long. Corolla yellow; keel beaked. Pod sword-shaped acuminate, 2.25 in. long, .25 in. wide. Seed oblong, black, truncate both ends, .2 in. long, hilum long. *Hab.* Sandy places; Pahang, Kota Tongkat (Evans). Negri Sembilan, Seremban. Perak, Tanjong Malim; Kwala Kangsa; Kwala Temengoh (Ridley).

10. PACHYRHIZUS, Rich.

Climber. Leaves trifoliate. Racemes long, nodes tumid. Calyx 2-lipped, upper lip emarginate, lower 3-lobed. Corolla large, petals sub-equal, keel blunt. Stamens diadelphous. Style long, circinate at top bearded down inner side beyond the oblique stigma. Pod linear, turgid, depressed between seeds. Species 2 or 3; the others Mexican and Angolan.

(1) **P. angulatus** *Rich. DC. Prodr.* ii. 402; *King l.c.* 53.

Stout climber. Root tuberous. Leaves 8 to 9 in. long; leaflets glabrous, 4 in. long and wide, deltoid more or less lobed above; petiolules .2 in. long. Racemes 6 to 10 in. long on 12 in. long peduncles. Bracts lanceolate, .25 in. long, silky. Corolla 1 in. long, purple. Pod 6 to 9 in. long, .5 in. wide. Seeds 7 to 12, brown. *Hab.* Cultivated and an occasional escape. *Native names:* Kachang Bengkuang or Sengkuang. *Use:* The tuber and young pods eaten. The ripe beans are very poisonous.

11. CLITORIA, Linn.

Climbers or erect shrubs. Flowers showy. Leaves 3- to 7-foliate; leaflets stipellate. Calyx tubular; teeth deltoid or lanceolate. Corolla large, standard orbicular spurred at base, wings and keel much shorter. Stamens monadelphous or diadelphous; anthers uniform. Ovary stalked; ovules many; style bearded along the inner side. Pod linear flattish, or turgid. Seeds numerous. Species 27, tropics of both worlds chiefly the New.

(1) **C. Ternatea** *Linn. Sp. Pl.* 753; *Prain, l.c.* 56.

A common garden plant with large deep blue or white or light blue flowers and both single and double forms. Only occurs in gardens, and occasionally escapes into hedges. *Native name:* Kachang Telang.

(2) **C. cajanifolia** *Benth. in Mart. Flor. Braz., xv.* 121; *Prain, l.c.* 57.

Shrub about 3 ft. tall, branched pilose. Leaves 2 to 3·5 in. long; petioles 1 in. long; leaflets 3, elliptic obtuse, base cuneate, coriaceous, finely reticulate, grey hairy beneath, 2 to 3 in. long, 75 to 1 in. wide. Flowers 1 to 2 on axillary peduncles 2 in. long, reversed. Calyx 75 in. long. Corolla 1·5 to 2 in. long; standard 1·5 in. wide, pale violet to white with purple spot at base. Pod turgid, 1·25 in. long, 35 in. wide, glabrous, a rib along each valve-face. Seeds 5 to 7 globose, viscid adhesive. *Hab.* Common by roadsides in Singapore. Johor, Tebrau. Malacca, Bukit Sabukor. Selangor, Langat. Negri Sembilan, Rembau (Cantley). *Native names:* Beluntas Padi; Rumput Sabusuk; Rumput Turi.

A native of Brazil, but now introduced into Java, Siam and Borneo by cattle, to whose hair the viscid seeds adhere. Earliest date 1844 Malacca (Griffith).

12. TERAMNUS, Sw.

Twining herb. Leaflets 3. Calyx campanulate, teeth subequal. Corolla little exsert; petals about equal; standard not spurred. Stamens monadelphous, alternate; anthers abortive. Ovary sessile; ovules many; style short, beardless. Pod linear hooked at tip by the style flattened, septate between seeds. Species 4, tropics.

(1) *T. labialis* Spreng. Syst. iii. 235; Baker, l.c. 184; Prain, l.c. 79.

Slender twiner sparsely hairy. Leaves 2·5 to 4·5 in. long; petioles 1·5 in. long; leaflets 3, membranous ovate-oblong, base round, tip sub-acute or obtuse, terminal 1 to 2·5 in. long, 75 to 1·5 in. wide, laterals smaller sparsely hairy beneath. Racemes lax axillary 8- to 12-flowered, 2 to 3 in. long; pedicels 2 in. long, fasciated above. Calyx 15 in. long. Corolla 25 in. long, reddish; standard emarginate. Pod glabrous linear recurved, 1·5 to 2 in. long, 2 in. wide. Seeds 8 to 12. *Hab.* Open rocky spots, rare. Penang (Wallich 1822, No. 5518). Perlis, Kanga. *Distrib.* Tropics.

13. DIOCLEA, H.B.K.

Woody climbers. Leaves trifoliate sub-coriaceous. Flowers often appearing without the leaves in elongate racemes, blue or pink. Bracts long caducous. Calyx campanulate; teeth short, upper 2 connate. Corolla large; keel incurved not beaked. Stamens monadelphous, upper stamen free below, connate with the others in the middle; anther perfect, the other anthers alternately perfect and abortive. Ovary sub-sessile, hairy; style incurved glabrous. Pod oblong, turgid, 1- to 3-seeded, flattened along upper suture. Species 17 to 18, all tropical American except these two.

Leaflets glabrescent; flowers 75 in. long . . . (1) *D. reflexa*
 Leaflets velvety beneath; flowers 1 in. long . . . (2) *D. javanica*

(1) **D. reflexa** Hook. *fil. Niger Flora* 306; *Baker, l.c.* ii. 196; *Prain, l.c.* 59; *King, Ann. Bot. Gard. Calc.* ix. 30, *pl.* 40.

Liane 20 to 30 ft. long. Leaves 9 in. long; leaflets sub-coriaceous glabrous above and nearly so beneath when adult, ovate acuminate, base rounded truncate, 5 in. long, 3 in. across; petioles 4 in. long; petiolules .25 in. long. Stipules lanceolate. Racemes over a foot long, gradually lengthening, often produced when the plant is leafless, tomentose. Flowers sub-sessile. Bracts linear pubescent reflexed caducous, .5 in. long. Calyx campanulate, 1.4 in. long. Corolla pink or violet and white, .75 in. long; standard orbicular emarginate. Pods 1- or 2-seeded, oblong-obovate flattened, 3 to 4 in. long, 2 in. wide, .5 in. thick along the top edge, yellowish silky becoming glabrous. Seed discoid, dark brown, 1.25 in. across. *Hab.* Thickets and rocky open spots. Singapore, Reservoir. Pahang, Kwala Pahang. Malacca (Maingay). Perak, Chanderiang (Kunstler). Perlis, Bukit Lagi, Kanga. *Distrib.* India, tropical Africa and America. *Native name*: Kachang Laut.

Scented of musk.

(2) **D. javanica** Benth. *Pl. Jungh.* 236; *Prain, l.c.* 60.

Big woody climber. Leaves 6 to 7 in. long; leaflets ovate rather smaller than in the last species, velvety beneath, as are the petioles and petiolules. Racemes as in *D. reflexa*, but more velvety. Calyx teeth one-third length of tube. Corolla rose pink or pinkish blue. Selangor, Batu Tiga (Curtis). Perak, Ulu Bubong (Kunstler); Ayer Larut (Wray). *Distrib.* Ceylon, Burma, Java.

14. PUERARIA, DC.

Twining shrubs or herbs. Leaves trifoliate. Flowers fairly large in fascicles on long racemes. Calyx and teeth long or short, upper two connate. Corolla exsert; standard spurred at base as long as the blunt wings and keel. Stamens monadelphous. Ovary sessile, many-ovuled; style filiform, much incurved beardless. Pod linear, flattish. Species 12, Indo-China.

(1) **P. phaseoloides** Benth. in *Journ. Linn. Soc.* ix. 125; *Baker, l.c.* ii. 199; *Prain, l.c.* 161.

Slender twiner 20 to 30 ft. long, pubescent hairy. Leaves 6 to 8 in. long; leaflets membranous thinly hairy above, velvety-tomentose beneath, triangular ovate, base cuneate broad, laterals oblique, blunt or sub-acute, 3 to 4 in. long, 2 to 3 in. wide; petioles 3 to 4 in. long. Stipules lanceolate small. Racemes 1 ft. long, puberulous (peduncle 5 in. long). Flowers in scattered pairs. Calyx campanulate, .25 in. long, hairy, upper teeth broad, lateral ones triangular, lower lanceolate, all setaceous. Corolla mauve and white, .6 in. long; standard orbicular, spurred, white with a blue spot. Pod eventually glabrous, narrow linear flat, 3.5 in. long, .2 in. wide. Seeds 16, dark brown, .15 in. long, .1 in. wide.

Hab. Low country in thickets, Pahang River, Negri Sembilan, Kwala Pedas. Selangor, Batu Caves. Perak, Ipoh (Curtis); Goping (Kunstler); Kwala Kangsa. Penang (Wallich); Quarry (Curtis). Province Wellesley, Permatang Bertam. Perlis, Chupeng. Lankawi. Kelantan River near Chaning. *Distrib.* Indo-Malaya.

15. CANAVALIA, DC.

Large climbing or creeping plants. Leaves trifoliolate. Flowers large pink, fragrant in racemes. Calyx tubular, 2-lipped, upper lip entire or emarginate, lower 3-toothed. Corolla large; standard round, keel blunt incurved. Stamens monadelphous. Ovary sessile many-ovuled; style incurved, beardless. Pod large, linear or oblong, flat or turgid with a ridge along each edge of upper suture. Species 10 to 12, chiefly American.

Pod long, flattened, double channelled along the dorsal suture.

Pod 1·5 to 2 in. across, many-flowered (cultivated) . (1) *C. gladiata*

Pod ·5 to ·75 in. across, few-flowered (trailer, sea-shore) . (2) *C. obtusifolia*

Pods short broad turgid, flat along the upper suture (climber wild) (3) *C. turgida*

(1) *C. gladiata* DC. *Prodr.* ii. 404. *C. ensiformis* Baker, in *Hook. fil. F.B.I.* ii. 195; *Prain, l.c.* 62, in part, not of DeCandolle.

A glabrous climber. Leaves 10 to 12 in. long; leaflets ovate acute, base rounded, 5 to 6 in. long, 2·5 to 4 in. wide; petioles 6 in. long. Racemes 3 to 8 in. long on peduncles 4 to 6 in. long. Flowers 12 to 20. Calyx puberulous, upper lip oblong emarginate. Corolla rose pink (rarely white), 1·5 in. long. Pod linear-oblong, dorsal suture grooved between 3 keels, turgid cylindric or broad and flat, 12 to 24 in. long, 1·5 to 2 in. wide. Seed white, grey or red, 1·25 in. long, ·5 to ·75 in. wide. *Hab.* Cultivated. *Native name*: Kachang Parang. *Use*: Pods eaten.

DeCandolle correctly separated the Asiatic species *C. gladiata* from the American *C. ensiformis*, but Baker unfortunately put them together, adding one or two other species to it. Its origin seems to be unknown; I have seen none but cultivated plants.

(2) *C. obtusifolia* DC. *Prodr.* ii. 404; Baker, in *Hook. fil. F.B.I.* ii. 196. *C. lineata* Prain, *l.c.* 63, not of DeCandolle.

A trailing plant on sand-hills, with long creeping stems. Leaves 8 to 9 in. long, light green fleshy membranous; petioles 3 to 5 in. long; leaflets ovate or orbicular blunt or rounded, occasionally slightly retuse at tip, base cuneate, 2 to 3 in. long and as wide; petiolules ·25 in. long. Racemes of 4 to 6 flowers; peduncles 6 to 10 in. long. Calyx ·6 in. long, upper lip oblong entire reticulate. Corolla rose pink to deep mauve, 1 in. long; standard emarginate. Pod linear-oblong, strongly three-keeled, 3 to 5 in. long, ·75 in. wide; epicarp not separating from pericarp. Seed ·5 in. long,

dark brown. *Hab.* Common on sandy coasts growing with *Ipomœa triloba*. Singapore, Tanjong Katong; Changi. Malacca, Kemaman, Kwala Kemaman (Rostado). *Distrib.* Tropical Asia. *Use*: Seeds eatable when young; it makes a good pease-porridge. The flowers eaten raw by Malays.

There has been a quite unnecessary confusion by botanists as to the name of this and the next species. DeCandolle based his *C. obtusifolia* on the excellent figure of *Katu isjandi* in Rheede's *Hortus Malabaricus*, vol. 8, pl. 43, but unfortunately added references to some South American species. *C. lineata* DC., given for this plant by Prain, is a Japanese plant quite distinct.

(3) *C. turgida* Grah. Wall. Cat. No. 5534A. *C. obtusifolia* Prain, l.c. 63, not of DeCandolle.

Climbing plant, glabrous. Leaves 10 to 12 in. long (petioles 6 in. long) ovate, acutely acuminate, base round, 5 to 6 in. long, 3·5 to 4·5 in. wide. Racemes 3 to 8 in. long; peduncles 6 to 12 in. long. Calyx not reticulate, 5 in. long, upper lip rounded hardly emarginate. Corolla rose pink, 1 in. long; standard orbicular hardly emarginate. Pod short, turgid, dorsal sutures hardly keeled, not grooved between, 3 to 5 in. long, 1·75 to 2·25 in. wide; epicarp separating from pericarp. Seeds 3 to 6, brown, yellow-streaked, 75 in. long. *Hab.* Climbing on trees and bushes near the sea. Seeds poisonous. Singapore, Changi; Toas; Pulau Ubin (Hullett). Pahang, Pekan; Pulau Manis, Pahang River. Malacca, Chenana Putih and Bukit Panchur (Cantley). Perak, Telok Anson (Kunstler). Penang (Wallich). Kelantan, Kamposa. *Distrib.* Indo-China and Malaya. *Native names*: Kachung Rang-Rang; Kachang Hantu.

16. SPATHOLOBUS, Hassk.

Very large lianes. Leaves 3-foliate stipellate. Flowers small in large terminal and axillary panicles. Calyx campanulate, teeth lanceolate or deltoid, upper 2 connate. Corolla exsert dark pink or white; petals sub-equal, keel straight. Stamens diadelphous. Ovary 2-ovuled; style incurved, beardless. Pod flat, thin, indehiscent with one seed at the tip. Species 10, 1 African, the rest Malayan.

Big lianes; leaflets 4 to 5 in. across, red-tomentose; flowers black purple.

Leaflets puberulous above, tomentose beneath (1) *S. ferrugineus*

Leaflets glabrous above; nerves only tomentose beneath (2) *S. gyrocarpus*

Slender lianes.

Bracteoles longer than buds; leaflets 3·5 in. across, pubescent (3) *S. bracteolatus*

Bracteoles inconspicuous.

Leaflets 2 in. across, glabrous above, pubescent beneath; flowers pink (4) *S. acuminatus*

Leaflets 2·3 in. across, glabrous above, pubescent beneath; flowers white (5) *S. dubius*

Leaflets glabrous; flowers white.

Leaflets oblong; calyx glabrescent . . . (6) **S. Maingayi**

Leaflets oblanceolate; calyx pubescent;
panicle lax . . . (7) **S. Ridleyi**

(1) **S. ferrugineus** Benth. *Pl. Jungh.* 238; *Prain, l.c.* 75.

A very big liane over 100 ft. long, and 6 in. through. Branchlets tomentose. Leaves 9 in. long; leaflets coriaceous puberulous above, rusty-pubescent beneath, terminal one ovate blunt or rounded at both ends or base cuneate, laterals oblique, terminal one 5 to 6 in. long, laterals shorter; nerves 5 to 7 pairs and reticulations prominent below; petioles 3 to 4 in. long. Stipules triangular, 25 in. long. Panicles 8 to 10 in. long, lax red pubescent; branches 4 to 6 in. long. Calyx 2 in. long; teeth deltoid. Corolla 25 in. long, deep blackish pink; standard oblong, notched. Pod 3 to 5 in. long, 7 in. wide, dilate toward the tip, pubescent, yellowish brown. *Hab.* Common, forests. Singapore, Garden Jungle; Bukit Timah. Johor, Bukit Serom. Malacca, Bukit Bruang (Derry). Perak, Batang Padang (Kunstler). Province Wellesley, Kubang Ulu (Curtis). *Distrib.* Sumatra, Java, Borneo. *Native names:* Akar Guayah; Akar Jangat; Akar Sejangat; Akar Sekoet.

var. sericophyllus Ridl.

Leaves 6 in. long; petioles 3 in. long softly tomentose; leaflets elliptic, rounded at base, tip blunt, laterals oblique; nerves 7 pairs finely silky, hairy on both surfaces especially on nerves, reticulations not prominent, 3 in. long, 1.75 in. wide. Panicles lax, 4 to 8 in. long, silky tomentose. Flowers small, silky. *Hab.* Singapore, Kranji and Bukit Timah (Ridley).

(2) **S. gyrocarpus** Benth. *Pl. Jungh.* 238; *Baker, in Hook. fil. F.B.I.* ii. 193; *Prain, l.c.* 76.

Big liane 150 ft. long, 5 to 7 in. through, rusty-pubescent. Leaves 12 in. long (petioles 4 to 6 in. long); leaflets coriaceous, terminal one sub-rhomboid, laterals oblique elliptic, base narrowed, tip sub-acute above, glabrous beneath; nerves and reticulations strongly elevate, hairy; petiolules velvety. Stipules ovate-lanceolate. Panicles lax, 12 in. long, pubescent; branches 6 to 8 in. long, paniced. Calyx white silky-pubescent, 1 in. long, teeth deltoid. Corolla deep blackish pink, 15 in. long. Standard orbicular, notched. Pod 3 to 5 in. long, 1 in. wide, velvety. *Hab.* Forests in the north of peninsula. Perak, Ulu Bubong and Goping (Kunstler); Penang (Wallich 5442). *Distrib.* Philippines.

(3) **S. bracteolatus** *Prain, l.c.* 76.

Woody climber 15 to 30 ft. long, sparsely pubescent. Leaves 10 to 12 in. long, coriaceous ovate acute, mucronulate glabrous except a few hairs on the nerves on both sides; nerves prominent, 8 to 9 pairs, reticulations not prominent, 8 to 9 in. long, 3.5 in. wide; petioles 2 to 2.5 in. long, velvety; petiolules thick, 3 in. long tomentose; leaves at ends of branches often 1-foliate.

Panicles axillary and terminal, 1·5 to 2 ft. long; branches 3 to 4 in. long hairy. Bracts lanceolate hairy acuminate, 1 in. long. Calyx 1·5 in. long, brown pubescent. Corolla small. *Hab.* Dense jungle 3000 to 4000 ft. altitude, near rocks; Perak, Gunong Batu Putih (Kunstler). Province Wellesley. Bukit Mertajam; a form with the leaves very hairy beneath; on the top of the hill.

(4) *S. acuminatus* Benth. *Pl. Jungh.* 238.

Stout liane, glabrous. Leaves 8 or 9 in. long; petioles slender, 3 in. long; leaflets oblong cuspidate obtuse, base round, coriaceous, glabrous except midrib beneath puberulous; nerves very fine and reticulations visible, but not elevate, 4 to 6 in. long, 1·5 in. across. Panicles axillary, 6 to 8 in. long; branches 1·5 to 2 in. long. Calyx puberulous 1·5 in. long. Corolla 4 in. long yellowish white (Wallich), purple (Phillips). Pod 3 to 5 in. long, velvety, semi-transparent, 7 in. long, 3 in. wide at tip. *Hab.* Penang Hill (Wallich 8082) (Phillips), apparently rare, as no one has found it of late years. *Distrib.* Andamans and Martaban.

Wallich's specimens only in young flower, Phillips' in fruit.

(5) *S. dubius* Prain, *l.c.* 78.

Liane 100 to 150 ft. long, 4 to 8 in. through. Leaves 6 to 8 in. long (petioles 1 to 3 in. long puberulous); leaflets ovate lanceolate acuminate, base rounded, bright green coriaceous, glabrous above; nerves 5 pairs with reticulations beneath slightly raised, pubescent, 2 to 6 in. long, 1·5 to 3 in. wide. Stipels subulate, 1·5 to 2 in. long. Panicles spreading, 8 in. long, slender, sometimes 2 to 3 together. Calyx 12 in. long, teeth short, upper bifid pubescent. Corolla 26 in. long, pure white. Pod oblong falcate rounded at tip, lower suture curved, glabrous, 4·25 in. long, 1 in. wide. *Hab.* Forests. Perak, Gunong Bubu range at 800 to 1200 ft. altitude (Kunstler). Penang Hill (Curtis).

(6) *S. Maingayi* Prain, *l.c.* 79.

Woody climber about 60 ft. tall, glabrous. Leaves 4 to 5 in. long (petioles 2 in. long); leaflets ovate acute, base rounded; nerves 5 to 6 pairs, reticulations fine, conspicuous, 2 in. long, 1·75 in. wide. Stipels subulate 1 in. long, stipules ovate. Panicles 6 to 8 in. long. Bracts minute; rachis puberulous. Calyx 12 in. long, puberulous, campanulate, teeth short rounded, pink. Corolla white or pinkish white, 25 in. long; standard orbicular emarginate. Pods oblong curved, tip round, 4 in. long, 1 in. wide, thicker than in most species. *Hab.* Open rocky jungle and lowland forests. Singapore, Bukit Timah Road; Garden Jungle. Johor, Sungei Tebrau (flowers rose). Malacca (Maingay). Perak, Goping and Ulu Bubong (Kunstler); Tapah (Wray).

(7) *S. Ridleyi* Prain, *l.c.* 80.

Big liane over 100 ft. long, glabrous. Leaves 6 in. long; petioles 1·5 in. long; leaflets oblanceolate acuminate, base cuneate;

nerves 9 pairs, fine ascending, 3 to 3·5 in. long, 1 to 1·25 in. wide. Stipels small rigid; stipules lanceolate 2·5 in. long. Panicles 2·5 in. long; branches few 1 in. long. Calyx campanulate 12 in. long pubescent, teeth rounded upper truncate. Corolla 25 in. long, white or yellow; standard orbicular, retuse. Pod 4 in. long, 1 in. wide, oblong dilate towards tip, rounded puberulous. *Hab.* Singapore on a Kempas tree in Botanic Gardens and at Chan Chu Kang. Apparently very local.

EXCLUDED SPECIES

S. CRASSIFOLIUS *Benth. Pl. Jungh.* 238; *Prain, l.c.* 78; ? *Penang* (*Wallich* 5913).

It has not again been found in Penang, and Wallich puts a ? to the locality. His other specimens were from Sylhet.

17. MUCUNA, Adans.

Perennials or annuals. Leaves large trifoliate. Flowers large deep purple, or yellow and white drying black. Calyx campanulate bristly, upper teeth connate lower longer. Corolla long exsert; standard half as long as keel (beaked). Stamens diadelphous; anthers dimorphous. Ovary sessile; ovules many; style incurved, beardless. Pod oblong or linear, rather thick, large, covered with very irritating bristles. Species 30, tropics. The cowhage plants.

Pods flat; seeds large with a hilum extending all round.

Pods with plaits across the sides.

Flowers light dull purple (1) *M. biplicata*

Pods without plaits.

Racemes short corymbose; bracts large boat-shaped; flowers fawn and white (2) *M. acuminata*

Racemes long peduncled; bracts minute; flowers pale yellow (3) *M. gigantea*

Pods swollen, hooked; bracts minute oval; hilum small.

Flowers purple (4) *M. pruriens*

(1) *M. biplicata* *Teysm. and Binn. Cat. Hort. Bogor.* 261; *Prain, l.c.* 66. *M. atropurpurea* *Baker, in Hook. fil. F.B.I.* ii. 186 in part.

A large climber 30 to 40 ft. long, glabrous. Leaves 9 to 12 in. long; leaflets ovate-oblong cuspidate, base round (laterals oblique), 6 to 8 in. long, 5 in. across; petioles 4 to 6 in. long. Inflorescence corymbose 2 in. long, 15- to 18-flowered, velvety; pedicels 2 in. long. Calyx greenish brown densely pungent-bristly, 35 in. long, campanulate, teeth minute. Corolla light dull purple, 1·75 in. long; standard 75 in. wide. Pod oblong 3·5 in. long, 1·75 in. wide. covered with close-set oblique plaits, edges of pod double reflexed. *Hab.* River banks and forests. Johor, Kota Tinggi. Pahang, Kwala Tembeling. Malacca, Mt. Ophir (Maingay). Perak, near Gunong

Bubu and Sungei Rayah (Kunstler); Temengoh; Gapis Pass (Curtis). Penang, Government Hill (Fox). Lankawi, Kesap (Curtis). *Distrib.* Sumatra, Borneo.

(2) **M. acuminata** *Grah. Wall. Cat.* 5621; *Prain, l.c.* 67.

Slender climber 20 to 30 ft. long. Leaves 6 to 10 in. long; leaflets glabrous above, sparingly puberulous beneath, ovate-oblong abruptly acuminate, base rounded, laterals oblique, 2.5 to 4 in. long, 2 to 3.5 in. wide; petioles 4 to 6 in. long pubescent. Inflorescence in small corymbs, 2 to 3 in. long; peduncles grey-pubescent. Calyx pale brown, densely pungent bristly, .5 in. long, tube wide, teeth unequal, upper ones truncate, lateral wide deltoid, lower linear, longer. Corolla 1.75 to 2 in. long, pale green or fawn and white. Pod 3 in. long, 1.5 in. wide, broad winged down sutures, not plaited, bristly. Seeds 3. *Hab.* Woods and thickets. Singapore, Chan Chu Kang. Selangor, Batu Caves. Perak, Gunong Malacca, Kinta (Kunstler). Penang (Wallich). *Distrib.* Java.

(3) **M. gigantea** *DC. Prodr.* ii. 405; *Baker, in Hook. fil. F.B.I.* ii. 186; *Prain, l.c.* 68.

Long slender climber, glabrous. Leaves 5 to 9 in. long; leaflets glabrous, oblong cuspidate, bases cuneate, laterals oblique, 4.5 in. long, 2.5 in. wide. Inflorescence a short umbelliform corymb of pale yellow flowers on a slender peduncle 4 to 18 in. long. Calyx .5 in. long, green with pungent bristles, teeth short, upper truncate, the others triangular. Corolla 1.25 to 1.5 in. long; standard .75 in. long. Pod winged down both sutures, smooth or with oblique cross ridges (not plaits), bristles yellow brown, 3.5 to 6 in. long, 2 in. across. Seeds 2 to 4. *Hab.* Thickets, especially on sea coasts. Singapore, Blakang Mati. Johor, Bekok river-bank. Muar, Sungei Pauh (Fox); Malacca, Tanjong Kling. Pahang, Pekan. Dindings, Bruas. Lankawi, Kwah (Curtis). *Distrib.* Indo-Malaya, China, Polynesia.

(4) **M. pruriens** *DC. Prodr.* ii. 405; *Baker, l.c.* 187; *Prain, l.c.* 68.

Annual climber, pubescent. Leaves 6 to 9 in. long; leaflets ovate-rhomboid, glabrous above, grey, silky beneath, shining, laterals very oblique, 3 to 5 in. long, 2 to 3 in. wide; petioles 2.5 to 4.5 in. long, silky. Racemes pendulous to 1 ft. long, 3- to 30-flowered; rachis silky. Calyx 4 in. long with few pungent bristles, campanulate, upper teeth triangular, lower lanceolate. Corolla 1.25 to 1.5 in. long, purple; standard .6 in. long and as broad. Pod 2 to 3 in. long, .5 in. wide, turgid, apex hooked, ridged longitudinally, densely pungent bristly. Seeds 5 to 6. Perak, Kampong Kota (Wray). *Distrib.* All tropics. *Native names*: Kachang Babi; Kachang Karkaras Gatal (applied to all species).

18. ERYTHRINA, Linn.

Trees, often big, thorny. Flowers large, red, in dense racemes, usually produced before the leaves. Leaves trifoliate, large. Calyx oblique, spathaceous, splitting to base or campanulate 2-lipped. Petals very unequal, slender, much longer than wings and keel. Upper stamen free nearly to base or connate with the others half-way; anthers uniform. Ovary stalked, many-ovuled; style incurved, beardless. Pod linear, turgid, torulose. Seed hard, brown or black. Species 25 to 30, tropics of both worlds.

Those occurring inland and south of Kedah are probably remains of cultivation. *E. indica*, *E. ovalifolia*, *E. stricta* and *E. lithosperma* have all been planted for ornament, shade for cocoa, and for stakes for pepper, and the plants of these species seen in the south of the peninsula have probably been planted for some such reason. They are popularly known as "Dadap" by Malays.

Pods turgid and seed-bearing throughout their length; hilum large, oval.

Calyx spathaceous, not 2-lipped.

Calyx oblique 5-toothed; flowers bright red; standard broad

Calyx cup-shaped, entire; flowers black red . . . (1) *E. indica*

Calyx oblique retuse; standard narrow . . . (2) *E. atrosanguinea*

Calyx 2-lipped. . . (3) *E. suberosa*

Pod 6-seeded . . . (4) *E. ovalifolia*

Pod 1-seeded; base of pod flat; one seed at tip (rarely 2 to 3) . . . (5) *E. lithosperma*

Pod turgid, beaked, 1 seed in middle . . . (6) *E. rostrata*

(1) *E. indica* Lam. *Encyc. Meth.* ii. 291; Baker, in Hook. *fl. F.B.I.* ii. 188; Prain, *l.c.* 70.

A big tree. Bark grey prickly, 60 ft. tall. Leaves 8 to 12 in. long; petioles 4 to 6 in. long, pubescent when young as are the leaves; leaflets, terminal sub-reniform, lateral oblique triangular, tip cuspidate, base truncate 4 to 6 in. long and about as broad, with 2 ovate glands (stipels). Stipules lanceolate. Racemes dense 4 to 6 in. long on woody peduncles 3 to 4 in. long; pedicels .25 in. long soon glabrescent. Calyx 1 to 1.25 in. long, oblique splitting down the back, teeth 5, 2 or 3 subulate .2 in. long, the others shorter. Corolla scarlet 2 to 2.5 in. long; standard 1 in. across. Pod 6 to 12 in. long; stalk .75 to 1 in. long, black torulose 6- to 8-seeded. Seed .6 in. long, brown. *Hab.* Seashores generally, often planted in towns. Perak (Scortechini). Kedah, Alor Sta; Gunong Geriang, apparently wild here (Ridley). *Distrib.* India, Malaya, Polynesia.

(2) *E. atrosanguinea* Ridl. *Journ. Roy. As. Soc. S. Br.* 59, p. 93.

A low tree. Branches thorny. Leaves (deciduous in flowering season) 6 in. long; leaflets ovate-obtuse, base round, coriaceous, glabrous; rachis and midrib on back armed, 3 in. long, 2 in. across.

Racemes 8 in. long. Flowers numerous, blackish red. Calyx cup-shaped entire with a short cusp .5 in. long, pubescent. Corolla 1 in. long; standard ovate; wings short, oblong-linear; pistil pubescent stalked. Pods 6 to 7 in. long, .5 in. wide, long-beaked torulose falcate. Seeds cylindric-oblong, blunt. *Hab.* Open sandy country. Kedah, Alor Sta, Bukit Pinang. Lankawi, Kwah seashore (Ridley).

(3) *E. suberosa* var. *horrida* Ridl.

Tree 30 to 40 ft. tall thorny, thorns large. Branches covered with thick conic thorns. Leaves unknown. Flowers 1.5 in. long, appearing before leaves. Calyx spathaceous, oblique retuse not 2-lipped, pubescent. Corolla standard narrow vermilion, much longer than broad, keel golden. Stamens grey. *Hab.* Lankawi, Terutau (Curtis). *Distrib.* Bangtaphan.

Prain says, *l.c.* p. 73, that the flowers are exactly those of *E. suberosa*, but the branch is much more thorny than in the Tenasserim form. I therefore make it a variety of *E. suberosa*, at least till the foliage has been collected.

(4) *E. ovalifolia* Roxb. *Hort. Beng.* 53; *Baker, l.c.* ii. 189; *Prain, l.c.* 72. = Jacson

Big tree. Bark grey prickly. Leaves 8 to 12 in. long; petioles 4 to 5 in. long, prickly; leaflets sub-coriaceous, glaucous beneath, glabrous, terminal one ovate, 4 to 6 in. long, 2.5 to 3.5 in. wide, laterals smaller, base round or broad cuneate; stipels 2 ovate glands. Racemes lax, 8- to 20-flowered, 3 to 6 in. long; peduncles 5 to 8 in. long. Buds narrow ovate. Calyx .5 in. long, 2-lobed, .6 in. across. Corolla dark velvety brown tinged scarlet; standard 1.5 in. wide, emarginate. Ovary grey puberulous, stalked. Pod 6 to 8 in. long; stalk .5 in. long, valves dehiscing. Seeds 6 to 8, brown, sub-reniform. *Hab.* Low country, probably the remains of cultivation. Malacca (Maingay). Perak, Kinta (Kunstler). *Distrib.* India to Malaya and Polynesia. Formerly cultivated here as a shade-tree for coffee.

(5) *E. lithosperma* Miq. *Fl. Ind. Bat.* i. 209 (not of Blume); *Baker, l.c.* ii. 190; *Prain, l.c.* 73. subarborescens

Tree 40 to 60 ft. tall. Stem prickly. Leaves 10 to 12 in. long; petioles 4 to 5 in. long, sometimes prickly; leaflets membranous, glabrous when adult, triangular-ovate cuspidate, terminal one wide cuneate at base, 4 to 6 in. long, 3 to 4 in. across; stipels 2 oblong glands, .15 in. long. Stipules ovate acute, puberulous. Racemes dense, 3 to 4 in. long; peduncles 5 to 8 in. long. Buds ovate. Calyx .3 in. long puberulous, equally 2-lipped. Corolla 1.5 in. long. Standard oblong obtuse, crimson red, wings and keel .5 in. long. Pod 4 to 8 in. long, 1.25 in. wide at base, which is flat and seedless, .6 in. wide in the upper 1- to 3-seeded part. Seeds .75 in. long, black. *Hab.* Dubiously wild here, formerly planted as a shade for cocoa and persisting in abandoned estates. The speci-

mens from Singapore (Hullett) were planted in waste ground near Tanglin post-office. *Hab.* Perak, Waterloo estate (Curtis); Gunong Malacca, Kinta (Kunstler). Penang (Wallich). *Distrib.* Indo-China and Malay islands.

(6) *E. rostrata* Ridl. n. sp.

Much-branched tree about 40 ft. tall. Young parts scurfy velvety. Leaves 9 in. long; petioles 3 to 4 in. long unarmed; leaflets thin, membranous, deltoid-ovate, terminal one with very broad cuneate base, apex acuminate, sub-acute, 5 in. long and as wide at base; nerves 4 pairs, laterals smaller, base broad very inæquilateral, rounded; petiolules 2 in. long, all glabrous, glands globose oblong. Calyx spathaceous, not bifid, split on upper side, 5 in. long (in fruit) ribbed. Pod stipitate; stipes 7 in. long; 1-seeded at base above stipes, dilate fusiform, 2 in. long, 1 in. through, tip long-beaked, beak 2 to 2.5 in. long, narrowed to the point. Seed one oblong, 5 in. long, pinkish red; hilum narrow. *Hab.* Pulau Adang seashore (Ridley).

I have seen no other specimen like it from anywhere, and no petals. Nearest perhaps to *E. indica*, but with only one seed and both ends of the pod narrowed.

19. INDIGOFERA, Linn.

Herbs and shrubs, more or less covered with appressed hairs and compound odd pinnate leaves. Flowers small numerous in axillary racemes. Calyx campanulate; teeth 5. Corolla standard ovate; keel straight not beaked, spurred at base. Stamens diadelphous; anthers apiculate. Ovary sessile; style short, incurved. Stigma pencillate. Pod linear-cylindric several-seeded. Species 250, tropics.

Herb very hairy; pod hairy; flowers rather large,
red

(1) *I. hirsuta*

Half shrubby, nearly glabrous; pod glabrous.

Calyx deep cleft; flowers small; pods narrow-
straight 1 in.; flowers yellow

(2) *I. tinctoria*

Calyx short-toothed; pods ascending 3 in. long;
flowers pink

(3) *I. Finlaysoniana*

(1) *I. hirsuta* Linn. *Sp. Pl.* 751; Baker, in Hook. *fil. F.B.I.* ii. 98; *Prain, l.c.* 81.

An annual branching brown-hairy herb, 1 to 3 ft. tall. Leaves 2 to 5 in. long; rachis brown-hairy; leaflets elliptic to obovate, base narrowed, tip rounded, silky on both sides, 1.25 in. long, 6 in. across; petiolules 1 in. long. Racemes axillary, 7 to 8 in. long, elongating, hairy. Flowers very numerous, small. Calyx 1.5 in. long, densely pubescent. Corolla 2 in. long, red. Pod 5 to 7 in. long, straight, densely pubescent, 6- to 8-seeded. *Hab.* Sandy seashores. Singapore, Tanjong Katong. Pahang, Pekan; Malacca, Pulau Besar. Penang (Curtis). Kelantan, Kampos. *Distrib.* Tropical seashores.

(2) **I. tinctoria** Linn. *Sp. Pl.* 751; *Baker, l.c.* ii. 99; *Prain, l.c.* 81.

A shrub 2 to 4 ft. tall. Branches slender erect. Leaves 1 to 2 in. long; petioles .5 to 1 in. long; leaflets thin, membranous, 4 pairs, obovate-oblong, .5 to 1 in. long, .2 to .3 in. wide, glabrous above, silky appressed beneath. Racemes 2 to 4 in. long, lax, sub-sessile. Flowers numerous, very small. Calyx .04 in. long, teeth acute. Corolla .15 to .2 in. long, reddish yellow exsert. Pod .7 to 1 in. long, cylindric, straight, slender, .1 in. thick. *Hab.* An occasional escape from cultivation. Singapore. Malacca (Griffith), Pahang near the Sultans' tombs. Pekan. Dindings, Pangkor (Scortechini). *Distrib.* Asia, origin doubtful. *Native names*: Nila; Tarum. The indigo plant.

The indigo cultivated by the Chinese extensively from cuttings is, I believe, *I. Anil*, Linn. It has short falcate fruit. I have only seen very poor fruit of it, as it is always cut before fruiting. It is a more woody plant than *I. tinctoria*, and is a native of South America.

(3) **I. Finlaysoniana** *Grah. in Wall. Cat. No.* 5288. *I. galeoides* *Prain, Journ. Beng. l.c.* 82, not of *DeCandolle*.

A tall shrub rising to 8 ft. Branches at first pubescent, then glabrous. Leaves 8 to 12 in. long; petioles .5 to 2 in. long; leaflets 6 to 12 pairs, oblong blunt, .5 in. long, .3 in. wide or bigger, membranous, green above, glabrescent beneath and appressed hairy. Racemes 2 to 3 in. long, dense-flowered. Calyx .04 in. long, hoary; teeth deltoid short. Corolla pink or pale red, .4 to .5 in. long. Pods glabrous cylindric, straight beaked, erect fastigiate, 2.5 to 3 in. long. Seeds 15 to 18. *Hab.* Sporadic, but apparently wild. It is not cultivated as *Prain* suggests. Malacca (Griffith). Pulau Tioman (Burkill). Perak, Bukit Bungarag (Kunstler). Lankawi (Curtis). *Distrib.* Indo-Malaya.

20. TEPHROSIA, Pers.

Herbs or shrubs. Leaves compound odd-pinnate; leaflets opposite. Flowers in terminal racemes. Calyx campanulate; teeth distinct, sub-equal. Corolla exsert; petals clawed. Standard sub-orbicular; keel incurved not beaked. Stamens diadelphous. Ovary sessile, linear; style incurved. Stigma penicillate. Pod linear flat, many-seeded, 2-valved. Species 100, tropics generally.

Pods brown hairy	(1) T. subamœna
Pods glabrescent	(2) T. purpurea

(1) **T. subamœna** *Prain, l.c.* 86. *T. Hookeriana* var. *amœna* *Prain, l.c.* 85.

A branched bushy herb slightly downy, about 2 ft. tall. Leaves 4 to 8 in. long; leaflets 6 to 9 pairs, narrow oblanceolate truncate, glabrous above, thinly silky beneath, 1 in. long, .2 in. wide. Stipules setaceous. Racemes lateral 6 to 14 in. long.

wings inside rosy, '35 to '5 in. long; standard silky with a rosy centre. Pods 2 to 2'5 in scimitar-shaped 2 in. long, '2 in. wide, brown hairy. Seeds 8 to 10. *Hab.* Waste ground; Singapore, Bidadari. Malacca, Bukit Sabukor; Bukit Bruang (Derry); Malaka Pindah (Cantley). Penang, Payah Trobong (Curtis); Batu Feringhi; Jelutong; Pulau Tikus. *Distrib.* North India. *Native name*: Kachang Buluh.

(2) **T. purpurea** Pers. *Synops.* 329; *Prain, l.c.* 85.

Shrubby at base, much-branched, glabrous. Leaves 3 to 6 in. long; leaflets 6 to 10 pairs oblanceolate, blunt, '5 in. long, 2 in. across, obscurely silky beneath. Racemes lateral 3 to 6 in. long, lax; pedicels slender, '1 to '2 in. long. Calyx silky '1 to '15 in. long; teeth linear. Corolla '25 to '3 in. long, pale mauve. Pods scimitar-shaped glabrous, 1'25 to 1'45 in. long, '1 in. wide. Seeds 6 to 8. *Hab.* Waste ground, roadsides, probably introduced. Malacca, road to Sungei Hudang. Pahang, Pekan. Selangor, Kajang. Penang, Batu Feringhi; Telok Bahang (Curtis). *Distrib.* Indo-Malaya.

EXCLUDED SPECIES

T. CANDIDA DC.; *Prain, l.c.* 84.

Singapore (Hullett), not native. All the specimens were from a plant in the Botanic Gardens now dead.

21. SESBANIA, Pers.

Shrubs or small trees or herbs. Leaves narrow even-pinnate with numerous linear leaflets. Flowers in racemes, axillary. Calyx campanulate 2-lobed or 5-toothed. Corolla exsert; petals all clawed; standard broad, keel straight, blunt or curved beaked. Stamens diadelphous. Ovary stipitate linear; style filiform incurved. Pod long and narrow septate between the numerous seeds. Species 40, cosmopolitan.

Pod twisted pendulous; flowers '75 in. long . . . (1) **S. paludosa**

Pod straight, ascending; flowers '5 in. long . . . (2) **S. cannabina**

(1) **S. paludosa** Roxb. *Hort. Beng.* 56; *Prain, l.c.* 82.

Tall annual herb up to 12 ft. tall, pithy. Leaves 4 to 12 in. long, sessile; leaflets 10 to 30 pairs, sparsely hairy. Racemes drooping 8- to 12-flowered, 4 to 5 in. long. Flowers few, yellow, dotted purple, '75 in. long. Pods 10 to 12 in. long, pendulous, twisted. *Hab.* Marshy open ground, Kedah, near ricefields (Kunstler). *Distrib.* India, Burma, China, Java.

(2) **S. cannabina** Pers. *Syn.* ii. 316; *Prain, l.c.* 83.

Slender herb, 3 to 6 ft. tall. Leaves 2 to 3 in. long, sessile; leaflets 8 to 20 pairs, glabrous, '3 in. long, '1 in. wide, dark green. Racemes about 1 in. long, slender; flowers few, '4 in. long yellow; standard streaked red. Pods cylindric, 8 in. long, '1 in. through.

Hab. Damp open spots. Perak, Temengoh. Perlis, Kanga. *Distrib.* Bengal, Burma, Java.

EXCLUDED SPECIES

S. GRANDIFLORA Pers. *Synops.* ii. 316; *Prain, l.c.* 84. *Agati grandiflora* Desv. *Journ. Bot.* i. 120, t. 4.

Tall slender tree 20 to 30 ft. high, 8 to 10 in. through. Leaves 6 to 12 in. long; leaflets 16 to 30 pairs, linear-oblong. Racemes 1 in. long. Flowers 2 to 4, white. Corolla 3 to 3.5 in. long. Pods 20 in. long. Cultivated for its leaves, eaten as a vegetable and in Kelantan at Kota Bharu as props for pepper-vines. Singapore, Perak, Kelantan. *Distrib.* Mascarene isles to North Australia. *Native name:* Turi.

S. COCCINEA Poir *Encyc.* vii. 127.

A low shrub with similar leaves and deep rose-coloured flowers as large. Pods shorter, occasionally cultivated in gardens. Origin unknown.

22. PSORALEA, Linn.

Herbs or under-shrubs. Leaves simple (or pinnate) gland-dotted. Calyx-tube campanulate, 5-toothed. Corolla little exsert; petals all clawed, upper stamen free; anthers small uniform. Ovary sessile or short-stalked. Pod ovoid or oblong, 1-seeded indehiscent; pericarp adhering to seed. Species 100, chiefly S. Africa, N. America and Australia.

(1) *P. Corylifolia* Linn. *Sp. Pl.* 764. *Baker, in Hook. fil. F.B.I.* ii. 103; *Bot. Mag.* t. 665.

Herbaceous annual branched, about 2 ft. tall, hairy all over and black, gland-dotted. Leaves simple ovate denticulate, base shortly cuneate or round, tip sub-acute, 4.5 in. long, 3.2 in. wide; petioles 1.5 in. long. Racemes axillary; peduncles 3 in. long. Flowers crowded in racemes 1.5 in. long, yellow, 10 to 30. Calyx .12 in. long, sessile; teeth lanceolate. Corolla hardly exsert. Pod .2 in. long, black, globose. *Hab.* Sporadic in waste ground. Singapore, Alexandra Road. Perak, Kamuning (Ridley). *Distrib.* India, Africa.

23. MILLETTIA, W. and Arn.

Prain, l.c. 86; *Dunn, Journ. Linn. Soc.* xli. 123.

Climbing shrubs or trees. Leaves imparipinnate 2 (rarely 1) to many leaflets. Panicles large or reduced to racemes of fascicles. Calyx campanulate; teeth short. Petals white or pink; standard ovate or orbicular; wings oblong. Stamens monadelphous (rarely diadelphous); filaments free at tip. Ovary sessile, rarely stipitate, 3- to many-ovuled. Pod linear or oblong, coriaceous or woody,

flattened or thick. Seeds lenticular or reniform. Species 134, Africa, Indo-Malaya, China, Australia.

- Woody climber; calyx silky; corolla mauve; pod
 velvety (1) **M. sericea**
 Trees; leaves simple; pod velvety (2) **M. unifoliata**
 Leaflets 3 to 5 pairs; pod brown velvety; flowers
 white (3) **M. albiflora**
 Leaflets 3 to 5 pairs; pods glabrous.
 Leaflets quite glabrous; pod not winged (4) **M. decipiens**
 Leaflets quite glabrous; pod winged on edges (5) **M. pterocarpa**
 Leaflets silky pubescent beneath; pod not winged. (6) **M. Hemsleyana**

(1) **M. sericea** Benth. *Pl. Jungh.* 248; Baker, in Hook. *fil. F.B.I.* ii. 104; Prain, *l.c.* 88; Dunn, *l.c.* 169.

A big woody climber. Leaves about 8 in. or less long; petioles 3·5 in. long; leaflets 3 to 4 pairs, elliptic shortly acuminate blunt, base rounded, coriaceous, coppery golden beneath with minute scales; nerves fine, conspicuous beneath, 3 to 4 in. long, ·2 in. wide. Racemes axillary 5 to 6 in. long. Flowers numerous, pedicelled. Calyx tubular, ·15 in. long, brown silky. Corolla ·5 in. long; standard brown outside, violet mauve darker at base, with yellow green central bar; wings mauve. Pod 3 to 7 in. long, 1 in. across, brown velvety turgid when ripe. Seeds 1 to 3, dark brown, 1 in. long, ·75 in. through. *Hab.* Common in woods. Johor, Kwala Sembrong (Kelsall). Malacca, Ayer Panas; Batu Tiga. Selangor, Kwala Lumpur. Negri Sembilan; Bukit Tampin, Perak, Larut (Kunstler); Simpang (Wray); Goping (Kunstler). Penang, Penara Bukit at 1000 ft. altitude (Curtis). *Distrib.* Sumatra, Java. *Native names:* Akar Mumbo; Akar Mumbol.

var. *malaccensis* Prain, *l.c.* Leaflets larger, 6 to 8 in. long, coppery beneath and rather less rigid. Pods longer, flat. Singapore (Lobb). Malacca (Hervey, Maingay).

(2) **M. unifoliata** Prain, *l.c.* 93.

Glabrous tree 20 to 30 ft. tall. Stem 10 to 15 in. through. Leaves simple, coriaceous oblong-lanceolate acuminate or caudate, base cuneate reticulate, midrib and 6 to 9 pairs of nerves elevate, 5·5 to 7 in. long, 1·5 to 2·5 in. wide; petioles ·1 to ·2 in. long thick. Racemes 3 to 6 in. long axillary with fascicles of 3 to 4 flowers, distant. Flowers white. Calyx ·2 in. long, campanulate, hairy inside; teeth short blunt. Pod linear 6 in. long, 1 in. across, flat, yellowish-velvety. *Hab.* Forests, local. Dindings, Lumut; Pangkor (Curtis). Perak, Goping (Kunstler).

(3) **M. albiflora** Prain, *l.c.* 92.

Tree 40 to 50 ft. tall, 2 to 3·5 in. through. Leaves deep shining green 8 to 12 in. long; leaflets coriaceous 3 to 6, lanceolate acuminate, base cuneate, glabrous, finely reticulate 5 to 10 in. long, 1·5 to 2·5 in. wide (lower ones smaller); nerves 6 to 9 pairs elevate; petioles ·1 in. long. Panicles slender shortly branched, at ends of

branches 1 to 1·5 ft. long, puberulous. Calyx ·25 in. long, campanulate; teeth triangular, brown. Corolla pure white ·75 in. long. Pod linear, dark velvety-brown, 7 to 13 in. long, 1·5 to 2 in. wide, flat, woody. *Hab.* Woods, river-banks; a very handsome tree. Pahang, Tahan River; Malacca (Maingay); Selangor Petaling; Klang Gates (Burn-Murdoch); Perak, Larut; Goping (Kunstler). Penang, old pass to Ralow (Curtis). *Native names:* Urat Rusa (deer-sinew); Kayu Rindu.

(4) **M. decipiens** *Prain, l.c.* 172.

Big tree, 40 to 60 ft. tall. Stem 2 to 3 ft. through, glabrous. Leaves 8 to 9 in. long; leaflets 4 to 5 pairs, membranous, elliptic acuminate (lowest ovate acuminate), beneath glaucous 2 to 3·5 in. long, 1·25 to 1·5 in. wide; petiolules ·2 in. long. Racemes axillary 6 in. long, puberulous to glabrous; pedicels ·2 in. long. Calyx wide cup-shaped, obscurely toothed ·15 in. long. Corolla ·4 in. long, pink or white tinged pink; standard orbicular, silky outside. *Hab.* River-banks, woods. Perak, Kwala Dipang (Scortechini); Temengoh. Pahang, Telor Sesih, Kwantan (Foxworthy). *Native name:* Jedar.

(5) **M. pterocarpa** *Dunn, l.c.* 175. *M. glaucescens* *Prain, l.c.* 89 (*not of Kurz*).

Large glabrous tree. Leaves 6 to 8 in. long; petioles 1·5 in. long; leaflets 3 to 4 pairs, membranous lanceolate caudate (lowest ones ovate) cuneate, glaucescent beneath, 3·5 in. long, 1 in. wide (lowest 1·5 in. long); petiolules ·1 in. long. Racemes axillary 6 in. long. Corolla 4 in. long; standard orbicular bicallose at base steel blue. Pod linear glabrous 6·5 in. long, 1 in. wide, sutures narrowly winged. *Hab.* Perak, Kapayong, Kinta (Wray); Ipoh.

(6) **M. Hemsleyana** *Prain, l.c.* 90; *Dunn, l.c.* 176.

Tree 20 to 90 ft. tall, 10 to 15 in. through. Branchlets puberulous. Leaves 6 to 8 in. long; rachis pubescent; leaflets 3 to 4 pairs, membranous, bright green, glabrous above, glaucescent and pubescent beneath, the midrib and bases of nerves beneath conspicuously bearded, elliptic-obovate (lowest ovate) acuminate 2 to 3·5 in. long, 1·25 to 1·5 in. wide; petiolules ·2 in. long; stipules ·25 in. long deciduous. Racemes axillary, slender 2·5 to 4 in. long, puberulous; pedicels ·25 in. long. Calyx shallow, tubular, pubescent, obscurely toothed, ·15 in. deep, red or green tinted red. Corolla ·4 in. long, white or tinged pink; standard orbicular bicallose at base. Pod linear-ob lanceolate, base narrowed, glabrous, ·6 in. long, ·75 in. wide. *Hab.* Forests, not rare in Perak. Pahang, Kwala Tembeling; Kwala Lipis (Foxworthy). Negri Sembilan, Johol. Perak, Ulu Slim (Kunstler); Plus River (Wray); Pulau Kamiri (Wray); Temengoh. *Native name:* Jada.

The fruiting specimens were referred by Prain to *M. decipiens*.

24. **FORDIA**, Hemsl.

Small trees with imparipinnate leaves of 8 to 12 leaflets. Flowers in stiff racemes borne on the old wood, or in small axillary fascicles. Calyx campanulate. Corolla pink or white, rather small. Ovary 2-ovuled. Seeds strophiolate. Species 6, China, Borneo, Sumatra.

(1) **F. pauciflora** *Dunn Kew. Bulletin*, 1911, p. 237. *Millettia cauliflora* *Prain, l.c.* 94.

A slender shrub 6 to 8 ft. tall, 4 in. through. Leaves 18 in. long, in a terminal tuft; leaflets 5 pairs membranous glabrous, lower ovate, upper elliptic, all caudate, base rounded or cuneate, lower 1.5 to 3.5 in. long, 1.4 in. wide, upper 4 to 6 in. long, 1.6 to 2 in. wide; nerves depressed above, elevate beneath; petiolules 1.5 in. long; rachis pubescent or glabrous. Flowers 2 or 3 in a short fascicle on the stem. Calyx .2 in. long. Corolla pink or white silky .3 in. long. Pods solitary curved, linear acuminate, narrowed at base, 4.5 in. long, .75 in. wide, thin. *Hab.* Rocky woods, chiefly limestone. Perak, Larut (Kunstler); Lenggong, on limestone rocks (Ridley).

25. **ADINOBOTRYS**, Linn.

Woody climbers or trees. Leaves alternate imparipinnate; leaflets opposite, 5-toothed. Standard round, short-clawed; wings oblong semi-sagittate. Stamens free from standard diadelphous. Ovary stipitate. Pod egg-shaped dehiscent. Seed 1, large (rarely 2) not flattened.

Climber; flowers golden velvety with large bracts. (1) **A. erianthus**

Big tree; flowers glabrous, deep purple. (2) **A. atropurpureus**

(1) **A. erianthus** *Dunn, l.c.* 194. *Millettia eriantha* *Benth. Pl. Jungh.* 250; *Prain, l.c.* 88.

Woody climber almost glabrous except inflorescence. Leaves 8 to 11 in. long; leaflets, 2 to 3 pairs obovate-oblong or elliptic cuspidate, 2 to 4 in. long, 1.25 to 2.5 in. across, dark green, stiffly coriaceous; petiolules .25 in. long. Racemes numerous, crowded, at first cone-like with large (deciduous) golden silky ovate acute bracts, 2 in. long, eventually 6 in. long; pedicels .15 in. long. Calyx campanulate, .4 in. long, brown red with bronze fur. Corolla standard rich coppery red, centre greenish yellow, outside dull red with golden fur. Stamens pink. Pod ovoid flattened, turgid 2 in. long, 1.75 in. wide, woody rugose hairy, beaked. Seed 1. *Hab.* Woods. Singapore, Bukit Mandai; Garden Jungle. Malacca, Batu Tiga (Holmberg); Jus (Goodenough). Pahang, Pulau Jellam, Pahang River. Negri Sembilan, Bukit Tumiang (Cantley). Penang, Telok Bahang (Curtis). *Native names*: Akar Pua; Akar Koyah; Akar Kuayah; Akar Pera.

(2) **A. atropurpureus** Dunn, *Kew Bulletin* 1911, p. 197. *Millettia atropurpurea* Benth. *Pl. Jungh.* 249; *Prain, l.c.* 89; *Pongamia atropurpurea* Wall. *Pl. As. Rar.* i. 70, t. 78.

A very large tree 60 to 80 ft. tall with a large head. Leaves 15 to 18 in. long, glabrous; leaflets 3 to 4 pairs, coriaceous deep shining green, narrow-oblong, base round, tip short cuspidate, 4 to 6 in. long, 1·5 to 2 in. across; petiolules 25 in. long. Racemes copious in a dense tomentose panicle 6 to 8 in. long. Bracts ovate, 1 in. across; pedicels 2 in. long. Calyx 25 in. long campanulate, teeth small 2 upper truncate, others acute, silky. Corolla black purple, 5 in. long. Pod about 4 in. long, 2 in. wide, 1- to 2-seeded, dark brown. Seeds 1 or 2, large thick brown. *Hab.* Common in forests and on river-banks, often covering the ground with its flowers. Pahang River, Malacca, Bukit Bruang; Sungei Hudang (Cantley). Negri Sembilan, Tampin Hill; Bukit Kandang (Cantley). Selangor, Ulu Selangor, Lankawi, Kesap (Haniff). Province Wellesley, Krian. Penang Hill (Curtis). Kedah, Yan. Jalor, Biserat (Gwynne Vaughan). *Distrib.* Tenasserim, Borneo, Sumatra. *Native names*: Tulang Daeng; Chicha; Girah Payah; Merbong.

26. PADEBRUGGEA, Miq.

Woody climbers with imparipinnate leaves. Flowers paniced, axillary, rather small, white or pink. Calyx campanulate; teeth short; standard orbicular, short-clawed; wings clawed, auricled. Ovary stipitate, 2-ovuled. Fruit flat, ovoid, very woody, wrinkled, large velvety. Species 2, Malay Peninsula and Java.

Panicles 3 in. long, 1·5 in. wide (1) **P. dasyphylla**

Panicles 6 in. long, 3 in. wide (2) **P. Maingayi**

(1) **P. dasyphylla** Miq. *Fl. Ind. Bot.* i. 150; Dunn, *Kew Bulletin* 1911, p. 197, fig. on p. 198. *Millettia oocarpa* Prain, *l.c.* 92.

Big climber. Branchlets glabrous. Leaves 6 to 8 in. long; leaflets 4 to 6 pairs, oblong rounded at both ends, glabrous above as is rachis, pubescent beneath, 2 to 3 in. long, 1 to 1·5 in. wide; petiolules 2 in. long. Stipels setaceous. Panicles axillary, 3 in. long, 1·5 in. across, only slightly puberulous. Calyx 2 in. long campanulate, puberulous; teeth obscure. Corolla white, tinged pink, 5 in. long. Standard orbicular, base auriculate, puberulous. Pod obovate, woody, woody rounded, 4 in. long, 2·5 in. wide, dark brown velvety somewhat rugose. *Hab.* Perak, Batu Togoh (Wray). *Distrib.* Java.

(2) **P. Maingayi** Dunn, *Kew Bulletin* 1911, p. 197. *Millettia Maingayi*, Baker, in. *F.B.I.* ii. 110; *Prain, l.c.* 91.

A long woody liane twisting round trees, about 2 in. thick. Leaves 8 to 10 in. long; leaflets 5 to 8 pairs, oblong, base round, tip round or sub-acute, 1·5 to 2 in. long, 1 in. across, coriaceous, velvety beneath; petiolules 2 in. long with persistent stipels

·1 in. long. Racemes copious in axillary panicles, pendulous 4 to 6 in. long, 6 in. through, pubescent. Flowers numerous, short pedicelled, rose pink, very fragrant. Calyx ·2 in. long campanulate pubescent. Corolla ·5 in. long. Standard auricled at base. Pod oblong, flattened, very woody deeply wrinkled, grey green, velvety, 6 in. long, 3·5 in. wide, ·75 in. thick, indehiscent. *Hab.* In lowland woods. Probably not rare, but not always flowering and usually high up in trees. Singapore, Garden Jungle (Maingay). Selangor, Ulu Selangor (Kunstler).

27. DALBERGIA, Linn. fil.

(*Prair.*, *Journ. As. Soc. Beng.* lxvi. 2, p. 112 and lxx. 2; *Ann. Bot. Gard. Calc.* x. i.)

Trees or climbing shrubs. Leaves with alternate sub-coriaceous leaflets. Flowers numerous, small in terminal axillary panicles, generally white. Calyx campanulate; teeth 5, short. Corolla exsert; standard broad, keel blunt; petals joined only at tip. Stamens 9 to 10, monadelphous with the tube split only above or diadelphous, split also below; anthers minute, basifixed, the cells back to back. Ovary stalked; ovules few; style short incurved, glabrous. Pod oblong or strap-shaped, usually thin and flat, not winged, 1- to 4-seeded, indehiscent. Species about 70, Tropics generally.

Standard erect; flowers small; inflorescence dichotomous.

Pod falcate reniform, thick; leaflets sub-coriaceous 2·5 by 1 in.

(1) *D. parviflora*

Pod samaroid, thin flat; panicles terminal; leaves pubescent beneath.

Leaflets 11 to 15, ·7 to 1·5 in. long; pods stiff

(2) *D. Scortechinii*

Leaflets 7 to 9 in. long; pods thin.

(3) *D. Curtisii*

Leaflets nearly 2 in. long

(4) *D. stercoracea*

Leaflets smaller, ·5 in. long; flowers foetid, ·5 in. long

(5) *D. phyllanthoides*

Pod widely ovate, elliptic, thin; leaflets numerous ·25 in. long

Standard bent back, wings sagittate; panicles cymose axillary; flowers ·25 in. long.

Pod ligulate; leaflets 3 or 4.

Ovary glabrous; flowers minute, white

(6) *D. Hullettii*

Ovary pubescent; leaves 4 by 2 in. coriaceous; flowers rather large

(7) *D. rostrata*

Pod falcate reniform.

Leaflets 3, acute, 3 in. long, lanceolate

(8) *D. menoides*

Leaflets 5 to 7, blunt, 1·5 in. long, obovate, seashores

(9) *D. torta*

Pod ligulate.

Leaflets numerous, 24 to 41, ·25 in. long

(10) *D. tamarindifolia*

Leaflets 13 to 17, glabrous beneath, 1 in. long

(11) *D. velutina*

Pod falcate reniform, thick corky.

Leaflets coriaceous oblong-ovate, 4 by 2 in.

(12) *D. Kunstleri*

(1) **D. parviflora** Roxb. *Hort. Beng.* 98; *Prain, l.c.* lxvi. 121 (part); *Ann. Bot. Gard. Calc.* x. 34, pl. 8.

Liane 80 ft. long. Main stem spiny. Leaves 6 to 8 in. long; leaflets 5 to 9, ovate-lanceolate, tip blunt acuminate retuse, base rounded glabrous; nerves and reticulations very fine, 2 to 3½ in. long, .75 to 1.5 in. wide. Panicles 3 to 4 in. long and as wide; branches and pedicels puberulous. Flowers minute secund. Calyx campanulate; teeth obtuse, upper 2 connate. Corolla white; petals short clawed; standard narrow obovate. Stamens 10, monadelphous, vexillary one shorter. Ovary glabrous; style short. Pod turgid, obovoid flattened, 1- to 2-seeded indehiscent, .75 to 2 in. long, .6 in. wide. Seed reniform. *Hab.* River-banks and forests. Pahang, Ayer Hitam, Pekan; Temerloh. Perak, Matang Jambu (Wray); Goping (Kunstler). Kedah, Kulim (Haniff). *Distrib.* Tenasserim, South Siam, Malay Archipelago.

(2) **D. Scortechinii** Prain, *l.c.* lxx. 444; *Ann. Bot. Gard. Calc.* x. 40, pl. 15.

Climbing shrub, glabrous. Leaves 6 to 8 in. long; leaflets 11 to 15 elliptic, blunt or retuse, glabrous except midrib above, puberulous beneath, .7 to 1.5 in. long (rarely larger), .35 to .75 in. wide; rachis and petioles puberulous. Flowers minute, white. Panicles terminal, 2 to 4 in. long, 1.5 to 3 in. wide, pubescent. Calyx teeth short, blunt, lowest longer lanceolate. Corolla white, petals short clawed. Stamens 9 in 2 bundles of 5 and 4, vexillary filaments free. Ovary pubescent, short, stipitate. Pod ovate-lanceolate, glabrous, stipitate, 1.5 to 2 in. long, .5 in. wide. Seed 1 to 3, reniform. *Hab.* Forests. Singapore, Bukit Timah. Malacca (Maingay). Perak, Bujong Malacca (Scortechinii). Penang, Ayer Hitam (Curtis). *Distrib.* Bangka, Borneo, Java.

(3) **D. Curtisii** Prain, *l.c.* 58; *Ann. Bot. Gard. Calc.* x. 41, pl. 16.

Climbing shrub. Leaves 6 to 7 in. long; leaflets 7 to 9, oblong or elliptic, base cuneate, tip rounded emarginate, glabrous above, puberulous except midrib beneath, 1.5 to 2 in. long, 1 in. wide; rachis and petiolules puberulous. Panicles 4 to 5 in. long, 3 in. wide pubescent. Flowers minute, white secund inodorous. Calyx campanulate; teeth short, blunt. Corolla white; petals short-clawed; standard wide oblong emarginate. Stamens 9 in one sheath split above. Ovary long, stipitate pubescent; style none. Pod glabrous. *Hab.* Lowland woods. Malacca (Maingay). Perak, Teluk Anson. Penang, Penara Bukit Road at 500 ft. altitude (Curtis). *Distrib.* Sumatra.

(4) **D. stercoracea** Maing. Prain, *l.c.* 58; *Ann. Bot. Gard. Calc.* x. 42, pl. 17. *D. Junghuhnii* Baker, in *Hook. fil. F.B.I.* ii. 233.

Climbing shrub 15 to 30 ft. long. Leaves 3 to 4 in. long; leaflets 7 to 9, oblong or elliptic, base cuneate, tip round truncate

or retuse, glabrous above, glaucous puberulous beneath, .6 to 1.25 in. long, .35 to .75 in. wide; rachis puberulous. Panicle and cymes terminal and axillary 3 to 4 in. long, .2 in. wide, pubescent. Flowers minute .1 in. long, white foetid. Calyx campanulate; teeth blunt short except lowest longer acute. Corolla, petals short-clawed. Stamens 9 in one sheath. Ovary short stipitate, tip pubescent; style short. Pod thin, membranous, green, glabrous, blunt, ellipsoid, 2.5 in. long, 1 to 1.5 in. wide, 1- rarely 2-seeded. *Hab.* Common, edges of forests and seashores. Singapore, Garden Jungle; Changi; Pulau Ubin. Johor, Minyak Buku. Malacca, Sungei Hudang; Bukit Bruang (Derry). Negri Sembilan, Seremban (Cantley). *Distrib.* Sumatra. *Native names:* Akar Urat-Urat; Akar Saga Paya; Bunga Pitaia.

(5) *D. phyllanthoides* Bl. *Miq. Fl. Ind. Bat.* i. 134. var. *sennoides* Prain, *Ann. Bot. Gard. Calc.* x. 43, pl. 20. *D. sub-sympathetica* Prain, *l.c.* lxvi. 116. *D. sennoides* Bl. *Miq. l.c.*

Climbing shrub 60 to 80 ft. long. Branchlets pubescent. Leaves 1.5 to 3 in. long; leaflets 9 to 15, elliptic-oblong, tip rounded, base cuneate, green glabrous above, glaucescent hairy beneath, .25 to .4 in. long, .2 to .3 in. wide; rachis pubescent. Panicles axillary small, 3 in. long, 1 to 2 in. across. Flowers minute secund. Calyx teeth blunt except the lowest acute. Corolla white; petals short-clawed; standard oblong or obovate emarginate. Stamens 9, usually in one sheath split above. Ovary glabrous or nearly so, short stipitate. Pod glabrous thin, membranous green, tip blunt, base cuneate, stipitate, 1- rarely 2-seeded, 2.5 in. long, 1 in. wide. *Hab.* Woods at hill bases. Perak; Waterfall, Thaiping (Wray); Penang, Waterfall (Curtis). *Distrib.* Java, Borneo.

(6) *D. Hullettii* Prain, *l.c.* lxvi. 119; *Ann. Bot. Gard. Calc.* x. 50, p. 85.

A shrub or treelet. Branchlets black puberulous, leafless when in flower. Stipules ovate acute, .25 in. long. Leaves unknown. Flowers white in short clustered racemes, 1 to 1.5 in. long, axillary with tufts of triangular pubescent bracts at base; pedicels slender, .3 in. long. Calyx campanulate rusty-tomentose, .15 in. long; teeth acute half as long as tube. Corolla petals long-clawed, standard orbicular reflexed, wings and keel-petals hastate. Stamens 9, rarely 10 in one sheath. Ovary glabrous, stipe long pubescent; ovule 1. *Hab.* Open swampy ground. Rare. Flowers when leafless. Singapore, Thomson Road (Hullett); Selitar (Ridley).

(7) *D. rostrata* Grah. *Wall. Cat.* 5867; Prain, *Journ. As. Soc. Beng.* lxx. 245. *D. pseudo-sissoo* Miq. *Fl. Ind. Bat.* i. 128; Prain, *l.c.* lxvi. (2), 118.

Woody climber 15 to 25 ft. long, glabrous, occasionally erect tree-like. Leaves 6 in. long; leaflets stiffly chartaceous, 3 to 4 (rarely 5 or 2) oblong, base narrowed cuneate or round, tip cuspidate;

nerves fine inconspicuous, glabrous, 2 to 4 in. long, 1 to 2 in. wide (terminal largest). Panicles lax axillary corymbose, grey downy, 2·5 to 3·5 in. long and as wide; pedicels ·15 in. long. Calyx campanulate, ·2 in. long, puberulous, teeth sub-equal, wide, triangular. Corolla cream white, tips flushed pink. Petals long-clawed; standard orbicular oblong reflexed. Stamens 9, in one sheath split above. Ovary long, stipitate, pubescent 1- to 2-ovuled. Pod ligulate firmly coriaceous, blunt 3 to 4 in. long, ·5 to ·65 in. wide. Seed 1, oblong, ·75 in. long. *Hab.* Woods. Singapore, Garden Jungle; Bukit Mandai. Penang Hill 200 to 400 ft. altitude (Curtis). *Distrib.* Ceylon, S. India, Malay islands to Celebes.

(8) **D. menoides** *Prain, Journ. As. Soc. Beng. l.c. lxvi. 120; Ann. Bot. Gard. Calc. x. 64, pl. 41.*

Woody climber. Leaves 5 in. long; leaflets 3, sub-coriaceous, glabrous above, glaucescent appressed puberulous beneath, lanceolate or ovate-lanceolate, base round or cuneate acute, 3 to 3·5 in. long, 1 to 1·5 in. wide. Flowers few, sessile in very short axillary racemes, ·15 to ·25 in. long. Calyx teeth obtuse sub-equal, pubescent. Corolla white, petals long-clawed; standard sub-orbicular emarginate, reflexed. Stamens 10 monadelphous. Ovary stipitate glabrous; ovule 1. Pod semilunar glabrous firm, 1·5 in. long, ·75 in. wide. Seed 1 reniform. *Hab.* Perak, Krian (Scortechini). Rare.

(9) **D. torta** *Grah. Wall. Cat. 5873; Prain, l.c. lxvi. 120; Ann. Bot. Gard. Calc. x. 64, pl. 42. D. monosperma Dalz. Baker, l.c. ii. 337. D. candanensis Prain, Journ. As. Soc. Beng. lxx. (2), 49.*

Climbing shrub. Leaves 3 in. long; leaflets 5 (rarely 3 or 7) obovate-oblong blunt or retuse, glabrous dark greenish above, appressed pubescent beneath, ·6 to ·8 in. long, ·4 to ·6 in. wide. Panicles sessile congested axillary 1 to 2 in. long, slightly puberulous. Calyx glabrescent, teeth short, triangular, blunt. Corolla white, ·2 in. long; petals long-clawed; standard oblong reflexed. Stamens 9 (or 10) monadelphous. Ovary stipitate, glabrous; style subulate; ovules 1 to 2. Pod flat, brown, rather thick, falcate rounded, ·9 in. long (1-seeded) or 1·5 in. long (2-seeded), ·5 in. wide. *Hab.* Littoral scrub; common. Singapore, Pulau Ubin; Kranji; Pulau Damar. Johor, Tana Runto; Pulau Tinggi (Feilding). Malacca, Tanjong Kling. Dindings. Perak, Matang (Scortechini). Lankawi (Curtis). *Distrib.* East Asia to Polynesia.

(10) **D. tamarindifolia** *Roxb. Hort. Beng. 53; Baker, l.c. ii. 234; Prain, l.c. lxvi. 117; Ann. Bot. Gard. Cat. x. 69, pl. 48.*

Climbing shrub (or erect tree 20 to 40 ft.). Branches densely pubescent. Leaves 5 to 6 in. long; leaflets 24 to 41, thin pubescent all over, paler beneath trapezoid-oblong, ·6 to ·75 in. long, ·3 in. wide. Stipules lanceolate, ·2 in. long. Panicles sessile or short-peduncled, corymbose dense, densely puberulous, ·5 to 2 in. long,

·5 to 1 in. wide. Calyx glabrescent, greenish yellow, teeth ovate. Corolla white; petals long-clawed; standard ovate, reflexed. Stamens 9 to 10 monadelphous. Ovary glabrous, stipitate; ovules 2 to 3. Pod thin green, brown when dry, reticulate ligulate stipitate, 1·5 to 3 in. long, ·4 in. wide. Seeds 1 to 3, nearly straight. *Hab.* Open forest near water; Pahang, Tahan River. Perak, Goping (Kunstler). Penang (Wallich 5865). Kedah, Yan. *Distrib.* Himalaya, Burma, China, Indo-China, Malay isles.

(11) **D. *velutina*** Benth. *Pl. Jungh.* i. 255; *Prain, l.c.* lxvi. 117; *Ann. Bot. Gard. Calc.* x. 74, *pl.* 55, 56.

Climbing shrub. Branches red-pubescent. Leaves 6 to 8 in. long; leaflets 13 to 17 oblong blunt or acute, membranous, dark green, rusty-velvety beneath, 1·5 to 2 in. long, ·6 to ·8 in. wide; rachis velvety. Stipules obovate to linear lanceolate, ·6 in. long. Panicles dense, axillary corymbose, 4 in. long, 2·5 in. wide, velvety. Calyx pubescent, base gibbous, upper teeth acute, lower obtuse. Corolla white or spotted pink, ·2 in. long; petals long-clawed; standard orbicular reflexed. Stamens 9 to 10, monadelphous, or tube partly split above on lower face; filaments alternately long and short. Ovary glabrous; ovules 2 to 3, stipitate, styles pubescent; style long. Pod stipitate thin, brown, 1- to 2-seeded, 2 to 3 in. long, ·6 to ·7 in. wide. *Hab.* Forest edges.

var. *Maingayi*. Leaves glaucescent, glabrous above, beneath branches, rachis, stipules and calyx rusty pubescent. Flowers pink or white. The commonest variety in the peninsula. Singapore Changi, near Tampinis. Malacca (Maingay both varieties), Lan-kawi, Kwah (Curtis), (typical form). *Distrib.* Type form, Burma, Assam: var. *Maingayi* Tenasserim, Malay islands.

(12) **D. *Kunstleri*** *Prain, l.c.* lxvi. 121; *Ann. Bot. Gard. Calc. l.c.* 104, *pl.* 90.

Liane 40 to 60 ft. long, 3 to 4 in. through. Branchlets pubescent. Leaves 10 to 12 in. long; leaflets 7 to 9, dark green, glabrous above, pubescent beneath, coriaceous elliptic acuminate, base round, 4 to 6 in. long, 2 in. wide; rachis and petiolules at first pubescent. Panicles 4 to 6 in. long, 3 to 4 in. wide, puberulous. Calyx teeth ovate-lanceolate blunt (except lowest, lanceolate). Corolla "dark blue" (probably dark pink); petals all long-clawed; standard orbicular emarginate. Stamens 10 usually in one sheath, which is sometimes split on both sides. Ovary long stipitate, pubescent. Style long, slender; ovules 2 to 4. Pod thick corky, pubescent falcate 1- (or 2-)seeded, 1·5 to 2·5 in. long, ·9 in. wide, ·4 in. thick. Seed reniform. *Hab.* Limestone rocks. Perak, Goping and Kinta River (Kunstler).

28. **PTEROCARPUS**, Linn.

Big trees. Leaves of about 7 coriaceous; leaflets alternate, racemes axillary paniced. Flowers light yellow. Calyx turbinate,

teeth short. Petals exsert, long-clawed; standard and wings crisped. Staminal sheath split above and often below; upper stamen free. Ovary stalked, 2-ovuled. Pod orbicular, 1-seeded, winged all round with the point near the base. Species 15, tropics.

(1) *P. indicus* Willd. *Sp. Pl.* iii. 904; *Prain, l.c.* lxvi. 123.

Tree 60 to 80 ft. or more. Stem 4 to 5 ft. through. Leaves 8 to 10 in. long; leaflets 5 to 9, ovate, base rounded or short cuneate acuminate, 2 to 4 in. long, 1.5 to 2 in. wide, terminal a little larger. Panicles 6 in. long. Calyx .25 in. long, brown silky. Corolla golden yellow, .6 in. long. Pod 1.75 to 2 in. across, pubescent. *Hab.* Common as a roadside tree all over the peninsula, and probably wild in rocky places near the sea and rivers, as in Malacca and Ulu Selangor (Kunstler). Penang (Wallich in 1822). *Native name*: Angsana. *Distrib.* Tenasserim, Malay islands, Java, Borneo.

29. PONGAMIA, Vent.

A tree. Leaves odd-pinnate. Flowers racemed, medium size pink. Calyx campanulate sub-truncate. Corolla much exsert; standard broad silky, keel blunt; petals cohering at tips. Stamens monadelphous, upper filament free low down; anthers versatile. Ovary sub-sessile 2-ovuled; style glabrous. Pod woody, oblong, turgid indehiscent. Species 1, seashores from Mascarene isles to Polynesia.

(1) *P. glabra* Vent. *Jard. Malm. t.* 28; *Baker in Hook. fil. F.B.I.* ii. 240; *Prain, l.c.* 94.

Tree about 40 to 60 ft. tall. Stem 2 to 3 ft. through. Leaves 8 to 10 in. long; leaflets 5 to 7, oblong or ovate acute, base cuneate, 3 to 7 in. long, 1 to 3.5 in. wide, thinly coriaceous, light green, glabrous. Racemes 4 to 6 in. long; peduncles 1 to 1.5 in. long; rachis puberulous. Calyx .12 in. deep. Corolla .35 to .5 in. long. Standard orbicular 2-auriculate at base. Ovary pubescent. Pod light brown, 1.5 to 2 in. long, .8 to 1.5 in. wide. Seed 1, testa white marked with brown lines.

var. *typica*. Leaflets 5, rarely 7, oblong-ovate, 2.5 to 3.5 in. wide. Racemes simple. *Hab.* Sea coasts in sandy spots, common all over the peninsula. The variety *xerocarpa* usually occurs further inland.

var. *xerocarpa*. Leaflets 7 to 9, lanceolate 1 to 1.35 in. wide. Racemes 2 to 3 together. *Hab.* Inland. Singapore, Bukit Timah Road. Malacca, Merlimau (Derry). Province Wellesley, Tasek Gelugur. Perak, Trong (Wray), Kedah. *Native name*: Malapari.

30. DERRIS, Lour.

Large woody climbers, rarely trees. Leaves odd-pinnate; leaflets exstipellate. Flowers pink, white or violet, showy in axillary or terminal panicles or racemes. Calyx campanulate nearly truncate. Corolla much exsert; standard broad, keel blunt. Stamens usually monadelphous, the upper one free in § *Aganope*;

anthers versatile. Ovary sessile; ovules few; style incurved filiform. Pod thin flat, indehiscent oblong (1-seeded) strap-like (few-seeded) winged on upper or lower sutures. About 40 species, tropics.

Standard without calli at base :—

Vexillary stamen free throughout; flowers paniced (§ *Aganope*).

Pod winged on the upper edge only and sinuate; flowers .5 in. long; green and white

(1) *D. sinuata*

Pod winged both sides; flower under .3 in. long, white

(2) *D. thyrsiflora*

Vexillary stamen united with the others; flowers fascicled on tumid nodes (§ *Eu-derris*).

Pods winged along upper edge only; narrow pointed with ends; seeds several.

Climber; flowers white in long narrow panicles, white

(3) *D. scandens*

Tree; leaflets numerous, 25 to 30; flowers in dense panicles, violet

(4) *D. dalbergioides*

Pods sub-orbicular or oblong; seeds few; climbers.

Pods glabrous; flowers pale pink

(5) *D. uliginosa*

Pods pubescent; flowers white, tipped pink

(6) *D. elegans*

Pods winged on both edges.

Flowers white

(7) *D. affinis*

Flowers pink

(8) *D. amœna*

Standard with 2 calli on the base.

Leaves and pink petals pubescent

(9) *D. elliptica*

Leaves and pink petals glabrous

(10) *D. malaccensis*

Pod thick woody unwinged dehiscent; fruit unknown

var. *aptera*

Flowers in slender racemes

(11) *D. Yappii*

(1) *D. sinuata* Thw. *Enum. Pl. Zeyl.* 93; Baker, in Hook. *fil. F.B.I.* ii. 246; Prain, *l.c.* 98.

Woody sarmentose shrub. Leaves 10 to 16 in. long; leaflets 5 to 7, coriaceous, glabrous ovate to ovate-oblong, shortly cuspidate blunt, base round or deltoid; nerves 5 to 7 pairs, 4 to 5 in. long, 2 to 3 in. wide. Panicles of long racemes 6 to 12 in. long. Flowers distant; pedicels .2 in. decurved. Calyx cup-shaped, silky .2 in. long, green. Corolla .6 in. long; keel and wings white; standard orbicular, .5 in. wide, base cordate, apple green, ecallose. Stamens diadelphous, vexillary one free to base. Ovary pubescent. Pod strap-shaped, sinuate between the seeds, upper suture narrow-winged, 4 to 8 in. long, 1.5 in. wide. *Hab.* Tidal rivers, common. Singapore, Yo Chu Kang; Pulau Ubin. Malacca (Griffith). Pahang, Kwala Lipis (Machado); Rumpin River (Evans). *Distrib.* India, Ceylon, Indo-China, Malaya.

(2) *D. thyrsiflora* Benth. *Journ. Linn. Soc.* iv. *Supp.* 114; Baker, *l.c.* ii. 246; Prain, *l.c.* lxvi. 99.

Sarmentose bush rarely climbing. Leaves 8 to 15 in. long;

leaflets 5 to 9, dark shining green, oblong to oblong-lanceolate acute or rounded at both ends, 4 to 6 in. long, 1·5 to 2·5 in. wide. Panicles large thyrsoïd, 8 to 24 in. long. Calyx tubular, truncate greenish white, 12 in. long, 15 in. wide. Corolla white, 3 in. long; standard orbicular, 35 in. across, base ecallose cordate. Stamens diadelphous, vexillary one free. Pod strap-shaped, thin, flat, winged on both sutures (wings 25 in. wide), 3·5 in. long, 1 to 1·25 in. wide. *Hab.* Common in open country. Singapore, Bukit Timah. Johor, Castlewood. Pahang River. Malacca, Bukit Bruang (Derry). Negri Sembilan, Seremban. Perak, Batang Padang (Kunstler). Penang Hill (Curtis). Kedah, Yan. *Distrib.* Sumatra, Java. *Native names:* Akar Tulang Bukit; Akar Berumbat.

(3) **D. scandens** Benth. *Journ. Linn. Soc. iv. Supp.* 103; Baker, *l.c.* ii. 240; *Prain, l.c.* 100.

Lofty climber up to 100 ft. tall. Leaves 4 to 6 in. long, dark green shining; leaflets 9 to 19, rigid, sub-coriaceous obovate-oblong to oblong acute, cuneate or rounded at base, 2 in. long, 75 in. wide, glabrous above, grey-pubescent beneath. Racemes short-peduncled to 15 or 18 in. long, pubescent. Calyx 12 in. long, silky campanulate. Corolla white or pale rose, 35 in. long. Stamens monadelphous. Pod 1 to 3 in. long, 4 to 5 in. wide, narrowed to both ends, narrowly winged above grey-silky, 1- to 4-seeded. *Hab.* In woods usually near the sea. Singapore, Pulau Merambong. Pahang, Pekan. Penang, Batu Feringhi and Telok Bahang (Curtis and Ridley). Lankawi, Terutau (Haniff). *Distrib.* Indo-Malaya, Australia.

(4) **D. dalbergioides** Baker, *in Hook. fil. F.B.I.* ii. 241; *Prain, l.c.* 101.

A tree 30 to 40 ft. tall. Branchlets pubescent. Leaves 6 to 8 in. long; leaflets 25 to 39, linear, rounded at both ends, tip emarginate, pale beneath, 1 in. long, 35 in. wide; rachis and petiolules pubescent. Racemes numerous 3 to 6 in. long, about 75 in. across; rachis pubescent. Calyx 15 in. long, brown-silky, teeth deltoid. Corolla 45 in. long, violet; standard oblong-cordate 2-glandular. Stamens monadelphous. Ovary pubescent. Pod 1- to 5-seeded narrowed to both ends, 1 to 2·5 in. long, winged along upper suture. *Hab.* Open country, a very pretty tree. Pahang, Kwala Sekim, Rumpin and Bunchah, Kwala Lipis (Foxworthy). Malacca, Batu Gajah; Machap Road; Bt. Panchur (Derry). Negri Sembilan, Tampin Hill. Perak, Padang Rengas; Tomoh (Machado). Setul. *Distrib.* Tenasserim. *Native names:* Munjai hutan; Berak Atai.

(5) **D. uliginosa** Benth. *Pl. Jungh.* 252; Baker, *l.c.* ii. 241; *Prain, l.c.* 102.

Black-stemmed slender woody climber 40 or more ft. long, glabrous. Leaves 5 to 8 in. long; leaflets 5 (or 3) stiff coriaceous,

ovate acuminate or caudate, base round 3 to 5 in. long, 1.5 to 2.5 in. wide, polished. Racemes 3 to 5 in. long of several flowers. Calyx .15 in. wide campanulate, edge ciliate. Corolla pale rose pink or white pink-tinted, .4 in. long; standard orbicular sub-cordate ecallose. Stamens 1-adelphous. Ovary puberulous. Pod round or oblong, 1 to 2 in. long, 1.25 in. across, rather thin and flat, yellowish. Seed 1 flat, 1 in. long and as wide. *Hab.* Climbing over bushes in mangrove swamps, common. Singapore, Kranji; Jurong; Pulau Ubin (Hullett). Johor, Tana Runto; Pulau Dayong (Feilding). Malacca, Pulau Besar (Griffith). Pahang,



FIG. 54.—*Derris uliginosa*.

Kwala Pahang. Dindings, Pangkor (Curtis). Penang, Pulau Betong (Curtis). Kedah, Pulau Song-Song; Alor Sta. *Distrib.* E. Africa, Mascarenes, to W. Polynesia. *Native name:* Akar Ketuil.

(6) *D. elegans* Benth. *Pl. Jungh.* 252; *Baker, l.c.* ii. 242; *Prain, l.c.* 103..

A slender liane about 60 ft. long. Branchlets pubescent. Leaves 8 to 12 in. long; leaflets green coriaceous 5 (rarely 3 to 7), terminal one largest, oblong to lanceolate, 3 to 8 in. long, 1.5 to 4 in. wide, glabrous above, red-pubescent beneath when young or always red-pubescent; nerves 6 to 8 pairs, prominent beneath. Racemes solitary or fascicled 2 to 3 in. long, villous. Calyx .15 in.

long, pubescent, black purple. Corolla white tipped pink, '4 to '5 in. long; standard orbicular-oblong eglandular. Stamens monadelphous. Ovary villous. Pod rounded-oblong, 1'5 in. long, 1 in. wide flat pubescent. Seed 1, rarely 2.

var. *typica*. Leaflets ovate to lanceolate acute, sub-glabrous beneath. Flowers '5 in. long. Selangor, Ulu Gombak (Burn-Murdoch). Perak, Gunong Bubu and Larut (Kunstler).

var. *vestita* Prain. Leaflets oblong-acuminate to ovate acute, always densely rusty-red-velvety beneath. Flowers '4 in. long. Malacca (Maingay). Perak, Larut and Gunong Bubu (Kunstler). *Distrib.* Tenasserim, Sumatra.

(7) **D. affinis** Benth. *Pl. Jungh.* 252; *Prain, l.c.* 104. *D. floribunda* Prain, *l.c.* 105.

Glabrous woody climber. Leaves 6 in. long; leaflets 5, stiffly chartaceous, ovate acute, base round, 2'5 in. long, 1'25 in. wide, glabrous; nerves 10 pairs hardly prominent. Panicles 6 to 12 in. long, sparingly branched; branches 2'5 in. long or less; rachis puberulous. Calyx campanulate '12 in. long, edge sinuate-toothed, sub-glabrous. Corolla white, '35 in. long; standard orbicular ecallose. Stamens monadelphous. Ovary sparsely hairy. *Hab.* Perak, Larut (Scortechini). Penang (Wallich). *Distrib.* Java.

(8) **D. amœna** Benth. *Pl. Jungh.* 252; *Baker, in F.B.I.* ii. 245.

Large climber. Black stem 50 ft. long. Leaflets 7 (or 9 or 5) sub-coriaceous or coriaceous, ovate-oblong cuspidate, base rounded or cuneate, 2 to 4 in. long, 1 to 2 in. wide; nerves indistinct. Panicles fastigiate, branched 6 to 9 in. long. Calyx campanulate '12 in. long, glabrescent, mouth sinuate, toothed. Corolla '3 in. long, rose pink; standard ecallose. Stamens monadelphous. Ovary puberulous. Pod thin, ligulate-oblong, 3 to 4 in. long, 1 to 1'5 in. wide; upper wing '25 in. wide, lower narrow. Seeds 2. *Hab.* Climbing high on trees in lowland forests.

var. *typica*. Leaves less coriaceous, green on both sides. Perak, Trong (Kunstler). Pulau Adang. *Distrib.* Tenasserim.

var. *Maingayana* Prain, *D. Maingayana* Baker, *l.c.c.* Leaves stiff, glaucous beneath. The commonest form, Singapore, Garden Jungle. Malacca, Sungei Hudang (Derry); Rembau; Bukit Sabukor; Brisu. *Native names*: Akar tuba; Akar Pah kedah.

(9) **D. elliptica** Benth. *Journ. Linn. Soc. iv. Supp.* 111; *Baker, l.c.* ii. 2, 43; *Prain, l.c.* 106. *Pongamia elliptica* Wall. *Pl. As. Rar.* iii. 20, *t.* 237.

Scrambling shrub. Stems black; shoots pubescent. Leaves 9 to 15 in. long; leaflets 9 to 13, membranous, at length sub-coriaceous, oblong to oblong-lanceolate cuspidate, 3 to 6 in. long, 1 to 1'3 in. wide, glabrous (adult) above, pubescent beneath. Racemes 9 to 10 in. long, tomentose. Calyx '25 in. long, campanulate, pubescent. Corolla rose pink (rarely white), '65 in. long;

standard orbicular, back silky, base bicallose. Stamens monadelphous. Ovary villous. Pod oblong to lanceolate, 1- to 4-seeded winged on upper suture, slightly on lower, 1·5 to 3·5 in. long, .75 in. wide. *Hab.* Scrambling over rocks. Often cultivated by Chinese as an insecticide. I am doubtful as to its occurring wild, though it may be so in a few places where it grows over rocks, as at Penara Bukit in Penang (Curtis) and in Perlis. *Distrib.* Cambodia, Siam to Malay isles. *Native name:* Akar Tuba. *Use:* For drugging fish and killing insects on crops; a solution of the root bark used. Poisonous. (See Gimlette, "Malay Poisons," p. 92.)

(10) **D. malaccensis** Prain, *l.c.* 107. *D. cuneifolia* var. *malaccensis* Benth. *Journ. Linn. Soc. iv. Supp.* 112.

Climbing shrub 30 to 50 ft. long, glabrous. Leaves 9 to 15 in. long, bright green; leaflets 5 to 7 (or 9) sub-coriaceous elliptic, base round, caudate-acuminate glabrous, 4 to 6 in. long, 2 to 2·5 in. wide. Racemes solitary axillary, 4 to 6 in. long. Calyx .15 in. long, reddish campanulate, edge ciliate, sinuate. Corolla rose pink (or white), .65 in. long; standard orbicular truncate or obcordate, base bicallose. Stamens monadelphous. Ovary pubescent. Pod oblong, winged or not, 1- to 4-seeded, 2 to 3 in. long. *Hab.* Forests, Singapore, Chan Chu Kang. Selangor, Ulu Selangor (Goodenough); Sempang Track, Semangkok Pass. Perak, Goping (Kunstler). Penang, Waterfall (Curtis). *Distrib.* Tenasserim, Siam, Borneo.

var. *aptera* Prain, *l.c.c.* and var. *millettioides* Prain.

Only fruiting specimens of these are known. They differ from *D. malaccensis* in having the pod thick and woody without any wing, and in the specimen labelled *millettioides* pointed at both ends and dehiscent, as in *Pongamia*; the leaflets are rather more coriaceous and round at the base, seldom even slightly narrowed. In *malaccensis* the pod is quite thin, strongly nerved and winged, the leaves thinner and often narrowed distinctly to the base. A specimen from Wray, Simpang plains, Perak, while having the thick pod of *aptera*, has a trace of wings, and the leaves are thin and narrowed at the base. Till flowers of this variety *aptera* are obtained, it must, I think, be placed as a variety of *malaccensis*, but I expect it to turn out an entirely distinct plant. The specimens were obtained from Perak, Ulu Bubong, Larut and Goping by Kunstler.

(11) **D. Yappii** Craib, *Kew Bulletin*, 1910, p. 21.

Branchlets grey, pustulate, when young hirsute. Leaves 8 in. long; leaflets 7, glabrous chartaceous, ovate or elliptic, cuspidate-caudate, base rounded or narrowed, 3 to 4·25 in. long, 1·6 to 2 in. wide; nerves prominent beneath, 10 pairs; petiolule .2 in. long. Racemes fascicled or solitary 1 to 3·5 in. long; rachis red-hairy. Calyx truncate, puberulous .1 in. long. Corolla .25 in. long. Standard orbicular emarginate. Stamens monadelphous; anthers

uniform. Ovary sessile, pubescent, 4-ovuled. *Hab.* Kelantan, Kwala Aring (Yapp).

31. KUNSTLERIA, Prain.

Big lianes. Leaves unequally pinnate, 1- to 7-foliate, exstipellate; stipules small. Panicles large thyrsoid, terminal and in upper axils. Flowers abundant, small, dark purple to nearly black. Calyx campanulate, teeth lanceolate, upper 2 connate. Corolla exsert; standard ovate entire, keel boat-shaped; petals slightly cohering. Stamens 10-diadelpheous, upper one free and adnate to the standard claw; filaments alternate, long and short; anthers versatile. Ovary sessile; ovules free; style filiform, incurved. Pod thin, strap-shaped, membranous or coriaceous, indehiscent not winged. Seeds 1 to 3 oblong, flat. Species 5, Malay Peninsula and Sumatra.

Leaflets solitary.	.	.	.	.	.	.	(1) K. Curtisii
Leaflets 3.	.	.	.	.	.	.	(2) K. Kingii
Leaflets 5, thickly coriaceous, dense, red-velvety beneath	.	.	.	.	.	.	(3) K. Forbesii
Leaflets 5, chartaceous, glabrous.	.	.	.	.	.	.	(4) K. Ridleyi
Leaflets 7.	.	.	.	.	.	.	(5) K. Derryi

(1) **K. Curtisii** Prain, *l.c.* 110.

Liane. Leaves 5 to 8 in. long; leaflets solitary, peltate ovate-lanceolate, coriaceous, 4 to 6.5 in. long, 2.5 in. wide, acute, base rounded; nerves 4 to 5 pairs, prominent as are reticulations beneath, above glabrous, beneath red-tomentose; petioles .75 to 1.5 in. long; petiolules .25 in. long. Panicles terminal and axillary, 8. to 12 in. long, 5 to 8 in. across, rusty-pubescent. Calyx campanulate pubescent, .15 in. long; teeth triangular, upper deltoid bifid. Corolla .25 in. long, purple, standard ovate-oblong. Pod thin, flat red-velvety, 5 in. long, 1 in. wide. Seeds 2 to 3.

var. *typica*. Leaves above and petioles glabrous, beneath pubescent, hairs white; rachis and branches rusty-pubescent. Pods reticulate. *Hab.* Forests, Penang, Telok Bahang (Curtis).

var. *laxiflora*. Leaves beneath, petioles and petiolules, rachis and pods densely red-velvety. *Hab.* Dindings, Telok Serah (Curtis).

(2) **K. Kingii** Prain, *l.c.* 110; King, *Ann. Bot. Gard. Calc.* ix. 26, *pl.* 35.

Liane over 100 ft. long. Leaves 5 to 8 in. long, trifoliate, glabrous; leaflets ovate-lanceolate, 4 to 6 in. long, 1.5 to 2 in. wide, tip acute, base of terminal one cuneate, of laterals rounded; nerves 5 to 6 pairs, prominent beneath, as are reticulations, thinly coriaceous; petioles 1.5 to 2.5 in. long; petiolules .2 in. long. Panicles 8 to 12 in. long, 5 to 8 in. across, pubescent. Calyx campanulate, pubescent, .15 in. long; teeth triangular, upper deltoid bifid. Corolla black, tipped red, .25 in. long. Pod reticulate brown-pubescent, 2 to 4 in. long, .6 in. wide, 1- to 2-seeded. Seeds

oblong, 1·25 in. long, dark brown. *Hab.* Dense jungle at 800 to 1500 ft. altitude. Perak, Larut Hills (Kunstler).

(3) **F. Forbesii** *Prain, l.c.* III.

Woody climber 6 to 10 ft. tall. Branches rusty-pubescent. Leaves 8 to 10 in. long; leaflets 5, elliptic, coriaceous stiff, glabrous above, red-tomentose beneath, base rounded peltate, tip acute; nerves 6 to 9 pairs, elevate beneath, 3·5 to 5 in. long, 2 to 2·5 in. wide; petioles 3·5 in. and petiolules ·25 in. long, red-pubescent. Panicles strict velvety, 12 to 18 in. long, 5 to 6 in. wide. Calyx campanulate, velvety, ·15 in. long; teeth lanceolate, upper triangular bifid. Corolla lake-red, ·25 in. long. *Hab.* Perak, Selama (Kunstler). *Distrib.* Sumatra.

(4) **K. Ridleyi** *Prain, l.c.* III.

A very big liane. Branchlets puberulous. Leaves 6 to 8 in. long; leaflets 5, elliptic coriaceous, glabrous, base rounded, tip blunt; nerves 5 to 6 pairs, slender prominent, reticulations conspicuous, fine, 2 to 3·5 in. long, 1·25 to 2 in. wide (terminal one much the largest); petioles 2 to 3 in. long; petiolules ·2 in. long pubescent. Panicles 12 to 18 in. long, 4 to 6 in. across pubescent. Calyx campanulate rusty, ·15 in. long; teeth triangular, upper deltoid bifid. Corolla ·25 in. long, purple black. Pod golden-pubescent reticulate 6 in. long, 1·25 in. wide. *Hab.* In lowland woods, not rare but local. Singapore, Garden Jungle; Selitar (Ridley).

(5) **K. Derryi** *Prain, l.c.* II2.

Liane. Branchlets rusty-pubescent. Leaves 6 to 8 in. long, ·75 to 1·5 in. wide, base of terminal deltoid, of laterals rounded, tip cuneate; nerves 6 to 7 pairs prominent beneath, stiff chartaceous, pubescent on nerves above, entirely so beneath; petioles 2·5 to 3 in. long. Panicles strict, 12 to 15 in. long, 2 to 3 in. wide, pubescent. Calyx campanulate, ·15 in. long; teeth triangular, upper notched. Corolla dark purple, ·25 in. long. *Hab.* Malacca, Machap-Tebung Road (Derry).

32. GEISSASPIS, Wight and Arnott.

Annuals. Leaves of two pairs of leaflets. Flowers in terminal racemes with large membranous persistent ciliate bracts. Calyx 2-lipped, upper lip entire, lower toothed. Corolla exsert, yellow. Standard round. Stamens monadelphous. Ovary short-stalked; ovules 2; style incurved. Pod of 1 to 2 joints, turgid, edge flat, reticulate veined. Species 3, India, Africa.

(1) **G. cristata** *W. and A. Prodr.* 218; *Baker, in Hook. fil. F.B.I.* ii. 181.

Densely cæspitose trailing. Branches ·5 to 2 ft. long. Leaves ·5 in. long; leaflets obovate retuse, ·4 in. long, ·2 in. wide. Heads 1 in. long; bracts ·5 in. long, ·2 to ·3 in. wide, reniform green to brown with red cilia. Flowers very small, yellow. Pod joints 1 to 2·15 in. long. *Hab.* Sandy open country, edges of rice-fields in the

north, Kedah, Alor Sta. Perlis, Kanga, common (Ridley). *Distrib.* India, Burma, Cambodia.

33. ZORNIA, Gmel.

Annual herbs. Bracts large coriaceous; leaflets 1 to 2 pairs, dotted. Flowers in lax racemes. Calyx minute; upper teeth short, connate, lowest shorter. Corolla exsert yellow; standard broad. Stamens monadelphous. Ovary sessile; ovules many. Pod of several flattened, muricate joints, 1-seeded. Species 10, all but 2 American.

(1) **Z. diphylla** Pers. *Synops.* ii. 318; *Baker, in Hook. fil. F.B.I.* ii. 147; *Prain, l.c.* 126.

A diffuse prostrate annual. Branches wiry, 18 in. long. Leaves .25 in. long; leaflets 1 pair lanceolate, .5 in. long, .12 in. wide, dotted glabrous. Stipules lanceolate with a long spur. Racemes 3- to 12-flowered, 1 to 3 in. long. Bracts ovate acute, .2 in. long. Corolla pale orange or yellow, very small. Pods .4 in. long, joints 1 to 6, pubescent, prickly. *Hab.* Sandy places, Singapore, Changi and Galang. Penang, Fort Cornwallis (Burkill). *Distrib.* Cosmopolitan.

34. SMITHIA, Ait.

Herbs or under-shrubs. Leaflets many; leaf-rachis ending in a bristle. Stipules scarious, large auricled. Flowers racemose axillary. Calyx 2-lipped, lips entire. Corolla exsert. Standard orbicular. Stamens in 2 bundles of 5. Ovary linear; ovules many. Pod of several joints folded in calyx. Species 20 to 30, Old World tropics.

(1) **S. sensitiva** Ait. *Hort. Kew, ed. I, iii.* 496; *Baker, in Hook. fil. F.B.I. l.c.* 148; *Prain, l.c.* 126; *Salisb. Parad. t.* 92.

Diffuse spreading herb. Base woody, glabrous. Branches 1 to 3 ft. long. Leaf .5 to 1 in. long, sparsely bristly; leaflets 3 to 10 pairs, .25 to .4 in. long, oblong blunt, edges and midrib bristly. Racemes 1- to 6-flowered; peduncles .3 in. long; pedicels .15 in. long. Bracts small ovate acute, scarious. Calyx .25 to .3 in. long, lips sub-acute, bristly. Corolla yellow, .4 in. long. Pod of 4 to 6 joints, faces papillose. *Hab.* Sandy spots. Perak, Tambun near Ipoh. Perlis at Kanga (Ridley). *Distrib.* S.E. Asia, Africa.

35. AESCHYNOMENE, Linn.

Erect herbs or under-shrubs. Leaves with very numerous odd-pinnate linear narrow leaflets. Flowers few in racemes. Calyx 2-lipped, faintly toothed. Corolla thin, yellow; standard orbicular, keel not beaked. Stamens in 2 bundles of 5. Ovary stalked linear; style filiform incurved. Pod linear, stalked with 4 to 8 flat 1-seeded joints. About 30 species, tropics generally.

Stems slender much branched; flowers small; pod narrow, smooth

Stem little branched; flowers large; pod broad, warted. (1) *Æ. indica*

(1) *Æ. indica* Linn. *Sp. Pl.* 713; Baker, in *Hook. fil. F.B.I.* ii. 151; Prain, *l.c.* 128.

Slender annual herb 1 to 3 ft. tall, glabrous. Leaves 2 to 3 in. long; leaflets 20 to 30 pairs linear obtuse, .2 in. long, .05 in. wide. Stipules lanceolate, auricled, .3 in. long. Racemes axillary 1- to 4-flowered; peduncles 1 in. long. Calyx .2 in. long, glabrous; teeth unequal, 2 upper ones sub-connate. Corolla .45 in. long, thin yellow, tinged pink or orange. Pod 1 to 1.5 in. long, straight, .12 to .15 in. broad, upper edge straight, lower dented, joints 8 to 10. *Hab.* Ponds and wet spots in open country. Singapore, Galang, Johor, Batu Pahat. Province Wellesley, Bukit Seraya. Perak, Temengoh. Perlis, Kanga. Jalor, Biserat (Gwynne-Vaughan). *Distrib.* Tropics.

(2) *Æ. aspera* Linn. *Sp. Pl.* 713; Baker, *l.c.* ii. 152; Prain, *l.c.* 128.

Shrubby, pithy, 3 to 12 ft. tall, 3 in. through, unbranched. Leaves 3 to 6 in. long; leaflets 30 to 50 pairs, linear obtuse .2 to .5 in. long, .05 in. wide. Stipules lanceolate, auricled. Racemes axillary, sometimes branched, 2- to 4-flowered, 2.5 in. long. Calyx hairy, unequally toothed. Corolla .75 in. long, yellow. Pod 2 to 2.5 in. long, .3 in. wide, indented both sides, edges and faces echinulate, joints 4 to 8. *Hab.* Very rare in wet spots, only once collected and possibly a temporary alien. Malacca (Griffith). *Distrib.* S.E. Asia and Africa. "Sola" used in making pith hats.

36. URARIA, Desv.

Shrublets. Leaves of 1 to 9 leaflets. Flowers small very numerous in a dense hairy raceme. Calyx-tube short, two upper teeth short, lower ones setaceous white hairy. Standard broad, wings adhering to keel. Stamens diadelphous; anthers uniform. Ovary sessile or short-stalked; ovules few. Pod of 2 to 6 small turgid 1-seeded joints. Species 15, tropical Asia.

Erect plants; leaves 5- to 9-foliolate; heads cylindric.

Leaflets oblong; heads thick, 8 to 18 in. long (1) *U. crinita*

Leaflets narrow, lanceolate under an inch wide; head slender (2) *U. picta*

Creeping plant; leaflets 1 to 3; heads dense, short, oblong 1 to 2.5 in. long (3) *U. lagopoides*

(1) *U. crinita* Desv. *Journ. Botanique* i. 123; Baker, *Hook. fil. F.B.I.* ii. 155; Prain, *l.c.* 130.

Shrubby plant about 1.5 to 3 ft. tall. Stems downy, hardly branched. Leaves, petioles 2 to 3 in. long; leaflets 2 to 5 pairs oblong to ovate acute, base round, sub-coriaceous, glabrous above rachis, midrib and nerves elevated, beneath hairy, 3 to 4 in. long, 1.5 in. wide. Stipules lanceolate acuminate, .6 in. long puberulous.

The lower leaves and those of young plants are trifoliate. Racemes dense, cylindric, 5 to 12 in. long, 1 to 1·5 in. through; bracts scarious, deciduous; pedicels ·45 to ·65 in. long with long bristles. Calyx ·2 in. long, teeth plumose. Corolla ·3 in. long, light blue. Pod puberulous, joints 4 to 6, black, ·13 in. long, ·1 in. wide. *Hab.* Common in open ground, banks, etc. Singapore, Orchard Road. Johor, Kwala Sembrong (Kelsall). Malacca, Pulau Sepang; Sungei Hudang; Brisu. Pahang River; Piangu, Endau (Evans). Selangor, Rantau Panjang (Kloss); Batu caves; Kerling. Perak, Temengoh. Patani, Tomoh (Machado). Penang, Balik Pulau (Curtis). Kelantan, Lebeh River (Yapp). Setul. *Distrib.* Indo-China, Malaya. *Native names*: Poko Ekor Anis; Ekor Kuching; Seringau; Pua Acoraging.

(2) *U. picta* Desv. *Journ. Bot.* i. 123, t. 5, fig. 19; *Baker, in Hook. fil. F.B.I.* ii. 155; *Prain, l.c.* 130.

Tall, little-branched shrublet 3 to 6 ft. tall. Young stems downy. Leaves 2 or more in. long; leaflets 2 to 4 pairs, linear-lanceolate acuminate obtuse, coriaceous, green with a white central band finely reticulate, pubescent beneath as is rachis, 2·5 to 3·5 in. long, ·2 to ·3 in. wide; nerves beneath elevate. Racemes dense cylindric, 6 to 12 in. long, ·5 in. through; pedicels ·25 in. long, bristly. Bracts ovate-acuminate, bristly. Calyx ·2 in. long. Corolla violet pink exsert, ·3 in. long. Pod glabrous lead-colour, joints 3 to 6, ·13 in. long, ·1 in. wide. *Hab.* Open sandy country, rare. Pahang River. Province Wellesley, Tasek Gelugur; Permatang Bertam. Jalor, Biserat, paddy-fields (Gwynne-Vaughan). *Distrib.* India, Cambodia, Malaya.

(3) *U. lagopoides* DC. *Prodr.* ii. 324; *Baker, l.c.* ii. 156; *Prain, l.c.* 131.

Creeping and ascending woody shrublet, 1 to 3 ft. long. Leaves 1 to 2 in. long; rachis pubescent; leaflets solitary or one pair and a larger terminal one oblong rhomboid rounded, base truncate or cordate, thickly membranous, glabrous above, reticulate, hairy beneath, 1 to 2 in. long, ·75 to 1 in. wide; petioles ·5 to ·75 in. long. Stipules lanceolate setaceous. Racemes dense oblong, 1 to 2·5 in. long, ·8 in. through; bracts lanceolate silky, acuminate. Calyx ·12 in. long, plumose. Corolla white. Pods glabrous, joints reticulate, ·15 in. long, ·8 in. wide. *Hab.* Open sandy country. Pahang River; Raub track (Machado). Selangor, Batu Caves. Perak, Tambun, Ipoh; Kwala Kangsa; Temengoh. Province Wellesley, Pagar Tras; Tasek Gelugur. Perlis, Kanga. Setul. Jalor, Biserat (Gwynne-Vaughan). *Distrib.* India, China, Malaya.

37. PHYLACIUM, Benn.

Twining herbs. Leaves trifoliate. Stipules small, persistent, linear; leaflets stipellate. Racemes axillary; pedicels short, completely enveloped in a large boat-shaped bract. Calyx tubular,

2-lipped, 4-toothed. Standard ovate retuse, base bi-auriculate; wings oblong, long-spurred; spurs incurved, keel straight, short spurred. Stamens diadelphous, upper filament adnate to slender claw. Ovary short-stalked, base surrounded by a disc; style inflexed. Pod round, acute, stalked. Species 2, Indo-China and Malayan.

(1) **P. bracteosum** Benn. *Pl. Jav. Rar.* 159, t. 33; *Prain, l.c.* 129.

Twenty to 30 ft. long. Young parts and leaves beneath hairy; leaflets ovate-oblong, blunt, base rounded, herbaceous, 2 to 3 in. long, 1.5 in. wide; petioles 1.5 in. long. Racemes 2 to 10 together, 1.5 to 2 in. long. Bracts pale green, 1 to 1.5 in. long, hairy inside. Calyx .15 in. long. Corolla .3 in. long, white tinted pink. Pod .25 in. long, hairy. *Hab.* Rare, in open jungle. Perak, Gunong Pondok (Kunstler). *Distrib.* Malay isles.

38. ALYSICARPUS, Neck.

Diffuse herbs. Leaves simple rarely 3-foliate, stipellate, subcoriaceous. Flowers small in axillary racemes. Calyx glumaceous, teeth long, upper 2 often connate. Corolla not exsert. Standard broad, keel obtuse adhering to wings. Stamens diadelphous. Ovary sessile or nearly so; style incurved. Pod terete or turgid of several 1-seeded joints. About 15 species, tropics of Old World.

Herb, 1 to 2 ft. erect; upper leaves lanceolate;
flowers white

(1) **A. vaginalis**

Prostrate herb; all leaves oblong; flowers
purple

(2) **A. nummularifolius**

(1) **A. vaginalis** DC. *Prodr.* ii. 353. *Miq. Fl. Ind. Bat.* i. 231; *Prain, l.c.* 132.

Wiry erect or ascending herb, 1 to 2 ft. tall, glabrous. Leaves 1-foliate; petioles .1 to .2 in. long; leaflets lower, oblong obtuse, base cordate .5 in. long, .2 in. wide, upper narrow lanceolate, subacute 1.5 in. long, .1 in. wide. Stipules lanceolate papery, .3 in. long. Raceme at end of branch, 1.5 in. long. Flowers 8 to 12, yellowish white or brown. Calyx .12 in. long, glabrescent, teeth setaceous. Pod terete reticular veined, .5 to .75 in. long, joints 6 to 8. *Hab.* Dry open places. Singapore, Changi. Malacca, Pulau Besar (Maingay). Dindings, Lumut; Pangkor (Scortechini). Perlis, Kanga. *Distrib.* India, Africa, China, Malaya.

(2) **A. nummularifolius** DC. *Prodr.* ii. 353. *A. vaginalis* var. *nummularifolius* *Miq. l.c.*; *Baker, l.c.*; *Prain, l.c.* 133.

A hairy dwarf prostrate herb creeping in grass-turf. Leaflets all oblong obtuse cordate, .5 to 1.2 in. long, .2 to .7 in. wide; petioles .2 in. long. Stipules lanceolate-acuminate, .3 in. long. Racemes short, dense. Flowers dark purple, small. Pod .6 in. long. *Hab.* In turfey spots, common. Singapore, hospital grounds; Tanjong Katong. Malacca, Pulau Besar (Maingay); Malacca Hill (Griffith); Pengkalan Minyak (Cantley). Dindings, Lumut.

Penang, Waterfall (Curtis). *Distrib.* Indo-Malaya. *Native name* : Akar Siliguri. *Use* : A decoction of the roots for colic.

The two species are usually made varieties of one (Prain, *l.c.*), but are so different in general appearance when typical that I think it advisable to follow Linné and others in keeping them separate. *A. nummularifolius* is prostrate, the branches often a foot long with purple flowers, *A. vaginalis* erect with nearly white flowers.

39. DESMODIUM, Desv.

— Herbs or shrubs. Leaves 1- or 3-foliolate, stipellate. Flowers small, white, pink, blue or yellow in racemes. Calyx campanulate, upper two often sub-connate. Corolla exsert; standard broad; wings adherent to keel; upper stamen free from the other united 9. Ovary sessile or stalked; style incurved. Stigma minute capitate. Pod of several 1-seeded joints compressed, the joints separating. Species 150, cosmopolitan.

- i. SAGOTIA :—Prostrate herbs with 1 to 3 axillary flowers; leaves trifoliolate.
 - Pedicles hardly exceeding petioles; leaflets obovate truncate .25 in. long . (1) *D. triflorum*
 - Pedicles .5 in. long; leaflets oblong or obovate, round .5 in. long . (2) *D. heterophyllum*
 - Pedicles .5 in. long; leaflets obovate, round, 1.25 in. long, .75 in. wide . (3) *D. trifolium*
- ii. PHYLLODIUM :—Shrubs. Bracts large 2-foliolate, persistent; flowers in umbels.
 - Plant downy; leaves glabrous above . (4) *D. pulchellum*
 - Plant velvety downy all over . (5) *D. vestitum*
- iii. DENDROLOBIUM :—Shrubs, bracts small deciduous; flowers small umbellated axillary.
 - Leaflets smooth; pods glabrous . (6) *D. umbellatum*
 - Leaflets rugose; pods strigose . (7) *D. rugosum*
- iv. EUDESMODIUM :—Erect herbs or shrublets; leaves 1- to 3-foliolate; flowers in racemes; bracts deciduous.
 - Big shrubs; racemes elongate.
 - Racemes often paniced; corolla violet . (8) *D. megaphyllum*
 - Racemes simple; flower white; pod joints narrowed both ends . (9) *D. laburnifolium*
 - Slender wiry shrublets.
 - Racemes lax; flowers pink; leaflets ovate acuminate, 4 to 6 in. long . (10) *D. laxum*
 - Racemes lax; flowers scarlet; leaflets ovate blunt, 2 in. long . (11) *D. scalpe*
 - Racemes dense.
 - Leaflets silky beneath, white, obovate cuneate . (12) *D. capitatum*
 - Leaflets not silky beneath, obovate cuneate; flowers deep purple, rarely white. (13) *D. polycarpum*
 - Leaflets elliptic or round, base round, white, silky beneath; flowers pale lavender . (14) *D. ovalifolium*
 - Leaves 1-foliolate; racemes terminal lax.
 - Petioles not winged.
 - Joints of pod narrowed at the ends, sticky; flowers white . (15) *D. ormocarpoides*

Pods indent on upper suture only not sticky.

Raceme sub-glabrous; pods sub-glabrous; flower yellow . . . (16) **D. gangeticum**

Raceme tomentose; pods pubescent; flowers pink . . . (17) **D. virgatum**

Petioles winged . . . (18) **D. triquetrum**

v. **PLEUROLOBIUM**:—Erect under-shrubs; flowers racemed.

Pods not segmented, dehiscing along ventral suture . . . (19) **D. gyroides**

(1) **D. triflorum** DC. *Prodr.* ii. 334; *Baker, in Hook. fil. F.B.I.* ii. 173; *Prain, l.c.* 135.

Small trailing herb, diffuse, 6 to 18 in. long. Branches hairy. Leaves .5 in. long, 3-foliate; petioles .2 in. long; leaflets membranous, obovate-cuneate, tip truncate or emarginate, terminal one .25 in. long, .2 in. across, laterals smaller. Flowers very small, 1 to 3 in axillary fascicles. Calyx white, hairy, .1 in. long. Corolla pink. Pod .4 to .6 in. long, .15 in. wide, joints 3 to 5, reticulate puberulous, upper suture straight, lower indented. *Hab.* Roadsides and turfy spots. Singapore, Gardens; Bukit Timah. Pahang, Pekan. Malacca (Maingay). Dindings, Lumut. Province Wellesley (King). Penang (Wallich), Waterfall. Perlis, Kanga. *Distrib.* Cosmopolitan.

(2) **D. heterophyllum** DC. *Prodr.* ii. 334; *Baker, l.c.* ii. 173; *Prain, l.c.* 135.

Trailing herb 2 to 3 in. to 2 ft. long, diffuse hirsute. Leaves 1 to 1.5 in. long, trifoliate; petioles .5 in. long; leaflets membranous, oblong or obovate, tip rounded, terminal one .5 to 1 in. long, .3 to .5 in. wide, laterals half as big. Stipules lanceolate. Flowers 1 to 2, axillary or racemose; pedicels hairy .5 to .8 in. long. Calyx .15 in. long, densely hairy. Corolla rose pink turning blue, .25 in. long. Pod .5 to .75 in. long, .18 in. wide, joints 4 to 5, glabrescent except lower edge, lower suture indented, upper straight. *Hab.* Very common in grass plots, edges of roads and other turfy spots. Singapore, everywhere. Pahang, Pekan. Malacca, Bukit Panchor (Cantley); Town. Perak, Thaiping. Penang (Wallich 5701). Tringganu (Yapp). Legeh, Tremangan (Gwynne-Vaughan). *Distrib.* S.E. Asia. *Native names*: Omba-Omba; Akar Sisik Naga; Akar Telinga Tikus.

(3) **D. trifoliastrum** Miq. *Fl. Ind. Bat.* i. (1), 248.

Woody prostrate plant, slender branched. Stems appressed, hairy. Leaflets 3, elliptic obovate, tips rounded, above sparsely hairy, beneath silky-hairy, 1.25 in. long, .75 in. wide (or less); petioles 1 in. long. Raceme terminal 3 in. long, silky-hairy. Flowers 2 or 3 on slender hairy peduncles, .5 in. long, bluish white. Calyx teeth lanceolate acuminate. Corolla small. Pods 1 in. long, 4-jointed, upper edge straight, lower indented, covered with adhesive hairs. *Hab.* Damp swamps in forest, not common. Pahang, Kota Glanggi. Perak, Temengoh (Ridley). *Distrib.* Java.

(4) **D. pulchellum** Baker, in Hook. fil. F.B.I. ii. 162; Prain, l.c. 136.

Bushy shrublet 4 to 5 ft. tall, downy. Leaves trifoliate 5 to 6 in. long; petioles .25 to 4 in. long, coriaceous rugose glabrous above, downy beneath, ovate-lanceolate sub-acute, 3 to 4 in. long, 1.5 in. wide; petiolules .15 in. long, lateral pair much smaller, .25 in. long, .75 in. wide. Inflorescences numerous, 8 to 18 in. long, in racemes or flowers solitary in the axils of 1- to 3-foliate, orbicular leaf-like bracts, .4 to .5 in. long and nearly as wide. Calyx .1 in. long, hairy, teeth lanceolate. Corolla yellow, .25 in. long. Pod .2 to .3 in. long, puberulous indented on both sides, joints 2, rarely 3, .12 in. wide. *Hab.* Open sandy heaths. Johor (Kunstler). Pahang River, open heaths. Malacca (Griffith). Perak, Telor Pinang; Kwala Kangsa; Kota Bharu (Kunstler). Kedah, Alor Sta. *Distrib.* India and Siam.

(5) **D. vestitum** Baker, l.c. ii. 162.

Bush, velvety downy all over. Leaves 2.5 in. long; petioles .2 in. long; leaflets 3, ovate-elliptic, obtuse, terminal, 2.3 in. long, 1.2 to 2.5 in. wide, base rounded, laterals shorter; nerves 4 pairs prominent on both sides; petiolule, terminal .4 in., lateral .1 in. long. Corymbs 3- to 4-flowered with membranous ovate orbicular thin bracts, 1 to 1.25 in. long, 1 in. wide. Calyx .12 in. long, teeth deltoid. Corolla .4 in. long, mauve. Pod .5 in. long, joints 3, hairy. *Hab.* Adang islands, Pulau Rawei (Ridley). *Distrib.* Tenasserim.

(6) **D. umbellatum** DC. Prodr. ii. 235; Baker, l.c. ii. 161; Prain, l.c. 137.

Big shrub 5 to 6 ft. tall or more. Branchlets downy. Leaves 5 to 7 in. long, trifoliate; petioles 1 in. long; leaflets sub-coriaceous, glabrous above, paler puberulous beneath, ovate-oblong obtuse (rarely acute), terminal one 3 to 3.5 in. long, 2 to 2.5 in. wide, laterals smaller. Stipules large, .3 in. long. Corymbs umbelliform axillary .3 in. long on peduncles as long. Flowers 6 to 12, white. Calyx .15 in. long, teeth lanceolate, pubescent, silky. Corolla .5 in. long. Pod 1.5 to 2 in. long, .25 in. wide, glabrous, thick coriaceous of 4 (1 to 3) joints. *Hab.* Seashores, tidal mud and sand. Very common. Whole peninsula from Singapore to Perlis. *Native name*: Dedulang.

(7) **D. rugosum** Prain, l.c. 137.

Big shrub, much-branched puberulous. Leaves 5 to 7 in. long, trifoliate; petioles 1 in. long; leaflets coriaceous rugose, midrib and nerves above puberulous and on under-side densely puberulous, obovate acute, terminal one 4 in. long, 2.5 in. wide; nerves 10 to 12 very prominent, as are reticulations; petiolules .5 in. long. Inflorescence axillary; peduncles .25 in. long; corymbs 3- to 6-flowered. Calyx .2 in. long, pubescent. Corolla .5 in. long, white. Pod 1.5 in. long, joints 4, .3 in. long, .25 in. wide, thick,

coriaceous, densely hairy, on long pedicels. *Hab.* Open places, rare. Lankawi (Curtis). *Distrib.* Tenasserim.

(8) **D. megaphyllum** Zoll. *Nat. en Geneesk. Arch.* iii. 58; *Prain, l.c.* 139.

A fine bushy shrub about 8 ft. tall. Branchlets tomentose. Leaves 7 to 9 in. long, trifoliate; petioles 2 to 2.5 in. long; leaflets sub-coriaceous, puberulous above, grey woolly beneath, rhomboid ovate-acuminate, terminal one cuneate at base, 4 to 6 in. long, 2.5 to 3.5 in. wide; petiolules 1 to 1.5 in. long; laterals smaller, base obliquely rounded. Stipules .15 in. long, lanceolate. Racemes often paniced, terminal and axillary 8 to 10 in. long; flowers fascicled, in 25 to 30 fascicles. Bracts .5 in. long. Calyx .15, teeth triangular. Corolla violet, .3 in. long. Pod dull crimson, 2 to 2.25 in. long, 6- to 8-jointed, joints .25 in. long, .2 in. wide, puberulous, indented on lower suture. *Hab.* Local in forest. A very handsome shrub. Perak, Batang Padang Valley at 2000 ft. altitude and upwards (Wray, Ridley). *Distrib.* Tenasserim, Java.

(9) **D. laburnifolium** DC. *Prodr.* ii. 337; *Baker, l.c.* ii. 163.

A stout woody shrub, nearly glabrous. Leaves trifoliate 3 to 4 in. long; petioles .5 to 1 in. long, flattened; leaflets sub-coriaceous ovate to lanceolate, base narrowed, apex narrowed sub-acute or blunt, glabrous above and nerves invisible; nerves elevate hairy, 4 pairs, terminal leaflet 2 to 4 in. long, 1 in. wide; petiolule .5 in. long, flat; laterals about half as large; petiolules .05 in. long. Racemes axillary and terminal, 4 to 6 in. long. Flowers numerous. Calyx 12 in. long, hairy, teeth lanceolate, lower linear. Corolla white, .25 in. long. Pod 2 to 3 in. long, green, joints flat, elliptic narrowed at both ends, .6 in. long, .2 in. wide, adhesive hairy. *Hab.* Johor, Kota Tinggi (Ridley). Apparently very rare here, I only once saw it. *Distrib.* Indo-Malaya, China.

(10) **D. laxum** DC. *Prodr.* ii. 336.

A slender wiry plant 2 to 4 ft. tall. Leaves 5 to 8 in. long, trifoliate; petioles 1 to 2.5 in. long; leaflets membranous, glabrous above, sparsely hairy beneath on nerves, terminal one narrow ovate, 4 to 6 in. long, 1.5 to 2 in. wide, narrowed to tip, base cuneate; petiolule .75 in. long; nerves 3 pairs; lateral leaflets smaller, 3 to 4 in. long, bases slightly oblique. Stipules linear-lanceolate, .5 in. long. Racemes narrow, 12 to 20 in. long, sometimes paniced. Flowers distant. Calyx .08 in. long, pubescent, teeth deltoid. Corolla pink, .25 in. long. Pod 1 to 3 in. long; stalks .3 in. long; joints few, .5 in. long; constrictions oblique, nearly to upper suture. *Hab.* Rare in forests. Perak, Ulu Batang Padang; Telom (Wray, Ridley). *Distrib.* Indo-Malaya.

(11) **D. scalpe** DC. *Prodr.* ii. 334; *Baker, l.c.* ii. 165.

A very slender shrublet 2 to 3 ft. tall, hairy. Leaves trifoliate; petioles 1.5 in. long, hairy; leaflets membranous, terminal one rhomboid, sub-acute, hairy on both sides, 2 in. long, 1.5 in. wide;

petiolule .2 in. long; laterals smaller ovate, base oblique, 1.7 in. long, .75 in. wide. Racemes terminal axillary, 8 to 12 in. long, hairy with flowers scattered in pairs on slender pedicels .5 in. long. Calyx .1 in. long, hairy, teeth setaceous. Corolla scarlet .3 to .5 in. long. Pod stipitate; joints 1 to 3 half-rhomboidal, .25 to .3 in. long and half as broad. *Hab.* Very local, in a damp spot in forest, with *Viola* and *Sanicula*. Pahang, Telom Valley, 4000 ft. altitude. *Distrib.* Indo-Malaya.

(12) **D. capitatum** DC. *Prodr.* ii. 336; *Baker, l.c.* ii. 170; *Prain, l.c.* 139.

Creeping shrublet. Branches 1 to 2 ft. long, white tomentose at tips. Leaves 2 to 2.5 in. long, trifoliate; petioles .6 in. long; leaflets sub-coriaceous, glabrescent above, white-silky beneath; obovate-cuneate, tip rounded or ovate rounded, terminal one 1.25 in. long, 1 in. across, laterals smaller, .75 in. long; nerves 8 pairs. Stipules linear, .25 in. long. Racemes dense axillary and terminal, 1 to 2 in. long; pedicels .2 to .25 in. long, reflexed in fruit. Bracts small ovate cuspidate. Calyx .1 in. long, glabrescent, teeth setaceous. Corolla purplish red, .2 in. long. Pods .5 to .75 in. long, .15 in. wide puberulous, joints 6, lower suture indented. *Hab.* Open sandy country. Pahang, Pulau Tawar; Kwala Tembeling. Selangor, Batu Caves. Perak, Teluk Anson (Kunstler); Thaiping (Scortechini). Perlis, Bukit Lagi, Kanga. *Distrib.* Ceylon, Burma, Malay islands.

(13) **D. polycarpum** DC. *Prodr.* ii. 334; *Baker, l.c.* ii. 171; *Prain, l.c.* 140, excluding var. *ovalifolium*.

Erect shrublet 2 to 3 ft. tall. Branchlets few tomentose. Leaves 2 to 4 in. long, 3-foliate; petioles .6 to 1 in. long; leaflets coriaceous, glabrous, light green above, appressed-hairy beneath, oblong-obovate obtuse 1.25 to 2 in. long, 1 to 1.5 in. wide, laterals smaller .75 to 1.25 in. long. Racemes dense, terminal sub-sessile, 1 to 4 in. long; bracts ovate-cuspidate. Calyx .1 in. long, glabrescent, teeth setaceous. Corolla deep mauve violet; standard pink, .2 in. long. Pod .5 to .75 in. long, .15 in. wide, joints 6 to 8, indented in lower suture, edges hairy. *Hab.* Common in open country in lalang fields, very showy. All over the whole peninsula. *Distrib.* Africa, Asia, Polynesia. *Native names:* Kachang Kaya Betina; Kalumbar; Rumput Kerbau D'rapah; Katambar.

var. *albiflorum* Ridl. Pods larger. Flowers white. *Hab.* Pahang, Kwala Bruas; Sungei Meang. Perak, Gunong Keledang and Telok Pinang (Ridley).

var. *rigidum* Ridl. *Journ. Roy. As. Soc. S. Br.* 59, p. 97.

A strict woody plant about 3 ft. tall. Leaflets coriaceous, lanceolate base round, tip blunt, 3 in. long, .75 in. wide, glabrous shining above, with long white silky hair beneath. Racemes terminal 5 to 8 in. long. Pods .5 in. long, short hairy. *Hab.* In dry spots.

Pahang, Rumpin River (Evans); Penang, Ayer Hitam (Curtis). Lankawi (Curtis). Kedah, Alor Sta (Ridley).

sub. var. *minor*. A small form. Leaflets oblong-obtuse, .75 to 1 in. long, reticulate; branches silky. Racemes 1.75 in. long. *Hab.* Setul, Heaths (Ridley).

(14) **D. ovalifolium** Wall. Cat. 5730. *D. polycarpum* var. *ovalifolium* Prain, l.c. 141.

Prostrate shrublet with long branches. Leaves trifoliate; leaflets elliptic to round, base round, terminal one 1 to 2.5 in. long, .7 to 1.3 in. wide, laterals about half as big, white-silky beneath; petioles .2 to .5 in. long. Racemes axillary and terminal dense, 1 in. long. Calyx sub-glabrous, .1 in. long. Corolla pale lavender, .15 in. long. Pod .75 in. long, hairy all over, joints 6 to 8. *Hab.* Waste ground and roadsides. Common. Singapore, Ang Mo Kio. Pahang, Pekan; Kwala Lipis (Machado). Johor, Kota Tinggi. Malacca, Ayer Keroh; Alor Gajah; Machap (Derry). Negri Sembilan, Kwala Pemas; Tampin. Dindings, Lumut. Perak, Goping; Telor Pinang; Kwala Kangsa. Penang (Wallich). Rahman, Kota Bharu (Gwynne-Vaughan). Kedah, Alor Sta. *Distrib.* Sumatra.

This has been confused by most botanists with *D. polycarpum*, though in life the two could not be mistaken. It differs in its creeping habit, round silky leaves and pale lavender flowers.

(15) **D. ormocarpoides** DC. Prodr. ii. 327.

Weak shrublet, 2 ft. tall, unbranched. Young parts shortly hairy. Leaves 1-foliate; petioles .75 in. long, pubescent; leaflet sub-coriaceous, glabrous above, silky beneath, ovate acute, base round, 4 to 6 in. long, 1.5 to 2.5 in. wide. Stipules ovate acuminate. Raceme terminal 6 to 10 in. long; flowers 12 to 20, distant pale blue or white; bracts minute; rachis puberulous. Calyx .1 in. long, pubescent teeth deltoid. Corolla .2 in. long. Pod 3 to 4 in. long, .15 in. wide, pendulous, very adhesive, joints 6 to 8, flat thin green, constricted at both sutures. *Hab.* Dense forests. Pahang, Kwala Tembeling. Selangor, Ginting Bidai. Perak, Temengoh. Penang, Balik Pulau. *Distrib.* India, Ceylon, Java.

Our form has more pubescent leaves than the Indian one and is the var. *velutina* Prain. It occurs also in the Andamans and Java.

(16) **D. gangeticum** DC. Prodr. ii. 327; Baker, l.c. ii. 168; Prain, l.c. 142.

A slender shrublet 1 to 4 ft. tall with few puberulous branches. Leaves 1-foliate; petioles slender, .75 in. long; leaflets elliptic, blunt to ovate sub-acute, 3 to 5.5 in. long, 1.2 in. wide; nerves fine, 8 to 9 pairs. Stipules linear, .25 in. long. Racemes terminal, axillary slender, 8 to 14 in. long. Flowers in distant fascicles, bracts minute. Calyx pubescent, .08 in. long, teeth lanceolate. Corolla yellow, .15 in. long. Pod sub-falcate, .5 to .75 in. long,

·1 in. across, 6- to 8-jointed, indented on upper suture, puberulous with hooked hairs. *Hab.* In woods; not common. Johor, Pulau Aur (Kelsall). Malacca Hill. Penang, Penara Bukit (Curtis). Province Wellesley, Bukit Juru. Setul. Kedah, Gunong Geriang. Perlis. Kelantan, Kota Bharu. *Distrib.* Africa, India, China, Malaya.

(17) **D. virgatum** Zoll. *Nat. en Geneesk. Arch.* iii. 58; *Prain, l.c.* 143.

Slender shrublet, 1 to 4 ft. tall, pubescent. Leaves 1-foliolate; petioles ·25 in. long, tomentose; leaflet membranous, glabrous above, puberulous beneath, ovate acute, base round or truncate, 3 to 5 in. long, 1 to 2 in. wide; nerves 8 to 9 pairs. Stipules short, triangular, ·15 in. long. Racemes slender erect, tomentose, 3 to 8 in. long; flowers in 20 to 30 fascicles. Calyx glabrous, ·08 in. long. Corolla pink, ·2 in. long. Pod sub-falcate, ·5 to ·75 in. long, ·1 in. across, 6- to 8-jointed, indented on upper suture, densely hairy, hairs hooked. *Hab.* Forests, rare. Perak Batu Kurau (Scortechini). *Distrib.* Burma, Java.

Much resembles *D. gangeticum*, but is easily distinguished by its pink flowers.

(18) **D. triquetrum** DC. *Prodr.* ii. 326; *Prain, l.c.* 143.

Shrublet. Leaves 1-foliolate; petioles winged, 1 in. long, ·3 in. wide; leaflet oblong-lanceolate acute, base broad, truncate or rounded, coriaceous, glabrous; nerves 15 to 20 pairs, 1·25 to 5 in. long, ·75 to 1 in. wide. Stipules ·5 to ·75 in. long, ·2 in. wide, lanceolate-acuminate. Racemes axillary and terminal, strict 6 to 10 in. long. Flowers 20 to 40 in axils of scarious bracts. Calyx ·15 in. long, hairy, teeth unequal, upper deltoid, lower linear. Corolla ·3 in. long, purple. Pod 1 to 2 in. long, ·25 in. wide, flat, joints 6 to 8, hairy. *Hab.* Woods. Pahang, Kwala Tahan (Seimund). Perak, Telor Pinang, Ipoh (Curtis); Sungei Rayah (Kunstler). Kedah, Alor Sta. Lankawi. Perlis, Kanga. Setul. *Distrib.* India and Cambodia.

(19) **D. gyroides** DC. *Prodr.* ii. 316.

Shrub 10 ft. tall. Branches pubescent. Leaves 2·5 to 3 in. long, 3- or 1-foliolate; petioles ·75 in. long; leaflets membranous, oblong or ovate-oblong blunt, glabrous above, thin pubescent beneath, 1·75 to 2 in. long, 1 to 1·25 in. wide; nerves 6 to 8 pairs (lateral leaflets when present ·5 in. long, ·4 in. wide). Racemes dense strobilate with large bracts ·25 in. long. Calyx ·1 in. long, teeth triangular. Corolla ·35 in. long, ·2 in. wide, purple. Pod 1 to 1·5 in. long, ·2 in. wide, falcate, joints 6 to 10, not separating, dehiscing along the indented lower suture, tomentose. *Hab.* Perak, Kinta (Kunstler). Tomoh (Machado). *Distrib.* Indo-Malaya, Indo-China.

40. **SOPHORA**, Linn.

Shrubs (or trees). Leaves odd-pinnate. Flowers showy, yellow (white or purple), racemed (or panicked). Calyx oblique, campanulate, teeth short. Corolla much exsert; standard broad; petals equal clawed. Stamens free nearly to base. Ovary stalked. Pod moniliform, joints turgid. Species 25, whole world tropics.

(1) **S. tomentosa** Linn. *Sp. Pl.* 373; *Prain, l.c.* 146.

Seashore shrub, grey tomentose. Leaves 6 to 12 in. long; leaflets 11 to 17, elliptic-ovate obtuse, 1 to 1·5 in. long, ·5 to ·75 in. wide, glabrous above, tomentose beneath. Racemes 6 in. long. Calyx obliquely truncate. Corolla ·35 in. long, bright yellow. Pod 6- to 8-seeded, 4 to 6 in. long, hoary, each joint separated by a stipe as long as itself. Seed black. *Hab.* Sandy sea-coasts; not common. Dindings, Lumut. Lankawi, Burau Bay. Adang islands, Pulau Butang. *Distrib.* Ceylon, Andamans, Burma, Malaya, Polynesia.

41. **ORMOSIA**, Jacks.

Trees (one a climbing shrub). Leaves odd-pinnate. Flowers in panicked racemes. Calyx campanulate, deeply 5-lobed, two upper teeth connate into upper lip. Corolla exsert; petals short-clawed, white, standard orbicular, keel-petals free, oblong blunt. Stamens free or connate at base only, exsert, incurved. Ovary sub-sessile; style filiform. Stigma oblique. Pod fleshy or woody turgid, dehiscent. Seeds red. Species 25, cosmopolitan.

Climber. Panicle of racemes lax. (1) **O. scandens**
Trees.

Seeds large, black and red, solitary.

Panicles large, dense; flowers pink; pod 3 in.
across (2) **O. macrodisca**

Panicle lax; flowers yellow; pod 1·25 in. across (3) **O. gracilis**

Flowers racemed; ovary golden-silky; pod
unknown (4) **O. penangensis**

Seeds small, all red; pod ·6 in. long.

Leaves glabrous beneath (5) **O. nitida**

Leaves pubescent beneath.

Leaflets petiolulate; pod valves thin.

Leaflets 9 to 13 acuminate, 2·5 in. long (6) **O. parvifolia**

Leaflets 4 in. long, acute or blunt thinly
pubescent beneath; panicles lax (7) **O. sumatrana**

Leaflets pubescent beneath; panicles dense (8) **O. microsperma**

Leaflets sessile; pod-valves woody (9) **O. venosa**

(1) **O. scandens** *Prain, l.c.* 147.

Woody climber over 100 ft. long, 6 to 8 in. through, glabrous. Leaves 12 to 15 in. long; leaflets 5 to 7, ovate-oblong, acuminate coriaceous, base round 6 to 9 in. long, 2·5 to 3 in. across; nerves 13 to 18, slightly elevate, reticulations small, distinct. Racemes panicked 12 in. long, 6 in. across, tawny-silky; pedicels ·2 in. long.

Calyx silky, lower teeth as long as tube deltoid, uppers form a bifid lip. Corolla .35 in. long, white tinged reddish. Ovary ovate, hairy on upper edge; ovules 3. *Hab.* Perak, Larut 300 to 500 ft. altitude (Kunstler).

(2) *O. macrodisca* Baker, in *Hook. fil. F.B.I.* ii. 253; *Prain, l.c.* 148.

A big tree 80 ft. tall and 2 ft. through. Leaves 8 to 10 in. long; leaflets 7 to 9, dark green, coriaceous, glabrous above, pubescent beneath, oblong, base round, tip acute, 3 to 5 in. long, 1.25 in. wide; nerves faint 7 to 9 pairs. Racemes in crowded panicles 6 in. long, 3 to 4 in. wide, rachis brown-silky. Calyx .3 in. long, brown-silky, teeth oblong-obtuse. Corolla .5 in. long, rose pink, veined darker, base of standard green. Ovary glabrous; ovules 3. Pod sub-orbicular, 3 in. wide, .75 in. thick, rose pink. Seed 1, oblong, .7 in. wide, scarlet, aril black. *Hab.* Singapore. One tree in Dalvey road near the Gardens. *Distrib.* Sumatra.

(3) *O. gracilis* Prain, *l.c.* 148.

Slender tree, 30 to 40 ft. tall, 6 to 8 in. through. Leaves 5 to 8 in. long; leaflets 7 to 9, ovate-lanceolate, chartaceous, bright green, glabrous above, sparsely hairy beneath, caudate-acuminate, base cuneate 2.5 to 3 in. long, 1 in. across; nerves 8 to 9 pairs faint. Panicles lax, 2.5 to 3 in. long, grey-silky, slender. Calyx .25 in. long, silky green, teeth ovate-lanceolate. Corolla .35 in. long, pale yellow; standard .25 in. across. Ovary puberulous; ovules 2. Pod hard thick oblong-ovate, stalked, 1.5 in. long, 1.25 in. wide, green with bluish bloom. Seed 1, oblong, .75 in. long, .6 in. wide, scarlet, aril black, .15 in. long. *Hab.* Dense forest at 1800 ft. altitude. Perak, Taiping Hills, Maxwell's Hill (Kunstler and Wray).

(4) *O. penangensis* Ridl. *Journ. Roy. As. Soc. S. Br.* 68, p. 11.

A tree 50 to 60 ft. tall. Leaves glabrous 6 in. long with slender petioles 1 in. long; leaflets 7, elliptic-lanceolate, acute, base cuneate, 3 in. long, 1.12 in. wide; petiolules .25 in. long. Flowers in numerous sub-terminal racemes 4 in. long. Calyx .3 in. long, red puberulous, lobes ovate blunt, equal. Corolla .5 in. long; petals obovate, tip round. Stamens glabrous, free, exsert. Ovary cylindric, golden-silky; style glabrous. Fruit not seen. *Hab.* Penang Hill at Grace-Dieu 2000 ft. altitude (Haniff).

(5) *O. nitida* Prain, *l.c.* 149.

Tree 30 to 50 ft. tall, 5 to 8 in. through. Leaves 5 to 7 in. long; leaflets 7, rigidly coriaceous, glabrous, glossy dark green, obovate or elliptic, obtuse base rounded, 2.5 to 4 in. long, 1.3 to 2 in. wide; nerves 12 to 15 pairs, slender; lateral leaflets smaller. Panicles of fastigate racemes, puberulous 6 to 8 in. long, 5 to 6 in. wide. Calyx .2 in. long, tawny-silky, teeth deltoid. Corolla unknown. Pod oblong, 1 in. long, .75 in. across, valves thinly woody, glabrous, black outside, stalk as long as calyx-tube. Seed

oval, red, '35 in. long, '3 in. wide, no aril. *Hab.* Dense hilly jungle. Perak, Goping (Kunstler).

(6) *O. parvifolia* Baker, in *Hook. fil. F.B.I.* ii. 253; *Prain, l.c.* 149.

A medium-sized tree. Branches brown-velvety. Leaves 6 to 8 in. long; leaflets 9 to 13, coriaceous, glossy green above, thinly hairy (except the densely tomentose nerves) beneath, oblong acuminate, base round 2 to 2.5 in. long, '6 to '7 in. wide; nerves fine 8 to 9 pairs. Racemes paniced, 3 to 4 in. long, 2.5 in. wide, densely brown-velvety. Calyx '2 in. long, brown-silky, teeth triangular. Corolla white '35 in. long; standard '25 in. across. Ovary ovate silky; ovules 3. Pod orbicular, 1-seeded (or oblong if 2-seeded), short stipitate; valves thin, at first silky, then glabrescent black outside. Seed ovoid '3 in. long, '25 in. wide, red, no aril. *Hab.* Open country generally near sea or rivers. Singapore, Pasir Panjang; Changi; Reservoir. Pahang, Pekan; Rumpin River (Evans). Malacca (Griffith). Panchur. *Native name*: Saga Hutan.

The Pahang tree differs from the Malacca one in having the leaves almost or quite glabrous beneath and very small reticulations.

(7) *O. sumatrana* *Prain, l.c.* 150.

A large tree. Branchlets tomentose. Leaves 8 to 10 in. long; leaflets 7 to 9, ovate or ovate-elliptic, obtusely apiculate, base rounded, coriaceous, glabrous shining above, hairy glabrescent below; nerves 8 to 10 pairs, 2 to 4 in. long, 1 to 1.75 in. wide. Racemes paniced, lax, 6 to 8 in. long and as wide, pubescent. Calyx '2 in. long, tawny-pubescent, 3 lower teeth ovate-lanceolate. 2 upper forming a bifid lip. Corolla pinkish white marked lilac purple, '35 in. long; standard orbicular, emarginate, '3 in. wide. Stamens exsert. Ovary puberulous, 3-ovuled. Pod orbicular (1-seeded), oblong (2-seeded) 1 to 1.75 in. long; valves thin woody black glabrescent. Seed ovoid red, no aril. *Hab.* Malacca, Brissu (Holmberg). *Distrib.* Sumatra.

(8) *O. microsperma* Baker, *l.c.* ii. 253; *Prain, l.c.* 151.

Tree 40 to 60 ft. tall. Branches velvety-brown. Leaves 8 to 10 in. long; leaflets 11 to 13, rigid, coriaceous, shining dark green, glabrous above, puberulous beneath, oblong or obovate acute or obtuse, base broad round, 2.5 to 4 in. long, 1.5 to 2 in. wide; nerves 7 to 9 pairs, elevate slightly beneath. Panicles of fastigate racemes 8 in. long, 6 in. across, brown-velvety; pedicels very short. Calyx '25 in. long, velvety. Corolla white, '45 in. long; standard '35 in. wide. Ovary velvety, 3- to 4-ovuled. Pod '6 in. across, orbicular (1-seeded), oblong (2-seeded); valves thin, woody, glabrescent. Seed '3 in. long, '25 in. wide red, no aril. *Hab.* Dense woods on mountains and open country. Singapore, Dalvey. Malacca, Nyalas (Derry). Selangor, Ulu Selangor (Kunstler).

var. *Ridleyi* Prain, l.c. Leaves more coriaceous and velvety beneath. Panicle much larger. Flowers pedicelled distinctly. Fruit unripe dense-velvety. Singapore, Selitar (Ridley).

(9) *O. venosa* Baker, l.c. ii. 254; *Prain, l.c.* 152.

A big tree with densely velvety branches. Leaves 4 to 6 in. long; leaflets 7, obovate-oblong, blunt, base cuneate sub-sessile, densely tomentose beneath; nerves 10 to 12, strongly elevate, above glabrous, 3 to 4 in. long, 1.5 to 2 in. wide. Panicle 4 to 5 in. long, 3 in. wide, densely tomentose; pedicels as long as calyx. Calyx .25 in. long, velvety, teeth triangular. Corolla .35 in. long, white; standard .3 in. across. Ovary velvety. Pod oblong or obovoid, 1.5 in. long, 1.35 in. wide; valves woody thick, black and glabrous outside. Seeds 1 to 2, ovoid, .5 in. long, red. No aril. *Hab.* Malacca (Maingay).

CULTIVATED PAPILIONACEÆ

Cajanus indicus Spreng, *Syst. Veg.* iii. 248; *Prain, l.c.* 47. An erect shrub about 6 ft. tall. Leaves 2 to 5 in. long, appressed hoary silky; leaflets 3. Racemes axillary of few yellow flowers, veined red. Pod 2 to 3 in. long, downy with depressions between the 2 to 6 seeds. *Native names*: Dal; Kachang Kayu. Occasionally cultivated in gardens.

Dolichos Lablab Linn, *Sp. Pl.* 725; *Prain, l.c.* 54. A twining bean with trifoliate leaves and racemes 6 to 8 in. long on peduncles nearly as long. Flowers showy, purple or white. *Native names*: Kachang Karkaras or Kachang Jariji. *Use*: The pods form the local "French beans."

Psophocarpus tetragonolobus DC. *Prodr.* ii. 403; *Prain, l.c.* 55. Twiner, roots tuberous. Leaves trifoliate. Racemes lax, 4- to 6-flowered; peduncles long. Flowers large, showy, azure-blue. Pod 6 to 12 in. long, 4-winged; wings denticulate. *Native names*: Four-angled bean; Kachang Botol; Kachang Botor. Cultivated for its pods, eaten as a vegetable.

Centrosema Plumieri Benth. *Ann. Wien Mus.* ii. 118; *Prain, l.c.* 57. Twiner, trifoliate. Racemes 2- to 6-flowered. Flowers very large; standard orbicular, white, centre crimson. Pod narrow 6 in. long, lower suture winged. An occasional escape from gardens into roadside hedges. Singapore and Perak, "The Butterfly Pea."

Arachis hypogæa Linn. *Sp. Pl.* 741. The ground nut, "Kachang Goring," an annual tufted herb with yellow flowers and well-known fruit, is cultivated in Singapore, Province Wellesley, the Dindings and Penang.

Lourea vespertilionis Desv. *Prain, l.c.* 132; "Malay Peninsula, Norris," is a rare plant even in gardens, and has no claim to be admitted to the flora.

(B) CÆSALPINIÆ (Genera 42-56).

42. CASSIA, Linn.

Shrubs, trees or herbs. Leaves simple, even pinnate. Flowers usually large showy yellow or pink in axillary racemes and terminal panicles. Calyx-tube very short; sepals imbricate. Petals 5, imbricate. Stamens 10, rarely all perfect, 3 to 5 reduced to stamino-odes or absent; anthers usually basifixed dehiscent by terminal pores. Ovary sessile or stalked, many-ovuled; style incurved. Pod terete or flat, usually septate. Seeds flat. Species 340, whole tropical world.

Stamens 10, fertile.

Pod terete; flowers pink; tree (1) *C. nodosa*

Pods flat; flowers yellow; shrub (2) *C. glauca*

Stamens 7, fertile; pods dehiscent.

Trees; flowers in large panicles; yellow.

Stipules large; pod thin-valved; leaflets

pubescent (3) *C. timoriensis*

Stipules small; pod thick, stiff (4) *C. siamea*

Coarse weedy shrubs.

Glabrous; pod 4-angled (5) *C. Tora*

„ pod sub-terete (6) *C. obtusifolia*

„ pod flattened (7) *C. occidentalis*

Hairy; flowers in axillary pairs, yellow (8) *C. hirsuta*

Tall shrub; flowers with erect racemes with orange bracts (9) *C. alata*

Slender under-shrubs with very small leaflets.

Leaflets linear; diffuse herb; pod 2 in. long;

seeds 20 to 25 (10) *C. mimosoides*

Leaflets oblong; erect; pod 1 to 1.5 in. long;

seeds 8 to 16 (11) *C. Leschenaultiana*

(1) *C. nodosa* Ham. in Roxb. Hort. Beng. 31; Baker, in Hook. fil. F.B.I. 261; Prain, l.c. 155.

A tree 40 to 80 ft. tall. Stem 10 to 15 in. through. Leaves 9 to 10 in. long; leaflets chartaceous, 6 to 12 pairs, oblong, shortly acuminate, base rounded 2 to 2.5 in. long, 1 to 1.25 in. wide, glabrous above, pubescent beneath. Flowers in corymbs, 2 to 3 in. long on the old nodes of the branches below the leaves. Sepals green, ovate obtuse, hairy. Corolla rose pink, .5 in. across; petals ovate, clawed. Pod terete, 1.5 to 2 ft. long, .5 in. through, black with thin dissepiments between the 60 to 90 flat seeds. *Hab.* Riverbanks, forests, not rare. Pahang River, common. Malacca, Brisu; Sadanen; Selandor (Derry). Negri Sembilan, Tampin Hill. Perak, Chanderiang (Kunstler); Temengoh; Goping. Ulu Kerling (Kunstler). Penang, Waterfall (Curtis). *Distrib.* Burma, China, Sumatra, Borneo. *Native names:* Turukop Bumi; Sibusuk; Busuk-Busuk.

(2) *C. glauca* Lam. *Encyc. Meth.* i. 647; Baker, l.c. ii. 265; Prain, l.c. 157.

Shrub or treelet, 15 to 20 ft. tall, nearly glabrous. Leaves

6 to 9 in. long; leaflets 4 to 6 pairs, membranous, pale green above, glaucous beneath and slightly puberulous, ovate acute, base cuneate, 2 to 4 in. long, 1 to 2 in. wide; nerves 10 to 12 pairs; rachis puberulous with long conical glands between each of the lower pairs of leaflets. Flowers in axillary corymbs, 4 in. long, 2 to 5 in. across. Calyx-segments orbicular, yellow unequal. Petals pale yellow, 1 in. long, .75 in. across. Pod flat straight linear, 6 to 8 in. long, .5 to .7 in. wide; stalk .5 to .6 in. long. Seeds 20 to 30, oval biseriate. *Hab.* In cultivated ground, doubtfully wild. Singapore, Sungei Morai. Malacca (Maingay). Perak, Sim-pang (Wray). Penang, Pulau Tikus. *Distrib.* Tropical Asia.

(3) *C. timoriensis* DC. *Prodr.* ii. 499; *Baker, l.c.* ii. 265; *Prain, l.c.* 162.

Small tree about 20 to 30 ft. tall, pubescent. Leaves 1 to 1.5 ft. long; leaflets 16 to 24 pairs, membranous, glabrescent to densely pubescent above, sparsely pubescent to tomentose beneath, lanceolate-oblong, base round, 1 to 1.75 in. long, .35 to .65 in. wide. Flowers in a large terminal panicle, 1 to 1.25 ft. long, 6 in. across. Sepals unequal oblong-obtuse, pubescent, larger ones .3 in. long. Petals oblong, .6 in. long, .3 in. wide, orange yellow. Stamens 7; staminodes 3. Pod straight linear, flat thin, valves coriaceous, 5 to 6 in. long, .5 in. wide; stalk 3 in. long. Seeds biseriate, 16 to 20 oval obtuse, .25 in. long.

var. *typica*. Leaflets glabrescent above, sparsely pubescent beneath. Stipules narrow. *Hab.* Rare, Lankawi, Kwah (Curtis).

var. *xanthocoma* Miq. Leaves pubescent above, golden tomentose beneath. Stipules large. *Hab.* Limestone districts, not rare. Pahang River. Selangor, Batu Caves. Perak, Ipoh; Goping; Kwala Kangsa; Temengoh. Kelantan, Kwala Lebir (Gimlette). Kedah, Gunong Geriang. Perlis, Kanga. *Distrib.* Tenasserim, Malaya. *Native names:* Beksas; Bebatai.

(4) *C. siamea* Lam. *Encyc. Meth.* i. 648; *Prain, l.c.* 163.

Tree 30 to 50 ft. tall, 12 in. or less through. Leaves 6 to 12 in. long; leaflets 4 to 16 pairs, sub-coriaceous, glabrous, dark green, paler beneath, oblong-obtuse, base round, 1.25 to 2.25 in. long, .5 to .9 in. wide. Flowers in large terminal panicles 8 to 16 in. long, 6 to 8 in. across, bright yellow. Sepals ovate-oblong unequal, puberulous. Petals sub-orbicular, .75 in. long. Stamens 7; staminodes 3. Pod straight, flat, sutures thickened; valves coriaceous, 6 to 9 in. long, .5 in. wide; stalk .5 in. long. Seeds 20 to 30, oval, .3 in. long. *Hab.* River-banks, open country, often planted as a roadside tree. Malacca, Chenana Putih (Cantley); Brisu (Derry). Pahang, along the Pahang River from the mouth to Kwala Tembeling. Selangor, Ulu Selangor (Kunstler). Penang (Curtis). Kedah, between Alor Sta and Perlis. *Distrib.* India, Indo-China, Malay islands. *Native names:* Guah hitam; Jual; Sibusuk; Busuk-Busuk (lit. fœtid, on account of the fœtid smell

of the leaves after rain); Johar; Jaha. *Use*: Flowers eaten in curry.

(5) **C. Tora** Linn. *Sp. Pl.* 376; *Prain, l.c.* 158.

A foetid herb or under-shrub, 2 to 3 ft. tall. Leaves 2 to 4 in. long; leaflets 3 pairs, membranous, glaucous, obovate-oblong; leaflets, uppermost 2 in. long, 1 in. wide, lower 1 to 1.75 in. long, .75 in. wide, tip acute, base obliquely rounded; nerves 8 to 10 pairs. Flowers in sub-sessile pairs, axillary crowded. Calyx 5-lobed to base, lobes ovate acute, green, .2 in. long. Petals oblong-obtuse pale yellow, .3 in. long, .2 in. wide; standard retuse. Stamens 7 with 3 staminodes; anthers brown. Pod 6 to 8 in. long, .15 in. wide, nearly 4-angled; valves puberulous not reticulated. Seeds 25 to 30, rhombohedral, brown, shining. *Hab.* Rare, in waste ground. Perak, Kwala Dipang (Scortechini). *Distrib.* Tropical Asia.

(6) **C. obtusifolia** Linn. *Sp. Pl.* 377; *Prain, l.c.* 159.

Much resembling *C. Tora* Linn., but not foetid, the leaves not glaucous, deltoid at the tip. Flowers bright yellow. Petals .5 in. long, .35 in. wide. Pod 8 to 10 in. long, .2 in. wide, sub-terete. Seeds 30 to 35, brown, .2 in. long. *Hab.* Very common on waste ground. Singapore, Pulau Ubin, etc. Pahang, Pekan and far up the Pahang River. Malacca, Tanjong Kling. Selangor, Kwala Lumpur; Raub Track (Machado). *Distrib.* S. America, now naturalised in Asia. *Native names*: Gelenggang Padang; Gelenggang kechil.

(7) **C. occidentalis** Linn. *Sp. Pl.* 377; *Bot. Reg. t.* 83; *Baker, in Hook. fil. F.B.I.* ii. 262; *Prain, l.c.* 160.

Under-shrub 2 to 4 ft. tall. Leaves 6 to 8 in. long; leaflets 3 to 5 pairs, membranous glaucous, foetid, ovate-oblong, base rounded, tip acuminate, glabrous or pubescent beneath, 1 to 3 in. long, .5 to 1.25 in. wide; gland globose at base of rachis. Flowers in axillary paniced corymbs, few; bracts and calyx white. Petals yellow veined orange, .5 in. long. Stamens 7; staminodes 3. Pod sub-falcate linear, compressed, glabrous, 4 to 5 in. long, .35 in. wide, .2 in. thick. Seeds ovate, small, brown, 20 to 30. *Hab.* Common in waste ground. Singapore, Changi; Gelang. Malacca Hill; Bukit Bruang (Cantley). Selangor, Batang Berjuntai. Penang, Batu Feringhi (Curtis). Kelantan, Kota Bharu. *Distrib.* Whole world, probably originally American. *Native names*: Kachang Kota; Kutepeng hutan.

(8) **C. hirsuta** Linn. *Sp. Pl.* 378; *Prain, l.c.* 159.

Branched annual 2 to 5 ft. tall. Leaves 4 to 8 in. long; leaflets 3 to 6 pairs, membranous green hairy foetid, ovate acuminate, base cuneate 1.5 to 3.5 in. long, 1 to 1.5 in. wide; rachis with one large gland just above base. Flowers in sub-sessile axillary pairs. Sepals ovate sub-acute, pilose, .25 in. long. Petals bright yellow, .45 in. long, ovate-oblong blunt. Stamens 7 with 3

staminodes. Pod falcate, 6 to 8 in. long, '25 in. wide, sub-terete, villous, valves papery. Seed small, '15 in. long, ovate, brown, 90 to 120. *Hab.* Waste ground. An introduced American weed. Formerly occurring in Tanglin, Yo Chukang and other parts of Singapore. Selangor, near Batu Caves. *Native name* : Sinteng.

(9) **C. alata** Linn. *Sp. Pl.* 378; *Baker, l.c.* ii. 264; *Prairie, l.c.* 161.

Large lax-branched shrub about 6 ft. tall. Leaves 1 to 2 ft. long; leaflets 8 to 14, stiff papery, light green, linear-oblong obtuse, base rounded, glabrous, 2 to 4 in. long, 1 to 1.5 in. wide. Flowers in erect spike-like racemes 6 to 18 in. long, at first covered with large ovate-rounded orange bracts, '75 in. long. Sepals spatulate, obtuse, '1 in. long, '6 in. wide, orange. Petals ovate-orbicular 1.25 in. long, yellow orange. Stamens 7; staminodes 3. Pod black, 6 to 8 in. long, '8 in. wide, winged. Seeds 50 to 60, triangular, '25 in. long. *Hab.* Damp spots near cultivation. An American plant now dispersed all over the tropics and valued for the use of its leaves in skin disease, popularly known as "seven golden candlesticks." *Native names* : Gelenggang; Daun Kurap.

(10) **C. mimosoides** Linn. *Sp. Pl.* 379; *Baker, l.c.* ii. 266.

Low slender shrublet about 6 to 12 in. tall or taller. Leaves 3 to 4 in. long; leaflets 40 to 60 pairs, linear mucronate, '1 to '15 in. long, glabrous. Flowers axillary solitary or 2 to 3. Sepals linear-lanceolate '25 to '3 in. long. Petals sub-equal elliptic or sub-orbicular, short-clawed, obtuse. Stamens 10, all perfect, alternately long and shorter. Pod 2 in. long, '2 in. wide, linear, flat. Seeds 20 to 26, rhomboid, dark brown. *Hab.* Open grassy spots. Johor, Castlewood. Province Wellesley, Tasek Gelugur. Penang, top of Government Hill. *Distrib.* S.E. Asia.

(11) **C. Leschenaultiana** DC. *Mem. Soc. Hist. Nat. Gen.* ii. (2), 132; *Prairie, l.c.* 165. *C. mimosoides* var. *Wallichiana* Baker, in *Hook. fil. F.B.I.* ii. 266.

Slender shrubby plant pubescent, 6 in. to 1 ft. or more tall. Leaves 1 to 2 in. long; leaflets 16 to 24 pairs, narrow oblong, mucronate, glabrous or puberulous, '4 to '6 in. long, '1 to '15 in. across. Flowers axillary, 1 to 3 together. Sepals unequal linear-lanceolate, '35 in. long. Petals sub-equal, elliptic or orbicular, yellow, '4 to '6 in. long. Stamens 10 (or 9 or 7, the upper 1 or 2 reduced to staminodes). Pod 1 to 1.5 in. long, '2 in. across, linear, flat. Seeds 8 to 16, rhomboid. *Hab.* Grassy spots, roadsides. Singapore, formerly common in Tanglin; Bukit Mandai. Perak, Temengoh. Penang Hill, 2000 ft. altitude (Curtis). *Distrib.* India, Cochin-China.

EXCLUDED SPECIES

CASSIA JAVANICA Linn. *Sp. Pl.* 379. A medium-sized tree with blunt leaflets and corymbs of pink flowers with blunt petals,

from amongst the leaves, 10 stamens and a long terete pod. Thaiping (Wray), Prain, *l.c.* 156. The only tree I know of in Thaiping is planted in the gardens. It seems to be quite absent from the peninsula as a wild plant. Native of Sumatra and Java. *Native name*: Dulang.

- C. *FISTULA* Linn. *Sp. Pl.* 377. The Indian Laburnum. *Native name*: Bireksa. A low tree with long pendent spikes of large yellow flowers; pod long cylindric, is occasionally to be seen in gardens. It is recorded from Malacca under the old name of *Cana fistula* by Linschoten (*Voyages to the East Indies*) in 1583.
- C. *SOPHERA* Linn. *Sp. Pl.* 379; Penang, *fide Baker in F.B.I. l.c.* 262. I have seen no specimens from Penang or anywhere else in the Malay Peninsula. It resembles *C. occidentalis*, but has 8 to 12 pairs of leaflets and turgid, not flat pods. A South American weed.

43. KOOMPASSIA, Maing.

Gigantic trees. Leaves odd-pinnate; leaflets alternate, subcoriaceous. Flowers small in terminal panicles. Sepals 5, lanceolate. Petals 5 sub-equal. Stamens 5; filaments short; anthers basi-fixed, opening by pores. Ovary sessile, sub-globose; ovule 1. Pod oblong, thin, papery, winged all round, base narrowed and twisted. Seed solitary in the middle.

Leaflets 7 to 9, 2 to 3 in. long	:	:	:	(1) K. malaccensis
Leaflets 9 to 11, 1 to 1'25 in. long	:	:	:	(2) K. excelsa

(1) **K. malaccensis** Benth. in Hook. *fl. Ic. Pl.* xii. 58, t. 1164; Prain, *l.c.* 166.

A tree 100 to 150 ft. tall, 3 to 8 ft. through buttressed at the base. Leaves 5 to 8 in. long; rachis pubescent; leaflets 7 to 9, ovate-lanceolate or oblong acuminate blunt, light shining green, 2 to 3 in. long, '8 to 1'25 in. wide; nerves 10 to 12 pairs. Panicles 3 to 4 in. long or more, pubescent. Sepals ovate acute, brown, '12 in. long, tomentose. Petals white, base green, oblong, obtuse, '15 in. long. Stamens very short, flesh-colour; anthers widely triangular. Ovary pubescent, violet. Pod 4 to 5 in. long, 1'25 to 1'5 in. wide, oblong, papery, light green, twisted at the base. *Hab.* Forests, often left in cultivated ground, being too hard to fell in clearing forest. Singapore, Tanglin; Selitar, etc. Malacca, Merlimau; Sungei Hudang; Selandor (Derry). Pahang, Pulau Tawar; Perak, Thaiping (Kunstler, Wray). Dindings, Lumut (Curtis). Province Wellesley, Tasek Gelugur (Fox). Penang, Penara Bukit (Curtis). *Distrib.* Sumatra. *Native name*: Kempas. *Use*: Timber, finely figured and hard, but not durable if exposed.

(2) **K. excelsa** Taubert Ber. Ges. Deutsch. Ges. x. 641. *K. parvifolia* Prain, *l.c.* 166.

A gigantic tree over 150 ft. tall. Branchlets golden-hairy when

young. Leaves 3 to 4 in. long; leaflets 9 to 12, elliptic-lanceolate, obtuse often emarginate, base cuneate, glaucescent silky beneath, 1 to 1.25 in. long, .25 to .35 in. wide; rachis and petioles silky when young. Panicles terminal at first silky, then glabrescent, 3 to 4 in. long; branches spreading 1.5 in. wide; flowers scattered .3 in. across. Calyx-tube short conic. Sepals ovate-lanceolate, pubescent in bud, nearly glabrous in flower. Petals elliptic white, nearly as long. Stamens with slender filaments as long as anthers. Ovary cylindric, glabrous. Pod 3 in. long, 1 in. wide oblong, apex broad rounded, red. *Hab.* Forests; apparently very rarely flowering. Pahang, Raub (Burn-Murdoch); Perak, Goping (Kunstler); Grit; Gapis (Wray). *Distrib.* Borneo. *Native name:* Tualang (in Borneo, Tapan).

44. DIALIUM, Linn.

Medium to very tall trees, wood very hard. Leaves odd-pinnate; leaflets alternate 3 to 9, coriaceous. Flowers small white in large terminal panicles. Calyx-tube short; lobes lanceolate, deciduous. Petals o. Stamens 2, included; anthers attached near the base. Ovary sessile, 2-ovuled. Pod oblong or ovoid, globose, with black pericarp; endocarp pithy, sweet. Seed 1. Species 15, cosmopolitan. Malay name, Keranji; fruit of several species sold in the markets for eating. Timber very hard and compact, highly valued. The great size of these trees makes collecting specimens difficult, hence they are comparatively little known.

Leaves glabrous.

Pods 1.5 in. long, umbonate (1) **D. Kunstleri**

Pods 1 in. or less, blunt, not velvety.

Leaves thinly coriaceous.

Panicles lax, spreading; pedicels as long as calyx

(2) **D. patens**

Panicles erect; pedicels shorter than the calyx.

Leaflets lanceolate, alternate; seed sub-quadrate

(3) **D. indum**

Leaflets elliptic, opposite; seed orbicular

(4) **D. laurinum**

Pods velvety; leaflets coriaceous

(5) **D. Maingayi**

Leaflets pubescent beneath.

Leaflets large 5 to 7, golden-pubescent beneath

(6) **D. platysepalum**

Leaflets small 9 to 12, alternate, golden-tomentose beneath

(7) **D. Wallichii**

Leaflets small 13 to 15, opposite, rusty tomentose beneath

(8) **D. Kingii**

(1) **D. Kunstleri** *Prain, l.c.* 168.

Tree 80 to 100 ft. tall, 2 to 3 ft. thick. Leaves 5 to 6 in. long; leaflets 5 (or 3), ovate-lanceolate narrow acuminate, base cuneate, 4 to 5 in. long, 1.25 to 1.5 in. wide, coriaceous, glabrous; nerves faint 5 to 6 pairs; petiolules 1 in. long. Panicles terminal and

axillary, 4 in. long, 3 in. wide. Flowers unknown. Pod subspherical, tip umbonate, 1·5 in. long, 1·35 in. wide, glabrous, black. Seed 1 sub-rotund, ·6 in. long. *Hab.* Open hilly jungle. Perak, Goping (Kunstler).

(2) **D. patens** Baker, in *Hook. fil. F.B.I.* ii. 270; *Prain, l.c.* 169.

Tree 60 to 80 ft. tall, 10 to 20 in. through; branches slender. Leaves 5 to 6 in. long; leaflets 3 to 5, oblong or elliptic cuspidate or acute, base rounded, sub-coriaceous, glabrous; nerves 8 to 10 pairs, fine, 3 to 5 in. long, 1·5 to 2·25 in. wide; petiolules stout, ·25 in. long. Panicles 6 to 8 in. long, 4 to 5 in. wide; branches slender, glabrous. Calyx ·15 in. long, tube 0; lobes white, imbricate, ovate-oblong, obtuse, grey pubescent on both sides. Stamens, filaments short slender. Ovary silky, sessile. Pod ovoid, black, grey pubescent, ·5 in. long, ·35 in. across. Seed oblong, angles round, ·3 in. long, dark maroon. *Hab.* Low wet jungle. Malacca (Griffith, Maingay). Pahang, Kwantan (Foxworthy). Perak, Larut (Kunstler). *Distrib.* Borneo. *Native names:* Keranji Umbut; Keranji Burong; Keranji Baledu.

(3) **D. indum** Linn. *Mantiss.* 24; *Benn. Pl. Jav. Rar.* 136, t. 30; *Prain, l.c.* 169.

Tree about 60 to 70 ft. tall. Branches grey puberulous. Leaves 6 to 8 in. long; leaflets 5 to 9, chartaceous, elliptic lanceolate-acuminate, base cuneate, 3 to 4 in. long, 1 to 1·5 in. wide, glabrous; nerves faint, 8 to 10 pairs; petiolules ·2 in. long. Panicles terminal and axillary, 4 in. long, 3 in. wide; branches slender, silky. Calyx ·15 in. long, white; tube 0; segments 5, imbricate, grey puberulous. Stamens 2; filaments short, slender. Pod sub-orbicular, ·9 in. wide, apiculate puberulous with minute silky hairs. *Hab.* Open country on river-banks. Pahang, Pijai, Pahang River (Ridley). Penang, Ayer Hitam (Curtis). *Distrib.* Java. *Native names:* Tulang Dayong.

(4) **D. laurinum** Baker, *l.c.* ii. 269; *Prain, l.c.* 170.

Big tree. Branchlets puberulous. Leaves 7 to 8 in. long; leaflets 7 (rarely 5) elliptic, tip cuspidate blunt retuse, base round coriaceous, glabrous, 4 to 5 in. long, 1·75 to 2 in. wide; nerves 8 to 9 pairs; petiolules thick ·3 to ·4 in. long. Panicles 4 in. long, 3 in. wide, pubescent; flowers in clusters of 3. Calyx ·15 in. long, ovate-oblong, grey-velvety. Stamens short. Pod orbicular, 1 in. across, not apiculate, black with grey pubescence. Seed orbicular, ·5 in. across, reddish brown, reticulate. *Hab.* Dense forests. Singapore, Kranji. Malacca, Ayer Panas (Goodenough, Maingay). Pahang, Bentong (Foxworthy). *Native name:* Keranji papan.

(5) **D. Maingayi** Baker, *l.c.* ii. 269; *Prain, l.c.* 171.

Big tree. Branchlets glabrous. Leaves 4 to 5 in. long; leaflets 9 (or 7) elliptic-oblong, cuspidate or acuminate, base round, coriaceous, dark green above, pale beneath; nerves 4 to 5 pairs faint,

2 to 2·5 in. long, ·75 to 1 in. across; petiolules ·2 in. long. Panicles 4 to 5 in. long, 3 in. across, puberulous. Calyx ·25 in. long, tube campanulate, very short, lobes 5 (or 4) brown-velvety, silky all over. Stamens, filaments thick nearly as long as anther, connective hairy. Ovary black velvety. Pod obovoid, ·9 in. long, ·8 in. wide, deep olive-velvety. Seed obovate-quadrangle, striate ·45 in. long. *Hab.* Forests. Singapore (Maingay). Malacca, Selandor (Goodenough). Perak, Goping (Kunstler). Penang, Telok Bahang (Curtis). *Native names*: Keranji umbut; Keranji sakellet; Keranji burong; Mumpanjor.

(6) **D. platysepalum** Baker, *l.c.* ii. 270; Prain, *l.c.* 172.

Tree 80 to 90 ft. tall. Branchlets puberulous. Leaves 5 to 9 in. long; rachis puberulous; leaflets 5 to 7, elliptic or oblong to ovate lanceolate, caudate-acuminate, blunt, base rounded or cuneate, coriaceous, dark green shining above, yellow silky beneath, keel very prominent; nerves distinct, fine 9 to 11 pairs, 3 to 5 in. long, 1 to 2 in. wide; petiolules ·25 in. long. Panicles deltoid, lax, 5 to 8 in. long, 4 to 7 in. wide, brown-silky. Calyx ·2 in. long, tube distinct, campanulate, lobes imbricate, triangular blunt, coriaceous, dense, brown-velvety on both sides. Filaments thick. Ovary black-velvety. Pod obovoid or round, 1 in. long, ·6 to ·8 in. across, dark brown-velvety. Seed orbicular, pale-brown striate. *Hab.* Forests, common. Malacca, Ayer Panas; Selandor (Derry). Negri Sembilan, Senawang Reserve (Burkill). Selangor, Kwala Lumpur (Foxworthy). Perak, Relau Tujur (Wray).

var. ambiguum. *D. ambiguum* Prain, *l.c.* Branches and leaves nearly glabrous. Ovary green-silky, sessile; style glabrous. Malacca, Bukit Sadanen (Derry). Perak, Goping (Kunstler). Prain, *l.c.* 173, distinguishes three forms, the typical one with ovate-lanceolate cuneate leaflets and orbicular pods, Perak and Malacca (*Native name*: Sepan), and two forms to which he gives respectively the names of *papan* and *burong*. These being Malay words cannot be used in place of Latin. The first form has elliptic leaflets round at base, the second oblong leaflets and clavate pods. The foliage varies considerably in these trees, and I think the varieties are hardly worth keeping up; Keranji papan is a name given to *laurinum*, as well as to *platysepalum*. The word means *planks*, this tree being specially valued for timber. Keranji burong, Bird Kranji, is also used for *D. Maingayi*. *D. platysepalum* is also known as Keranji Tembaga and Sakellet (said to be a perversion of scarlet) and refers to the coppery underside of the leaves.

(7) **D. Wallichii** Prain, *l.c.* 174. *D. platysepalum var. Wallichii* Baker, *l.c.* ii. 270.

Tree about 80 ft. tall. Leaves 7 to 8 in. long; leaflets 9 to 11, alternate, bright green above, golden yellow beneath coriaceous, oblong-lanceolate acuminate acute, base rounded, 2 to 2·25 in. long, ·6 to ·8 in. wide; nerves 15 pairs, very inconspicuous;

petiolules .1 in. long; rachis yellow, pubescent. Panicles terminal, 6 to 8 in. long, 3 to 4 in. wide, golden-pubescent. Calyx .2 in. long, ovoid; tube distinct, lobes imbricate, broad triangular, obtuse, coriaceous, green-velvety outside, within white, glabrous. Stamens, filaments thick, connective pubescent. Ovary brown-silky, stipitate. Pod obovoid, .1 in. long, .75 in. wide, black-velvety. Seed sub-quadrate .4 in. long. *Hab.* Forests. Singapore (Wallich); Garden Jungle. Malacca (Maingay). Perak, Sungkai (Foxworthy).

(8) *D. Kingii* Prain, *l.c.* 175.

Big tree 100 to 150 ft. tall, 3 to 4 ft. through. Leaves 8 to 9 in. long; leaflets 13 to 15, opposite, coriaceous, glossy-green above, pubescent (not golden) beneath, oblong-lanceolate blunt, base rounded; nerves conspicuous elevate, 2 to 2.5 in. long, .6 to .8 in. wide; petiolules .1 in. long. Panicle large, 12 in. long, 6 in. wide, dark brown-velvety. Calyx .25 in. long, no tube, lobes broad ovate-obtuse, dark brown outside, white glabrous inside. Ovary brown-velvety, sessile. Pod spherical, .9 in. long, .75 in. wide, velvety-black. Seed sub-quadrate striate, .4 in. long. *Hab.* Old Jungle. Perak, Goping (Kunstler).

45. BAUHINIA, Linn.

Unarmed shrubs, erect or climbers with circinate tendrils. Leaves simple usually ovate, deeply cleft into 2 lobes, rarely entire. Flowers usually showy and rather large in panicles or corymbose, rarely simple racemes. Calyx-tube with disc produced to top, short, campanulate or long cylindric, teeth 2 to 5. Petals clawed. Stamens 10 or reduced to 3 or 1, with sterile ones; filaments filiform; anthers versatile. Ovary stalked; stigma small or large, peltate. Pod linear or oblong, flat, dehiscent. Species 150, all tropics.

Fertile stamens 10. § PAULETIA.

Shrub erect; flowers white (1) *B. acuminata*

Fertile stamens 3.

Calyx tube produced. § PHANERA.

Erect shrub; leaves tomentose; flowers large red and yellow (2) *B. mollissima*

Climbers; flowers large white or pink in terminal racemes.

Buds club-shaped.

Petals glabrous except midrib and claw.

Calyx lobes 1.25 in. long (3) *B. calycina*

Calyx lobes .5 to .7 in. long (4) *B. semibifida*

Petals densely pubescent all over.

Petals longer than calyx lobes.

Leaves pubescent; flowers pink (5) *B. Hullettii*

Leaves glabrous.

Stipules large orbicular; flowers white (6) *B. Griffithiana*

Stipules small; flowers greenish yellow (7) *B. ferruginea*

- Petals not longer than calyx lobes.
 Leaves pubescent; pedicels very short (8) **B. Ridleyi**
 Buds clove-shaped.
 Leaves of 2 connate leaflets, tips round; flowers cream colour (9) **B. glauca**
 Flowers medium, red or orange in dense terminal corymbs or racemes.
 Calyx tube much longer than limb.
 Leaves 5- to 7-nerved, pubescent beneath; pod velvety (10) **B. cornifolia**
 Leaves 7- to 9-nerved glabrous; pod glabrous (11) **B. bidentata**
 Leaves 7-nerved, silky beneath; petals hairy outside (12) **B. cuprea**
 Calyx tube twice as long as limb, or nearly so (13) **B. monticola**
 Calyx tube short, hardly or not exceeding limb.
 Flowers in pubescent racemes.
 Racemes many-flowered; leaves entire glabrous (14) **B. lucida**
 Racemes few-flowered; leaves bifid, pubescent beneath (15) **B. Scortechinii**
 Racemes panicled densely hairy.
 Leaves entire; racemes few 2 in. long (16) **B. integrifolia**
 Leaves bifid; racemes many 12 in. long (17) **B. flammifera**
 Flowers corymbose.
 Leaves coriaceous small 3·5 in. long (18) **B. Kingii**
 Calyx tube shorter than lobes. § LASIOBEMA.
 Flowers medium or small, green and pink or yellow, not red or orange.
 Flowers over 1 in. across in racemes.
 *Petals orbicular clawed (19) **B. Finlaysoniana**
 Petals lanceolate clawed (20) **B. Wrayi**
 Flowers ½ in. across; petals spatulate (21) **B. Curtisii**
 Flowers 7 in. wide very numerous; racemes 8 to 12 in. long (22) **B. strychnoidea**
 Flowers 1 in. wide; raceme 1 in. long (23) **B. micrantha**
 Flowers 6 in. wide; panicle 8 in. long (24) **B. glabrifolia**
 Flowers over 1 in. wide; panicle 9 in. by 7 in. (25) **B. bracteata**

(1) **B. acuminata** Linn. *Sp. Pl.* 376; Baker, in *Hook. fil. F.B.I.* ii. 276; Prain, *l.c.* 179.

A shrub about 5 to 10 ft. tall. Leaves slightly cordate cut down into acute or sub-obtuse lobes for a third of their length, glabrous above and hairy and glaucescent beneath, 4 to 5 in. long, 3·5 in. wide; petioles 1·25 in. long, puberulous. Flowers few corymbose, pure white. Calyx ½ in. long, green. Petals oblong, 1·75 in. long. Stamens 10 fertile. Pod 4 to 5 in. long, 6 to 7 in. wide. Seeds 5 to 15. *Hab.* An occasional garden escape or remains of abandoned cultivation. I have never seen any which appeared to be really wild, but it is to be seen, in sandy places usually, in

Singapore and Malacca. Kunstler collected it in Larut, and on limestone rocks at Gunong Pondok, and perhaps it is really wild there. *Distrib.* India, Cambodia, Malaya.

(2) *B. mollissima* Wall. *Cat.* 5782; *Prain*, l.c. 180.

An erect shrub (or slender climber to 60 ft.). Branches tomentose, no tendrils. Leaves cordate round, lobes .75 to 1.5 in. long, quite round at tips; nerves 11, glabrous above, and prominent puberulous beneath, 3.5 to 4.5 in. long, 4 to 6 in. wide; petioles pubescent, 1.5 in. long. Flowers few, racemed; peduncles .5 to 2.25 in. long, tomentose. Calyx tomentose, lobes linear-lanceolate,



FIG. 55.—*Bauhinia mollissima*.

1 in. long, reflexed tube as long. Petals oblanceolate, lower four 2 in. long, red brown with central yellow streak, the upper one 2.25 in. long, .5 in. wide, red with a branched yellow line, all pubescent outside. Stamens 3 fertile, glabrous. Ovary tomentose. Pod pubescent, 4 in. long, 1 in. wide. Seeds 1 or 2 orbicular. *Hab.* Open country north of peninsula, usually a bush, slightly scandent or not. Perak, Larut, climber (Kunstler). Penang (Wallich). Kedah, Yan. Perlis, Kanga. *Distrib.* Tenasserim.

(3) *B. calycina* Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 3. *B. ferruginea* var. *excelsa* Baker, in *Hook. fil. F.B.I.* ii. 283.

A climbing shrub covered with mealy red tomentum. Leaves ovate or nearly orbicular, lobes rounded one-third of length, base cordate, glabrous, 3 to 5 in. long and wide; petioles 1.5 to 2 in.

long. Raceme stout, mealy; pedicels 1·5 in. long. Calyx-tube ·25 to ·5 in. long; campanulate, lobes 5 linear-acuminate, acute, red-woolly, 1·25 in. long. Petals little longer, glabrous, white. Stamens 3 angled, ·75 in. long; filaments very short. Style short, pubescent. Pod oblong cuspidate, 7 in. long, 2 in. wide. Seeds 4, elliptic. *Hab.* Lowland woods in the south. Johor, Gunong Pulai. Malacca (Griffith). Selangor, Kwala Lumpur; Petaling. Negri Sembilan, Bukit Tangga (Napier); Bukit Kupa-yang (Cantley); Seremban. *Native name*: Akar Kurutok Hitam. *Use*: Roots boiled, a drug for dropsy.

Baker identified two specimens of this in Griffith's collections as *B. diphylla* and *B. ferruginea* var. *excelsa* respectively.

(4) **B. semibifida** Roxb. *Hort. Beng.* 31; *Wall. Pl. As. Rar. t.* 253; *Baker, l.c.* ii. 280; *Prain, l.c.* 182.

A medium or gigantic climber, often slender, but sometimes with a stem 4 to 6 in. thick. Leaves rounded, oblong, base cordate; lobes ovate, blunt ·5 in. long; nerves 11, elevate, pubescent beneath, 3 in. long and wide; petioles 1 in. long pubescent. Stipules ovate, falcate ·15 in. long. Raceme lengthening to 6 in. or more, red-tomentose; buds club-shaped; pedicels 1·25 in. long, tomentose. Calyx densely pubescent, tube ·4 to ·5 in. long, dilate towards base, lobes narrowly lanceolate acute ·5 to ·7 in. long, ·15 in. wide, green. Petals oblanceolate obtuse, short clawed, ·8 to 1 in. long, chalky white turning yellow green, glabrous except claw and on base of midrib. Stamens 3 fertile, white. Ovary stalked brown rusty-silky; style thick, silky. Stigma large, peltate. Pod oblong, thin; valves black, 4 in. long, 1·25 in. wide; stalk ·35 in. long. Seeds 4 to 6 orbicular. *Hab.* Thick forest and edges of forest. Singapore, Garden Jungle; Bukit Timah. Malacca (Griffith). Tringganu, Bundi (Rostado). *Distrib.* Sumatra.

Roxburgh's *B. semibifida* was based on a Sumatran plant cultivated in Calcutta Gardens. The pictures, Roxburgh's own and Wallich's, differ in the smaller flowers and distinctly hairy branches and leaves. The Singapore plant identified with this by Prain and the Malaccan plant identified by Baker are not hairy. I have seen no specimens from Sumatra. It was formerly at least common in Singapore, and our only wild *Bauhinia* there. I never met with it anywhere else. Baker's description appears to be based on the Malacca plant, and agrees with the Singapore plant.

(5) **B. Hullettii** Prain, *l.c.* 183.

Large climber 20 ft. or more tall, pubescent. Tendrils pubescent. Leaves rounded cordate, lobes rounded oblong, one-third length of leaf, sub-coriaceous, 2·5 to 4 in. long, 2·5 in. wide, sparsely pubescent above, appressed pubescent beneath or glabrous; petioles 1 in. long, pubescent. Stipules orbicular hairy. Raceme lax about 12-flowered, puberulous; pedicel 1·25 to 1·5 in. long. Buds club-shaped. Calyx rose pink, as are pedicels, tube dilate towards base, lobes lanceolate ·4 to ·5 in. long, ·1 in. wide. Petals oblanceolate obtuse, long-clawed, densely tomentose outside, 1·25 in. long,

·4 in. wide, "rose pink" (Prain), white at base, greenish yellow towards tip (Curtis). Stamens 3; filaments pink. Ovary stalked, silky; style tomentose, stout. Stigma oblique, peltate. *Hab.* Malacca (Holmberg). Perak (Wray). Penang, Waterfall (Curtis). *Native name*: Akar Tapah Kudah Antan.

(6) **B. Griffithiana** Prain, *l.c.* 183. *B. suffruticosa* Ridl. *Trans. Linn. Soc.* iii. 295. *Phanera Griffithiana* Benth. *Pl. Jungh.* 263.

A strong climber or big scandent shrub, glabrous. Tendrils glabrous. Leaves ovate-cordate or round, lobes ovate blunt 1 in. long, glabrous, coriaceous, 3 to 3·25 in. long, 3 in. across; petioles pubescent 1 in. long. Stipules long-persistent, orbicular, papery ·75 in. across. Racemes 3·5 to 6 in. long, pubescent; pedicels ·4 in. long. Bracts persistent ovate, ·3 in. wide. Calyx puberulous, lobes lanceolate ·6 in. long, ·15 in. wide, tube ·4 in. long. Petals white, silky oblanceolate obtuse, short-clawed, 1·25 to 1·5 in. long, ·4 to ·5 in. wide, densely tomentose outside. Stamens 6; filaments red. Ovary stalked, silky; style stout, silky. Stigma peltate. Pod oblong black ·5 in. long, 1·5 in. wide. Seeds 4 to 6 ovate, ·5 in. long. *Hab.* Thickets, not very common. Pahang, Kwala Tembeling. Malacca, Gading (Hervey); Ayer Panas; Alor Gajah; Chabau (Hullett). Perak (Scortechini). Penang (Kunstler).

The name given by me really antedates Prain's name, but the genus *Phanera* was reduced to *Bauhinia* by Bentham in the "Genera Plantarum."

(7) **B. ferruginea** Roxb. *Hort. Beng.* 90; *Baker, l.c.* 283; *Prain, l.c.* 183.

Big climber. Tendrils glabrous. Leaves rounded cordate, lobes oblong rounded, sinus narrow, 1·75 in. long, glabrous; nerves elevate 11; whole leaf 2·5 to 3 in. long, 3·25 in. wide; petioles ·75 in. long, hairy. Stipules ovate, falcate, ·15 in. long, deciduous. Racemes pubescent, 3·5 to 6 in. long; pedicels club-shaped, 1 in. long. Calyx-tube ·4 in. long slightly dilate towards base, lobes lanceolate, ·6 in. long, ·15 in. wide. Petals greenish yellow, oblanceolate, blunt, short-clawed, 1 to 1·25 in. long, ·35 in. wide, densely tomentose outside. Stamens 3; filaments pink. Ovary stalked, silky; style thick silky. Stigma oblique, peltate. Pod thin, oblong, black, glabrous, 8 in. long, 2 in. wide. Seeds 4 to 6, ovate, ·5 in. long. *Hab.* Forests. Selangor, Petaling. Perak, Larut and Gopong (Kunstler); Kamunting (Wray). Penang (Wallich 5776); Hill (Curtis). *Native name*: Lapang.

(8) **B. Ridleyi** Prain, *l.c.* 185.

Strong climber. Branches angled and tendrils long, silky. Leaves ovate blunt cordate; lobes 1 to 1·5 in. long, above glabrous, beneath silky, 2·5 to 3 in. long, 2 to 2·5 in. wide; petioles ·5 in. long, red-tomentose. Stipules ovate-lanceolate, caducous ·15 in. long. Flowers densely corymbose; pedicels ·2 in. long, tomentose. Calyx densely red-tomentose-hairy, tube ·3 in. long dilate at base,

lobes lanceolate, 4 in. long, 1 in. wide. Petals oblong-obtuse, hardly clawed not exsert, densely tomentose outside, white, 4 to 5 in. long, 2 in. wide. Stamens 3; anthers crimson; filaments red. Ovary short-stalked, tomentose; style 5 in. long. Stigma large peltate. *Hab.* Forests, local. Johor (King and Hullett). Perak, Pengkalan Bharu (Kunstler); Padang Rengas (Curtis).

Easily recognised by its angled stem, the angles fringed with silk and dense corymbs of short-pedicelled, short-petalled flowers.

(9) **B. glauca** Wall. *Cat.* 5785; *Baker, in Hook. fil. F.B.I.* ii. 282; *Prain, l.c.* 186.

Slender climber. Tendrils puberulous. Leaves membranous, ovate, deep cordate bilobed half-way; lobes round, 2 to 3 in. long, 2.75 in. wide, glabrous above, thin-pubescent beneath especially on nerves; petioles slender, 1.6 in. long. Stipules linear, subulate, 2 in. long. Corymbs 1 in. long and as wide on peduncles slender as long or longer, red-pubescent. Buds clove-like. Calyx glabrous, tube cylindric, 4 in. long, lobes short, ovate 1.5 to 2 in. long. Petals cream colour, oblong, long-clawed, edges wavy, .75 in. long, pubescent outside. Stamens 3, white. Ovary glabrous, stalked. Stigma small. Pod thin glabrous, 6 to 8 in. long, 1.5 to 2.25 in. wide. Seeds 15 to 20, oval in a line down the pod. *Hab.* Perak, Kampong Kota (Wray, Scortechini). *Distrib.* Tenasserim.

(10) **B. cornifolia** Baker, *in Hook. fil. F.B.I.* ii. 278; *Prain, l.c.* 186.

A lofty climber 100 to 150 ft. tall, thinly downy. Tendrils downy, few. Leaves coriaceous entire ovate, tip blunt, acute or minutely bifid, base broad rounded; nerves 7 pairs, glabrous above, sparsely silky or glabrous beneath, 2.5 to 3.5 in. long, 1.5 to 2.25 in. wide; petioles 1 in. long, puberulous. Corymbs 4 to 6 in. across; pedicels 2.25 in. long, pubescent. Buds clove-shaped. Calyx-tube slender, 1 in. long, lobes ovate, sub-acute, .25 in. long. Petals oblong-lanceolate, short-clawed, .8 in. long, .5 in. wide, orange yellow becoming red. Stamens 3; filaments short. Ovary downy, short-stalked. Stigma peltate. Pod oblong, woody, 4 in. long, 2 in. wide, red-pubescent. Seeds 4, 1 in. long. *Hab.* Hill forests, Pahang, Kluang Terbang (Barnes). Negri Sembilan, Seremban (Cantley). Selangor, Kerling; Semenyeh; Bukit Hitam (Kelsall). Perak, Gunong Keledang; Larut (Kunstler). Penang, top of hill (Curtis); Kelantan, Channing forests (flowers cherry red). *Native names:* Akar Tumbul Merah; Lapang.

(11) **B. bidentata** Jack, *Mal. Misc.* ii. (7), 76; *Baker, in Hook. fil. F.B.I.* ii. 279; *Prain, l.c.* 188.

A lofty climber. Tendrils glabrous. Leaves ovate, slightly cordate or truncate at base, tip round acute or bifid, coriaceous shining green, 2.5 to 5 in. long, 1.5 to 3.5 in. across, glabrous; nerves 7 to 9; petioles 1 in. long. Corymbs very abundant, 3 in. long and broad; pedicels pubescent, lowest 1.5 in. long. Buds

clove-shaped. Calyx-tube cylindric, ribbed, puberulous, 1 in. long; lobes ovate acute, 3 in. long. Petals orange yellow then scarlet, oblong, short-clawed, 6 in. long, 35 in. wide, pubescent outside. Stamens 3; filaments hairy. Ovary pubescent, stalked. Stigma large peltate. Pod oblong, woody, 4.5 in. long, 1.5 in. wide, glabrous. Seeds 4 to 5. *Hab.* Common and most conspicuous all over the jungles of the centre of the peninsula. Johor River (Hullett). Pahang, Kwala Tahan. Negri Sembilan, Pantai. Selangor, Semangkok; Rawang (Kloss); Batu Caves. Perak, Thaiping (Wray); Goping and Sungei Rayah (Kunstler); Penang Hill (Jack); Waterfall (Curtis); Province Wellesley, Tasek Gelugur (Fox). *Distrib.* Sumatra. *Native names:* Pride of Selangor; Katup-Katup; Akar Katup-Katup; Sekoyah; Dauh Nasi.

(12) **B. cuprea** Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 2.

Climber. Branches red-tomentose. Leaves ovate entire or shortly bifid, lobes short blunt, glabrous above, red-silky beneath; nerves 7, elevate, 3 in. long, 2.5 to 3 in. wide; petioles 1 in. long, sub-glabrous. Panicle 2 in. long. Flowers red, few; pedicels 2 in. long, red-pubescent. Calyx-tube cylindric, 5 in. long, lobes pubescent, boat-shaped, 35 in. long. Petals ovate, clawed 1 in. long, 5 in. wide, densely red-hairy. Stamens 3, red-hairy. Pistil hairy. *Hab.* Open hill-top, rare. Perak, Gunong Keledang (Ridley).

(13) **B. monticola** Ridl. *Journ. Roy. As. Soc. S. Br.* 75, p. 28.

Climber, glabrescent. Leaves ovate-deltoid, tip very shortly bifid or entire acuminate, base cordate, coriaceous, glabrous; nerves 7, 2 to 2.25 in. long, 1.5 to 2 in. wide; petioles 1 in. long. Racemes short, 1 to 2 in. long, glabrous or nearly so, lax; pedicels 1.5 in. long, slender, sparsely hairy; bracts minute caducous. Buds obovoid. Calyx-tube cylindric, 4 in. long, red, appressed hairy; lobes ovate, 3 in. long, hairy. Petals oblong obtuse, conspicuously veined, sparsely hairy on back, claw 1 in. long, blade .7 in. wide. Stamens very short, hairy at base. Pistil stalked, cylindric hairy on the suture, .2 in. long; style about half as long, hairy on the edge. Stigma large peltate. *Hab.* Hill forests, 4000 ft. altitude upwards. Selangor, Gunong Mengkuang Lebah 5000 ft. altitude (Robinson). Perak, Gunong Kerbau 4500 to 5500 ft. altitude (Robinson).

(14) **B. lucida** Wall. *Cat.* 5779A; *Prain, l.c.* 188. *B. emarginata* Baker, in *Hook. fil. F.B.I.* ii. 278, not of Miller.

Big climber 100 ft. long, glabrous. Leaves ovate-cordate entire acuminate, coriaceous, glabrous, 3.5 in. long, 2 to 2.5 in. wide, 5- (rarely 7-)nerved; petioles .3 to .4 in. long. Panicles of racemes lax, long peduncled, 4 to 6 in. long, 2 in. across, rusty-puberulous; pedicels .75 in. long or less. Buds clove-shaped. Calyx tomentose, tube cylindric, .25 in. long, .2 in. across. Petals ovate-oblong bright yellow, claw long, .8 in. across, pubescent outside. Stamens

3, fertile. Ovary glabrous except at base; style 15 in. long. Stigma large peltate. Pod narrow oblong woody 3.5 in. long, 1 in. wide, glabrous. Seeds 4 to 6, orbicular, 4 in. across. *Hab.* Dense and open forests. Perak, Larut (Kunstler). Penang (Wallich 5779).

(15) **B. Scortechinii** *Prairie, l.c.* 188.

Large climber, glabrous except at tip of branches. Leaves shallow cordate ovate bifid, lobes narrow, sub-triangular, sinus wide, coriaceous, glabrous above, appressed-hairy beneath; nerves 9 (rarely 7) elevated beneath, 3.5 to 4 in. long, 2 to 2.25 in. wide; petioles 1.5 in. long, glabrous. Racemes few-flowered, rusty-pubescent; pedicels .5 in. long or less. Bud .5 in. long, clove-shaped. Calyx-tube cylindric .25 in. long, lobes ovate nearly as long. Petals ovate tomentose outside. Stamens 3 (or 4) fertile, hirsute. Ovary pubescent; style glabrous. Stigma peltate. *Hab.* Perak, Gunong Haram (Arang) Para (Scortechinii).

(16) **B. integrifolia** *Roxb. Hort. Beng.* 90. *B. holosericea* *Ridl. Journ. Roy. As. Soc. S. Br.* 75, p. 28.

Big climber. Branches, petioles, inflorescence red-velvety. Leaves coriaceous orbicular cordate, entire or retuse at tip; nerves 7 or 9 elevated beneath, glabrous above, red-velvety beneath, densely on nerves and reticulations, 2 to 2.5 in. long, 2.4 to 3 in. wide; petioles 1.25 in. long. Panicles of a few stout racemes axillary and terminal, 2.5 to 5 in. long; branches with prominent flower-scars, very numerous. Bracts lanceolate-acuminate, 1 in. long; pedicels slender .6 in. long. Buds ovate, sub-acute, the tube shorter. Calyx-tube cylindric, dilate at base, .2 in. long, lobes oblong, .2 in. long, all hairy. Petals oblong, rather short-clawed, very red-hairy outside, .35 in. long, .2 in. wide. Stamens fertile, 3, slender glabrous. Ovary hairy all over; style about as long, slender, glabrous; stigma peltate. Pod woody, firm. 8 in. long, 2.5 in. wide, oblong, blunt, slightly narrowed at tip, brown, scurfy. Seeds flat orbicular, 1.1 in. long. *Hab.* Northern forests. Pahang, Sungei Jelai (Machado). Perak, Temengoh; Kinta (Murton). Province Wellesley (Kunstler). Penang (Roxburgh, Wallich). Kelantan, Sungei Lebeh (Yapp).

(17) **B. flammifera** *Ridl. Journ. Roy. As. Soc. S. Br.* 82, p. 182. *B. integrifolia* *Baker, in Hook. fil. F.B.I.* ii. 279; *Prairie, l.c.* 191 (*in part*), *not of Roxburgh*.

A lofty climber. Branches and tendrils puberulous. Leaves usually deep cordate, ovate, rounded with short wide sinus at top or quite entire (seedling leaves 8 in. across, thin, sinus broad, points acute). Adult leaves 4 to 6 in. long and about as wide; leaves near the inflorescence small 1 in. long, coriaceous, glabrous except nerves beneath, sometimes pubescent; nerves 11; petioles glabrous, 1.75 to 2.25 in. or more long. Flowers in leafy panicles, 12 in. long of dense, many-flowered racemes, 3 to 6 in. long; pedicels slender 1 in. long, puberulous. Calyx-tube .15 in. long,

lobes ovate acute, '2 in. long. Petals obovate, long-clawed '7 in. long, '3 in. wide, densely pubescent, yellow then orange, finally red. Stamens pink. Ovary pubescent, stalked. Stigma small, peltate. Pod oblong, woody, 7 to 8 in. long, 2'5 in. wide, pubescent. Seeds 3 to 5. *Hab.* Common in most of the forests of the centre of the peninsula, very conspicuous and showy. Malacca, Panchur (Derry). Muar (Feilding). Pahang, Kwala Tenok; Pekan; Kwala Lipis (Machado). Negri Sembilan, Seremban (Napier). Selangor, Kwala Lumpur. Perak, Kinta (Murton); Thaiping (Scortechini). Penang, Balik Pulau (Curtis). Tringganu, Bundi (Rostado). Kelantan, Chaning. *Distrib.* Patalung. *Native names*: Kankatok; Dau; Akar Dadaup. *Use*: The bast, which is very strong, used for tying.

Baker and other botanists mistook this plant for Roxburgh's *B. integrifolia*, but it is clear that Roxburgh intended by his species collected in Penang the entirely northern plant, and not this species.

(18) **B. Kingii** Prain, *l.c.* 189.

Small glabrous climber. Branches zigzag. Leaves deeply cordate ovate acuminate, bifid or entire, lobes very short, coriaceous, glabrous above and beneath, 5-nerved, 3'5 in. long, 2'5 to 3 in. wide; petioles 1 in. long. Corymbs axillary and terminal lax, 3 in. long, 2'5 in. wide to 6 in. across and 1 to 1'5 ft. long; pedicels slender, 1'25 in. long, puberulous. Bud clove-shaped. Calyx-tube narrow infundibuliform, '25 in. long, lobes ovate acute as long. Petals bright red oblong-lanceolate obtuse, long-clawed, '8 in. long, '25 in. wide, pubescent outside. Stamens 3, hirsute. Ovary pubescent along edges, stalk long; style large, peltate. Pod glabrous, woody, narrowly ovate, narrowed both ends, 2 in. long, '8 in. wide; stipe '2 in. long, pubescent. Seeds 1 to 2, ovate. *Hab.* Hill forests. Selangor, Bukit Hitam (Kelsall). Perak, Gunong Batu Putih (Wray). *Native name*: Akar Suloh.

(19) **B. Finlaysoniana** Grah. Wall. *Cat.* 5801; Baker, in Hook. *fil. F.B.I.* ii. 278; Prain, *l.c.* 190.

Big climber over 100 ft. long, glabrous. Leaves oblong ovate acuminate entire, base slightly cordate, coriaceous glabrous; nerves 5, strongly raised beneath, 3'5 in. long, 1'5 to 2'5 in. wide; petioles '3 to '4 in. long. Racemes dense, axillary and terminal 2 to 3 in. long, rusty-pubescent; pedicels '5 in. long. Buds clove-like. Calyx-tube '2 in. long, lobes ovate, '25 in. long, '2 in. broad, acute, tomentose. Petals orbicular, white or yellow, '6 in. long, '5 in. across, pubescent outside. Ovary pubescent on sutures and stalk. Pod linear-oblong, woody 2 in. long, '6 in. wide. Seeds 4 to 6. *Hab.* Perak, Larut (Kunstler, Scortechini). Penang, base of Government Hill (Curtis). *Distrib.* Siam.

(20) **B. Wrayi** Prain, *l.c.* 191.

Shrubby creeper 15 to 30 ft. long, glabrous. Leaves ovate truncate (rarely cordate) acuminate acute (rarely obtusely emar-

ginate), 2 to 3 in. long, 1·25 to 1·75 in. wide, glabrous above, glaucous beneath; nerves 5; petioles slender ·5 to ·6 in. long. Racemes lengthening as the flowers fall, from 1 to 4 in.; rachis with raised scars, glabrous; buds clove-shaped, ·2 in. long; pedicels very slender, 1 in. long. Calyx glabrous, tube ·15 in. long, lobes spatulate as long. Petals broad oblanceolate, long-clawed, edge wavy, sparsely pubescent outside, greenish yellow to pink. Stamens 3. Ovary glabrous. Stigma small. Pod obovate or oblong, thin, woody, 2 to 3 in. long, 1 in. across, glabrous. Seeds 1 to 2, ovate. *Hab.* On rocks usually at about 1000 ft. altitude. Johor, Gunong Pulai 1000 ft. altitude. Selangor, Ulu Selangor 1000 to 1200 ft. altitude (Kunstler). Perak, Larut (Kunstler).

(21) **B. Curtisii** *Prain, l.c.* 195.

Slender woody climber, nearly glabrous. Leaves ovate-oblong, base round, tip entire or shortly blunt, bilobed, membranous, glabrous; nerves 5 to 7, 2·5 to 4 in. long, 2 to 2·5 in. wide; petioles ·5 in. long. Racemes or few-branched panicles, 4 to 6 in. long; pedicels spreading, slender, ·6 in. long; buds ovate, very small. Calyx-tube campanulate, very small, lobes ovate, ·15 in. long, puberulous. Petals ·25 in. long, spatulate, glabrous, white. Stamens 3, longer. Ovary glabrous. Pod linear-oblong, flat, thin, sub-glabrous, 2·5 in. long, ·75 in. wide. Seeds 3 to 5. *Hab.* Lankawi, near the lake and on Terutau (Curtis).

(22) **B. strychnoidea** *Prain, l.c.* 195.

Creeper about 30 ft. long. Stems 1 in. through, glabrous. Leaves ovate acute, base cuneate, coriaceous, glabrous; 3 to 4 strong raised nerves, dark shining green, 3 to 3·5 in. long, 1·5 to 2 in. wide; petioles ·75 in. long. Racemes paniced or simple, 8 to 12 in. long; pedicels spreading ·75 in. long. Flowers very numerous, small. Calyx-tube campanulate, limb with 5 short teeth, glabrous. Petals spatulate, slightly puberulous inside. ·35 in. long, yellow or light red. Stamens 3. Ovary pubescent, Stigma large, peltate. Pod oblong woody, brown-velvety, 3 to 5 in. long, 2 in. wide. Seeds 3 to 5 ovate, ·1 in. long. *Hab.* Hills usually limestone. Pahang, Gunong Senyum (Evans). Selangor, Batu Caves on the top of the hill (Kelsall); Negri Sembilan, Tampin Hill (Burkill). Perak, Goping and Chanderiang (Kunstler); Tambun, Ipoh (Ridley).

(23) **B. micrantha** *Ridl. Journ. Roy. As. Soc. S. Br.* 59, p. 98.

A long climber over rocks. Leaves (red and silky when young), bright green ovate, tip shortly bilobed, base broad entire, glabrous except a little red hair at base; nerves 10; 2 in. long, 2·5 in. wide; petioles ·5 to ·75 in. long. Peduncles 2 in. long; raceme corymbiform 1 in. long, red-hairy; flowers white; pedicels ·5 in. long, pubescent. Calyx-tube cylindric, lobes ovate. Petals ·5 in. long, oblong rounded, crisped; stem pubescent. Stamens longer, glabrous. Ovary glabrous. Pod oblong, beaked at tip, 3 in. long,

1 in. wide, brown glabrous. Seeds 3, orbicular, .3 in. wide. *Hab.* Limestone rocks and bushes in open country. Perlis, on Bukit Lagi and Chupeng (Ridley). Pahang, Kwala Teku (Seimund). A form with larger petals.

(24) **B. glabrifolia** Baker, in *Hook. fil. F.B.I.* ii. 281; *Prain*, l.c. 193.

Slender climber 50 to 80 ft. long. Stem 1 to 5 in. through; branchlets and tendrils silky. Leaves membranous, glabrous, ovate-acuminate, base truncate, entire or bifid, with narrow acute, overlapping lobes; nerves 9 elevate, 4 to 6 in. long, 3 to 4.5 in. wide; petioles 1.25 to 2 in. long. Panicles 8 in. long, 4 in. wide, of dense small corymbs of small white flowers, grey-silky; buds clove-shaped. Calyx-tube .15 in. long, lobes ovate .25 in. long, grey-silky. Petals obovate, clawed .3 in. long, grey-silky outside. Stamens 3 glabrous. Ovary silky; style glabrous. Stigma small. *Hab.* Forests to 1000 ft. altitude. Perak, Goping (Kunstler); Blanda Mabok (Wray). Penang, Ayer Hitam and West Hill (Curtis). *Distrib.* Burma, Borneo.

The young leaves are split into two large ovate acuminate lobes down to the petiole.

(25) **B. bracteata** Grah. Wall. *Cat.* 5802; Baker, in *Hook. fil. F.B.I.* ii. 282.

Climber. Branches tomentose, reddish. Leaves coriaceous, glabrous, sub-cordate, lobes 2.5 in. long; nerves 10, 3.5 in. long and as wide; petioles 2 in. long. Panicle 9 in. long, 7 in. across, much-branched, tomentose; pedicels 1.5 to 2 in. long, pubescent. Calyx-tube very short, silky, lobes 2 ovate-oblong, pubescent, .3 in. long. Petals claw slender, pubescent, .6 in. long; blade cordate, rounded, crisped, greenish white, veins conspicuous, silky-hairy on both surfaces, .4 in. long and as wide. Stamens 3, hairy; staminodes 6 glabrous. Ovary hairy at base. *Hab.* Kedah, Gerun, base of Kedah Peak (Robinson, Haniff). *Distrib.* Siam and Tenasserim.

EXCLUDED SPECIES.

- B. PURPUREA Linn. *Sp. Pl.* 375. A shrub or tree with large purple (or white) flowers 3 in. across. Planted in gardens and occasionally as an escape into hedges at Tanglin, Singapore.
- B. DIPHYLLA Ham, Syme, *Embassy*, p. 476. An Indian plant. The plants referred to it by Baker belonged to two other species.
- B. TOMENTOSA Linn. *Sp. Pl.* 375. Gardens only. Shrub; flowers yellow with purple centre.
- B. ANGUINA Roxb. *Hort. Beng.* Erroneously given as Malayan by Baker; an Indian plant.

46. CYNOMETRA, Linn.

Trees of fairly large size. Leaves of few pinnate coriaceous leaflets. Flowers copious, very small in axillary corymbs or racemes. Calyx-tube short, lobes 4 to 5 imbricate. Petals 5, oblanceolate not exsert. Stamens 10 (in *C. polyandra* indefinite); filaments free, exsert filiform; anthers small oblong. Ovary 2-ovuled; style filiform. Pod turgid fleshy, usually rugose brown oblong oblique. Seeds 1. Species 20, tropics generally.

C. Cauliflora Linn. *Sp. Pl.* 382; *Prain, l.c.* 197. The Nam-Nam; Puki anjing, is occasionally cultivated in the Malay Peninsula. It has a short trunk and pink flowers with brown reniform acid fruits about 2 to 3 in. long, borne on the trunk.

Stamens 10.

Cymes umbelliform; bracts small; leaves 1 to 2

jugate (1) *C. ramiflora*

Racemes sub-spicate, dense; bracts large; leaves

3 jugate (2) *C. inæqualifolia*

Stamens 40 to 60.

Flowers in axillary corymbs (3) *C. polyandra*

(1) *C. ramiflora* Linn. *Sp. Pl.* 382; *Prain, l.c.* 197.

A medium tree about 20 to 30 ft. tall or more, branched low down. Leaves 1·2 to 2 in. long, leaflets 2 pairs, obliquely obovate oblong to sub-falcate oblong, coriaceous, dark green, glabrous, 1 to 5 in. long, ·25 to 2·5 in. wide, base oblique, cuneate, tip blunt. Corymbs sub-umbellate, above the axils of fallen leaves, 3 to 6 in. long. Bracts ovate, ·15 to ·2 in. across. Calyx-tube very short; sepals 5, ovate lanceolate, white, ·12 in. long. Petals white, linear-lanceolate ·15 in. long, narrower. Stamens 10, ·25 in. long. Ovary pubescent. Pod rugose oblong or ovoid, tip thickened, ·5 in. long, ·4 in. broad. *Hab.* Tidal rivers and mangroves. Common. Singapore, Kranji; Jurong. Johor, Scudai River (Hullett). Dindings, Bruas. Perak, Matang (Wray). *Distrib.* Ceylon, Malay isles.

var. *mimosoides* Baker, in *Hook. fil. F.B.I.* ii. 269; *Prain, l.c.* 198.

Leaflets smaller, terminal pair obtuse emarginate, hardly larger than the basal pair. Rare; open swampy country. Setul. *Distrib.* India, Burma, Ceylon.

(2) *C. inæqualifolia* Gray, *Bot. U.S. Expl. Exped.* 473; Baker, in *Hook. fil. F.B.I.* ii. 267; *Prain, l.c.* 199.

A big tree 80 ft. or more tall with very stout stem. Leaf shoots covered with large white, imbricating bracts. Leaves 2 to 3 in. long; leaflets 2 to 3 pairs, coriaceous elliptic-oblong, base oblique cuneate, sub-acuminate dark green glabrous sessile 2 to 3 in. long, 1 to 1·25 in. wide. Racemes axillary congested, 1 to 1·5 in. long, 1 in. wide. Bracts close imbricating, hard, ·25 in. across. Sepals 5, narrow obovate imbricate; tube short, white, ·2 in. long. Petals white, ·2 in. long. Stamens 10, ·4 in. long, slender. Ovary pubes-

cent stipitate. Pod obovoid oblique, woody, 2 to 2·25 in. long, 1·5 in. wide, ·75 in. thick, not rugose. *Hab.* Forests; common. Malacca, Selangor (Derry). Negri Sembilan, Seriting (Foxworthy). Selangor, Weld's Hill. Perak, Goping (Kunstler); Kwala Kangsa (Foxworthy). Province Wellesley, Tasek Gelugur. Penang, Waterfall.

I have seen a spray from Pahang, Bukit Lentong, Rumpin, collected by Mr. Yeop of the Forest Department, Selangor, with unifoliate leaves in the axils of which are small tufts of flowers quite similar to typical *C. inæqualifolia*. Possibly only an abnormality. The collector gives the name Kong Katong for it.

(3) **C. polyandra** Roxb. *Hort. Beng.* 32; *Prain, l.c.* 200 var. *Kurzii*.

Large tree. Shoots enveloped in imbricating bracts, lower ones ·3 in. across, inner ones 2 in. long, 1 in. across. Leaves, 3 pairs of leaflets; rachis puberulous elliptic obovate or oblong, base oblique cuneate, sub-acuminate coriaceous, dark green, paler beneath, 2·5 to 5·5 in. long, 1 to 2·5 in. across. Corymbs axillary sessile, 2 in. long, 1·5 in. across; pedicels pubescent, ·6 to 1 in. long. Calyx-tube short, lobes obovate, imbricate, white. Petals 5 lanceolate as long and narrower, white. Stamens 40 to 60; anthers versatile. Ovary pubescent. Pod oblique oblong, woody, wrinkled 2 to 2·5 in. long, 1·5 in. wide. *Hab.* Forests. Malacca, Batu Tiga (Holmberg). Penang Hill (Jack, Curtis); Kelantan, Kwala Lebir (Gimlette). The typical form is Indian, it has smooth pods. *Native names*: Malangkan; Bulangkan; Katang.

47. TAMARINDUS, Linn.

A big tree with pinnate leaves. Leaflets 10 to 20 pairs, oblong small; racemes often paniced. Calyx-tube turbinate, lobes 4, ovate acute. Petals 3, obovate-oblong. Stamens 3, connate, nearly half their length, alternating with bristle-like staminodes. Ovary stipitate; style short; ovules 8 to 10. Fruit linear-oblong, brown pulpy.

(1) **T. indica** Linn. *Sp. Pl.* 34; *Prain, l.c.* 201. *T. officinalis* Bot. Mag. 4563.

Leaves 2 to 6 in. long. Leaflets ·35 to 1·25 in. long, ·2 to ·3 in. across; racemes 2 to 4 in. long. Flowers about ·5 in. across. Petals yellowish with pink stripes. Pod 3 to 8 in. long, scurfy-brown outside, pithy green inside, 1 in. through. Cultivated chiefly in the north at Penang and Province Wellesley, and has occurred as an escape in Singapore on a rocky island in the Johor Strait (as a shrub), and in Selangor and Kedah. Probably a native of Africa. *Native names*: Asam Jawa; the Tamarind.

48. **SINDORA**, Miq.

Big trees. Leaves even-pinnate; leaflets few, stiff, coriaceous. Flowers panicled. Calyx with short tube, basal disc; 4 segments. Petal 1. Stamens 10, upper ones free, sterile, others monadelphous, hairy, unequal, 2 upper ones fertile, the rest alternately short and long, antherless or sterile; anthers oblong, versatile. Ovary pubescent, 2 to 5 ovules, stalked; style long circinate. Pod round or oblong; valves thin, woody, usually covered with prickles. Seed 1 to 2; testa hard, black; funiculus large thick arillate. Species 9, Indo-China, Malaya. *Native names*: Saputi or Sepetir.

FIG. 56.—*Sindora Wallichii*.

Pods spiny.

- | | |
|----------------------------------------------------------------------------|--------------------------|
| Leaflets 3 pairs; panicle pubescent; leaflets pubescent beneath | (1) <i>S. Wallichii</i> |
| Leaflets 3 pairs; panicle tomentose; spines fewer and thicker on calyx | (2) <i>S. intermedia</i> |
| Leaflets 3 pairs; panicle pubescent, hairy; leaflets large, quite glabrous | (3) <i>S. siamensis</i> |
| Leaflets 5 to 6 pairs, densely pubescent beneath | (4) <i>S. velutina</i> |
| Pod unarmed; leaves glabrous beneath | (5) <i>S. coriacea</i> |

(1) *S. Wallichii* Benth. *l.c.* Pl. 1017 and 1018; Prain, *l.c.* 203.
S. echinocalyx Prain, *l.c.* 204.

Very big tree. Leaves 4 to 6 in. long; rachis puberulous; leaflets 3 pairs, oblong, acute or round at both ends, 1.5 to 3.25 in.

long, 1 in. wide, glabrous above, pubescent beneath. Stipules large semi-lunar .6 in. long. Panicle 6 to 8 in. long, nearly as wide, pubescent. Flowers in spirals. Bracts ovate blunt, .4 in. long, pubescent beneath. Calyx-lobes .24 in. long, ovate acute, spinescent outside, olive green. Petal as long, densely hairy inside. Stamens pubescent, white. Pod orbicular to oblong, 3 in. long, 2 in. across, spiny-brown outside. Seed flat round, black, arillate, funicle orbicular, yellow. *Hab.* Forests. Singapore, Gardens. Malacca, Ayer Panas. Dindings (Fox). Negri Sembilan, Tanjong Agas (Foxworthy). *Native name*: Saputi Sindo.

I fail to see any difference between *S. Wallichii* and *S. echinocalyx* Prain.

(2) ***S. intermedia*** Baker, in Hook. fil. F.B.I. ii. 268; Prain, l.c. 204.

Over 100 ft. tall. Leaves 4 to 6 in. long; rachis puberulous; leaflets 3 pairs, oblong round or acute at both ends, coriaceous, puberulous beneath. Stipules small. Panicles 4 to 6 in. long, 2 to 3 in. wide, tomentose rachis zigzag. Bracts ovate acute, .3 in. long. Calyx-lobes 4, .25 in. long, ovate acute with few spines at tip, spinescent outside. Petal reddish, as long hairy. Stamens hairy. Pod wide, oblong, obliquely round at base, spiny outside, 2 in. long, 2.5 to 3.5 in. across. Seeds usually 2. *Hab.* Forests. Singapore, Changi; B'lakang Mati (Murton). Johor, Gunong Pantai. Dindings, Lumut; Gunong Tungul (Curtis). Province Wellesley (Fox). *Native name*: Saputi Sindo.

Near *S. Wallichii*, but more tomentose, with stouter panicle and fewer and thicker spines on calyx.

(3) ***S. siamensis*** Teysm. Miq. Ann. Mus. Bot. Lugd. Bat. iii. 86.

Gigantic tree. Leaves about 12 in. long; leaflets 6, coriaceous elliptic retuse or blunt, tip and base rounded, glabrous; nerves numerous fine; 6 in. long, 3 in. wide; petiolules .25 in. long. Panicles 10 in. long with branches 1.5 in. long, pubescent, hairy. Flowers crowded, numerous; pedicels .1 in. long. Bracts ovate, hairy as long. Sepals .25 in. long, hairy, warted. Stamens nearly glabrous. Pistil densely yellow-hairy. Pod oblong orbicular, 2.5 in. long and wide, glabrous, spiny. *Hab.* In rocky hill woods, rare. Kelantan Gunong, Kota Bharu (Ridley). *Distrib.* Siam.

Stipules in seedlings very large, oblique ovate-lanceolate acute.

(4) ***S. velutina*** Baker, in Hook. fil. F.B.I. ii. 269; Prain, l.c. 205.

Big tree. Branchlets, panicle and underside of leaves densely red-tomentose. Leaves 5 to 7 in. long; leaflets 5 to 6 pairs, oblong-elliptic blunt, base rounded, glabrous above, 3.5 in. long, 1.6 in. wide; petiolules tomentose .05 in. long. Panicles 6 in. long; branches thick, 1.5 in. long. Sepals oblong, .25 in. long, densely hairy tomentose, as is the petal. Stamens hairy. Ovary hairy. *Hab.* Malacca (Maingay), very rare. *Native name*: Saputi Jantan.

(5) **S. coriacea** Prain, *l.c.* 206.

A big tree 60 to 70 ft. tall. Branchlets glabrous. Leaves 5 to 6 in. long, glabrous; leaflets 4 pairs very coriaceous elliptic acuminate blunt, base rounded; nerves very fine, finely reticulate, 2 to 3 in. long, 1·25 to 1·5 in. wide; petiolules ·25 in. long. Stipules small. Panicles 12 to 18 in. long; branches distant, spreading 2 in. long. Flowers distant, softly downy. Calyx-lobes 4 not prickly, obovate. Petal 1. Stamens hairy at base. Pod oblong obovate woody, 3 in. long, 2·25 in. wide, quite unarmed, resinous. Seeds 2 to 3. *Hab.* Local in forests. Pahang, Temerloh (Foxworthy). Malacca, Chabau (Cantley). Selangor, Banji (Foxworthy). Penang Waterfall and Telok Bahang (Curtis). *Native name*: Saputi Minyak. In Penang called Merabau erroneously. *Use*: A fine furniture wood.

49. AFZELIA, Smith.

Trees, sometimes vast. Leaves even-pinnate; leaflets opposite, few, coriaceous. Flowers in large terminal panicles. Calyx disc produced to top of elongated tube; lobes 4, imbricate unequal. Petal 1, orbicular, clawed. Stamens 3, perfect; filaments long, pilose. Pod large, oblong, flattened, woody. Seeds several not arillate. Species 10 to 12, Old World tropics.

Leaflets 4, rarely 2; small trees.

Inflorescence glabrous (1) **A. retusa**

Inflorescence puberulous (2) **A. bijuga**

Leaflets 8 to 10; large tree (3) **A. palembanica**

(1) **A. retusa** Kurz, *Journ. As. Soc. Beng.* xliii. (2), 73; *Baker, in Hook. fil. F.B.I.* ii. 274; *Prain, l.c.* 207.

Tree 15 to 20 ft. tall. Stem 6 to 8 in. through. Leaves 3 to 6 in. long; leaflets 2 pairs glabrous, sub-coriaceous, oblong, base rounded, blunt retuse, 2 to 4 in. long, 1·2 to 2 in. wide; petiolules ·15 in. long. Panicle or simple raceme 2·5 in. long, terminal, glabrous; pedicels ·5 in. long, thick. Calyx glabrous, tube slightly dilated upwards, ·5 in. long, lobes 4, oblong, ·35 in. long. Petal ·7 in. long; limb ·6 in. wide, claw slender, pubescent, pink or white. Stamens pink, 1·25 in. long. Pod 5 to 6 in. long, ·2 in. wide, oblong, coriaceous. Seeds orbicular 1 in. across. *Hab.* Common in tidal rivers. Singapore, Toas. Malacca, Sungei Doon (Griffith). Negri Sembilan, Pengkalan Kempas (Foxworthy). Dindings, Pangkor (Scortechini). Perak, Matang (Wray). *Distrib.* Ganges delta, Andamans. *Native name*: Merabau Ayer.

(2) **A. bijuga** A. Gray, *Bot. Amer. Explor. Exped.* 467, t. 51.

Tree 50 ft. or less. Leaves as in *A. retusa*, but thinner and longer, more acuminate; panicles more branched with more flowers, pubescent, 6 in. long, 4 in. wide. Pod longer, 6 to 8 in. long, 2·5 in. wide. *Hab.* Sea coasts, apparently rare, Singapore (Wallich).

Dindings, Pangkor (Curtis). *Distrib.* Mascarene islands to Polynesia. Possibly only a variety of *retusa*.

(3) **A. palembanica** Baker, in Hook. *fil.* F.B.I. ii. 275; Prain, *l.c.* 209.

A gigantic buttressed tree over 100 ft. tall, 2 to 4 ft. through. Leaves 6 to 8 in. long; leaflets 4 pairs (rarely 3 or 5), subcoriaceous, glabrous oblong, base slightly oblique, round or cordate, tip rounded blunt, 2 to 4 in. long, 1·5 to 2 in. wide; petiolules 1·5 in. long. Panicles corymbose, terminal, 3·5 in. long, 2·5 in. across, pubescent. Calyx-tube cylindric, 2 in. long, lobes 4, oblong, 2·5 in. long, downy. Petal 3·5 in. long, limb oblong, white. Stamens pubescent, claret-colour. Pod 10 to 12 in. long, 3 to 5 in. wide, oblong, woody. Seeds oblong, 1·25 in. long. *Hab.* Forests of the whole peninsula. Pahang, Rumpin (Foxworthy). Malacca (Maingay, Griffith). Negri Sembilan. Selangor, abundant. Perak, Gopeng and Gunong Bubu (Kunstler). *Distrib.* Sumatra. *Native name:* Merabau. *Use:* A very valuable timber for building, furniture, sleepers, etc.

50. SARACA, Linn.

Shrubs or medium trees. Leaves even-pinnate; leaflets glabrous, coriaceous. Stipules large. Flowers in dense corymbs on old nodes with coloured bracts, red or yellow. Calyx petaloid, limb 4-cleft, tube cylindric, crowned with a lobed disc. Petals 0. Stamens 2 to 8 exsert; filaments filiform, long; anthers versatile. Ovary stalked, often rudimentary; style long, filiform. Stigma minute. Pod flat, coriaceous often very large, oblong pink. Seeds several ellipsoid flat. Species 16, Indo-Malayan.

Leaves 7-foliolate; corymbs large; flowers yellow; trees.

Bracts large, coloured.

Corymbs very large, often 9 in. through; leaflets oblong-lanceolate, acute (1) **S. thaipingensis**

Corymbs smaller, peduncled.

Leaves oblong-acute; calyx-lobes one-third length of tube (2) **S. declinata**

Leaves elliptic blunt, short, strong-nerved (3) **S. cauliflora**

Leaves 2- to 3-jugate; calyx lobes as long as tube.

Bracts large; petiolules 2·5 in. long (4) **S. Kunstleri**

Bracts small; petiolules 2 in. long.

Leaflets 1 to 2 pairs; stamens 7 to 8 (5) **S. bijuga**

Leaflets 4 to 7; stamens 3 to 4.

Pedicels and ovary glabrous (6) **S. macroptera**

Pedicels and ovary puberulous (7) **S. palembanica**

Leaves 2- to 4-jugate; corymbs lax, red; bush subscandent to a small tree (8) **S. triandra**

(1) **S. thaipingensis** Cantley, in Prain, *l.c.* 211.

A low-branched tree about 20 to 30 ft. tall. Stem thick. Leaves and rachis 12 to 16 in. long; leaflets sub-coriaceous, dark green, 5 to 8 pairs, oblong-lanceolate acuminate, 12 to 16 in. long, 4 to

5 in. wide. Corymbs on the old wood, 6 to 12 in. across. Bracts large, caducous, yellow. Flowers very numerous. Calyx-tube 1 in. long; lobes yellow, mouth at length deep red, oblong, .5 in. long. Stamens 4. Ovary stalked, puberulous on sutures. Pod 15 to 18 in. long, 3.25 in. wide, oblong, dark rose pink. *Hab.* Common in forests. Negri Sembilan, Tampin Hill. Selangor, Batu Caves; Ginting Bidai (Kloss); Ulu Gombak. Perak, Thaiping Hills. *Native names:* Gapis; Talan.

(2) *S. declinata* Miq. *Fl. Ind. Bat.* i. 84.

Tree about 20 ft. tall. Leaflets oblong-acute acuminate rather stiff, 10 by 4 in.; nerves somewhat prominent, about 12 pairs. Corymbs distinctly peduncled, 12 in. long, 9 in. wide. Calyx-tube 1.5 in. long, lobes .3 in. oblong blunt. Stamens 4, rarely 7. *Hab.* Hill forests. Perak Hills, Thaiping Hills; Sira Rimau, Gunong Inas (Yapp). *Distrib.* Java.

I am not clear which of this set of Java species Miquel intended by his *declinata*, as there are more than one in Java, but this species is identical with the plant so named by Koorders. Prain's *S. declinata*, l.c. 211, is a mixture.

(3) *S. cauliflora* Baker, in *Hook. fil. F.B.I.* ii. 272.

Tree. Leaflets 5 pairs, rather stiff, elliptic, blunt 5 in. long, 3 in. wide; nerves about 8 pairs, rather strongly elevate; petioles .2 in. long. Corymbs on branches 6 in. wide; peduncles 1 to 5 in. long or quite short. Bracts lanceolate-acute. Sepals .3 in. long yellow; pedicels and tube .5 in. long. Stamens 4 to 7. Pod "red brown," 12 in. long, 2.5 in. wide, beaked. Seed 1.75 in. long. *Hab.* Malacca (Griffith). Perak, Ulu Kenering (Wray).

Baker's type (in part) the Malacca plant has four stamens, Wray's (apparently identical) seven, but I believe the number of stamens varies in some species. The small corymb and short, blunt, strongly-nerved leaflets distinguish it.

(4) *S. Kunstleri* Prain, l.c. 213.

Tree 20 to 40 ft. tall. Stem 3 to 5 in. through. Leaves, rachis 5 to 10 in. long; leaflets 2 to 3 pairs, ovate acuminate, base cuneate, upper ones 8 to 10 in. long, 3.5 to 4 in. wide, lower ones 3.5 to 4 in. long, 2 to 2.25 in. wide, chartaceous, glabrous; nerves 6 to 9 pairs, prominent beneath; petiolules .25 in. long. Corymbs paniced on terminal peduncles, 8 to 12 in. long, glabrous. Calyx tube and pedicel very short, .4 to .5 in. long. Sepals ovate-oblong, .2 in. long; filaments 7. Pod falcate, 4 to 6 in. long, 1.5 in. wide. Seeds 5 to 6, ovate, .5 in. long, .7 in. wide. *Hab.* Rare in rocky jungle. Perak, Gunong Batu Putih, 1500 ft. altitude (Kunstler).

(5) *S. bijuga* Prain, l.c. 214.

Small tree 20 to 30 ft. tall. Stem 6 in. to 2 ft. thick, glabrous. Leaves, rachis 1 in. long; leaflets sub-coriaceous one or two pairs oblong-lanceolate acute, base of terminal pair oblique, upper margin rounded, base cuneate, lower pair round or sub-cordate,

4 to 10 in. long, 1 to 2.75 in. wide; petiolules under .1 in. long. Corymbs dense 4 to 5 in. across, axillary. Calyx orange at length light red, tube .25 in. long, lobes 4 or 5, blunt, nearly as long. Stamens 7 or 8, dark pink. Ovary stalked, puberulous along sutures (in most flowers rudimentary). Pod reddish yellow, 6 to 8 in. long, 2.35 in. wide; stalk .2 in. long. Seeds 4 to 6. *Hab.* Forests by stream edges. Perak, Batu Togoh (Wray), Kota (Wray); Kinta and Larut (Kunstler); Temengoh (Ridley).

(6) ***S. macroptera*** *Miq. Fl. Ind. Bat.* i. 1080; *Prain, l.c.* 215.

Tree 30 to 40 ft. tall. Stem 4 to 6 in. through. Leaves, rachis 4 to 15 in. long; leaflets rigidly coriaceous 4- to 7-paired, oblong-lanceolate cuspidate, base unequally rounded; nerves 12 pairs prominent beneath, 5 to 12 in. long, 1.5 to 3.5 in. wide; petiolules .15 in. long. Flowers in dense corymbs, fascicled in leaf axils and on old nodes, 1 in. long, 1.5 in. across. Calyx bright yellow, tube slender, 2.25 in. long, lobes 4, oblong, shorter. Stamens 3 to 4 twice as long. Disc crenately lobed. *Hab.* Low wet ground in dense jungle. Perak, Larut (Kunstler). *Distrib.* Sumatra, Borneo.

(7) ***S. palembanica*** (*Miq.*) *Baker, in Hook. fil. F.B.I.* ii. 272; *Prain, l.c.* 216.

Tree 30 to 40 ft. tall. Stem 8 to 10 in. through. Leaves, rachis 8 in. long; leaflets coriaceous, 4 to 7 pairs, oblong, shortly abruptly acuminate, base unequally rounded; nerves about 12 pairs, 5 to 14 in. long, 2.5 to 4.5 in. wide; petiolules .15 in. long. Corymbs fascicled on old nodes 2 in. long and nearly as wide; bracts and bracteoles .2 in. long. Peduncles and pedicels pubescent. Calyx orange yellow, tube slender .35 in. long, puberulous, lobes oblong .25 in. long. Stamens 4 (or 3) much longer. Ovary stalked, hairy. *Hab.* Dense low wet forest. Dindings, Pangkor (Curtis). Perak, Larut (Kunstler). Province Wellesley, Kubang Ulu (Curtis).

(8) ***S. triandra*** *Baker, in Hook. fil. F.B.I.* ii. 272; *Prain, l.c.* 216.

Slender tree, or often a sarmentose shrub about 15 to 20 ft. tall. Leaves, rachis 1.5 to 3 in. long; leaflets sub-coriaceous 2 to 3 (rarely 4) pairs, oblanceolate-oblong, blunt or short acuminate, base cuneate, 5 to 12 in. long, 2 to 6 in. wide; nerves prominent beneath; petiolule .15 in. long. Corymbs lax, panicked usually in axils 5 to 8 in. long and as wide. Bracteoles persistent .25 in. long, red. Calyx salmon red, tube slender, .25 in. long, as long as the four oblong lobes. Stamens 3 to 4, nearly three times as long; filaments purplish. Ovary long-stalked, pubescent. Pod oblong, obliquely rounded at base and blunt at tip, lower suture forming a beak, .25 in. long, 4 to 6 in. long, 1.5 to 1.75 in. wide, brown, puberulous. *Hab.* Common in forests. Malacca, Kesang Road (Hervey); Panchur (Derry); Sungei Hudang; Jus (Goodenough).

Dindings, Lumut (Curtis). Province Wellesley, Bukit Panchur. Pahang, Sungei Jelai (Machado); Negri Sembilan, Bukit Tangga, Seremban (Napier). Perak, Thaiping; Ayer Larut (Wray), Penang Hill (Curtis). Kedah, Gerun near Kedah Peak (Haniff). Kelantan, Kwala Lebir. *Distrib.* Sumatra, Borneo.

51. LEUCOSTEGANE, Prain.

Small tree. Leaves equal-pinnate, stipellate. Stipules large foliaceous, connate. Flowers small. Calyx infundibuliform; tube fleshy; lobes 4. Petals small, 2 in calyx throat between upper and lateral sepals. Stamens 2 perfect; anthers ovoid. Staminodes 2. Ovary stipitate, oblong; style filiform. Pod oblong compressed, apiculate. Species 1.

(1) *L. latistipulata* Prain, *Ann. Bot. Gard. Calc.* ix. 37, t. 46. *Saraca latistipulata* Prain, *l.c.* 217.

Small tree. Branches pubescent. Leaves, rachis 7 to 8 in. long; leaflets coriaceous, oblong cuspidate, base rounded slightly oblique, 2 to 5 in. long, .75 to 1.5 in. wide; petioles .1 in. long, thick. Stipules .75 to 1 in. long, ovate-acuminate. Flowers from nodes on old wood below the leaves, white; pedicels .1 in. long. Calyx-tube .15 in. long, lobes longer narrow oblong. Stamens pink. Pod oblong, apex truncate with a prominent beak, base narrowed 2 in. long, .75 in. wide, pink. *Hab.* Very local in thick hill-forest. Dindings, in forest at Lumut (Ridley).

52. CRUDIA, Schreb.

Trees, sometimes very large or shrubs. Leaves odd-pinnate; leaf-rachis sometimes prolonged beyond the last leaflet; leaflets distinctly alternate, rarely sub-opposed. Stipels 0. Flowers small in racemes, terminating, or in clusters at the bases of, the new leafy shoots. Calyx-tube very short with a short disc; lobes 4, oblong or ovate imbricate, persistent reflexed in flower. Petals 0. Stamens 10 (or 8 to 9) exsert; filaments free, filiform; anthers versatile. Ovary hairy few-ovuled, stalked; style filiform, incurved. Stigma small capitate. Pod-valves rounded, coriaceous, compressed. Seeds 1 or few. Species about 12, Malayan; 9 to 10 American and 2 Indian and African.

Leaflets 11 to 13 oblong lanceolate (1) *C. Scortechinii*
 Leaflets 7 to 9.

Leaflets, back and pod velvety; rachis prolonged
 beyond the last leaflet (2) *C. caudata*

Rachis not prolonged.

Leaflets glabrous; raceme glabrous (3) *C. glauca*

Leaflets puberulous beneath; raceme pubescent (4) *C. Curtisii*

Leaflets 4, alternate; raceme 12 in. long, glabrous (5) *C. penduliflora*

Leaflets 3 or 4, sub-opposite; raceme dense, 2 in.
 long, velvety (6) *C. Evansi*

Leaflets 3.

Leaflets elliptic-lanceolate, glaucous beneath; flowers subsessile

Leaflets lanceolate acuminate; flowers pedicelled . (7) *C. brevipes*

Leaflets oblanceolate, 2 in. long; flowers pedicelled (9) *C. lanceolata*

Leaflets ovate-oblong, 6 by 3 in. coriaceous . (10) *C. Wrayi*

(1) *C. Scortechinii* Prain, l.c. 220.

Tree 80 to 90 ft. tall. Branchlets pubescent. Leaves odd-pinnate, 6 to 8 in. long; leaflets 11 to 13 with petiolules .2 in. long and rachis tawny-pubescent, alternate lanceolate acuminate, base obliquely rounded, glabrous above, glaucescent beneath, 2 in. long, .4 in. wide. Racemes at the end and bases of new leafy shoots pubescent, 3 to 6 in. long. Flowers .2 in. long. Calyx-tube very short lined by a disc; lobes 4, pubescent on both sides. Stamens 9; filaments glabrous, free, alternating short and long. Ovary densely hairy; stalk as long as calyx-tube. Pod oblong, obliquely rounded at both ends, villous-brown wrinkled 2.5 in. long, 1.5 in. wide. Seed 1. *Hab.* Perak, Goping (Scortechini).

(2) *C. caudata* Prain, l.c. 219.

A small tree. Branches densely red-tomentose. Leaves, rachis tomentose, 1.5 to 2 in. long; leaflets 5 to 7 on tomentose petiolules .1 in. long, coriaceous, glabrous above; nerves 6 to 7 pairs, elevate, tomentose beneath, oblanceolate, base narrowed blunt, tip long caudate (tail .75 in. long), 2.5 to 4 in. long, 1 in. across. Racemes narrow; rachis tomentose; pedicels stout, .25 in. long. Calyx-tube very short; lobes rusty-tomentose outside, glabrous inside. Ovary rusty-velvety; stalk as long as calyx-tube. Pod linear-oblong, short-stalked, tip obtuse apiculate, 2 in. long, .75 in. across, red-pubescent. *Hab.* Johor, Tanjong Kupang (Ridley).

(3) *C. glauca* Prain, l.c. 221.

Tree 50 to 70 ft. tall, 1.5 to 2.5 ft. through. Leaves 4 to 4.5 in. long, glabrous; leaflets 7 to 8, alternate or sub-opposite, oblanceolate-oblong, base obliquely rounded, obtusely cuspidate, 2.5 to 4 in. long, 1.25 to 1.75 in. wide, papery, glaucous beneath. Racemes dense, narrow glabrous, 3 to 5 in. long. Flowers unknown. Pod oblong tapering at both ends to a stalk .25 in. long, beaked, puberulous, reticulate 4 in. long, 2 in. wide, firmly coriaceous. Seed 1, oblong. *Hab.* Dense forest on limestone hills. Perak, Goping (Kunstler).

(4) *C. Curtisii* Prain, l.c. 220; King, *Ann. Bot. Gard. Calc.* ix. 38, *pl.* 47.

Tree 80 to 150 ft. tall, 2 to 3 ft. through, with spreading top. Leaves 3 to 4 in. long; rachis and petiolules puberulous; leaflets 7 to 9, alternate oblong, short, blunt acuminate, base rounded or oblique, membranous to sub-coriaceous, green, glabrous above, glaucous puberulous beneath, 2 to 3.5 in. long, 1 to 1.5 in. wide. Racemes 4 to 6 in. long, lax, many-flowered; rachis grey-pubescent; pedicels slender .6 in. long. Calyx-tube short; lobes 4, pubescent

outside only. Stamens 10; filaments glabrous. Ovary downy; stalk longer than calyx-tube. Pod oblong, obliquely rounded at base, brown-pubescent, reticulate, 3 in. long, 1 to 2 in. wide; valves coriaceous. Seed 1. *Hab.* Forests. Pahang, Rumpin River (Foxworthy). Malacca, Bukit Sadanen (Derry); Batang Malacca (Holmberg). Selangor, Kepong (Burn-Murdoch). Perak, Thaiping and Goping (Kunstler). Penang Hill (Curtis). *Native names*: Kempas Ruman; Kempas Sawang; Natal.

The var. *Wallichii* Prain, is based on specimens collected by Wallich 5983 and 8089. They are leaf-specimens only, very hairy and quite indeterminate.

(5) **C. penduliflora** *Ridl. Journ. Roy. As. Soc. S. Br.* 61, p. 3.

Tree. Leaves with 4 alternate leaflets, distant elliptic, cuspidate, rounded at both ends, thin, coriaceous; nerves 6 pairs, 1 to 4 in. long, 1.5 in. wide; cusp .5 in. long; petiolules thick, .12 in. long. Racemes simple pendulous, 12 in. long; flowers .12 in. long, nearly sessile. Buds ovoid. Calyx-tube short; lobes 4, ovate, glabrous. Stamens 5; filaments slender. Ovary red-haired, conic. *Hab.* Malacca, base of Mt. Ophir on Gunong Mering (Ridley).

(6) **C. Evansi** *Ridl. Journ. F.M.S. Mus.* x. 133.

"Climbing plant," glabrous. Leaves 6 in. long; leaflets 3 or 4, thinly coriaceous, broad elliptic, shortly blunt acuminate, base very shortly narrowed, 6-nerved with nervules and reticulations nearly as conspicuous, 4 in. long, 2 in. wide; petiolules .2 in. long. Raceme dense; rachis thick scurfy-velvety, 2 in. long, brownish. Stamens 10, glabrous. Ovary densely hairy. *Hab.* Pahang, Gunong Senyum (Evans).

Mr. Evans says this is a climbing plant; all the rest of the species are trees.

(7) **C. brevipes** *Ridl. Journ. Roy. As. Soc. S. Br.* 82, p. 183.

Tree 16 ft. tall. Branchlets slender, white. Leaves rather thin; leaflets 3, elliptic-lanceolate, cuspidate, base shortly narrowed glaucous beneath; nerves 5 to 6 pairs, 2.5 in. long, 1 to 1.75 in. wide; petiolules .25 in. long. Racemes 5 in. long, slender dense; flowers numerous; pedicels under .05 in. long. Sepals 4, oblong, blunt, .08 in. long. Stamens 6; filaments long; anthers cordate. Ovary woolly hairy; style glabrous, filiform. Stigma small. *Hab.* Province Wellesley, Tasek Gelugur (Ridley). *Native name*: Poko Bebaru.

(8) **C. lanceolata** *Ridl. Journ. Roy. As. Soc. S. Br.* 75, p. 29.

Glabrous tree? Leaves, rachis 1.5 in. long; leaflets 3, subcoriaceous, lanceolate or ovate acuminate obtuse, base rounded, quite glabrous; nerves fine, 7 pairs with reticulations conspicuous beneath, 3.5 to 5.75 in. long; petiolules .1 in. long, thick. Raceme about 6 in. long, puberulous. Flowers distant, .3 in. across on puberulous pedicels .3 in. long. Calyx-tube short, puberulous,

lobes oblong, reflexed, puberulous outside. Stamens glabrous. Ovary dense, pale-woolly; stalk very short. *Hab.* Lankawi, Günong Raya (Haniff).

(9) **C. Wrayi** *Prain, l.c. 222.*

Small tree, glabrous. Leaves, rachis slender 1 in. long; leaflets 3, alternate, oblanceolate, base cuneate, apex acute or acuminate, 1.5 to 2.5 in. long, .5 to .1 in. wide; nerves fine. Racemes dense 2 to 8 in. long. Flowers numerous; rachis puberulous; pedicels .2 in. long. Calyx-tube very short; lobes 4 faintly puberulous outside, glabrous within. Stamens 8 to 9. Ovary densely pubescent; stalk as long as tube. *Hab.* Perak, Sungei Larut (Wray).

(10) **C. gracilis** *Prain, l.c. 223.*

A shrub 6 to 8 ft. tall, glabrous. Leaves, rachis .75 to 1 in. long; leaflets 3 (rarely 2), with stout petiolules .2 in. long, ovate-oblong-lanceolate, base cuneate, tip caudate, stiffly papery 4.5 to 6 in. long, 2 to 3 in. wide. Flowers pale yellow in narrow sparse spikes, 10 to 12 in. long; rachis glabrous. Stamens 8 to 9. Ovary shortly stipitate densely pubescent; stalk shorter than calyx-tube. *Hab.* Dense forest. Perak, Thaiping (Kunstler).

EXCLUDED SPECIES

C. SPECIOSA *Prain, l.c. 222*, is from Pungah, outside our boundary.

53. PELTOPHORUM, Vogel.

Medium-sized trees. Leaves even-pinnate with numerous narrow oblong leaflets. Flowers usually bright yellow in axillary or panicked terminal racemes. Calyx with a disc at the base, teeth sub-equal, deep cut. Petals oblong or rounded imbricate. Stamens 10, free, declinate, a dense tuft of hairs at the base; anthers linear-oblong. Ovary sessile; ovules free; style long. Stigma peltate. Pod oblong, flat indehiscent, thin, winged broadly on each suture. Species 7 or 8, cosmopolitan in the tropics.

Pedicels short not longer than calyx; indumentum
pubescent

(1) **P. ferrugineum**

Pedicels 3 to 4 times as long as calyx; indumentum
red-tomentose

(2) **P. dasyrachis**

(1) **P. ferrugineum** *Benth. Fl. Austral. ii. 279; Baker, in Hook. fil. F.B.I. ii. 257; Prain, l.c. 224.*

Tree about 60 to 80 ft. tall, low-spreading. Branchlets thinly tomentose. Leaves 6 to 12 in. long; petioles 1 to 1.5 in. long, sparsely tomentose, pinnae 16 to 20, 4 to 6 in. long; leaflets ligulate-oblong, sessile, .5 to .75 in. long, .35 in. wide. Racemes in a large terminal panicle 12 in. long, 8 to 9 in. across, rusty pubescent; pedicels .15 to .25 in. long. Calyx-lobes ovate-lanceolate, .25 in. long, rusty-pubescent outside. Corolla 1.25 in. across. Petals .8 in. long, orange yellow, base densely hairy, edges ciliate. Pod

2 to 4 in. long, 1 in. wide, glabrous longitudinally veined outside. *Hab.* Common near the sea. A beautiful tree, often planted in gardens. Singapore, Changi. Johor, Tana Runto. Malacca (Griffith, Hervey). Province Wellesley, Tasek Gelugur (Fox). Penang, Telok Bahang. Pulau Adang. Lankawi, Terutau (Curtis); *Distrib.* Tenasserim, Cambodia, Malaya, Australia.

(2) *P. dasyrachis* Kurz; *Baker, in Hook. fil. F.B.I. ii. 257.*

A tree resembling the last, but branches, petioles, rachis, inflorescence thickly red-tomentose. Leaves rather longer. Racemes 6 to 9 in. long; pedicels 1 to 1.5 in. long. Calyx densely velvety outside. Corolla large, 1.5 in. across, base hairy, edges glabrous. Pod 4 to 5 in. long, 1.25 to 1.4 in. wide, puberulous not veined outside. *Hab.* Sea-coasts and open forests. Malacca, common. Bukit Bruang (Griffith); Batu Berendam (Maingay); Selendor and Sungei Hudang (Cantley). Perak, Goping (Kunstler). *Distrib.* Siam, Sumatra. *Native name:* Batai. *Use:* Wood used for dyeing red.

54. MEZONEURON, Desf.

Robust, very prickly climbers. Leaves even-pinnate. Flowers in panicked racemes, showy. Calyx very oblique, tube long or short, lobes imbricate, lowest largest, hooded. Disc in tube. Petals obovate spatulate or oblong. Stamens free, declinate. Ovary declinate, few- or many-ovuled; style filiform; stigma small. Pod large, thin, oblong, upper suture broad-winged. Seeds compressed orbicular. Species 15, Old World tropics.

Calyx deep-cleft; tube short; anterior lobe deep-hooded

(1) *M. Kunstleri*

Calyx shallow-cleft; tube long; anterior lobe short-hooded

(2) *M. sumatranum.*

(1) *M. Kunstleri* Prain, *l.c.* 233.

A big climber with a few prickles. Leaves 6 to 8 in. long, pinnae 4 to 6, 4 to 5 in. long; leaflets 6 to 8, alternate, sub-coriaceous, ovate, base and tip cuneate, .5 to 1.25 in. long, .35 to .75 in. wide; petiolules .15 in. long. Panicles of racemes large 1.5 to 2 ft. long; racemes 8 to 10 in. long puberulous; pedicels slender, .35 to .45 in. long. Calyx leathery, anterior sepal hooded, the rest orbicular, tube very short. Corolla expanded, yellow. Petals ovate-orbicular. Stamens far exsert. *Hab.* Perak at Sungei Rayah (Kunstler).

(2) *M. sumatranum* W. and A. *Prodr.* i. 1081; *Prain, l.c.* 235.

A robust, very prickly climber, glabrous. Leaves 1 to 1.5 ft. long; pinnae 6 to 10, 8 to 12 in. long; leaflets 6 to 8, alternate, coriaceous, obovate-oblong emarginate apiculate, 1.5 to 2 in. long, 1.25 to 1.75 in. wide; petiolules .2 in. long. Panicles of erect racemes terminal or axillary, many-flowered very showy. Racemes 5 to 6 in. long; rachis thick. Calyx leathery, anterior sepal orbicular .25 in. long, others half as large, tube .5 in. long. Corolla

·5 in. long; petals sub-equal not expanded, all flame-colour, tipped green. Stamens hardly exsert yellow. Pod very thin, 3 to 4 in. long, 1·35 in. wide, red. Seeds 3 or 4. *Hab.* Common in edges of woods and open country. Singapore, Bukit Timah; Kranji. Malacca (Griffith). Selangor, Labu River. Perak, Thaiping (Scortechini). Dindings, Lumut at Simpiti. Province Wellesley, Ara Kuda (Curtis). *Distrib.* Sumatra. *Native name:* Akar Darah Blut (Eel's blood).

55. *PTEROLOBIUM*, R. Br.

Stout prickly woody climbers. Leaves even-bipinnate. Flowers in paniced racemes. Calyx deep cleft, disc near the base; lobes imbricate, lowest one longer and hooded. Petals spreading, oblong, clawed, as long as calyx. Stamens 10, free, hardly exsert. Ovary sessile, 1-ovuled; style filiform. Fruit a samara with a large oblique terminal wing. Species 7, Africa, Indo-Malaya, China, Australia.

(1) *P. densiflorum* Prain, l.c. 236.

A large pubescent climber armed with hooks and prickles. Leaves 4 to 8 in. long; pinnæ 8 to 16, 3 in. long; leaflets 14 to 16, narrow-oblong, blunt unequally rounded on both sides, ·6 in. long, ·25 in. wide, sub-coriaceous. Racemes dense in panicles; 100- to 200-flowered; rachis puberulous, 1·5 ft. long. Calyx puberulous, lowest sepal ·3 in. long. Corolla yellow. Pod 2 in. long, base turgid, wing ·5 to ·7 in. wide. *Hab.* Forests, very local. Penang, base of hill Waterfall, to the altitude of 2500 ft. (Maingay and Curtis); Ayer Hitam (Fox).

56. *CÆSALPINIA*, Linn.

Trees, shrubs or woody thorny climbers. Leaves large, bipinnate. Flowers yellow (rarely red) in axillary racemes. Calyx deep cleft, disc at the base; lobes imbricate, lowest the largest, hooded. Petals spreading, orbicular, clawed, upper one smaller. Stamens 10, free; anthers versatile. Ovary few-ovuled; style filiform. Pod oblong or ligulate, flat or turgid, smooth or spiny. Species about 40, tropics.

C. pulcherrima Sw. Obs. 166. A well-known garden shrub with yellow or red flowers, probably a native of S. America, is common in cultivation.

- i. *GUILANDINA*. Very thorny shrubs; pod prickly; seeds grey globose.

Leaves stipulate; leaflets small, ·5 in. long	(1) <i>C. Bonducella</i>
Leaves not stipulate; leaflets larger, 1·5 to 2 in. long	(2) <i>C. Bonduc</i>
- ii. *EU-CÆSALPINIA*. Pods unarmed, thin-valved.

Trees.	
Stipules 0; flowers ·75 in. across	(3) <i>C. Sappan</i>
Stipules lanceolate; flowers ·3 in. across	(4) <i>C. parviflora</i>

Climbers thorny.

Leaflets few, large, coriaceous (5) **C. Nuga**

Leaflets many small.

Flowers .75 in. across; pod winged on upper edge (6) **C. sepiaria**

Flowers .3 in. across (7) **C. stipularis**

iii. CINCLIDOCARPUS. Pod fleshy, thick-valved.

Leaflets oblong; racemes lax; pedicels longer than calyx (8) **C. digyna**

Leaflets linear; racemes dense; pedicels shorter (9) **C. tortuosa**

(1) **C. Bonducella** Fleming, *As. Res.* xi. 159; *Baker, in Hook. fil. F.B.I.* ii. 254; *Prain, l.c.* 226. *Guilandina Bonducella* Linn. *Sp. Pl.* 381.

A thorny climber. Branches armed with hooked yellow prickles. Leaves 1 to 2 ft. long with a pair of reduced pinnæ (compound stipules) at base; pinnæ 12 to 16, 2 to 3 in. long; leaflets 12 to 18, ovate or elliptic, base round, tip cuneate, .5 to 1 in. long, .3 to .6 in. wide. Racemes simple or paniced, 6 to 10 in. long. Bracts squarrose, reflexed, .25 in. long, downy. Calyx .25 to .3 in. long, downy. Petals oblanceolate, yellow. Stamens silky. Pod stalked, short, oblong 2 to 3 in. long, 1.75 in. wide, brown, densely aculeate. Seeds 2, oblong globose, lead colour. *Hab.* Sea-coasts, not very common. Penang, Tanjong (Curtis); Patani, hedges in rice-fields (Gwynne Vaughan). *Distrib.* All tropics.

(2) **C. Bonduc** Roxb. *Hort. Beng.* 32; *Baker, l.c.* ii. 255. *Guilandina Bonduc* Linn. *Sp. Pl.* 381.

A strong shrubby climber armed with hooked brown thorns. Leaves 1 to 2 ft. long, exstipulate; pinnæ 8 to 16, from 5 to 8 in. long; leaflets 12 to 14, ovate or elliptic acuminate, base round, 1.5 to 2 in. long, .75 to 1 in. wide. Racemes simple or paniced, 6 to 12 in. long. Bracts lanceolate, not squarrose, pubescent. Calyx .2 to .25 in. long. Petals oblanceolate, yellow. Pods stipitate oblong, turgid, 5 in. long, 2.5 wide, aculeate, brown. Seeds 4, oblong globose, lead colour, .5 in. across. *Hab.* Common near the sea. Malacca, Tanjong Kling. Pahang River. Selangor, Kwala Selangor. Dindings (Scortechini). Perak, Kinta (Kunstler). *Distrib.* Indo-Malaya. *Native names:* Olang; K'lubu.

(3) **C. Sappan** Linn. *Sp. Pl.* 381; *Roxb. Cor. Pl.* i. 17, t. 16; *Prain, l.c.* 228.

Shrubby tree about 20 ft. tall, thorny. Stem 6 to 10 in. through. Leaves 8 to 15 in. long; pinnæ 16 to 24, 4 to 6 in. long; leaflets 20 to 36, chartaceous, oblong oblique, sessile blunt, .5 to .75 in. long, .35 in. wide, glabrous except slight pubescence beneath. Racemes paniced, 12 to 16 in. long, separate racemes, 4 to 6 in. long. Calyx .4 in. long. Corolla .75 in. across, yellow, base of upper petal pink, orbicular. Stamens white, bases woolly. Ovary grey-velvety. Pod woody oblong flattened, 3 to 4 in. long, 1.5 to 2 in. wide, polished brown beaked. *Hab.* Wild on river-banks in sandy spots and often in gardens. Pahang River, Pulau Chengai; Pulau

Aor (Feilding). Malacca (Maingay); Chabau (Cantley). Perak, Ulu Bubong (Kunstler). *Distrib.* India, Cambodia, Malay isles. *Native name*: Seppang. *Use*: A red dye obtained from the wood. Sappan-wood.

(4) **C. parviflora** *Prain, l.c.* 330.

A small tree 30 to 40 ft. tall and 8 to 12 in. through, sparsely prickly (a large climber according to Kunstler). Leaves 8 to 10 in. long; pinnæ 18 to 24, 2 to 3 in. long; leaflets 30 to 36, subcoriaceous, sessile, oblong with lower corner produced, '35 to '5 in. long, '2 to '25 in. wide, glabrous. Stipules lanceolate, '45 in. long, entire. Racemes in a branched panicle, 2 to 3 ft. long; pedicels '25 in. long, all puberulous. Bracts linear, '2 in. long. Calyx '25 in. long, puberulous. Corolla 3 in. across, greenish yellow, hardly exsert. Stamens green, base woolly. Pod 1 in. long, '5 in. wide, with recurved beak. Seeds 4. *Hab.* Lowland forest, Perak, Larut (Kunstler); Relau Tujor (Wray); Gunong Bubu, a large climber (Kunstler).

(5) **C. Nuga** *Ait. Hort. Kew*, iii. 32; *Prain, l.c.* 227.

A stiff wiry thorny black-stemmed climber. Leaves 6 to 12 in. long; pinnæ 6 to 8; leaflets 4 to 6, light, shining green, coriaceous, glabrous, ovate acute, 1 to 2'5 in. long, '5 to 1 in. wide. Panicle of racemes 10 to 15 in. long, 6 to 8 in. across; racemes 2 to 3 in. long; pedicels '3 in. long. Calyx '25 to '3 in. long, glabrous. Corolla '5 in. across, bright yellow, fragrant. Petals orbicular, upper ovate acute, blotched red. Stamens woolly at base. Pod 2 in. long, 1'35 in. wide, turgid, beaked, indehiscent. Seed 1, black, 1 in. long. *Hab.* Tidal swamps. Common. Singapore, Kranji; Jurong; Selitar. Johor, Tebrau River, Malacca (Griffith), Pahang, Pekan. Muar, Sungei Segal (Fox). Selangor, Port Swettenham (Burkill). Perak River (Kunstler); Dindings, Lumut. Lankawi (Curtis). Perlis, Kanga. *Distrib.* S.E. Asia, Australia and Polynesia.

(6) **C. sepiaria** *Roxb. Hort. Beng.* 32; *Baker, l.c.* ii. 256; *Prain, l.c.* 229.

Prickly woody climber. Branches pubescent. Leaves 9 to 15 in. long; pinnæ 12 to 20, 2 to 3 in. long; leaflets 16 to 24, oblong blunt, base round, slightly oblique; petiolulate pale green above, glaucous beneath, '5 to '8 in. long, '2 in. wide. Stipules obliquely ovate, long-acuminate, base with lower angle auricled, '5 in. long, '3 in. wide. Racemes simple, drooping, 6 to 12 in. long, 2 to 2'5 in. wide; pedicels '75 in. long. Bracts ovate-lanceolate, '4 in. long pubescent. Calyx '5 in. long, pubescent. Corolla '75 in. across, yellow; petals orbicular. Stamens little exsert white, woolly below. Pod linear-oblong, 3 to 5 in. long, 1'2 in. wide, curved, turgid. Seeds 6 to 8, mottled, '4 in. long. *Hab.* Hill forests, Penang Hill at 2500 ft. altitude (Curtis). *Distrib.* India, China, Japan, Malay isles.

(7) **C. stipularis** Ridl. *C. parviflora* var. *stipularis* Prain, l.c. 230.

Climber, thorny. Leaves 12 in. long; pinnae 6 in. long, distant; leaflets oblong, tip broad, round, base truncate, oblique; midrib puberulous, .75 in. long, .4 in. wide. Stipules broad, ovate-oblong .75 in. long, .35 in. wide, edges often incised. Panicle over 12 in. long, pubescent with short thorns below the branches. Bracts lanceolate, linear, .25 in. long, very narrow; pedicels slender, longer. Flowers very similar to those of *C. parviflora*, but more pubescent. *Hab.* Open country. Malacca, Batu Tiga (Holmberg). Perak, Kurau (Wray). *Native name*: Akar Kuku Tupai.

(8) **C. digyna** Rottl. Willd. *Nov. Act. Cur.* iv. 198, t. 3; Baker, l.c. ii. 256; Prain, l.c. 231.

Woody climber, sparsely thorny. Leaves 6 to 9 in. long; pinnae 8 to 9, 1.5 to 2.5 in. long; leaflets 16 to 20, oblong blunt, base rounded sessile, membranous, glabrous above, glaucous-pubescent beneath, .35 to .45 in. long, .25 in. wide. Stipules subulate. Racemes simple, axillary, 8 to 12 in. long, lax; pedicels spreading 1 in. long. Calyx .3 in. long, glabrous. Corolla .75 in. across; petals orbicular, yellow, upper ones streaked with red. Stamens little exsert white-woolly below. Pod fleshy, indehiscent, oblong, turgid torulose, sutures thickened, 1.5 to 2 in. long, 1 in. wide. Seeds 2 to 4, ovoid, .5 in. long. *Hab.* Dry country in the North. Penang (Phillips); between the Waterfall and Tanjong Bunga (Curtis). Lankawi (Curtis). Perlis, Kanga, abundant. *Distrib.* India, Cambodia, Malaya.

Prain gives "Malacca, Griffith." I have seen no specimen from further south than Penang, and its occurrence in Malacca is highly improbable.

(9) **C. tortuosa** Roxb. *Hort. Beng.* 32; Baker, l.c. ii. 257; Prain, l.c. 231.

Glabrous climbing prickly shrub. Leaves 12 to 18 in. long; pinnae 30 to 40, 2.5 to 4 in. long; leaflets 40 to 60, sessile subcoriaceous, ligulate blunt, base obliquely cuneate, .25 to 3 in. long, .1 in. wide. Racemes axillary simple erect, 15 to 18 in. long; pedicels .5 in. long, slender. Calyx .5 in. long, glabrous, lower segment deeply hooded. Corolla .75 in. across; petals yellow, base streaked red, orbicular clawed. Stamens little exsert, green, woolly below. Pod oblong, twisted, sutures thickened, torulose 2 to 3 in. long, 1 in. wide. Seeds 2 to 5, dark brown. *Hab.* Thickets and woods near the sea. Singapore, Changi near Loyang. Penang, Penara Bukit (Curtis). *Distrib.* Tenasserim, Sumatra.

(C) MIMOSEÆ (Genera 57-66).

57. **PARKIA**, R. Br.

Big trees unarmed. Leaves bipinnate; leaflets linear or oblong, very numerous and small. Flowers in dense solitary obovoid heads

on long pendulous peduncles. Calyx tubular, 5-lobed; lobes imbricate. Corolla tubular, split half-way. Stamens 10, exsert; filaments below connate, and adnate to corolla; anthers gland-tipped. Ovary stalked; style filiform. Stigma minute. Pod strap-shaped or thick, dehiscent. Species 10, all tropics.

Leaflets sub-falcate, acute, 40 to 80 pairs; pod thick subterete (1) *P. Roxburghii*
 Leaflets straight, blunt, 20 to 25 pairs; pod thin, flat (2) *P. speciosa*

(1) *P. Roxburghii* Don, *Gen. Syst.* ii. 397; *Baker, in Hook. fl. F.B.I.* ii. 289; *Prain, l.c.* 239. *P. intermedia*, Hassk, *Pl. Jav. Rar.* 414.

A big tree 80 ft. tall. Bark pale. Branches spreading, pubescent. Leaves bipinnate, 12 to 24 in. long; pinnae 20 to 30 pairs, opposite; leaflets falcate linear-lanceolate, 40 to 80 pairs, tip acute, base truncate, edges puberulous, .3 in. long, .1 in. wide; petioles 2 to 3 in. long with one gland below the pinnae and 3 to 5 solitary on upper pinnae. Capitula pyriform, 1.5 in. long, 1 in. wide, pendulous on peduncles, 10 to 16 in. long. Calyx tubular, .25 in. long. Corolla yellowish white. Pod flattened oblong black woody 15 to 20 in. long (stalk 3 to 7 in. long), 1.5 in. wide, .25 in. thick. *Hab.* Villages, probably not wild, but often planted. Malacca, Panchur (Goodenough). *Distrib.* Java. *Native name:* Kedawong. *Use:* Seeds as a remedy for colic.

Prain notes that the *P. intermedia* Hassk. of Java is somewhat different from the true *P. Roxburghii* Don, of Cachar and Chittagong, and that the Malacca plant is *P. intermedia*; indeed it is probably introduced here from Java. It is doubtful if the two plants are specifically identical.

(2) *P. speciosa* Hassk. *Fl.* xxv. *Beibl.* 55; *Prain, l.c.* 240.

Tall, smooth-barked tree 60 to 80 ft. high, 2 to 3 ft. through. Branchlets glabrescent. Leaves bipinnate, pubescent, 8 to 10 in. long; pinnae 10 to 16 pairs; leaflets linear, 20 to 35 pairs, base truncate, tip blunt, .25 in. long, .1 in. wide, nearly glabrous; petioles 1 to 1.5 in. long with 1 gland between base and lowest pair of leaflets and 2 to 6 solitary between the bases of upper pinnae. Capitula club-shaped, 2 in. long, .75 in. through; peduncles 16 to 20 in. long. Calyx .25 in. long. Corolla white. Pod (stalk 2 to 5 in. long) 18 to 20 in. long, 2 to 2.5 in. wide, very thin, green drying black. Seeds 12 to 18. *Hab.* In woods and cultivated ground. Singapore, Bukit Timah; Blakang Mati. Malacca, Bukit Sabukor (Derry). Pahang River. Perak, Changkat Serdang (Wray). Province Wellesley (Kunstler). *Distrib.* Malay isles. *Native name:* Petai. *Use:* The pods are eaten cooked by Malays, but they cause the eaters to exhale a peculiar horrible odour.

EXCLUDED SPECIES

P. BIGLANDULOSA W. and A. *Malay Peninsula*, Baker, *l.c.* 289.
 No specimens known.

58. NEPTUNIA, Lour.

Aquatic herb. Leaves bipinnate, sensitive; leaflets numerous, membranous, oblong. Flowers minute in globose heads on erect peduncles, lower ones with staminodes only. Calyx minute, campanulate, 5-toothed. Petals 5, strap-shaped, connate at base. Stamens exsert; anthers gland-crested. Ovary stalked. Stigma clubbed. Pod oblong, coriaceous. Species 8, cosmopolitan.

(1) *N. oleracea* Lour. *Fl. Cochinchine*, 654; Baker, in Hook. *fil. F.B.I.* ii. 285; Prain, *l.c.* 244. *Mimosa natans*, Roxb. *Cor. Pl. t.* 119.

Floating herb with white fleshy horizontal stems. Leaves bipinnate, 3 in. long; pinnæ 4 to 6, 2 to 3 in. long; leaflets 8 to 15 pairs, .35 to .5 in. long, .2 in. wide. Peduncles 3 to 12 in. long; heads .5 to .75 in. through, yellow. Corolla .05 in. long. Pod oblong oblique, .5 to 1 in. long. *Hab.* Ditches. Formerly very abundant in Singapore (*vide* Jagor). Malacca (Cuming). Selangor, Klang (Burkill). Perak, Lenggong. Province Wellesley, Butterworth (King). Penang, Bagian Jennal (Curtis). Rahman, Kota Bharu (Gwynne Vaughan). Tringganu (Yapp). *Distrib.* Tropics generally. *Use*: As a pot herb.

59. ADENANTHERA, Linn.

Trees unarmed. Leaves bipinnate. Flowers minute in spike-like racemes. Calyx campanulate, regular. Petals lanceolate cohering at base. Stamens 10; anthers gland-tipped. Ovary sessile, many-ovuled; style filiform. Stigma capitate. Pod strap-shaped, torulose, falcate, valves twisted after dehiscence. Seed red, or red and black. Species 4, tropics of Old World.

Leaves blunt glabrous beneath; pinnæ 8 to 12.

Seed all red

Leaves acute, puberulous beneath; pinnæ 6 to 8.

Seed black and red

(1) *A. pavonina*

(2) *A. bicolor*

(1) *A. pavonina* Linn. *Sp. Pl.* 384; Prain, *l.c.* 243.

Tree 20 to 30 ft. tall or more; petioles 2 to 4 in. long; rachis 6 to 10 in. long; pinnæ 8 to 12, opposite, 3 to 6 in. long; leaflets alternate 10 to 16, ovate or oblong, base cuneate, tip blunt, membranous, dark green above, glaucous beneath, glabrous. Racemes 2 to 6 in. long, panicked on ends of branches. Flowers .15 in. long on slender pedicels as long. Calyx green. Corolla pale yellow; petals narrow, lanceolate. Stamens hardly exsert, pink. Pod 6 to 9 in. long, .6 in. wide, .3 in. thick contort in dehiscence. Seeds 10 to 15, lenticular, .35 in. across, shining red. *Hab.* Dubiously wild here and often planted. Singapore, Pasir Panjang; Lavender Road. Malacca (Griffith). Negri Sembilan, Tampin Hill. Jalor, Biserat (Gwynne Vaughan). Lankawi (Curtis). *Distrib.* S.E. Asia. *Native names*: Saga; Kanduri Batang.

(2) **A. bicolor** *Moon Cat. Pl. Ceyl.* 34; *Baker, in Hook. fil. F.B.I.* ii. 287; *Prain, l.c.* 243; *Trimen Fl. Ceyl.* ii. 120, *pl.* xxxiv.

Tree 20 to 80 ft. tall. Leaf 6 in. long; petioles 1·5 to 2·5 in. long; rachis 3 to 5 in. long; pinnae 6 to 8 opposite, 2·5 to 4 in. long; leaflets alternate 8 to 10, ovate or elliptic, base round, tip acute, sub-coriaceous, glabrous above, puberulous beneath, ·75 to 1·5 in. long, ·5 to ·75 in. wide. Racemes axillary or panicle 3 to 5 in. long. Flowers 1·5 in. long on pedicels as long. Calyx green. Corolla white; petals elliptic-lanceolate. Stamens exsert. Pod 4 to 6 in. long, ·6 in. wide, ·3 in. thick contort when ripe. Seeds 8 to 10, lenticular, ·35 in. wide, black and red (nearly all red). *Hab.* Lowland woods. Singapore, Bukit Mandai; Bukit Timah. Malacca, Sungei Hudang. Selangor, Ulu Sapetang. Perak, Larut (Kunstler); Asam Kumbang (Wray). Penang, Waterfall (Curtis). *Distrib.* Ceylon.

60. ENTADA, Adans.

Woody climbers with tendrils. Leaves bipinnate. Flowers in narrow dense racemes, minute, shortly pedicelled. Calyx campanulate 5-toothed. Petals narrow, falcate, linear. Stamens 8 to 10, free shortly exsert; filaments filiform; anthers crowned with a gland. Ovary many-ovuled; style filiform; stigma concave. Pod woody or coriaceous of many discoid or oblong one-seeded joints. Seeds orbicular or sub-triangular.

Leaves all green; pod straight, woody, indehiscent . . . (1) **E. Schefferi**

Leaves glaucous beneath; pod spiral, coriaceous dehiscing into joints . . . (2) **E. spiralis**

(1) **E. Schefferi** *Ridl. Journ. Bot.* 1920, p. 195. *E. Pursætha* *Schiff. Obs. Phyt.* iii. 90, *t.* xvi., xviii. A, *not of DeCandolle*.

A large woody climber often 6 in. through at base. Branches slender, quite glabrous. Leaves with petioles 2 in. long; rachis ending in a tendril; pinnae 4; leaflets green on both sides, sub-coriaceous, blunt usually obovate, base narrowed, tip broadest 1 to 2 in. long, ·6 to ·8 in. wide, quite glabrous. Spike 6 to 8 in. long, simple, densely-flowered. Flowers 1 in. or less; rachis puberulous. Bracts minute acuminate persistent. Calyx small cup-shaped, 5-toothed. Petals yellow, narrow-lanceolate, acute. Pod straight not breaking into lobes, 2·7 ft. long, 3 in. wide, with a very thick woody suture, edge slightly indented between the seeds. Seeds 13 to 15, flat ellipsoid, 1·25 in. long, 1·15 in. wide, ·25 in. thick, dark brown. *Hab.* River-banks covering the trees and bushes, local but abundant where it occurs. Muar, Sungei Pauh (Fox). Pahang, Pekan. Perak, Temengoh River; Haram (Scortechini); Telok Anson (Kunstler). Tringganu, Bundi (Rostado). Kelantan, Kota Bharu in a village. Penang (Wallich), Ayer Hitam (Curtis). *Distrib.* Java. *Native name:* Akar Beluru or Blu. *Use:* The bark used for soap.

Entada scandens Benth., *Mimosa scandens* Linn. is a mixture of several very distinct species from India and Ceylon, Eastern Malaya, Polynesia and South America. Distributed with Wallich Penang, 5293, are some scraps of foliage of apparently *E. spiralis*.

(2) **E. spiralis** Ridl. *Journ. As. Soc. Beng.* lxxvii. (2), 305.

Stem flattened spiral 3 in. wide, 1 to 2 in. thick. Leaves alternate, 3 in. long; pinnae 4; leaflets alternate elliptic to obovate oblong retuse, 2 to 3 in. long, 1 in. wide, dark green above, glaucous beneath, coriaceous. Racemes axillary 6 in. long; peduncle 2 in. long; rachis hairy. Calyx hairy, green. Petals 4 to 5, green. Stamens 8 to 10, white turning yellow, .25 in. long. Pod spiral green, thick, lobed, breaking into joints, and then dehiscing. Seeds 5 to 11, rounded triangular or heart-shaped, 2 in. long, 1 in. thick, testa brown, coriaceous. *Hab.* Common in secondary growth and woods in the south. Singapore, Tanglin; Chan Chu Kang, etc. Malacca, Ayer Panas (Goodenough), (Maingay). Dindings, Bruas. Perak, Larut (Kunstler).

61. LEUCÆNA, Benth.

Shrubs or trees. Leaves bipinnate. Flowers sessile in globose heads, 5-merous. Calyx cylindrical, short-toothed. Petals free, valvate. Stamens 10, free, exsert; anthers not gland-crested. Ovary stalked, many-ovuled; style filiform; stigma minute. Pod flat, strap-shaped, coriaceous. Species 8, American.

(1) **L. glauca** Benth. *Hook. Journ. Bot.* iv. 416; *Prain, l.c.* 246.

Shrub about 6 ft. tall, unarmed. Leaves 4 to 6 in. long; petioles 2 to 3 in. long; pinnae 4 to 8 pairs, 2 to 3 in. long; leaflets 10 to 15 pairs, linear-oblong acute, base oblique cuneate, glaucous downy, .4 to .5 in. long, .1 to .15 in. wide. Raceme of dense globose heads, .5 to .75 in. through; peduncles 1 to 1.25 in. long, slender. Corolla white .15 in. long. Stamens .25 in. long. Ovary pubescent. Pod 5 to 6 in. long, .4 to .5 in. wide. Seeds 15 to 20, narrow-ovate, base acute, .3 in. long. *Hab.* Open country and waste ground, introduced, but scattered over the peninsula. Pahang, Pulau Tawar. Selangor. Perak, Gapis (Scortechini). Penang Waterfall (Curtis), Kedah. *Distrib.* Whole tropics, doubtless of South American origin. *Native name*: Petai Jawa.

62. MIMOSA, Linn.

Shrubs or herbs, usually prickly. Leaves bipinnate; leaflets small linear. Flowers minute in dense globose heads, usually 4-merous. Calyx campanulate, short-toothed. Petals connate towards base. Stamens 4 to 10, exsert; anthers not gland-crested. Pod flat, of 1-seeded joints, separating from sutures. Species 230, chiefly American.

Low wiry herb; leaves sensitive; flowers pink	.	.	(1) M. pudica
Shrub; leaves not sensitive; flowers white	.	.	(2) M. sepiaria

(1) **M. pudica** Linn. *Sp. Pl.* 518; *Prain, l.c.* 247.

Low under-shrub up to 2 ft. tall, prickly and bristly. Leaves very sensitive of 4 digitate pinnæ, sessile on a 2-in. petiole; pinnæ 2 to 3 in. long; leaflets 12 to 20 pairs bristly beneath. Heads in pairs, axillary, rose pink, .35 in. long; peduncles 1 in. long. Stamens 4. Pods .6 to 1 in. long, .2 in. across, of 3 to 5 joints, sutures persistent, bristly. The sensitive plant. *Native name*: Samalu. *Hab.* Abundant all over the peninsula. Introduced from America in the 16th century.

(2) **M. sepiaria** Benth. *Hook. Journ. Bot.* iv. 595; *Prain, l.c.* 247.

A thorny shrub. Stem about 4 ft. tall and 6 in. through; branches long, erect. Leaves, rachis downy, 2 in. long; pinnæ 6- to 8-paired, not sensitive, 1.5 in. long, pubescent above; leaflets 12 to 20 pairs, coriaceous, ligulate, .2 to .3 in. long, .1 to .15 in. wide, tip sub-acute, base oblique, truncate, sessile. Panicles 6 to 8 in. long, of heads .25 in. through; rachis puberulous; peduncles .5 to .75 in. long. Corolla .05 in. long, white. Stamens 8 to 10. Pod black, straight, 1.5 to 2 in. long, .25 in. wide, joints 6 to 8, sutures unarmed. *Hab.* Damp ground. Singapore, chiefly at Tanglin. An escape from cultivation. *Distrib.* Also an escape in China and Borneo. *Use*: As a hedge plant and firewood.

63. ACACIA, Willd.

Spiny or thorny trees or shrubs, erect or climbing. Leaves bipinnate; leaflets narrow, very small. Flowers in globose heads or spikes. Calyx campanulate or funnel-shaped, short-toothed. Petals exsert, united in lower half. Stamens free, exsert; anthers not gland-crested. Ovary stalked or not; style filiform; stigma minute. Pod ligulate or oblong, not jointed, dehiscent or not, rarely sub-cylindric. Species 430, cosmopolitan, mostly Australian.

Erect shrubs, thorny.

Pods cylindric, fleshy; flowers orange . . . (1) **A. Farnesiana**

Climbing shrubs, thorny.

Pods flat; flowers white.

Flower-heads .4 in. long; leaves narrow oblong (2) **A. pseudo-intsia**

Flower-heads .2 in. across; leaflets linear. . . (3) **A. pennata**

(1) **A. Farnesiana** Willd. *Sp. Pl.* iv. 1083; *Prain, l.c.* 248.

A thorny shrub. Leaves bipinnate; rachis downy, 1 to 1.5 in. long; pinnæ 6 to 16, from 1 to 1.5 in. long; leaflets 10 to 20 pairs, green coriaceous, linear-oblong, .25 in. long, .05 in. wide. Stipules forming white thorns 1 in. long. Capitula .35 in. through, orange yellow, fragrant. Pod thick, cylindric, 2 to 3 in. long, .5 in. thick, pulpy, dark brown or black. Seeds 12 to 18, ovate. *Hab.* Sandy open places, probably introduced. Pahang near Pekan. Selangor, Kwala Selangor near the fort. Penang (Porter, Wall. Cat. 5264f).

Distrib. All tropics. *Native name*: Lasana. *Use*: Pods for making ink.

(2) **A. pseudo-intsia** *Miq. Fl. Ind. Bat. i. 12; Prain, l.c. 249.*

A lofty climber over 100 ft. long and about 3 ft. through, armed with hooked prickles. Leaves bipinnate; rachis 8 in. long, prickly; petioles 2·5 in. long, with large gland at base; pinnæ 8 to 12 pairs, 2·5 to 3·5 in. long; leaflets 30 to 35 pairs, linear-oblong, blunt, ¼ in. long, 1·5 in. wide, sub-coriaceous. Capitula ¼ in. across, white on peduncles ½ to ¾ in. long, 2 to 4 together on a 10 to 12 in. long panicle. Pod linear-oblong, 4·5 in. long, 1 in. wide, sutures thickened. Seeds 6. *Hab.* Common in forests in south. Singapore, Garden Jungle; Bukit Timah; Changi. Malacca, Tebong. Negri Sembilan near Tampin. Penang Hill (Haniff). *Distrib.* Sumatra, Java. *Native names*: Akar Kapok; Kayap.

(3) **A. pennata** *Willd. Sp. Pl. iv. 1090; Baker, l.c. ii. 297; Prain, l.c. 250, var. pluricapitata Baker, l.c.*

Climber about 80 ft. long. Branches prickly with curved thorns. Leaves bipinnate; rachis 6 in. long; petioles ¾ to 1 in. long, with a gland above the base; pinnæ 20 to 40 pairs, 1·25 to 2 in. long; leaflets 30 to 40 pairs, linear, ½ to ¾ in. long, under ½ in. wide. Capitula ½ in. through, white; peduncles ½ to ¾ in. long, in clusters of 4 to 8 on a 12 to 15 in. panicle. Pod linear-oblong, acute at both ends, thin, 4 to 6 in. long, ¾ to 1 in. wide. Seeds flat, ovate, ¼ in. long. *Hab.* Open country, common in the north. Pahang River. Malacca, Batu Tiga (Holmberg); Ayer Panas and Selandor (Cantley). Negri Sembilan, Bukit Sulu (Cantley). Perak, Larut; Goping and Ulu Bubong (Kunstler). Selangor, near Batu Caves. Penang (Porter, Wall. Cat. 5255). Kedah, Yan. Perlis, Chupeng; Kanga. *Distrib.* Malay isles. *Native name*: Akar Kayu Manis.

64. **SERIANTHES**, Benth.

Big tree unarmed. Branches and panicle rusty, puberulous. Leaves bipinnate. Flowers paniced, large, 5-merous. Calyx deep campanulate, toothed, woolly-silky. Petals adnate to staminal column at base. Stamens monadelphous, very numerous. Ovary sessile, many-ovuled. Pod large oblong nearly woody turgid, septate between the 6 to 8 seeds. Species 2, the other Polynesian.

(1) **S. grandiflora** *Benth. Hook. Lond. Journ. Bot. iii. 225; Prain, l.c. 251.*

Leaves, rachis puberulous, 7 to 9 in. long, a large gland at base and small ones between pinnæ; pinnæ 3- to 8-jugate, 3 to 4 in. long; leaflets 6 to 12 pairs, oblong-obtuse, base truncate oblique, coriaceous, pale beneath, glabrous, ½ to 1 in. long, ⅓ to ⅔ in. wide. Flowers few in panicles 4 to 6 in. long, branches 1·5 in. long. Calyx ½ in. long, teeth triangular. Petals yellowish white, 1·5 in. long, dense-woolly outside. Stamens over 500,

2·5 in. long. Pod 6 in. long, 2·25 wide, ·75 in. thick, woody, oblong or obovoid, narrowed at tip. *Hab.* Forests, south of peninsula, Singapore (Wallich 5285); Bukit Timah. Malacca, Pulau Besar (Griffith). *Distrib.* Malay isles.

65. **ALBIZZIA**, Durazz.

Trees, often large or (in *A. myriophylla*) climbing shrubs unarmed. Leaves bipinnate. Flowers in globose sessile or pedicelled heads. Calyx campanulate, toothed. Corolla funnel-shaped; petals united below the middle. Stamens indefinite, monadelphous at base, much longer than corolla; anthers not gland-crested. Ovary stalked or sessile; style filiform. Stigma capitate. Pod large thin, flat, strap-shaped, indehiscent, not septate. Species 20 to 30, Old World tropics.

Climbing shrubs with pulvinus of leaf base forming a hook.

- | | |
|----------------------------------------------------------------------------|---------------------------|
| Leaflets narrow, linear; flowers sessile | (1) A. myriophylla |
| Trees; flowers pedicelled; stamens white or yellowish white; umbels large. | |
| Leaflets 5 to 9 pairs; sutures straight, thickened | (2) A. Lebbek |
| Leaflets 12 to 16 pairs; sutures sinuate not thickened | (3) A. pedicellata |
| Flowers pink; umbels small, few-flowered | (4) A. littoralis |

(1) **A. myriophylla** Benth. *Hook. Lond. Journ. Bot.* ii. 90.

Woody climber 15 to 20 ft. or more long. Shoots brown-velvety. Leaves, rachis 5 to 9 in. long, tawny pubescent; pinnæ 12 to 20 pairs, 1 to 1·5 in. long; leaflets 35 to 50 pairs, linear sessile, tip acute, base slightly oblique, chartaceous, ·2 to ·25 in. long, ·07 in. wide, dark green, glabrous above, pale occasionally puberulous beneath. Stipules subulate, ·15 in. long, pulvinus base hardening into a small woody hook. Capitula ·5 in. across, 10- to 20-flowered, pale yellow; peduncles ·4 to ·5 in. long, in terminal and axillary brown-velvety panicles, 3 to 4 in. long. Calyx funnel-shaped, pubescent sessile. Corolla ·15 in. long; filaments 15 to 20. Pod 4 to 5 in. long, ·8 to ·2 in. wide, brown, thin, dehiscent. Seeds 6 to 8, obovate. *Hab.* Open country and forest edges, east and north of peninsula. Pahang, Sungei Penang (Watson). Perak (Scortechini). Penang, Moniot's Road (Curtis). Kelantan, Channing. Lankawi, Terutau (Curtis). Adang islands, Pulau Butong. *Distrib.* Tenasserim, Siam. *Native name*: Akar Manis.

(2) **A. Lebbek** Benth. *Hook. Lond. Journ. Bot.* iii. 87; *Prair.* l.c. 257.

Tree 40 to 70 ft. tall. Bark pale. Leaves, rachis 3 to 9 in. long, gland large at base; pinnæ 2 to 3 pairs, 4 in. long; leaflets 5 to 9 pairs, elliptic-oblong or obovate-oblong, blunt or retuse, base obliquely rounded, usually quite glabrous, bright green, 1 to 2 in. long, ·5 to ·75 in. wide. Umbels sub-capitate, pale green, 1·25 in. across; peduncles 2 to 4 in. long, axillary or corymbose

at the branch ends; pedicels '1 to '15 in. long. Calyx '15 to '2 in. long, teeth deltoid. Corolla '3 in. long, pubescent; filaments connate, shorter than corolla. Pod 4 to 12 in. long, 1 to 2 in. wide, linear-oblong, thin papery, yellowish. Seeds 4 to 12, '6 in. long. *Hab.* Open lowland rather dry country, but probably planted wherever it occurs here. Penang, Quarry; Telok Bahang (Curtis). Perlis, Kanga, open fields. *Distrib.* Asia and Africa.

(3) **A. pedicellata** Baker, in *Benth. Trans. Linn. Soc.* xx. 563; and in *Hook. fil. F.B.I.* ii. 299; *Prain, l.c.* 258.

A tall tree 40 to nearly 100 ft. high. Stem 3 ft. through. Leaves, rachis 5 to 8 in. long, gland large, '5 in. above base; pinnae 6 to 12 pairs, 4 to 6 in. long; rachis puberulous; leaflets 12 to 16 pairs, oblong-obtuse, sessile, base round, coriaceous, pale beneath, '5 to '75 in. long, '3 to '4 in. wide, glabrous. Umbels '75 to 1 in. wide, many-flowered, yellowish white; peduncles pubescent, 1 to 1'25 in. long; panicle 6 to 8 in. long. Calyx '15 in. long, pubescent. Corolla '3 in. long, pubescent. Stamens connate at base in a white tube, free part green, over 1 in. long. Pod indehiscent, 12 to 18 in. long, 2'5 in. wide, thin and brittle, yellowish, sinuate-oblong. Seeds 6 to 9, ovate, '25 in. long. *Hab.* Forests. Singapore, Kranji Road. Malacca (Maingay); Ayer Keroh (Goodenough); Perak, Goping; Ulu Bubong (Kunstler). Province Wellesley, Tasek Gelugur. Penang, Waterfall (Curtis).

(4) **A. littoralis** Teysm. and Binn. *Nat. Tijds. Ned. Ind.* xxix. 259.

Tree 40 to 50 ft. tall. Leaves, rachis 4 to 8 in. long, glabrous; pinnae 2 to 4 pairs, the upper ones 4 to 5 in. long; leaflets 5 to 6 pairs; lower pinnae 3 to 4 in. long; leaflets 3 to 4 pairs, elliptic-oblong or obovate blunt or retuse, base oblique round, sub-sessile, membranous, glabrous glaucescent beneath, '75 to 1 in. long, '4 to '75 in. wide. Panicles about 4 in. long; branches 2 to 3 in. long; peduncles at the extremities slender 1 in. long. Capitula '4 in. across; pedicels '25 in. long. Calyx '1 in. long, pubescent. Corolla '2 in. long, silky. Filaments rose pink at the ends, tube white. Pod 6 to 7 in. long, 1 in. wide, linear, narrowed to both ends, greenish brown. Seeds 12 to 16, oval, '4 in. long. *Hab.* On banks and cliffs by the sea. Singapore, Pulau Ubin. Penang, Pulau Jerajah (Curtis). *Distrib.* Malay isles.

EXCLUDED SPECIES

- A. ODORATISSIMA *Benth.* Malacca (fide Baker). Occasionally planted in gardens.
- A. LUCIDA *Benth.* Singapore (fide Baker). Not seen anywhere here.
- A. MOLUCANA *Mig. Fl. Ind. Bat.* i. 26. A very big tree 100 ft. tall, white bark and extensive spreading crown. Leaves narrow; leaflets numerous, oblong, '25 in. long and '1 in.

wide. Flower-heads numerous in panicles, white. Pods linear, 4 in. long, .5 in. wide, sutures thickened. Formerly much planted as a shade for coffee, and sometimes persisting long after the disappearance of the cultivation, occasionally reproducing itself. Native of Malay islands.

66. PITHECOLOBIUM, Mart.

Trees medium-sized, usually unarmed. Leaves bipinnate; leaflets even pinnate in few or many pairs. Flowers small, white or yellowish in globose heads or small clusters, in short panicles, pentamerous. Calyx campanulate or funnel-shaped, short-toothed. Corolla funnel-shaped; petals connate in a tube for half or two-thirds of their length. Stamens monadelphous, exsert; anthers glandless. Ovary often stalked; style filiform. Stigma minute capitate. Pod strap-shaped, curved to a circle or twisted, dehiscent along the lower edge, very much twisted during dehiscence. Seeds several, black, exallate. Species about 100. Mostly American, 1 or 2 African, rest Asiatic.

P. dulce Benth. Hook. Lond. Journ. Bot. iii. 199; Prain, l.c. 263. The Madras thorn. A shrub with stipular thorns, flower-heads .5 in. through, white, pod turgid, twisted, dark red, has often been planted as a hedge-plant in Singapore and Penang, but does not become spontaneous. Native of America.

Pods not twisted.

Pod indehiscent; leaves bipinnate; pinnæ with
2 pairs of leaflets

(1) *P. confertum*

Pod splitting in 2, valves velvety

(2) *P. bubalinum*

Pods twisted.

Pinnæ 1 to 4 pairs of leaflets.

Pods large, deeply lobed, brown

(3) *P. lobatum*

Pods not lobed, red.

Pods large, 1.5 in. across; leaflets large.

Panicles large, lax glabrous; flowers
small, cymose

(4) *P. ellipticum*

Panicles little-branched, hairy; flowers
in heads

(5) *P. affine*

Pods under 1 in. across.

Leaflets 3 pairs 4, in. long or less; flowers
over 5 in. long, few in head

(6) *P. Kunstleri*

Leaflets 3 to 4 pairs, 4 to 6 in. long;
flowers 1.5 in. long; fruit 2 by .4 in.

(7) *P. microcarpum*

Pinnæ with 3 to 10 pairs of leaflets;
flowers pedicelled.

Branches strongly angled; leaflets
.1 in. wide

(8) *P. angulatum*

Branches hardly angular; leaflets .75
in. wide

(9) *P. Clypearia*

Pinnæ with 15 to 20 pairs leaflets;
flowers sessile in pairs

(10) *P. contortum*

(1) **P. confertum** Benth. *Trans. Linn. Soc.* xxx. 304.

Small tree. Leaves glabrous, rachis .75 in. long; pinnae 1 pair, rachis 2 in. long; leaflets 2 pairs, sub-coriaceous, green, shining above, pale beneath, oblong blunt acuminate, base cuneate, distal pair 3.25 in. long, 1.75 to 2 in. wide, lower pair 2.5 in. long, 1.25 in. wide; nerves 3 to 4 pairs. Panicles axillary and terminal, 2 in. long of small 5- to 10-flowered heads, .75 in. across on pubescent peduncles, .75 in. long. Calyx sessile, .05 in. long, puberulous. Corolla .25 in. long, puberulous. Stamen-tube longer than corolla. Pod horseshoe-shaped, indehiscent (?), not indented between the seeds, 10 to 12 in. long. Seeds 11 to 13, ovate flattened, .75 in. long. *Hab.* Open country, not common. Singapore, Bedoh; Selitar; Bukit Timah. Pahang, Kwantan (Foxworthy). Malacca, Jelutong (Goodenough). Penang, Penara Bukit (Curtis). *Distrib.* Sumatra. *Native name* : Kongkor.

I am not sure if the pod ever splits, as fruiting specimens are rare.

(2) **P. bubalinum** Benth. *Trans. Linn. Soc.* xxx. 576; Prain, *l.c.* 264.

Tree 30 ft. tall. Branchlets pubescent. Leaves, rachis puberulous, .5 in. long; pinnae one pair; leaflets 1 to 2 pairs, glabrous, stiff papery dark shining green, oblong-lanceolate, acute, base cuneate, distal pair 4 to 5 in. long, 1.75 to 2.25 in. wide, basal pair 2.5 in. long, 1.25 in. wide; nerves 4 to 5 pairs. Panicles lax, 3.5 in. long or more, puberulous, heads 5- to 8-flowered, .3 in. through. Calyx pubescent, sessile, .05 in. long. Corolla white, .12 in. long puberulous; filament-tube longer. Pod red, oblong, generally falcate, blunt, base rounded 3 to 4 in. long, 1 in. wide, .75 in. thick, velvety. Seeds 8 to 10, ovoid, purple black, .75 in. long. *Hab.* Woods, not common. Singapore, Garden Jungle. Malacca (Griffith, Maingay). Selangor, Weld's Hill (Foxworthy). Penang, Penara Bukit (Curtis). *Distrib.* Sumatra. *Native names* : Giring Antan; Gerdas Padi; Keredas.

(3) **P. lobatum** Benth. *Hook. Lond. Journ. Bot.* iii. 208; Baker, *in Hook. fil. F.B.I.* ii. 305; Prain, *l.c.* 265.

Tree 60 to 80 ft. tall, crown spreading. Stem 15 to 20 in. through, grey. Leaves glabrous, .6 to 1 in. long; pinnae 1 pair; leaflets 2 to 3 pairs, oblong to oblong-lanceolate acute, base cuneate, stiff papery, distal pair 5 to 8 in. long, 2 to 3 in. wide, basal pair 3 in. long. Panicles 3 in. long, much branched, heads 3- to 5-flowered, .25 in. across on short peduncles. Calyx sessile, .05 in. long. Corolla glabrous, .15 in. long, white; filament-tube shorter than corolla. Ovary glabrous. Pod 9 to 10 in. long, horseshoe-shaped or twisted, deep purple, glabrous, deeply lobed along the lower suture, 2 in. wide, 1 in. thick. Seeds 3 to 6, orbicular, flat 2 in. across, brown, foetid. *Hab.* Campongs and waste ground, very common. Singapore to Penang. *Distrib.* Tenasserim, S. Siam,

Sumatra, Java. *Native name*: Bua Jering. *Use*: The seeds cooked and eaten by Malays.

(4) **P. ellipticum** Hassk. *Retzia* i. 225; *Prain*, l.c. 270. *P. fasciculatum* Benth. *Hook. Lond. Journ. Bot.* iii. 208; *Baker*, l.c. ii. 304.

Tree nearly 30 ft. tall. Branchlets puberulous. Leaves, rachis glabrous, 3 to 4 in. long; pinnae 2 pairs; leaflets 2- to 4-paired, elliptic-oblong acuminate dark shining green, glabrous, base round, rather stiff, 6 to 8 in. long, 2.5 to 3 in. wide, lower ones smaller. Panicle a foot long, rather stout, lax, long-branched. Flowers 2 to 5 together on the ends of the puberulous branchlets. Calyx .05 in. long, puberulous. Corolla yellowish, silky, .15 in. long; filaments united at base only, yellow, .2 in. long. Pod twisted into a circle or spirally, 3 to 7 in. long, 1.25 in. wide, dull red. Seeds 3 to 7, oblong, black with a pale blue bloom, hanging from the pod-edge when ripe, .8 in. long, .6 in. through. *Hab.* Common in lowland country, woods and open land. Singapore, Selitar; Pulau Ubin. Johor, Kwala Sembrong (Kelsall). Pahang, Pulau Chengei. Malacca, Ayer Panas (Derry); Chenana Putih (Cantley). Negri Sembilan, Tampin Hill. Perak, Goping and Chandleriang (Kunstler); Ulu Selama (Wray). Kedah, Pulau Song-Song. *Distrib.* Java, Sumatra. *Native names*: Jering Bali; Kachang Tupai; Saga Gajah.

(5) **P. affine** Baker, in *Hook. fil. F.B.I.* ii. 304; *Benth. in Trans. Linn. Soc.* xxx. 577; *Prain*, l.c. 269.

Tree 15 to 25 ft. tall, 6 to 8 in. through. Branchlets pubescent. Leaves, rachis 4 to 6 in. long; pinnae 1 to 2 pairs; leaflets 4 pairs, papery glabrous, lanceolate oblong or ovate-acuminate, base cuneate, terminal ones largest, 6 to 7 in. long, 3 in. wide, lowest 3 in. long, 1.5 in. wide; nerves 4 to 6 pairs. Panicles 6 to 8 in. lax, puberulous, heads dense, .75 in. across. Calyx sessile, .15 in. long, funnel-shaped, silky. Corolla .25 in. long, white silky; filament-tube as long as corolla, white. Ovary puberulous, stalked. Pod spiral curved into a circle 8 in. long, 1.25 in. wide, dull red or yellow. Seeds oblong, pendent from pod, 6 to 8, black with a blue bloom, 1 in. long. *Hab.* Open country, woods. Singapore, Tanjong Bunga. Malacca (Griffith). Selangor, Semangkok Pass. Perak, Chandleriang (Kunstler). *Distrib.* Burma. *Use*: Fruit used in curries.

(6) **P. Kunstleri** Prain, l.c. 271.

A low tree about 20 ft. tall with slender stems, bushy. Leaves, rachis puberulous, 1 to 4 in. long; pinnae 2, rachis 4 in. long; leaflets 3 pairs, terminal elliptic acuminate, base cuneate, 4.25 in. long, 1.75 in. wide, lowest 1.75 in. long, .75 in. wide or larger, papery glabrous above; nerves 7 pairs and midrib hairy beneath. Panicles 6 in. long, puberulous. Flowers (largest in genus) up to 12, sessile in a head. Calyx funnel-shaped, .2 in. long, silky. Corolla

·5 in. long, tube funnel-shaped, lobes oblong-acute; filaments 1·5 in. long, yellow; tube as long as corolla. Ovary very long, stipitate, pubescent. Pod twisted, 5 to 6 in. long, 1 in. wide, puberulous outside, red inside. Seeds 8 to 10, oblong, pendulous, black. *Hab.* Low swampy woods. Johor, Kota Tinggi; Castlewood; Kwala Sembrong (Kelsall); Sungei Biku (Down). Pahang, Piangu, Endau (Evans); Perak, Batang Padang district (Kunstler); Bernam River (Kunstler). *Distrib.* Borneo. *Use:* Fruit used for soap.



FIG. 57.—*Pithecolobium Kunstleri*.

(7) ***P. microcarpum*** Benth. *Trans. Linn. Soc.* xxx. 576; Baker, in Hook. *fl. F.B.I.* ii. 304; Prain, *l.c.* 268.

Tree about 20 to 30 ft. tall. Branches pubescent. Leaves, rachis pubescent, ·5 to 1·5 in. long; pinnæ 1 pair; leaflets 3 to 4 pairs, stiffly papery, dark shining green, ovate obtusely caudate, distal leaflets, base cuneate, 4 to 6 in. long; lower ones, base round 3 in. long. Panicles 4 to 6 in. long, lax puberulous, heads 5- to 8-flowered, ·4 in. across, sub-umbellate on short peduncles. Calyx sessile, glabrescent, ·05 in. long. Corolla white, ·15 in. long; filament tube shorter. Ovary glabrous. Pods spirally twisted, 1·75 to 2 in. long, ·3 to ·4 in. wide, indented between the seeds, orange red. Seeds 8 to 10, pea-shaped, ·2 in. through, black.

Hab. Common all over the peninsula in open country and thin woods, very beautiful in fruit, with its brilliant pods and deep green leaves. Singapore, Changi; Bukit Mandai; Bukit Timah. Malacca, Chabau (Cantley); Bukit Bruang (Holmberg). Penang, Batu Hitam (Curtis, Wallich). *Distrib.* Sumatra, Borneo. *Native names*: Jering Tupai; Petai Belalang; Kurudas; Kerudas; Kayam and Kayam Api.

(8) *P. angulatum* Benth. Hook. Lond. Journ. Bot. iii. 306; Baker, l.c. ii. 306; Prain, l.c. 274.

Tree about 20 ft. tall. Branches angled. Leaves 12 in. or more long; rachis angled puberulous; pinnæ 2 to 4 pairs, lowest 3 in. long terminal, 6 to 7 in. long; leaflets 3 to 8 pairs, ovate-oblong or lanceolate-acuminate, oblique, base very oblique cuneate, 1 to 3 in. long (terminal largest), 1 to 1.75 in. wide, stiffly papery, glabrous above and beneath except midrib on both sides. Panicles axillary and terminal about 6 in. long, with few short branches puberulous. Flowers in small terminal corymbs, about .5 in. across. Calyx .05 in. long, puberulous. Corolla .2 in. long, white or pale yellow, silky. Stamen-tube nearly as long as corolla; filaments pale pink. Pod 7 to 8 in. long, .7 in. wide, spirally twisted, puberulous, red, sinuate between the seeds. Seeds 8 to 10, black, .5 in. long. *Hab.* Secondary forest, common. Singapore, Changi (Hullett); Bukit Timah; Chanchu Kang. Malacca, Sungei Hudang and Bukit Bruang (Derry). Selangor, Rawang (Kloss). Perak, Gunong Batu Putih (Wray). Province Wellesley, Krian. Penang, Moniot's Road (Curtis). *Distrib.* Indo-Malaya.

(9) *P. Clypearia* Benth. Hook. Lond. Journ. Bot. iii. 209; Baker, l.c. ii. 305; Prain, l.c. 273.

Tree 25 to 30 ft. tall. Branches angled, pubescent. Leaves about 1 ft. long; pinnæ 3 to 6, 4 in. long; leaflets 3 to 7 pairs, trapezoid, midrib diagonal, stiffly papery, glabrous, dark green above, glaucous pubescent beneath, 1.5 in. long or less, .75 in. wide, sessile. Panicles very lax, 12 in. long. Flowers in small corymbs at the branch ends, .35 in. across. Calyx campanulate, .05 in. long, puberulous. Corolla white, glabrous, .1 in. long; filament-tube shorter than corolla, white, .35 in. long. Pod twisted, 4 to 5 in. long, .4 in. wide, orange outside, red inside, sinuate between seeds. Seeds 8 to 10 ovate, .25 in. long, black. *Hab.* Woods and open country, common. Singapore, Bukit Timah; Chanchu Kang; Selitar. Malacca, Ayer Panas (Griffith); Pahang, Pekan. Selangor, Kwa Lumpur. Negri Sembilan, Gunong Berumbun (Cantley). Perak, Changkat Jerin (Wray). Penang, Ayer Hitam (Curtis). Province Wellesley. Tringganu, Bundi (Rostado). *Distrib.* Malay islands. *Native names*: Jering Munyet; Petai Belalang.

(10) *P. contortum* Mart. Flora xx. (2), Beibl. 115; Baker, l.c. ii. 305; Prain, l.c. 272.

Tree 15 to 30 ft. tall, grey-pubescent. Leaves 4 to 8 in. long;

rachis slender pubescent; pinnæ 5 to 6 pairs, about 4 in. long; leaflets 15 to 20 pairs, oblong or trapezoid, obtuse or sub-acute, base obliquely truncate, papery, pubescent all over, '5 to '7 in. long, '25 to '35 in. wide, sessile. Panicles lax with very slender branches terminal puberulous, 8 to 12 in. long and as wide. Flowers sessile in pairs or single on the tips of the branches. Calyx '05 in. long, puberulous. Corolla greenish white, glabrous, '15 in. long; filament-tube as long as corolla, above cream colour, '35 in. long. Pod long, '4 to '8 in. wide, spirally twisted, puberulous, orange colour, red inside, margin sinuate. Seeds 8 to 10, oblong, black. *Hab.* Common in forests. Singapore, Sungei Buluh; Jurong; Kranji. Johor, Bukit Murdom (Kelsall). Malacca, Ulu Selangor; Kwala Lumpur. Dindings, Lumut. Perak, Thaiping, Waterfall (Wray); Goping (Kunstler); Hermitage Hill. Penang Hill (Main-gay, Curtis); Kedah Peak. *Native name*: Asam Jawa Antan.

EXCLUDED SPECIES (MIMOSÆ).

XYLIA DOLABRIFORMIS Benth. Baker, *l.c.* ii. 286; Prain, *l.c.* 245. Singapore, Wallich No. 5278. Though thus in Wallich's catalogue, the ticket on the specimen in the type-set of Wallich's plants gives Prome Hill (in Burma) as its locality.

ENTEROLOBIUM SAMAN Prain, *l.c.* 251; *Inga Saman*, Willd. The rain tree, often planted for shade, but not spontaneous anywhere. Native of Guiana.

CALLIANDRA UMBROSA Benth. Prain, *l.c.* 253; Penang (*fide* Baker). No specimen from the Malay Peninsula seen.

ORDER XLVIII. ROSACEÆ

Herbs, shrubs or trees. Leaves stipulate, usually alternate. Flowers bisexual and usually regular. Calyx-tube free or adnate to ovary, usually 5-lobed. Petals 5 or 0, inserted under the margin of the disc. Disc lining the calyx-tube or forming a ring at base. Stamens perigynous usually numerous (rarely 1, 5 or 10) often connate; filaments filiform, anthers small. Ovary 1 or more, free or connate. Carpels with free or connate basal lateral or sub-terminal styles; ovules 1 or more in each carpel. Stigmas simple or penicillate. Fruit various, achenes, berries or drupes. About 1200 species, whole world. (*King, Journ. As. Soc. Beng.* lxvi. ii. 275.)

Carpel 1.

Style basal; trees or shrubs; leaves simple, entire.

Stamens 6 to 30; drupe hard, hardly or not pulpy;
calyx-tube long

Stamens 8 to 10; drupe red, pulpy; calyx-tube
short

1. PARINARIUM

2. COCCOMELIA

- | | |
|------------------------------------------------------------------------------------------------------------|---------------|
| Stamens 2; drupe small, coriaceous; calyx-tube short | 3. PARASTEMON |
| Style terminal; trees or shrubs; leaves simple. | |
| Petals large; calyx 5-toothed; drupe pulpy | 4. PRUNUS |
| Petals minute or 0; calyx 5- to 10-toothed; drupe fleshy | 5. PYGEUM |
| <i>Carpels many</i> , fleshy or pulpy, not included in calyx-tube. | |
| Climbing thorny shrubs; leaves lobed serrate | 6. RUBUS |
| Calyx-tube becoming fleshy and enclosing the carpels; fruit a pome, with 3 to 5 bony or coriaceous stones. | |
| Flowers corymbose or fascicled | 7. PYRUS |
| Flowers paniced | 8. ERIOBOTRYA |

1. PARINARIUM, Juss.

Trees. Leaves entire, alternate. Flowers bisexual in paniced corymbose racemes, bibracteolate, usually white. Calyx-tube funnel-shaped or campanulate, lobes 5. Petals 5, sometimes clawed. Stamens 6 to 30; filaments united in an incomplete ring or in an unilateral bundle, all perfect or some anantherous. Carpel 1, adnate to one side of the calyx-tube, 2-celled; ovules 2 or 1. Drupe round, globose or ovoid, woody, 2-celled not pulpy. Species about 50, tropics of both worlds.

Leaves whitish beneath, woolly pubescent.

Leaves thin, 1.5 to 3 in. long, thinly whitish, pubescent; panicles lax

(1) *P. costatum*

Leaves stiffly coriaceous, 3 to 4 in. long, thick, yellow woolly; panicles very short

(2) *P. rubiginosum*

Leaves 5 in. long, elliptic, wide

(3) *P. polyneurum*

Leaves oblong 8 in. long; panicle large many-nerved

(4) *P. oblongifolium*

Leaves glabrous.

Flowers in sessile, solitary spikes.

Stamens 10; fruit 1 in. through; flowers small

(5) *P. spicatum*

Stamens 12 to 16; fruit much thicker; flowers large

(6) *P. Maingayi*

Flowers racemed or paniced; fruit woody; flowers straight.

Leaves large, sub-sessile, base broad, 3 in. wide

(7) *P. elatum*

Leaves smaller, base narrowed; petioles 2 in. long; stamens 12 to 16

(8) *P. scabrum*

Leaves oblong-lanceolate, stiff; stamens 10

(9) *P. asperulum*

Leaves broad, lanceolate; stamens 20 to 30

(10) *P. Kunstleri*

Leaves lanceolate acuminate.

Panicles short; flowers curved; petals unequal

(11) *P. heteropetalum*

Panicle corymboid; petals equal

(12) *P. Griffithianum*

(1) *P. costatum* *Bl. Mel. Bot. i. Hook. fil. F.B.I. ii. 311; King, l.c. 277.*

Tree 60 ft. tall or more, 2.5 to 3 ft. through. Branchlets puberulous. Leaves thinly coriaceous, ovate-elliptic or ovate-

lanceolate acuminate, base cuneate, glabrous, dark green, shining above, pale brown tomentose beneath; nerves 10 to 12 pairs, 1.5 to 3 in. long, .75 to 1.25 in. wide; petioles .25 in. long pubescent. Panicles terminal and axillary 4 to 8 in. long, lax, yellowish tomen-



FIG. 58.—*Parinarium costatum*.

tose. Flowers .25 in. long, solitary or in cymes of 4. Calyx puberulous outside with a line of subulate processes in the throat and a band of silky hair; lobes ovate shorter than tube. Petals obovate, clawed, pubescent. Stamens 8, villous. Fruit hard, oblong compressed, brown with pale spots, 1 in. long, .65 in. wide.

Hab. Woods, lowlands. Singapore, Chan Chu Kang. Malacca, Sungei Hudang (Holmberg). Penang, Telok Bahang (Curtis); Batu Feringhi. *Distrib.* Sumatra. *Native names*: Obi; Sukupal; Sukupa.

(2) **P. rubiginosum** *Ridl. Journ. Roy. As. Soc. S. Br.* 75, p. 29. *P. costatum* *var. rubiginosum*, *Ridl. Journ. F.M.S. Mus.* vi. 143.

Tree about 20 ft. tall. Branchlets densely yellowish tomentose. Leaves stiff coriaceous, ovate-lanceolate acuminate, base round, glabrous above, reddish woolly pale beneath; nerves strongly elevate, 3.5 to 4 in. long, 1.25 to 1.75 in. wide; petioles .2 in. long, red-woolly. Panicles .5 in. long, red-woolly. Flowers .2 in. long. Calyx-tube funnel-shaped, red-woolly outside, villous inside, teeth ovate acute. Petals small, oblanceolate, pubescent on edge. Stamens shorter than sepals, glabrous. Style very short, villous, as is the ovary. *Hab.* Mountain woods. Pahang, in woods above the Teku on Gunong Tahan, at 5000 ft. altitude (Ridley).

(3) **P. polyneurum** *Miq. Fl. Ind. Bat. Supp.* 306; *King, l.c.* 278.

Tree 60 to 100 ft. tall, 2 to 3 ft. through. Branchlets puberulous. Leaves oblong blunt acuminate, base round, above glabrous, beneath areolate whitish; nerves elevate, 15 to 18 pairs, 3 to 5 in. long, 1.35 to 2 in. wide; petioles .2 in. long. Panicles terminal, 4 in. long, many-flowered, grey-tomentose. Flowers yellowish white .2 in. long; pedicels very short. Calyx funnel-shaped, tomentose outside, villous inside, lobes lanceolate-acuminate, pubescent inside. Petals oblong, blunt not clawed, glabrous. Stamens 10 all fertile. Ovary silky. Drupe compressed, woody, scurfy, 2 in. long, 1 to 2 in. across, 2-celled. *Hab.* Dense jungle, near limestone. Malacca (Griffith, Maingay). Perak, Goping (Kunstler). *Distrib.* Sumatra.

(4) **P. oblongifolium** *Hook. fil. F.B.I.* ii. 309; *Prain, l.c.* 279. *P. Wallichianum* *Wall. Cat.* 7520.

Tree up to 100 ft. tall, 3 ft. through. Leaves oblong or elliptic, sub-acute, base rounded, dark shining above, white beneath; nerves elevate, 20 to 30 pairs, puberulous, 5.5 to 8.8 in. long, 1.85 to 3 in. wide, petioles .35 to .65 in. long. Panicles large, terminal, 6 in. long and wide, white tomentose. Flowers .25 in. long; pedicels very short. Calyx funnel-shaped, tomentose outside, villous inside, lobes ovate acute. Petals as long, spatulate. Stamens as long, 8. Ovary villous. Drupe woody 2 to 3 in. long, elliptic ovoid, scurfy white. *Hab.* Dense forests, low country. Singapore, near Bukit Mandai. Johor, Scudai River. Pahang, Rumpin River; Sungei Chenei (Fox); Kwala Lipis (Foxworthy). Malacca, Sungei Hudang (Derry). Perak, Ulu Bubong (Kunstler). *Native names*: Balau; Bidara hutan. *Use*: One of the most valuable timbers in the peninsula and nearly exterminated on account of this.

(5) **P. spicatum** King, l.c. 279.

Tree 60 to 80 ft. tall. Leaves elliptic-ovate, blunt or acuminate, base round slightly decurrent, glabrous; nerves 12 pairs, slender, reticulations small, distinct, 2 to 3 in. long, .85 to 1.6 in. wide; petioles .1 in. long. Panicles spike-like with 1 or 2 branches axillary and terminal, about 2 in. long, brown-pubescent. Flowers .5 in. long, sessile; bracts oblong 2 at base shorter. Calyx-tube funnel-shaped, tomentose, villous inside, lobes oblong obtuse. Petals longer, elliptic obtuse, glabrous, white tinted pink. Stamens 10, dark pink, glabrous. Ovary and style-base silky. Drupe sub-globose, 1 in. long, scurfy, grey. *Hab.* Dense mixed jungle, 300 to 800 ft. altitude. Perak, Goping (Kunstler); Ulu Bubong (Kunstler).

(6) **P. Maingayi** King, l.c. 280. *P. asperulum* Hook. fil. *F.B.I.* ii. 310, *not of Miquel*.

Tree. Leaves elliptic-oblong, blunt acuminate, base round, glabrous; nerves 10 to 12 pairs, 3 to 4.5 in. long, 1.35 to 2 in. wide; petioles .3 in. long. Panicles 4 to 5 in. long, tomentose hairy. Flowers sessile, .3 in. long. Calyx-tube funnel-shaped, tomentose hairy, lobes broad ovate obtuse. Petals longer, obovate. Stamens 12 to 16, long exsert. Ovary woolly. Drupe hard globose, 2 in. through; pericarp woody, .2 in. thick. *Hab.* In thick forest, scarce. Very near *P. asperulum* Miq. and *P. spicatum*. Malacca (Maingay and Griffith). Perak, Temengoh (Ridley).

(7) **P. elatum** King, l.c. 280.

Tree 100 to 130 ft. tall, 2 to 3 ft. through. Leaves sub-sessile elliptic to ovate-elliptic acute or shortly acuminate, base rounded, cordate, glabrous except a few hairs on the base of midrib beneath; nerves 12 to 14 pairs very prominent, 4.5 to 7.5 in. long, 1.5 to 3.25 in. wide; petioles .15 in. long, thick, strigose. Panicles axillary or terminal 1 to 2 in. long, dense, stout, tomentose. Bracts ovate. Flowers .3 in. long. Calyx-tube short, funnel-shaped, tomentose, mouth villous, lobes nearly as long, ovate sub-acute, tomentose both sides. Petals longer and narrower. Stamens longer, glabrous. Ovary silky. Drupe ovoid rounded, light brown, scurfy, 2-celled, 1.15 in. long, .8 in. through; pericarp 2 in. thick, hairy inside. Rare. Dense rocky jungle, 500 to 800 ft. altitude. Perak, Larut (Kunstler).

(8) **P. scabrum** Hassk. *Cat. Hort. Bog.* 1844, p. 269; King, l.c. 281.

Tall tree. Leaves coriaceous, elliptic-oblong, short acuminate, base rounded unequal, one side shortly decurrent, glabrous; nerves 13 to 15 pairs, 4 to 6 in. long, 1.75 to 2.75 in. wide; petioles .2 in. long. Racemes solitary or paniced, pubescent. Flowers .2 in. long. Bracts 2 lanceolate. Calyx-tube cylindric, dilate upwards, lobes oblong half as long. Petals longer, obovate, clawed. Stamens 12 to 16; filaments united at base. Ovary woolly. Fruit ovoid

obtuse compressed grooved, scurfy, 1 in. long, .6 in. wide. *Hab.* Perak (Scortechini). *Distrib.* Java.

Perhaps only a form of *P. asperulum*, but the leaves are broader.

(9) ***P. asperulum*** *Miq. Fl. Ind. Bat. Supp.* 307; *King, l.c.* 281.

Tree 50 to 80 ft. tall. Leaves thinly coriaceous, lanceolate or oblong-lanceolate acuminate acute, base rounded, shortly cuneate, glabrous; nerves 10 to 16 pairs, 3 to 5.5 in. long, 1 to 1.6 in. wide; petioles .25 in. long. Racemes solitary or paniced, sub-terminal deflexed, 1.5 in. long, tomentose. Flowers .3 in. long; pedicels .1 in. long. Bracts 2, lanceolate. Calyx-tube cylindric, lobes oblong acuminate, half as long. Petals longer, obovate, white. Stamens 10, glabrous, blue. Ovary villous. Fruit sub-ovoid, compressed, rounded, grooved on both sides, rough and scurfy 1 in. long, .6 in. wide. *Hab.* Forests up to 2000 ft. altitude. Singapore, Chan Chu Kang. Pahang, Tahan River; Kwantan, Tanjong Pasir (Foxworthy). Penang Hill at 2000 ft. altitude (Curtis); Moniot's Road; Batu Feringhi. *Distrib.* Sumatra.

(10) ***P. Kunstleri*** *King, l.c.* 202.

Tree 50 to 80 ft. tall. Leaves thinly coriaceous, oblong-lanceolate, acuminate, base rounded unequal or shortly cuneate, glabrous; nerves 6 to 7 pairs, slender, hardly elevate, reticulations very inconspicuous, 3.25 to 4.5 in. long, 1.15 to 1.65 in. wide; petioles .25 to .3 in. long. Calyx-lobes oblong, tomentose. Petals longer. Stamens 20 to 30, glabrous. Fruit globose-ovoid, very slightly compressed, 1.25 in. long, .9 in. wide, chocolate brown, scurfy. *Hab.* Dense jungle 300 to 500 ft. altitude. Perak, Larut (Kunstler).

Very like *P. scabrum*, but the leaves differ in texture and number of nerves.

(11) ***P. heteropetalum*** *Scort. King, l.c.* 283.

Tree 60 to 80 ft. tall. Leaves coriaceous, oblong-lanceolate acuminate both ends, base often unequal, glabrous; nerves obscure 5 to 6 pairs, 2 to 4.5 in. long, 1 to 1.16 in. wide; petioles .35 in. long. Panicles in upper axils 1 in. long, dense tomentose. Bract 1 lanceolate. Flowers .5 in. long, sessile. Calyx-tube, base cylindric above, campanulate bent at juncture of the two parts, green tomentose, lobes unequal, oblong to obovate. Petals 5, pink, very unequal, 2 upper erect, elliptic, clawed; 3 others narrow, flat, oblong. Stamens 20 to 30 in a semi-tubular phalange, glabrous. Ovary villous. *Hab.* Perak at 1000 to 1500 ft. altitude (Kunstler) in dense jungle. Probably from the Larut hills.

(12) ***P. Griffithianum*** *Benth. Niger. Flor.* 334; *Hook. fil. F.B.I.* ii. 310. *Maranthes multiflora* *Korth, Verh. Nat. Gesch. Bot.* 259, t. 70.

A big tree. Leaves coriaceous, oblong-lanceolate caudate-acuminate, base narrowed, glabrous, dark shining green; nerves 7

to 10 pairs, faint, 3·5 to 6 in. long, 1 to 2·25 in. wide; petioles ·25 to ·35 in. long. Panicles terminal, pyramidal, 5 to 6 in. long with peduncle, often 3 in. across, dense-flowered, glabrous. Bracts o. Flowers ·5 in. long; pedicels short. Calyx-tube campanulate, lobes broad round, as long, grey puberulous. Petals white, oblong, as long. Stamens 20 to 30 little longer. Ovary tomentose. Fruit ellipsoid obtuse, 1·5 in. long, ·75 in. wide, narrowed at base, woody eventually glabrous, yellow, densely woolly inside. *Hab.* Usually near the sea. Singapore, Changi; Fort Canning. Malacca, Pringitt (Griffith); Bukit Bruang (Derry); Brisu (Derry). Pahang, Pekan. Negri Sembilan, Tampin (Burkill); Pasir Panjang (Foxworthy). Penang, Muka Head (Curtis). Lankawi, Gunong Raya (Haniff). Kedah, Pulau Song-Song (Curtis). Perlis, Kanga: *Distrib.* Java, Borneo, Philippines. *Native names*: Merbatu Loyang; Chana; Mujagon; Sauh Hutan; Sunko Rimau.

2. COCCOMELIA, Ridl.

Small tree. Leaves coriaceous, petioled alternate. Panicles axillary and terminal. Flowers small, white, bracteate. Calyx-tube short, campanulate, oblique, lined inside in front with a hairy tube, lobes ovate. Petals oblong, little longer. Stamens 8 or 10; filaments glabrous united into a half-tube. Ovary 1-celled, 2-ovuled, hairy; style lateral. Stigma small capitate. Fruit a small red pulpy drupe; stone 1-celled. Species 1, Malayan.

(1) *C. nitida* Ridl. *Journ. Roy. As. Soc. S. Br.* 82, p. 183. *Parinarium nitidum* Hook. *fil. in F.B.I.* ii. 310; *King, l.c.* 284.

Tree 15 to 40 ft. tall. Stem 6 in. through. Branches slender. Leaves elliptic-lanceolate acuminate both ends, glabrous, bright green, lower side paler; nerves faint, 7 to 9 pairs, 2·25 to 3 in. long, ·8 to ·75 in. wide; petioles ·2 in. long. Panicles 3 to 3·5 in. long, hoary, with distant branches, ·5 in. long. Flowers ·15 in. long. Calyx sub-sessile, funnel-shaped, tomentose within, lobes triangular acute, tomentose. Petals oblong obtuse. Stamens connate, glabrous, 7 to 10. Fruit ellipsoid, pulpy red; stone woody, 1-celled, ·25 in. long, ·2 in. wide. *Hab.* Open country in woods and thickets. Singapore, Reservoir; Bukit Mandai, etc. Malacca, Bukit Sabukor; Bukit Sadanen (Derry). Sungei Ujong, Rembau (Cantley). Pahang, Kwala Pahang. Selangor, Ulu Selangor; Kwala Lumpur (Foxworthy). Perak near Ulu Kerling (Kunstler). Dindings, Simpit.

var. *latifolia*. Leaves broad elliptic ovate, stiffly coriaceous, pale 3·5 in. long, 2 in. wide. Fruit globose, ·3 in. long, ·25 in. wide. Penang Hill (Curtis); Setul Heath. *Distrib.* Borneo. *Native names*: Merbatu Merah; Merbatu putih and Merbatu Kechil; Mumbatu; Tumbatu; Marabatu; Mumpadang; Bangas Putih; Kelat Laya Hutan; Medang Kawan.

3. PARASTEMON, DC.

Big tree. Leaves alternate, coriaceous. Flowers very small, racemose or spicate, glabrous. Calyx-tube short, campanulate, 5-lobed. Petals 5 or 6, oblong. Stamens 2, unilateral, several imperfect. Carpel 1, adnate to one side of the tube, 1-celled. Style basal; ovules 2. Fruit oblong, coriaceous, 1-celled, 1-seeded. Seed testa hairy. Species 2, 1 Malay Peninsula, 1 Borneo.

(1) **P. urophyllum** A. DC. *Ann. Sc. Nat. Ser. 2*, xviii. 208; *King, l.c.* 285.

Big tree up to 100 ft. high, and 3 to 4 ft. through with drooping branches, glabrous. Leaves ovate-lanceolate or lanceolate caudate acuminate obtuse, bright green; nerves 4 to 6 pairs faint, 2.5 to 3 in. long, .85 to .15 in. wide; petioles .25 in. long. Racemes slender, 3 to 3.5 in. long. Flowers numerous .05 in. long; pedicels very short. Fruit yellowish, oblong, .45 in. long, .25 in. through. *Hab.* Common in open country, often near the sea. Singapore (Wallich); Jurong; Changi; Chan Chu Kang. Malacca, Ayer Panas (Hervey); Panchur (Goodenough). Negri Sembilan, Kopis Residency (Foxworthy). Dindings, Bruas; Lumut, Perak, Kol (Kunstler). Penang, Penara Bukit; Batu Feringhi (Curtis). *Distrib.* Labuan. *Native names*: Siagnos betina; Malas; Kelat Pasir.

4. PRUNUS, Linn.

Shrubs or trees. Leaves alternate. Flowers white or pink, solitary, paniced or racemed. Calyx deciduous in fruit, lobes 5, imbricate. Petals 5. Stamens 16 to 80 inserted in mouth of corolla tube; filaments free. Carpel 1. Style terminal; ovules 2. Drupe indehiscent or 2-valved, 1-seeded. Species about 80, chiefly north temperate zone.

(1) **P. martabanica** Kurz var. *Scortechini* King, *l.c.* 286.

Tree 40 to 80 ft. tall, 2 to 3 ft. through. Leaves lanceolate long acuminate, narrowed or round at base, glabrous membranous, 2.75 to 5 in. long, 1 to 1.75 in. wide; petioles .3 to .6 in. long. Racemes usually solitary, 2 in. long, many-flowered, pubescent. Flowers .35 in. across, greenish white. Calyx-tube campanulate, tomentose, lobes ovate. Petals orbicular, .1 in. long. Stamens 60 to 80. Ovary ovoid, glabrous; style long. Drupe ovoid acuminate beaked, 1 in. long, .4 in. through; pericarp thin, woody. *Hab.* Forests, not common. Perak, Chanderiang (Kunstler). Penang Hill at 1000 ft. altitude (Curtis). *Distrib.* Burma, Andamans.

5. PYGEUM, Gaertn.

Trees or shrubs. Leaves alternate; stipules minute (except one species). Flowers small, racemed or paniced, tomentose. Calyx-tube obconic, campanulate, 5- to 15-toothed. Petals very

small, 5 to 6 in a 5- to 6-toothed calyx, none in some species, villous, tomentose. Stamens 10 to 50 at the mouth of the calyx-tube; filaments slender, incurved. Carpels 1, basal in calyx-tube, ovoid hairy. Ovules 2; style terminal, slender, exsert in bud. Fruit globose or transversely oblong, grooved in centre on both sides, fleshy, green or black. Species about 30, tropical Asia, 1 in Africa.

Stipules large.

Leaves large, ovate, strongly nerved, hairy beneath (1) *P. stipulaceum*

Stipules small and caducous.

Flowers .5 in. wide; leaves glabrous large (2) *P. grandiflorum*

Flowers less than .3 in. wide.

Ovary glabrous; racemes 2 to 3 in. long.

Flowers .25 in. long, 5-merous; leaves 7 by 4 in. with 2 large glands at base (3) *P. polystachyum*

Racemes little longer than petiole; leaves narrow. (4) *P. lanceolatum*

Ovary hairy.

Racemes longer than petioles, over 1 in. long.

Leaves glabrous.

Racemes slender, lax; leaves elliptic 2 to 3 by .8 to 1.3 in. (5) *P. Scortechinii*

Racemes dense; leaves 6 by 3.5 in. (6) *P. coriifolium*

Leaves hairy on midrib beneath.

Leaves thin lanceolate-ovate. (7) *P. persimile*

Leaves stiff, coriaceous, broad, ovate (8) *P. parviflorum*

Racemes shorter than petioles.

Petals 6; leaves thin, ovate cuspidate (9) *P. Hookerianum*

Petals 0; leaves stiff, coriaceous; mountain plants.

Leaves 5 to 7 by 2 to 3 in.; stamens 12. (10) *P. Griffithii*

Leaves 6 by 3 in.; stamens 15 (11) *P. patens*

Leaves 2 to 2.5 by 1 to 1.3 in., glabrous (12) *P. brevifolium*

Leaves 1 to 2.15 in. long; branches and midrib dense-velvety (13) *P. ovalifolium*

Leaves 1.5 in. long; branches glabrous; midrib and edge hairy (14) *P. rubiginosum*

(1) *P. stipulaceum* King, l.c. 287.

Tomentose tree. Leaves very coriaceous, entire, elliptic acute, base broad cordate, edges revolute, above glabrous except midrib with nerves deeply depressed, below red-pubescent especially on nerves, 5 to 7 in. long, 2.5 to 3.75 in. wide; nerves 10 to 12 pairs, elevate; petioles tomentose, .5 in. long. Stipules ovate caudate acute persistent. Racemes below the leaves, 1.25 to 2 in. long, rusty-pubescent. Flowers .15 in. long; pedicels as long. Calyx-tube campanulate, teeth short blunt 10, tomentose. Petals 0. Stamens 15, glabrous. *Hab.* At 500 to 700 ft. altitude. Perak, Ulu Bubong (Kunstler).

(2) *P. grandiflorum* King, l.c. 288.

Tree 50 to 70 ft. tall, glabrous. Leaves thinly coriaceous,

elliptic to oblong-elliptic, short acuminate, base cuneate, no glands at base: nerves 8 to 9 pairs, prominent beneath, 5 to 8 in. long, 2·75 to 3·5 in. wide; petioles ·75 in. long. Panicles axillary, few lax branches, 3 to 5 in. long, rusty-tomentose at tips. Flowers ·5 in. long; pedicels ·15 in. long. Calyx-tube campanulate, lobes 5, tomentose reniform blunt. Petals 5, larger, round or oblong blunt, white. Stamens numerous. Pistil longer; ovary pubescent. *Hab.* Open rocky jungle, 500 to 800 ft. altitude. Perak near Gunong Bubu (Kunstler).

This is very like *P. polystachyum*, but the leaves are thinner and have no glands at the base.

(3) **P. polystachyum** Hook. *fil. F.B.I.* ii. 320; *King, l.c.* 290.

A stout tree about 80 ft. tall or less. Leaves coriaceous, thick, dark shining green above, paler beneath, elliptic-oblong, short, blunt, acuminate, base broad or very shortly cuneate with 2 large glands; nerves elevate, 7 to 10 pairs, depressed above, 4·5 to 7 in. long, 2·5 to 4 in. wide; petioles ·5 in. long. Racemes axillary, 2 to 3·5 in. long, sparsely pubescent. Flowers ·3 in. long; pedicels nearly as long. Calyx-tube campanulate tomentose, lobes 5 oblong. Petals 5. Stamens 40 to 50. Ovary glabrous. Drupe globular or transversely oblong shining light green, ·6 in. long. *Hab.* Common in forests. Singapore, Garden Jungle; Changi; Bidadari. Malacca (Maingay). Selangor, Gardens, Kwala Lumpur (Foxworthy). Perak, Chanderiang and Ulu Bubong (Kunstler).

(4) **P. lanceolatum** Hook. *fil. F.B.I.* ii. 319; *King, l.c.* 289.

Tree about 20 to 30 ft. tall. Leaves thin, coriaceous, glabrous, lanceolate or elliptic-lanceolate, acuminate, base long, narrowed with 2 glands; nerves 5 pairs, slender, 3 to 3·5 in. long, 1 to 1·4 in. wide; petioles ·23 to 3 in. long. Racemes ·5 in. long or less, hairy, axillary. Flowers ·15 in. long. Calyx campanulate, tomentose, teeth 10. Petals 0. Stamens 20, exsert. Ovary glabrous; style stout. Fruit transversely oblong, ·3 in. long, ·4 in. wide. *Hab.* Local, in hill forests. Johor, Gunong Pulau. Penang Hill (Lobb, by error on ticket Singapore). Telok Bahang (Curtis). *Native name*: Merapit.

var. *Maingayi*. *P. Maingayi* Hook. *fil. F.B.I.* ii. 319; *King, l.c.* 288.

Leaves always glabrous, thicker with less conspicuous nerves and slightly smaller. This seems to me to be a higher level or drier locality form of *lanceolatum*. *Hab.* Malacca, Selandor (Cantley); Bukit Sadanen (Derry). Perak (Scortechini). Penang, West Hill at 2500 ft. and at 1100 ft. altitudes (Curtis).

(5) **P. Scortechinii** King, *l.c.* 290.

Slender tree 40 to 50 ft. tall. Leaves coriaceous elliptic to oblong-lanceolate, acute or acuminate, base cuneate, glands 0, glabrous, paler beneath; nerves 6 to 7 pairs, 2 to 3 in. long, ·8 to

1·35 in. wide; petioles ·25 to ·35 in. long. Racemes solitary axillary 1·5 in. long, pubescent, hairy. Flowers 1·5 in. long; pedicels ·1 in. long. Calyx narrow, campanulate, lobes oblong sub-acute, hairy. Petals 0. Stamens 12, exsert. Pistil shorter. Ovary hairy. Fruit transversely oblong, glabrous or minutely pubescent, 3 in. long, 4 in. wide. *Hab.* Perak (Scortechini).

(6) **P. coriifolium** *Ridl. Journ. Roy. As. Soc. S. Br.* 75, p. 30.

A small tree. Leaves coriaceous elliptic, shortly blunt acuminate, base broad shortly narrowed, glabrous; nerves invisible above, prominent beneath, 5 pairs, reticulations invisible, 6 in. long, 3·5 in. wide; petioles 5 in. long. Racemes solitary axillary 5 in. long, dense. Flowers very shortly pedicelled, puberulous. Calyx-tube campanulate, pubescent, lobes 6, unequal ovate acute, inside of tube glabrous. Petals 0. Stamens long, rather thick, about 20. Style stout, glabrous; ovary hairy. *Hab.* Perak, woods at Temengoh, on the Kertai River (Ridley).

(7) **P. persimile** *Kurz in Journ. As. Soc. Beng.* xli. 306; *Hook. fil. F.B.I.* ii. 320; *King, l.c.* 291.

A small slender tree about 30 ft. tall. Leaves thin coriaceous, elliptic to elliptic-lanceolate, short blunt acuminate, base shortly cuneate glabrous; midrib, nerves and petiole pubescent on both sides; nerves 7 to 8 pairs, very prominent beneath, 2·5 to 4 in. long, 1·3 to 1·6 in. wide; petioles 3 in. long. Racemes 3- to 4-fascicled, 1·5 in. long, supra-axillary below leaves, tomentose; pedicels ·1 in. long. Calyx campanulate, tomentose, teeth 6. Petals 0. Stamens 12 to 18. Pistil, ovary and base of style silky. Stigma discoid. Fruit transversely oblong deeply grooved, glabrous, 2·5 in. long, 35 in. wide. *Hab.* Woods. Singapore, Tanglin; Kranji. Malacca (Griffith); Ayer Panas; Brisu and Batang Malacca (Derry). Negri Sembilan, Tanglin Hill (Goodenough). Selangor, Ginting Bidai. *Distrib.* Tenasserim. *Native name:* Medang Changnau.

(8) **P. parviflorum** *Teysm. and Binn. Nat. Tijds. Ned. Ind.* ii. 209; *King, l.c.* 291. *P. intermedium* *King, l.c.* 288.

Tree about 60 ft. tall. Leaves coriaceous elliptic to oblong or ovate-acuminate, base rounded or shortly cuneate, glabrous above, sparsely pubescent on nerves beneath; nerves 5 to 6 pairs elevate beneath, 2 to 4 in. long, 1·5 to 2 in. wide. Racemes fascicled, 1 to 1·5 in. long, dense on old wood, densely tomentose. Bracts ovate, tomentose outside. Flowers 2 in. long, sessile. Calyx campanulate, tomentose, teeth 10. Petals 0. Stamens 30 to 40, glabrous, exsert. Pistil shorter. Ovary hairy. Fruit sub-globose, apiculate pubescent when young, then glabrous green, grooved down both sides. *Hab.* Common in woods. Singapore, Kranji. Malacca, Sungei Hudang (Goodenough). Selangor, Bangi (Foxworthy). Perak, Larut and Ulu Bubong (Kunstler); Temengoh. *Distrib.* Java, Borneo.

I fail to see any difference between King's *intermedium* and *parviflorum*, Teyism.

(9) **P. Hookerianum** *King, l.c.* 293.

Shrub or small tree. Leaves thin, membranous-coriaceous, ovate or ovate-oblong acuminate, base rounded, glabrous above, pubescent on nerves and midrib beneath; nerves 6 to 7 pairs, inarching far from edge, 2 to 4 in. long, 1 to 1.8 in. wide; petioles .25 in. long. Racemes axillary, short, hardly .5 in. long, red-tomentose. Flowers densely crowded, .2 in. across, red-hairy. Calyx-tube tomentose, campanulate, teeth 6. Petals 6 lanceolate, pubescent outside. Stamens 20, much exsert. Ovary silky. Fruit sub-globular, 1-seeded, apiculate or oblong, 2-seeded, .25 in. long, .25 or .4 in. wide, black purple. *Hab.* Not rare in open country and woods. Johor, Gunong Pulai. Malacca (Maingay). Negri Sembilan, Tampin. Selangor, Semangkok Pass; Sungei Buluh. Perak, Blanda Mabok (Wray).

(10) **P. Griffithii** *Hook. fil. F.B.I. ii.* 293; *King, l.c.* 293.

Treelet. Branches stout, tomentose. Leaves coriaceous, oblong to oblong-lanceolate acuminate acute, base rounded slightly narrowed, edge sinuate above, glabrous beneath, minutely puberulous or glabrous; nerves 8 to 10 pairs, 5 to 7 in. long, 2 to 3 in. wide; petioles .4 in. long tomentose. Racemes axillary, solitary, .5 in. long, densely red-tomentose. Flowers 5 or 6. Calyx red-woolly, obconic, teeth 6. Petals 0. Stamens 12. Ovary hairy. *Hab.* Local at 1000 ft. altitude and upwards. Johor, Gunong Pantai. Malacca, Mt. Ophir at 4000 ft. altitude (Griffith). Selangor, Gunong Mengkuang Lebah (Robinson).

(11) **P. patens** *Ridl. Journ. F.M.S. Mus. vi.* 144.

Small slender tree 20 ft. tall. Branches red-scurfy. Leaves ovate coriaceous, base rounded, edge entire, glabrous above; nerves sunk elevate beneath, 9 to 11 pairs, red-scurfy, reticulations conspicuous, 6 in. long, 3 in. wide; petioles .25 in. long, red-scurfy. Flowers in small fascicles, less than .25 in. long. Bracts small, ovate. Calyx cupular, hairy, lobes short. Petals 0. Stamens 15, short, glabrous; anthers as long, elliptic; style thick, hairy. Drupe transverse oblong, 2-seeded, .25 in. long, sparsely hairy. *Hab.* Woods on high mountains, local. Pahang, woods on Gunong Tahan at about 4000 ft. altitude (Ridley).

(12) **P. brevifolium** *Hook. fil. F.B.I. ii.* 321; *King, l.c.* 293.

Shrub 3 to 4 ft. tall. Leaves coriaceous, ovate or elliptic, blunt acuminate, base very shortly narrowed, glabrous when adult; midrib depressed above, elevate beneath, as are 4 to 5 pairs fine nerves, 2 to 2.5 in. long, 1.1 to 1.3 in. wide; petioles .25 to .3 in. long. Racemes axillary, .3 in. long, red-tomentose, 6- to 10-flowered. Calyx-tube urceolate, teeth 5 to 6. Petals 0. Stamens 10 to 16, short. Ovary villous. Fruit globose, apiculate, .5 in.

through, black. *Hab.* Local, on high mountains. Malacca, Mt. Ophir at 4000 ft. altitude (Griffith, Hullett, Ridley).

(13) **P. ovalifolium** *King, l.c.* 292.

Small tree 15 to 20 ft. tall. Leaves stiffly coriaceous, oval blunt emarginate, base round, above glabrous, midrib rusty-tomentose on both sides; nerves 7 to 8 pairs, fine, red-hairy, 1·75 to 2·15 in. long, 1 to 1·15 in. wide; petioles 3 to 4 in. long. Racemes stout, axillary, 3 to 5 in. long, few-flowered, tomentose. Flowers 2 in. long, sessile, brown-tomentose. Calyx-tube campanulate, teeth oblong, blunt 10. Petals 0. Stamens 30 to 40, glabrous, exsert. Pistil shorter. Ovary silky. Fruit sub-globose, apiculate, grooved, 35 in. through. *Hab.* Mountains 4800 to 5300 ft. altitude. Perak, Gunong Bubu (Kunstler).

(14) **P. rubiginosum** *Ridl. Journ. F.M.S. Mus.* vi. 143.

Small bushy tree. Leaves ovate acuminate, base round, glabrous except midrib, sparingly hairy beneath; nerves 6 to 7 pairs, midrib and edge red-hairy, 1·5 in. long, 75 in. wide; petioles 3 in. long, rufous-hairy. Racemes dense, 4 in. long. Bracts oblong-ovate, red-hairy. Pedicels very short. Calyx 12 in. long, red-hairy, lobes 10. Petals 0. Stamens red glabrous. *Hab.* Local, in high mountains in small woods. Pahang, Gunong Tahan open country at 5000 to 6000 ft. altitude (Ridley).

6. RUBUS, Linn.

Sarmentose thorny shrubs. Leaves alternate, simple rarely compound; stipules conspicuous. Flowers in terminal and axillary panicles, rarely solitary, white or pink. Calyx-tube broad, lobes 5 persistent. Petals 5. Stamens very numerous. Disc lining the calyx-tube. Carpels drupaceous on a convex receptacle, 1-seeded. Abundant in north temperate zone, rarer in the south. Species about 200.

Leaves simple.

- | | |
|----------------------------------------------------|---------------------------|
| Flowers 5 in. wide; calyx woolly; leaves large | (1) R. alceæfolius |
| Flowers 4 in. or less wide; calyx tomentose; | |
| leaves buff tomentose beneath | (2) R. angulosus |
| Flowers about 4 in., lax panicle; calyx silky; | |
| leaves ovate hardly lobed | (3) R. glomeratus |
| Flowers a little smaller; panicle more lax; leaves | |
| hardly tomentose beneath | (4) R. Hasskarli |
| Flowers small; calyx pale velvety; leaves as in | |
| <i>glomeratus</i> , but white-scurfy beneath | (5) R. elongatus |
| Leaves pinnate | (6) R. roseæfolius |

(1) **R. alceæfolius** *Poir. Encycl. Method. Bot.* vi. 247; *Focke, Bibl. Bot.* 17, p. 78.

A robust bramble. Stem velvety, thorns large, dark. Leaves 5-lobed, cordate denticulate bullate with strigose hairs above, yellowish tomentose, back of leaf whitish, velvety; midrib thorny, 6 in. long and wide, or less; petioles 1·5 to 2·5 in. long, velvety

with strong thorns. Stipules hairy, long-setiferous. Panicles terminal, 6 in. long; branches 1 in. or less, stout velvety. Flowers 5 in. across. Sepals ovate-obtuse, white-silky inside, yellow-silky outside. Petals broad rounded about as long. Fruit red, sweet. *Hab.* Perak, Batang Padang valley 2000 ft. altitude (Wray). *Distrib.* Java, Sumatra.

The broad leaves and large flowers distinguish this bramble from the others.



FIG. 59.—*Rubus angulosus*.

(2) ***R. angulosus* Focke, *Bibl. Bot.* 17, p. 90.**

Big sarmentose shrub armed with short hooked thorns, buff tomentose. Leaves ovate or rounded, cordate, 3- to 8-lobed, lobes acute, denticulate, sparsely hairy above; midrib, back of leaf and petioles buff-tomentose, thorny, blade 3.5 to 8 in. long, 3 to 7 in. wide; petioles 1 to 3 in. long. Stipules pinnatifid, fimbriate. Flowers crowded in short axillary racemes to the branch ends. Bracts oblong, palmatifid hairy outside. Calyx yellow, silky; sepals triangular, lanceolate. Petals ovate erose-dentate nearly as long. Drupes small few, orange. *Hab.* Com-

mon in the lowlands. Singapore, Tanglin; Jurong. Malacca, Mt. Ophir; Selandor (Cantley). Pahang, Pekan; Kwala Tembeling; Temerloh. Selangor, Batu Tiga; Semangkok Pass. Perak, Relau Tujur (Wray). Penang. Tringganu, Bundi (Rostado). Kelantan, Kwala Lebir. *Distrib.* Mergui. *Native names:* Papa Runga; Duri Berumbet; Tempo Ranak; Tempo Ragat; Tempo Ranang; Tapa ringu (Tringganu); Akar Kupor. *Use:* Roots, decoction for dysentery.

(3) **R. glomeratus** Bl. *Bijdr.* IIII; *Focke, l.c.* 90; *King, l.c.* 295.

A rather slender bramble. Stems velvety when young, sparsely thorny. Leaves ovate deltoid cordate acuminate, obscurely 3-lobed, dentate, glabrous above except nerves, softly yellowish velvety beneath, 3 to 4 in. long, 2 to 2.25 in. wide; petioles 1 to 1.5 in. long. Panicles slender 6 in. long; branches short, yellowish-tomentose. Flowers .4 in. across. Sepals ovate-triangular acuminate, yellow-tomentose. Petals shorter, white. Fruit orange, few drupes. *Hab.* Hill woods. Singapore, Jurong. Selangor, Bukit Kutu; Semangkok Pass (Machado); Perak, Thaiping Hills (Hervey and Brooks). Penang Hill (Wallich). *Distrib.* Malay Isles.

Nearly always a mountain plant, and common above 2000 ft. altitude, but I once found it at sea level in Singapore. *Native names:* Akar Balik Adap; Akar Bulan Mudik; Akar Kupor.

(4) **R. Hasskarli** Miq. *Fl. Ind. Bat.* 381. *R. glomeratus* var. *gracilis*, *King, l.c.* 295.

Slender purplish bramble with few thorns. Leaves deltoid, thin, 3- to 5-lobed wide, cordate acuminate denticulate above, glabrous except midrib and nerves, beneath concolorous, nearly glabrous, 4.25 in. long, 3 in. wide; petioles slender, 1.25 in. long appressed, hairy and thorny. Stipules oblong-lanceolate pinnatifid about half-way. Panicles long, 8 in. or more lax, lowest branch 3.5 in. long, yellowish tomentose. Buds ovoid, acute. Pedicels .5 in. long. Sepals ovate acuminate, .2 in. long, yellowish silky tomentose outside. Petals shorter, white. Fruit raspberry colour. *Hab.* Mountain forests, not common. Perak, Batang Padang valley (Wray). Penang (Schomburgk). *Distrib.* Java, Sumatra.

This differs from *R. glomeratus* in its straggling inflorescence and the leaves not yellowish white beneath.

(5) **R. elongatus** Smith, *Icon.* iii. 6, 62; *Focke, l.c.* 60, *pl.* 22. *R. Lobbianus* Hook. *l.c.* *Pl.* 741-742.

A slender climber 30 to 40 ft. tall. Branches hardly puberulous, covered with many short curved thorns. Leaves thin ovate acuminate, edges at base sinuate but not lobed, margins denticulate, base widely cordate, glabrous above, pale grey puberulous beneath, 3.5 in. long, 2.4 in. wide; petioles slender, very thorny, 1.5 in.

long. Stipules pectinate. Inflorescence slender zigzag puberulous, lax, 6 in. long; branches short, 1 to 1.5 in. long. Flowers .3 in. across. Sepals rounded. Petals white. Fruit red, glossy black when quite ripe. *Hab.* Dense open jungle, 300 to 800 ft. altitude. Perak, Larut (Kunstler); Thaiping Hills, Waterfall (Wfay). *Distrib.* Malay isles.

(6) *R. rosæfolius* Sm. *Ic.* iii. 60; *Focke, l.c.* 153; *King, l.c.* 296.

A slender scrambling bramble, with slender stems sub-glabrous with long straight thorns. Leaves pinnate; leaflets 7 to 9, ovate or lanceolate acuminate, toothed, glabrous or hairy beneath, 1.5 to 3 in. long, .7 in. wide. Stipules subulate. Flowers 1 to 2 axillary and terminal on peduncles .5 in. long, glabrous or pubescent, .5 in. across. Calyx-lobes setaceous, glabrous. Petals large, white. Fruit a blunt cone of many crimson drupes, about .5 in. tall, sweet and juicy. *Hab.* Mountain thickets, Pahang, Telom. Selangor, Semangkok Pass. Perak, Thaiping Hills near the Cottage, 3500 to 5000 ft. altitude (Wray). *Distrib.* India, Malay islands to Papua.

7. PYRUS, Linn.

Trees or shrubs. Leaves simple. Flowers in terminal cymes or corymbs. Bracts subulate or linear. Calyx-tube urceolate or obconic, lobes 5. Petals 5. Stamens 20 or more; filaments connate at base. Disc annular or lining the tube. Carpels 2 to 5 connate and adnate to tube. Styles 2 to 5; ovules 2 in each cell. Fruit fleshy, 2- to 5-celled, cells with a membranous cartilaginous endocarp. Species 100, North Temperate zone, rare in tropics.

(1) *P. granulosa* Bertol. in *Mem. Acad. Sc. Bot. Ser* 2, iv. 312; *King, l.c.* 297.

Tree 80 to 100 ft. tall. Stem 2 to 3 ft. through. Leaves coriaceous ovate, acuminate, base cuneate or round, edges serrate, glabrous; nerves 7 to 9 pairs, prominent below, 4 in. long, 2.5 in. wide. Corymbs lax, terminal. Fruit globose pear-shaped rugulose, .75 in. long, .6 in. through, 4-celled; endocarp of large granules. *Hab.* Rocky spots in woods by streams, 2000 to 5000 ft. altitude. Pahang, open woods and stream borders on Gunong Tahan. Perak, Thaiping Hills at 2000 to 2500 ft. altitude (Kunstler); Box Hill (Fox). *Distrib.* India, Burma, Sumatra.

8. ERIOBOTRYA, Lindl.

Trees or shrubs. Leaves alternate petioled, coriaceous. Flowers white in corymbs and panicles. Calyx-tube turbinate, lobes ovate, 5. Petals 5. Stamens 30, insert in calyx-mouth. Ovary inferior, 2- to 5-celled; ovules 2 in a cell. Styles 2 to 5, free or more or

less connate at base, apices dilate. Drupe or berry ovoid, 1- to 5-locular, cells 1- to 2-seeded.

(1) **E. bengalensis** Hook. *fil. F.B.I.* ii. 371. Photinia dubia, Wall. *Cat.*

A shrub or tree. Leaves elliptic or oblong acuminate, narrowed to base, crenate, glabrous; nerves 8 to 12 pairs, 4 to 5 in. long, 1·75 in. wide; petioles 75 to 1 in. long. Panicles 2 to 3 in. long, usually dense woolly, rather stout. Flowers 3 in. across, white, fragrant. Calyx-tube obconic. Petals orbicular, claw woolly. Styles 2, base woolly. Fruit 75 in. long, ellipsoid-ovoid, crowned with the sepals, 1- to 2-seeded, green. *Hab.* Rocky spots. Pahang, Gunong Tahan (Robinson). Malacca at Bukit China (Griffith). Dindings at Segari (Ridley). *Distrib.* Himalayas, Burma.

ORDER XLIX. SAXIFRAGACEÆ.

Trees, shrubs or herbs. Leaves alternate or opposite; stipulate or not. Flowers bisexual, regular. Calyx more or less adnate to ovary, sometimes free, sometimes inferior. Petals 5 or 4, perigynous or epigynous. Stamens as many or double, rarely numerous. Ovary of 2 to 3 or 5 united carpels, 2- to 3- or 5-celled with axile placentas or 1-celled with parietal placentas. Styles as many as carpels, free or combined nearly to top. Ovules numerous. Fruit capsular or berried. Seeds numerous (one in *Polyosma*). Species 600 in cold or temperate regions and mountains of tropics, with a few tropical trees or shrubs.

Sub-herbaceous shrub; leaves simple; flowers blue; fruit succulent	1. DICHROA
Shrubs or trees; leaves pinnate, stipulate; fruit capsular, 2-celled; seeds few	2. WEINMANNIA
Shrubs or small trees; leaves simple. Flowers 4-merous; fruit drupaceous, 1-seeded, inferior	3. POLYOSMA
Flowers 5-merous; fruit capsular, conic	4. ITEA

1. DICHROA, Lour.

A sub-herbaceous shrub. Leaves opposite, lanceolate serrate, membranous. Panicle terminal, many-flowered. Flowers and fruits dark blue. Calyx-tube adnate to ovary, 5- to 6-toothed. Petals 5 to 6 valvate. Stamens 10 to 12 epigynous. Ovary three-quarters inferior, 1-celled; styles 3 to 5; ovules numerous on 3 to 5 parietal placentas. Berry blue. One species.

(1) **D. febrifuga** Lour. *Fl. Cochinchine*, 301; Wall. *Pl. As. Rav. t.* 213; *Bot. Mag. t.* 3046; King, *l.c.* 298.

Shrubby at base, 3 to 6 ft. tall, nearly glabrous. Leaves caudate-acuminate, 4 to 5 in. long, 1·4 to 1·8 in. wide; petioles 6 to 1·75 in. long. Panicles large, lax, about 6 in. or more long and wide.

Buds white. Petals, stamens and stigmas deep blue. *Hab.* Mountain forests at 2500 to 5000 ft. altitude. Pahang, Telom. Selangor, Ginting Bidai. Perak, Thaiping Hills, common; Gunong Inas (Yapp). *Distrib.* Indo-Malaya, China. Flowers with pale blue or white petals occasionally occur.

2. WEINMANNIA, Linn.

Trees or shrubs. Leaves stipulate odd-pinnate (or trifoliate or simple) glandular serrate. Flowers small racemose. Calyx-tube short, lobes 4 to 5. Petals 4 to 5, imbricate, spathulate or obovate inserted under the margin of a perigynous disc. Stamens 8 to 10, insert with the petals; filaments exsert. Ovary free, conic 2-celled. 2-beaked. Styles 2. Capsule coriaceous, 2-celled, 2-valved. Seeds elongate. Species 80, Mascarene, Malaya, Australia, America.

(1) *W. Blumei* Planch. Hook. Lond. Journ. Bot. vi. 470; King, l.c. 299.

A small much-branched tree. Leaves bright red when young, pinnate 2 to 3.5 in. long; leaflets 9 to 11, sessile, oblong lanceolate acute, glabrous except for a few black hairs beneath; nerves 6 to 7 pairs, .75 to 1 in. long (terminal one longer), .2 to .3 in. wide. Stipules obovate, round, .2 in. across, pubescent. Racemes clustered about 3 in. long, terminal. Flowers pinkish white. Capsules elliptic with the two divergent styles at tip red. *Hab.* Mountains, not rare, 4000 to 6000 ft. altitude. Malacca, Mt. Ophir. Pahang, Gunong Tahan (Robinson); K'luang Terbang (Barnes). Perak, Gunong Bubu (Wray); Gunong Hijau, Thaiping Hills. *Distrib.* Java, Philippines.

3. POLYOSMA, Bl.

Trees of medium or small size or shrubs. Leaves coriaceous or membranous, opposite petioled. Flowers in terminal racemes, short pedicelled with 3 bracts, white, fragrant. Calyx-tube short, adnate to ovary; lobes 4, small. Petals 4, epigynous, linear, valvate, pubescent outside, villous inside, recurved in flowering. Stamens 4; filaments hairy. Ovary inferior, 1-celled; style columnar, long; ovules numerous, parietal. Stigma simple. Fruit baccate, 1-seeded. Species 20, Indo-Malaya, Australia.

Leaves membranous drying black.

Leaves sinuate-dentate, 2.5 in. long, 1 in. wide; flowers 1 in. long, few (1) *P. ilicifolia*

Leaves sinuate-dentate, 6 to 7 by 3.5 in.; flowers .5 in. many (2) *P. grandis*

Leaves entire; leaves 4 to 6 in. long.

Fruit elliptic, narrow both flowers .3 in. appressed, hairy (3) *P. integrifolia*

Flowers conoid; flowers sparsely puberulous (4) *P. conocarpa*

Leaves 3.5 by 1.5 in.; flowers small, .2 in. long (5) *P. fragrans*

Leaves coriaceous, glabrous, drying black.

Leaves glaucescent beneath (6) *P. glaucescens*

Leaves not glaucescent beneath.

Leaves short cuneate at base (7) *P. coriacea*

Leaves long, acuminate at base (8) *P. Scortechinii*

Leaves sparsely denticulate; buds fascicled (9) *P. fasciculata*

Leaves bright yellow green, velvety beneath.

Leaves 3 to 4 in. long; flowers '2 in. long (10) *P. læte-virens*

Leaves 6·5 by 2·5 in.; flowers '4 in. long (11) *P. Ridleyi*

Leaves fuscous tomentose beneath; with nerves prominent, sunk above, 6 to 8 in. long (12) *P. flavo-virens*

(1) *P. ilicifolia* Bl. *Bijdr.* 658; *Benn. Pl. Jav. Rar.* 193, pl. 40. *P. parviflora*, King, *l.c.* 300.

Shrub. Leaves membranous, elliptic or obovate narrowed at both ends, edges dentate sinuate, glabrous; nerves 10 pairs, 2·5 in. long, 1 in. wide; petioles '1 to '25 in. long. Racemes 1 in. long, few-flowered. Flowers white 1 in. long. Calyx-tube short, green, glabrous, lobes ovate acute. Petals connate in middle, subglabrous outside, linear, villous within. Stamens rather longer. Fruit ellipsoid, smooth, narrowed at base crowned by the sepals, black, '1 in. long. *Hab.* Mountains at about 4000 to 5000 ft. altitude. Selangor, Menuang Gasing (Kloss); Mengkuang Lebah (Robinson). Perak, Gunong Inas at 5000 ft. altitude (Wray). *Distrib.* Java.

King's *P. parviflora* is based on a very young state of the inflorescence of this plant.

(2) *P. grandis* Ridl. *Journ. Roy. As. Soc. S. Br.* 75, p. 30.

Tree 40 to 50 ft. tall with spreading branches. Stem 1·5 to 2 ft. through. Leaves ovate-elliptic, cuspidate acuminate, cuneate at base, thin, margins distinctly denticulate, glabrous above and beneath except midrib and prominent nerves 12 pairs; secondary nerves prominent, 6 to 7 in. long, 3·5 in. wide; petioles stout '5 in. long, flat, thin, pubescent. Racemes 6 in. long; peduncles 1 in. long, sparingly pubescent. Buds narrow, cylindric, blunt, on '1 in. long pubescent pedicels. Calyx-tube cylindric, lobes broad, ovate acute as long as tube. Petals sub-glabrous, white, base greenish, narrow linear, sparingly villous inside. Stamens shorter. *Hab.* Hill forests. Perak, Larut Hills 3500 to 4000 ft. altitude (Kunstler).

(3) *P. integrifolia* Bl. *Bijdr.* 659; King, *l.c.* 302, in part.

Small tree. Leaves thin, elliptic acuminate or cuspidate, base cuneate, glabrous above; nerves 10 pairs, slender, and midrib puberulous beneath, 4·5 in. long, 2·1 in. wide; petioles puberulous, '5 in. long. Racemes 6 to 8 in. long, dense-flowered. Flower-buds straight, narrow, cylindric; pedicel yellow-hairy '1 in. long. Petals linear, grey pubescent, villous inside. Stamens shorter. Fruit elliptic, narrowed slightly at both ends, '35 in. long, '2 in.

wide; pedicels .1 in. long. *Hab.* Malacca (Griffith and Maingay), apparently not at all common. *Distrib.* Java.

(4) **P. conocarpa** *Ridl. Journ. Roy. As. Soc. S. Br.* 75, p. 31; *P. mutabilis* *King, l.c.* 301, *not of Blume*.

Tree 20 to 100 ft. tall. Young parts appressed, hairy. Leaves thin, elliptic-lanceolate acuminate, long narrowed to base, glabrous; nerves about 8 pairs conspicuous beneath and inarching well within margin, edge quite entire 3.5 to 6 in. long, 1.25 to 2 in. across; petioles .2 in. long, appressed-hairy when young. Racemes 5 in. long, appressed-hairy. Flowers white, scattered or in little groups, pedicelled; pedicels .1 in. long, in fruit .2 in. long. Calyx-tube campanulate, hairy with very small sub-acute teeth. Petals linear, narrow, .2 in. long, sparsely hairy outside, hairy within. Stamens nearly as long. Fruit conoid truncate, strongly ribbed when dry, .25 in. across at the base, narrowing upwards. *Hab.* Forests up to about 1000 ft. altitude. Scented like privet. Singapore (Wallich 8472). Pahang, Kuantan (Foxworthy). Perak, Larut (Kunstler 4344); Birch's Hill (Wray 508). Penang, Pentlands (Curtis 1081). Lankawi, Gunong Raya (Haniff). Kelantan Woods by Pehi River, Chaning. *Distrib.* Sumatra Padang, Ayer Mantjur (Beccari 524). *Native names:* Tembosa jantan; Poko Tupai; Sa-Senduk.

(5) **P. fragrans** *Benn. Pl. Jav. Rar.* p. 196. *Itea fragrans* *Wall. No.* 8472.

Branches spreading. Bark pale; young parts puberulous. Leaves thinly coriaceous, glabrous except midrib and nerves sparsely hairy beneath, long narrowed to base, 3.5 in. long, 1.5 in. wide; nerves 7 pairs, fine elevate. Racemes puberulous, 4.25 in. long. Flowers .2 in. long; pedicels very short or 0. Calyx-tube campanulate, lobes ovate acute, puberulous. Petals narrow linear, thinly puberulous outside, sparsely villous inside. Stamens considerably shorter. *Hab.* Singapore (Wallich). Johor, Tebrau River (Ridley). Perak (Scortechini). *Distrib.* Borneo.

This seems to be a scarce tree.

(6) **P. glaucescens** *Ridl. Journ. Roy. As. Soc. S. Br.* 75, p. 31.

A small tree 20 to 30 ft. tall, glabrous. Leaves elliptic to lanceolate acute, base narrowed, coriaceous, glaucous beneath; nerves very obscure, 3 to 3.5 in. long, 1.75 to 1.5 in. wide; petioles 1 in. long. Racemes pubescent, 2.5 to 3 in. long. Flowers crowded yellowish white, .2 in. long. Buds oblong, blunt, dilate at base. Calyx-tube very short, funnel-shaped, pubescent, lobes acute, spreading. Petals oblong, obtuse, sparsely strigose outside, villous at tip within. Stamens shorter. *Hab.* Open rocky slopes in small woods. Pahang, Gunong Tahan on the Padang and at Skeat's Ridge (Robinson and Ridley).

(7) **P. coriacea** King, *l.c.* 300.

Shrub or small tree. Leaves thinly coriaceous, ovate to lanceolate, glabrous, acuminate or acute, base cuneate, not glaucous beneath; nerves invisible above about 8 pairs, 3 to 3·2 in. long, 8 to 1·75 in. wide; petioles 1 in. long. Racemes 4 in. long, terminal, many-flowered. Buds grey pubescent, cylindric, blunt not dilate at base, distinctly pedicelled; pedicels ·05 in. long. Calyx short, teeth short, ovate, rather blunt. Petals narrow, linear, blunt. Stamens a little shorter. *Hab.* Mountains. Selangor, Gunong Mengkuang Lebah (Robinson). Perak, Gunong Bubu 5000 ft. altitude (Wray).

(8) **P. Scortechinii** King, *l.c.* 301.

Tree 30 to 50 ft. tall. Leaves narrow, elliptic-lanceolate or oblanceolate, thinly coriaceous, sometimes drying green, glabrous, acuminate blunt, base long narrowed; nerves very fine, visible on both surfaces, about 12 pairs, 5 in. long, 1·5 in. wide; midrib strong; petioles ·2 to ·3 in. long, blade sometimes decurrent nearly to base. Raceme 2·5 to 3 in. long, glabrous. Flowers nearly sessile. Calyx campanulate, lobes short, widely triangular, acute, glabrous. Petals ·3 in. long, linear blunt, not dilate at base, very sparsely pubescent on edges, tip inside sparsely hairy. Stamens shorter; filaments hairy. *Hab.* Mountains. Perak (Scortechini); Gunong Inas at 3700 ft. altitude (Yapp).

(9) **P. fasciculata** Ridl. *Journ. Roy. As. Soc. S. Br.* 75, p. 32.

Shrub. Leaves sub-coriaceous, elliptic, base narrowed blunt, tip sub-acute, glabrous, edges sparsely denticulate; nerves obscure 6 to 10 pairs, 4 to 6 in. long, 1·75 to 2 in. wide; petioles ·5 to ·75 in. long. Spikes 6 in. long, dense, puberulous. Buds cylindric, blunt, sparsely pubescent, ·4 in. long, fascicled in groups. Calyx-tube short, sub-campanulate, pubescent, lobes ovate acute. Petals short, oblong-linear, obtuse, sparsely villous inside. Stamens little shorter. *Hab.* Kedah Peak (Ridley). Rare.

(10) **P. læte-virens** Griff. in King, *l.c.* 303. (F'g. 60, p. 686.)

Tree 20 to 50 ft. tall, 8 to 12 in. through. Branchlets yellowish tomentose. Leaves coriaceous, bright yellow green, smooth above; midrib depressed, velvety-green yellow beneath, lanceolate or narrow elliptic, acute, base narrowed 3 to 4 in. long, 1·2 to 1·75 in. wide; petioles ·2 to ·3 in. long. Racemes 3 to 5 in. long, yellow tomentose, ·1 in. long. Calyx short, cylindric, lobes wide ovate acute, hairy. Petals white, silky pubescent outside, densely villous inside, narrow linear, ·2 in. long. Stamens shorter. Fruit obovoid, rounded crowned with calyx lobes, yellow-pubescent, ·2 in. long; pedicel ·1 in. long. *Hab.* Mountains. Malacca, Mt. Ophir (Griffith), a very glabrous form. Negri Sembilan, Senawang (Foxworthy). Selangor, Kwala Lumpur; Sungei Buluh (Foxworthy). Perak, Ulu Kerling (Kunstler). Penang, West Hill (Curtis). *Native names* : Poko Tupai; Tambal.

var. *robusta* Ridl. Leaves elliptic, abruptly cuspidate, stiffly coriaceous 5·25 in. long, 3·5 in. wide; petioles 1·25 in. long. Fruit 3 in. long. Pahang, Gunong Tahan 5000 to 6000 ft. altitude (Robinson, Ridley).



FIG. 60.—*Polyosma late-virens*.

(11) **P. Ridleyi** King, *l.c.* 304.

Tree. Branches tomentose. Leaves coriaceous, narrowly elliptic caudate-acuminate, base cuneate, above glabrous when adult, beneath dense yellowish-tomentose; nerves 9 to 11 pairs, prominent beneath as are secondaries, 6 to 6·5 in. long, 2 to 2·5 in. wide; petioles 1 to 2 in. long, tomentose. Racemes stout 5 in. long, densely yellow-tomentose. Flowers 4 in. long on a 1 in. pedicel. Calyx-tube shorter, teeth broad. Petals linear, blunt, villous inside. Stamens, filament villous as long. *Hab.* Lowland woods, very rare. Singapore, Selitar (Ridley).

(12) **P. flavo-virens** Ridl. *Journ. Roy. As. Soc. S. Br.* 75, p. 32. *P. velutina* King, *l.c.* 304, *not of Blume*.

Spreading tree 40 ft. tall, 12 to 18 in. through. Branchlets velvety. Leaves stiffly coriaceous obovate to oblanceolate, narrowed to base, acuminate or shortly cuspidate, above glabrous; nerves depressed beneath, soft yellow-hairy, especially on the

nerves about 14 pairs elevate, secondary nerves as prominent, 6 to 8 in. long, 2·5 to 3 in. wide; petioles ½ to 1 in. long, velvety. Racemes 8 in. long, velvety pubescent; pedicels ½ in. long with several acute bracts. Calyx-tube very short, obconic; lobes triangular, acute, longer, yellow-hairy. Petals white, linear-oblong, ⅓ in. long, puberulous outside, villous within. Stamens shorter, villous. Fruit conic, base broad, ⅓ in. long; apex acute 4-ridged, ¼ in. long; pedicels ½ in. long, all pubescent. *Hab.* Forests. Dindings, Bruas (Ridley). Perak, Goping and Larut (Kunstler). Penang Hill, Balik Pulau (Curtis).

This is certainly not *P. velutina* Bl. of Koorders and Valeton Booms. Pl. 195, as the fruit is four times as big as in that plant.

4. ITEA, Linn.

Shrubs or trees. Leaves simple, alternate, petioled, glabrous, dentate or crenate. Racemes axillary and terminal, long many-flowered. Calyx-tube adnate to ovary base, 5-lobed. Petals 5, oblong, white, valvate. Stamens 5 perigynous. Ovary 2-celled; ovules many aside ⅞ in., superior. Capsule conic, elongate, splitting through the dissepiments and style. Seeds oblong, testa produced. Species 2, Indo-Malaya, N. America, Japan.

(1) *I. macrophylla* Wall. *Roxb. Fl. Ind.* ii. 419; *Hook. fil. F.B.I.* ii. 408.

A medium-sized tree. Leaves ovate acuminate, base round edge, glandular-denticulate; nerves 4 pairs, elevate beneath, 3·5 to 5 in. long, 2·5 to 3 in. wide; petioles ⅞ to 1 in. long. Racemes 4 in. long, puberulous. Flowers ½ in. across. Calyx-tube gradually narrowed to base, in fruit campanulate, ½ in. long; fruit valves widely diverging ⅓ in. long. *Hab.* Rare. In woods on rocky stream banks, mountains. Pahang, Gunong Tahan at 5000 ft. altitude by the Teku River (Ridley). *Distrib.* India, Java, Borneo.

ORDER L. DROSERACEÆ.

Small insectivorous herbs, with leaves covered with glandular hairs. Flowers small, racemose, white, pink or violet. Calyx free from ovary 4- to 8-lobed. Petals 4 to 8 hypogynous. Stamens as many. Ovary 1- to 3-celled; ovules parietal, numerous; styles 3 to 5. Capsule 2- to 5-valved. Seeds numerous. Species 110, most temperate and tropical lands.

1. DROSERA, Linn.

The Sundews occur all over the world except Polynesia; most abundant in Australia.

- Leaves linear, narrow; flowers rose pink (1) **D. indica**
 Leaves spatulate, round; flowers white (2) **D. Burmanni**

(1) **D. indica** *Linn. Sp. Pl.* 282; *King, l.c.* 306.

Stems erect 3 to 6 in. tall. Leaves scattered alternate, linear very glandular-hairy, 1 in. long, very narrow; petioles glabrous .5 in. long. Racemes 2 to 4 in. long. Flowers rose pink .3 in. across. Style 3, bifid. *Hab.* In damp sandy spots, usually in the north. Province Wellesley (King). Lankawi (Curtis). Setul Heath (Ridley). *Distrib.* Africa, Indo-Malaya, China, Australia.

(2) **D. Burmanni** *Vahl. Symb.* iii. 50; *King, l.c.* 306.

Stem very short. Leaves forming a rosette 1 in. across, radical, spatulate-cuneate, rounded, glandular-pubescent, red .5 in. long; petioles as long. Stipules as long as petioles. Scapes 2 to 8 in. tall, slender, red glabrescent. Flowers few at top small, white; pedicels less than .25 in. long, glabrous. Styles 5, not bifid. *Hab.* Not common, but locally plentiful, usually in damp sandy spots. Pahang, sandy country, Pekan. Malacca, Mt. Ophir in moss (leaves green) at 3000 ft. altitude. Tringganu (Yapp). Setul Heath, with *D. indica*. *Distrib.* W. Africa, all tropical Asia, China, Japan, Australia.

ORDER LI. CRASSULACEÆ.

Herbs, usually fleshy, succulent. Leaves simple (or divided). Flowers cymose or paniced, regular. Calyx 4- to 5-fid (rarely more). Petals as many as calyx lobes (free) or connate. Stamens as many or double (hypogynous) or attached to corolla. Carpels as many as petals with a hypogynous (gland or) scale at the base. Ovules many. Follicles dehiscent on inner face. Seeds many. Species about 400, whole world except Malaya and Polynesia.

1. BRYOPHYLLUM, Salisb.

A tall succulent herb. Leaves opposite, simple, crenate. Flowers in a tall panicle of cymes, greenish or dull red. Calyx inflated, cylindric, 4-lobed. Corolla campanulate, 4-lobed. Petals connate. Stamens 8 in 2 series insert on the middle of the corolla tube. Hypogynous scales 4 blunt. Carpels 4 attenuated into the styles; follicles 4, many-seeded. Species 4, African, one now dispersed all over the tropics.

(1) **B. calycinum** *Salisb. DC. Prodr.* iii. 396; *Hook. fil. F.B.I.* ii. 413; *Bot. Mag. t.* 1409.

Stems 1 to 4 ft. tall. Leaves simple or 3-partite; leaflets oblong or elliptic, crenate. Calyx purplish green, 1 to 1.5 in. long. Corolla green constrict in middle, reddish purple at top. Fruit enclosed in the persistent now papery perianth. *Hab.* Sandy

places, no doubt introduced from Africa, but thoroughly established in a few spots. Pahang, Pekan. Malacca (Maingay, Hervey). Perlis, Tebing Tinggi. *Native names*: Tumbo Daun; Sadingin; Karanchong (Pahang). *Use*: As a febrifuge.

2. KALANCHOE, Adans.

Erect herbs, succulent. Leaves often deeply cut. Flowers moderate, erect in paniced cymes. Calyx 4-lobed. Corolla flask-shaped, limb 4-fid, yellow. Stamens 8, in 2 rows adnate to corolla-tube; scales 4, linear or oblong. Carpels 4, with long styles; follicles 4. Species 25, chiefly African.

(1) **K. laciniata** DC. *Pl. Grasses*, t. 100; *Hook. fil. F.B.I.* ii. 415.

Leaves pinnatifid. Flowers pale yellow about 1 in. long. Malacca (Maingay). *Distrib.* India, Burma, tropical Africa, Java.

This is a common pot plant with the Chinese. I have never seen it here in flower, but Maingay's specimens are in flower. It is not native or wild anywhere in our region, but might occur as an escape in dry spots.

ORDER LII. HAMAMELIDEÆ.

Trees or shrubs. Leaves alternate simple or palmate-lobed. Flowers often unisexual in heads (or spikes). Calyx small or 0, adnate to ovary. Petals 0 to 5. Stamens 4 to many. Ovary 2-celled; styles 2, spreading; ovules 1 to many. Capsule woody dehiscing at tip so as to split each style in two. Seeds 1 to many. Species over 30, Persia, India, China, Japan, India, N. America and S. Africa. (*King, Journ. As. Soc. Beng.* lxvi. (1), p. 307.)

Petals present.

Petals oblong, pink 2 to 4; stamens 7 to 10	1. RHODOLEIA
Petals linear, white, 5; stamens 5	2. MAINGAYA
Petals linear, spatulate; leaves cordate ovate; stamens 10 to 14	3. BUCKLANDIA
Petals 0; leaves oblong-lanceolate serrate; stamens many.	4. ALTINGIA

1. RHODOLEIA, Hook.

Shrubs or small trees, exstipulate. Leaves coriaceous alternate, glaucous beneath. Flowers in axillary peduncled decurved heads with whorls of bracts. Calyx-tubes connate in heads adnate in lower half to ovary; limb annular. Petals unilateral pink, 2 to 4, absent in central flowers, clawed, oblong. Stamens 7 to 10 inserted with petals; filaments thick; anthers linear-oblong. Ovary half inferior ovoid, tip bifid. Capsule woody, 2-celled, 2-valved with many small angular seeds. Species 3, 1 Hongkong and 2 Malay Peninsula (one also in Sumatra).

- Leaves oblong-lanceolate; capsules glabrous . . . (1) **R. Teysmanni**
 Leaves ovate, red, scurfy beneath; fruit red scurfy . . . (2) **R. ovalifolia**

(1) **R. Teysmanni** *Miq. in. Versl. en Meded. K. Akad. v. Wetensch. vi. 124; King, l.c. 309.*

Tree or big shrub, glabrous. Leaves oblanceolate or oblong, blunt narrowed at the base, coriaceous, glabrous; nerves very fine and inconspicuous, 6 to 10 pairs, beneath glaucous, 3 to 4.5 in. long, 1.75 to 2 in. across; petioles 1 to 1.25 in. long. Heads solitary about 1 in. long, ovoid on curved peduncles, .25 in. long.



FIG. 61.—*Rhodoleia ovalifolia*.

Bracts broad, round, outer glabrous, inner red-hairy. Petals bright rose pink, oblong-lanceolate clawed, tip rounded. Stamens as long. Capsule glabrous, .4 in. long, dehiscent widely for more than half their length. *Hab.* Mountains, Malacca, Mt. Ophir. Selangor, Klang Gates. Negri Sembilan, Bukit Senaling (Hudson). Pahang, Telom. Perak, Batang Padang (Wray). Kedah Peak, 3000 ft. altitude (Robinson). *Distrib.* Sumatra.

(2) **R. ovalifolia** *Ridl. Journ. Roy. As. Soc. S. Br. 75, p. 33.*

A big shrub with stout branches about 10 ft. tall. Young parts densely red-pubescent. Leaves adult very stiff coriaceous above glabrous, beneath at first red-scurfy eventually glabrous and white or glaucous, ovate acute, base rounded, sub-cordate;

nerves and reticulations depressed above; nerves 6 to 8, strongly elevate beneath, some secondary nerves prominent, 4 in. long, 2·5 in. wide; young leaves lanceolate acute, base acuminate, 4·5 in. long, 1·75 in. wide; petioles densely velvety eventually glabrous, 1·5 in. long. Heads solitary; peduncle 1·5 in. long, hairy red. Bracts rounded, inner ones very densely red hairy. Petals linear spatulate, ·5 in. long, ·1 in. across, blunt, rose pink. Filaments slender, ·75 in. long; anthers oblong. Capsule ·5 in. long, densely red-hairy. *Hab.* Mountains on open rocky spots. Pahang, Gunong Tahan at 5000 ft. altitude (Robinson, Ridley).

2. MAINGAYA, Oliver.

Tree. Leaves ovate or oblong, acuminate, base rounded, membranous to thinly coriaceous. Stipules small. Heads sub-terminal peduncled of about 15 white flowers. Calyx-tube adherent to ovary. Petals 5-linear, perigynous. Stamens 5 perigynous; filaments very short; anthers horned. Staminodes 10, horned. Ovary half inferior, 2-celled; styles 2, distinct. Ovule 1 in each cell. Capsule woody, ovoid truncate. Species 1.

(1) *M. malayana* Oliver, in *Trans. Linn. Soc.* xxviii. 517, t. 44; *Hook. fil. F.B.I.* ii. 428; *King, l.c.* 307.

Tree 30 to 60 ft. tall. Stem 18 to 24 in. through. Leaves 3·5 to 10 in. long, 1·25 to 3·75 in. wide. Peduncles ·5 to 2 in. long. Head ·75 in. through. Capsule tapering into a thick pedicel, ·75 in. long, apex truncate more than half enclosed in calyx-tube, usually 2 together. *Hab.* Mountains, 2000 to 3000 ft. altitude. Perak, Gunong Bubu (Kunstler). Penang Hill, Sungei Penang and Moniot's Roads (Curtis).

3. BUCKLANDIA, Br.

Tree about 80 ft. tall. Leaves alternate, cordate ovate acuminate, petioled; stipules large coriaceous oblong deciduous. Inflorescence of 3 to 5 peduncled heads at first enclosed in a pair of stipules. Flowers adnate by calyces, about 8 in a head. Calyx-tube adnate to ovary, 5-lobed. Petals in bisexual flower linear spatulate, fleshy. Stamens 10 to 14; filaments long. In females, petals rudimentary. Stamens 0. Ovary half inferior, 2-celled; styles 2, separate; ovules 6 in 2 rows in each cell. Capsule nearly superior, woody, sub-globose. Seeds 6, upper wingless, sterile, lower winged fertile. Species 1, Himalaya, Burma, Java, Sumatra.

(1) *B. populnea* Br. Wall. *Cat.* 7414; *Griff. As. Res.* xix. 95, plates; *Hook. fil. l.c.* 429; *King, l.c.* 308.

Leaves coriaceous often base rounded, apex acuminate; young leaves tricuspidate; nerves 5, prominent, radiating from base; 3 to 8 in. long, 2·75 to 7 in. wide; petioles 1 to 2·5 in. long. Stipules 2 in. long, ·75 in. wide, apex round. Peduncles silky at first ·5 in. long. Heads ·3 to ·4 in. through in flower, ·5 in. in fruit. *Hab.* High mountain forests, but very rare in flower or fruit, at 5000 ft.

altitude. Pahang, Kluang Terbang (Barnes). Selangor, Menuang Gasing, Ulu Langat (Kloss); Semangkok Pass. Perak, Gunong Inas (Wray).

4. *ALTINGIA*, Noronh.

Tree about 50 ft. tall. Leaves alternate ovate or oblong, gland-serrate, thin coriaceous. Flowers in dense heads wrapped in a large bract. Males, heads racemose, females solitary. Male heads a mass of stamens with short filaments; anthers obpyramidal. Female heads of 12 to 20 flowers. Calyces confluent. Petals 0. Ovary three-quarters inferior, 2-celled; styles 2; ovules numerous axile. Fruit head globose, rough puberulous. Seeds numerous, lower ones winged fertile. Species 2, Indo-Malaya, China.

(1) *A. excelsa* Noronh. *Verh. Bat. Genootsch.*, v. 41; *Hook. fil. F.B.I.* ii. 429.

A big tree. Leaves 3 to 4 in. long, 1.75 in. wide, tip apiculate, blunt, base narrowed glabrous; nerves 8 pairs, slightly elevate beneath; petioles 1 in. long. Peduncle 2 in. long. Capitula .5 in. through. *Hab.* Rare on mountains. Pahang, Gunong Tahan at 5000 ft. altitude (Ridley). *Distrib.* India, Java.

Our plant has stiffer leaves shortly narrowed to a blunt point, the Indian and Javanese forms have thinner long acuminate leaves.

ORDER LIII. HALORAGEÆ

King, *l.c.* 309, gives two species of this order as inhabitants of the region, but the evidence for their occurrence here is so doubtful that I exclude both. They are:—

HALORAGIS MICRANTHA R. Br.

Perak? Scortechini. "No specimens in Scortechini's collections, but a field note from him" (King).

Not given by King.

MYRIOPHYLLUM INTERMEDIUM DC.

"Malacca, Griffith, probably on Mt. Ophir." No specimen occurs in Griffith's collections at Kew, nor is it mentioned in the *F.B.I.* Mt. Ophir is a most improbable locality for this pondweed.

ORDER LIV. RHIZOPHORACEÆ

Tidal mud trees. Leaves opposite stipulate, coriaceous. Flowers in axillary cymes, rather large. Calyx-tube obscure, adnate to ovary; sepals coriaceous 4 to 14. Petals 4 or more, entire or lacerate. Stamens 8 to many. Ovary inferior, 1- to 4-celled. Fruit fleshy, more or less conic. Embryo germinating before the fruit falls and emitting a long thick root. Species about 20, tropics. The Mangroves, Bakau of Malays.

Petals 4, entire; stamens 8; ovary 2-celled	1. RHIZOPHORA
Petals 5 to 6, emarginate; stamens 10 to 12; ovary 3-celled	2. CERIOPS
Petals 5 to 6 lacerate; stamens many; ovary 1-celled	3. KANDELIA
Petals and sepals 8 to 14; petals bifid; stamens 16 to 28; ovary 2- to 4-celled	4. BRUGUIERA

1. RHIZOPHORA, Linn.

Trees. Leaves coriaceous, glabrous, opposite. Stipules large, in pairs, caducous. Flowers medium, on short axillary cymes, Calyx 4-lobed with connate bracteoles at base. Petals 4, entire, on a fleshy disc. Anthers 8, sub-sessile. Ovary 2-celled, half inferior, projecting as a cone; cells 2-ovuled. Stigma bifid. Fruit brown, pear-shaped, with the calyx-teeth persistent. Radicle long, pendent. Species 5, tropical mud shores.

Leaves broad, elliptic; cymes 3-flowered; petals fleshy, woolly

(1) *R. mucronata*

Leaves narrow, lanceolate; cymes 2-flowered; petals thin, glabrous

(2) *R. conjugata*

(1) *R. mucronata* Lam. *Dict.* vi. 189; *Ill.* 396, f. 2; *Wight, Ill.* i. 209; *King, l.c.* 312.

Very large shrub or tree 60 to 80 ft. tall. Leaves elliptic, tapering to each end, mucronate; nerves invisible, 5 to 8 in. long, 2.5 to 4.25 in. wide; petioles 1.2 to 1.75 in. long. Cymes 2 in. long, 3-flowered. Flowers .5 to .6 in. long yellow. Calyx-lobes triangular, sub-acute. Petals shorter, linear-lanceolate, woolly inside. Stamens 8. Fruit obovoid, 1.5 in. long; radicle 1 to 2 ft. long, cylindric. *Hab.* Mangrove swamps everywhere. *Distrib.* Old World tropics to Australia. *Native names:* Belukap; Bakau Korap.

R. stylosa Griff. *Notulæ.* iv. 666; *l.c. Pl. As. t.* 640, seems to be a smaller form with smaller leaves and flowers, more villous petals and longer style. It was obtained in Malacca, and I have seen specimens much like it from the Malay Islands to New Guinea. It should be looked for again.

(2) *R. conjugata* Linn. *Sp. Pl.* 443; *King, l.c.* 313.

Large shrub or tree 60 to 80 ft. tall. Leaves oblong-lanceolate, tapering to both ends, mucronate; nerves visible, 5 to 6 in. long, 1.25 to 2.5 in. wide; petioles .8 to 1.25 in. long. Cymes 2-flowered, .5 in. long. Sepals ovate acute. Petals shorter, glabrous. Stamens 11 to 12. Fruit obclavate, 1 in. long; radicle slender, 12 in. long. *Hab.* All mangrove swamps. Old World tropics, less widely distributed than the last. *Native names:* Bakau (name applied to all mangroves); Akit; Bakau Minyak. *Use:* In tanning and dyeing.

2. CERIOPS, Arn.

Small trees or shrubs. Leaves opposite, obovate. Cymes condensed. Flowers few, small. Calyx 5- to 6-lobed, with connate bracts at base. Petals 5 to 6, insert at the base of a 10- to 12-lobed

disc. Stamens 10 to 12. Ovary 3-celled; cells 2-ovuled; style short. Stigma simple. Fruit obovoid, 1-celled, 1-seeded; radicle slender. Species 7, tidal rivers, Old World.

(1) **C. Candolleana** Arn, *Ann. Nat. Hist.* i. 364; *Wight, Ill.* 209.

Large shrub or tree. Leaves obovate-oblong blunt, narrowed long to base, 1·75 to 2 in. long, 1 to 1·5 in. wide; petioles ·6 to 1 in. long. Cymes 1 in. long, branched. Flowers ·25 in. long. Calyx-lobes 5, oblong. Petals oblong-obovate, truncate with 3 short appendages. Stamens 10, as long. Fruit obclavate, nearly 1 in. long; radicle 6 to 12 in. long, slender, thickened near tip, grooved when dry. *Hab.* Mangroves, common. Singapore, Jurong, etc., to Penang. *Distrib.* India and Ceylon, Borneo. *Native name*: Tengah. *Use*: In dyeing, giving a bright brown colour, and in tanning nets and sails. Cloth dyed in Tengah bark and then in indigo, becomes purple or black.

C. Roxburghiana Arn, *King, l.c.* 316. "Probably in all the provinces," has never been collected in the Malay Peninsula.

3. KANDELIA, Wight and Arn.

Small tree. Leaves opposite, coriaceous, oblong blunt. Peduncles axillary, dichotomously branched. Flowers few, large, white. Calyx 5- to 6-lobed; lobes linear lanceolate. Petals 5 to 6, bifid; lobes multifid. Stamens indefinite; filaments slender, exsert. Ovary 1-celled, half inferior, prolonged above calyx into a cone; ovules 6. Stigma 3-lobed. Fruit obclavate, cylindric, girt at base by calyx-tube, 1-celled, 1-seeded; radicle fusiform, slender. Species 1, Indo-Malaya.

(1) **K. Rheedii** W. and A. *Prodr.* i. 311; *King, l.c.* 317.

Leaves 2 to 4 in. long, 1·5 in. wide; petioles ·5 in. long. Peduncles 2 in. long, 4- to 9-flowered. Flowers ·6 to ·8 in. long. Fruit 1 in. long; radicle 6 to 15 in. long. *Hab.* Tidal rivers, very local. Johor, Batu Pahat. Pahang, Pulau Lang, Rumpin (Foxworthy). *Distrib.* India, Ceylon, Malay isles.

2. BRUGUIERA, Lamk.

Trees or large bushes. Leaves coriaceous. Peduncles axillary, cymose, or 1-flowered. Flowers large or small. Calyx-lobes narrow, 8 to 14, tube obconic, ebracteate. Petals oblong, as many, 2-lobed or emarginate, embracing pairs of stamens. Stamens 16 to 28; filaments filiform; anthers linear, as long. Ovary 2- to 4-celled, not projecting; cells 2-ovuled. Stigma 2- to 4-lobed, minute. Fruit obconic; radicle long. Species 7, Old World Tropics.

Flowers solitary, axillary, large; calyx red.

Petals 2-lobed; lobes with 2 to 4 bristles,
glabrous

(1) **B. gymnorhiza**

- Petals 2-lobed; lobes with 1 bristle in the cleft;
 inner face woolly (2) **B. eriopetala**
 Flowers cymose, small, green.
 Calyx lobes as long as tube; petals bifid (3) **B. caryophylloides**
 Calyx lobes quarter length of tube; petals
 emarginate (4) **B. parviflora**

(1) **B. gymnorrhiza** Lam. *Encycl.* iv. 696; *Ill. t.* 397; *King, l.c.* 314.

Large tree with stout branches. Leaves thick, elliptic acute, base cuneate; nerves invisible, 3·5 to 6 in. long, 1·75 to 2·5 in. wide; petioles 1·5 in. long. Flowers solitary, axillary, 1·25 to 1·5 in. long; peduncles ·35 in. long. Calyx coriaceous campanulate cut into 12 narrow acute teeth, bright red. Petals shorter, as many, bilobed at tip and with 2 to 4 bristles on each lobe, base pubescent not woolly. Stamens 2 opposite each petal, shorter. Fruit small; radicle 1 to 2 ft. long. *Hab.* Common in mangrove swamps, Singapore to Penang. *Distrib.* Africa, tropical Asia to Papua.

(2) **B. eriopetala** Wight, *Ill.* i. 210; *King, l.c.* 314.

Tree 30 ft. or more tall. Branches more slender than preceding. Leaves thinner, narrower, lanceolate acute, base cuneate, 3 to 4 in. long, 1·25 to 1·65 in. wide; petioles ·6 to ·75 in. long. Flowers solitary, axillary; peduncles ·25 in. long. Calyx 1·25 in. long, tube wide campanulate, ·5 in. long, red, lobes 10. Petals shorter deeply bifid with a bristle between, densely white-woolly. *Hab.* Mangroves, the commonest species. Singapore, Kranji, etc. Malacca (Griffith). Pahang. Selangor. Perak, Penang (Curtis). Lankawi, Pulau Segai (Haniff). *Distrib.* South India, Malay isles, China. *Native name:* Mata Buaya.

(3) **B. caryophylloides** Bl. *Enum. Pl. Jav.* i. 93; *Hook. fil. F.B.I.* ii. 438; *King, l.c.* 315.

Bushy tree smaller than the two former. Branches slender. Leaves bright green, oblong or elliptic-lanceolate acute, base narrowed; nerves faintly visible above when dry, 3 to 4 in. long, ·8 to 2 in. wide; petioles 1 in. long. Cymes about 1 in. long, 2- to 3-flowered. Flowers green, ·4 to ·5 in. long. Calyx-tube urceolate; lobes linear blunt, 8, eventually reflexed. Petals shorter, tip bifid sparsely white-hairy; lobes obtuse with 3 to 5 hairs at tip. Stamens 16. Fruit ·5 in. long, obconic with reflexed sepals half as long; radicle 2·5 to 8 in. long. *Hab.* Mangrove swamps, common. Singapore, Pulau Ubin (Hullett) to Perak, Sapetang (Wray) and the Adang islands. *Native names:* Buah Brus; Bakau Putih. *Distrib.* India, Ceylon, Malay isles.

(4) **B. parviflora** W. and A. *Prodr.* 311; *King, l.c.* 315.

Shrub or small tree. Leaves oblong-lanceolate or elliptic acute, base cuneate; nerves visible on both sides when dry, 3 to 3·5 in. long, ·8 to 1·25 in. wide; petioles ·75 to 1 in. long. Cymes 2- to 5-flowered, erect, 1 in. long. Flowers ·4 to ·5 in. long. Calyx-tube

cylindric; lobes 8 much shorter. Petals 8 much shorter, oblong, tip broad emarginate and except for 5 white hairs glabrous. Stamens 16. Fruit cylindric, ribbed, 1 in. long; radicle 4 to 5 in. long. *Hab.* Mangroves, fairly common, but less so than the last. Whole peninsula. *Native name*: Lenggadai. *Distrib.* India, Malay isles.

ORDER LV. LEGNOTIDÆ

Trees or shrubs. Leaves opposite, stipulate. Flowers small, white, axillary cymose. Calyx tubular adnate more or less to ovary. Petals 4 to 5, usually lacerate on the edge of the tube. Disc lining tube. Stamens twice as many as petals. Style 1. Fruit drupaceous. Seed 1. Species about 80, tropics.

Flowers in short cymes; petals on edge of disc; ovary half inferior	1. CARALLIA
Flowers fascicled; petals from below disc; ovary superior	2. GYNOTROCHES
Flowers 1 or 2, axillary; petals on edge of tube	3. PELLACALYX

1. CARALLIA, Roxb.

Trees or shrubs. Leaves coriaceous (rarely thin) glabrous, petioled ovate or elliptic. Cymes short axillary trichotomous, simple or branched. Calyx-tube campanulate, 5- to 8-lobed; lobes short, valvate. Petals 4 to 5 on edge of crenulate disc lining the tube, clawed, entire orbicular or more or less lacerate. Disc epigynous, 10- to 16-lobed. Stamens insert with petals; filaments filiform; anthers small, oblong. Style filiform. Fruit globose or ovoid, fleshy, 1-celled, 1- to 2-seeded. Seed globose-reniform. Species 12, Indo-Malaya, Australia.

Leaves entire coriaceous.

Leaves obovate; cymes as long as peduncles; flowers several, 15 in. long	(1) <i>C. integerrima</i>
Leaves obovate; cymes on peduncles longer than petiole; flowers 3 together, 25 in. long	(2) <i>C. eugenioidea</i>
Leaves elliptic, sub-acute; peduncles long 3-flowered, 25 in. long	(3) <i>C. montana</i>
Leaves elliptic cuspidate, larger, thinner; flowers 3 to 5 in cyme, 15 in. long	(4) <i>C. Scortechinii</i>
Leaves coriaceous elliptic acuminate serrulate 1.75 in. long; cymes of 3 or more flowers small	(5) <i>C. euryoides</i>
Leaves thin elliptic, large and spinulose on edge.	
Flowers in peduncled cymes; bracts imbricate; seeds 2	(6) <i>C. spinulosa</i>
Flowers in very short racemes; shrub	(7) <i>C. suffruticosa</i>

(1) *C. integerrima* DC. *Prodr.* iii. 33; *Hook. fl. F.B.I.* ii. 439. *C. lucida* King, *l.c.* 318, not of Roxburgh.

A glabrous tree 40 to 60 ft. tall. Leaves coriaceous obovate to elliptic-oblong, shortly cuspidate, base long-narrowed, edge entire;

nerves very fine and numerous, 3 to 3·75 in. long, 1·5 to 2 in. wide; petioles ·2 to ·3 in. long. Cymes axillary 1 in. long, including the stout peduncle. Flowers ·15 in. long. Calyx-tube cylindric; teeth 6 to 7 triangular. Petals orbicular crenate. Stamens twice as many and longer. Fruit pisiform, glabrous 1-celled, 1-seeded. *Hab.* In woods usually in damp spots in the lowlands. Singapore, Bukit Timah forest. Johor, Ulu Kahang (Kelsall). Pahang, Rumpin River (Foxworthy). Malacca, Brisu; Selandor (Cantley). Selangor, Kwala Lumpur (Foxworthy). Perak, Sungei Rayah (Kunstler). Penang, Chalet. Kelantan, Kota Bharu. Lankawi, Kwah (Curtis). Perlis, Kanga. *Distrib.* Indo-Malaya. *Native names*: Merpoin; Janggut Kli; Bong-Bong; Kusinga; Mesinga; Tingkawa. *Use*: Leaves used as tea.

(2) *C. eugenioides* King, *l.c.* 320.

Tall tree. Leaves oblanceolate or obovate, apex blunt or rounded, base narrowed, tip edge minutely crenulate, with raised dots on the lower surface; nerves 6 pairs, fine conspicuously inarching, 1 to 1·75 in. long, ·7 to ·8 in. wide; petioles ·1 to ·2 in. long. Cymes 3-flowered, axillary peduncles 1 in. long, slender. Flowers ·25 in. long. Calyx-tube narrow, campanulate; lobes 5, triangular. Petals 0. Stamens 10, inserted on a 10-lobed disc. Ovary 5-celled. Fruit obovoid, crowned by the enlarged sepals ·3 in. long, ·2 in. thick. *Hab.* High mountains. Not common. Selangor, Gunong Mengkuang Lebah (Robinson) at 5000 ft. altitude. Perak (Scortechini).

I have seen no petals on this plant, but they may be early caducous.

(3) *C. montana* Ridl. *Journ. F.M.S. Mus.* vi. 145.

Shrub 8 to 10 ft. tall. Leaves only at branch ends, obovate or elliptic-ovate, shortly acuminate blunt, base cuneate, edge denticulate, coriaceous, gland-dotted beneath; nerves 7 pairs, midrib grooved above, prominent beneath, 2 in. long, 1·25 in. wide; petioles stout ·25 in. long. Cymes 3-flowered, axillary ·75 in. long. Flowers ·25 in. long. Calyx-tube funnel-shaped, lobes 5, triangular. Petals ovate, laciniate, clawed, white. Stamens 10. *Hab.* High mountains, open rocky places at 4500 to 5000 ft. altitudes. Pahang, Gunong Tahan (Ridley, Robinson); Kluang Terbang (Barnes). Perak, Gunong Kerbau (Haniff).

(4) *C. Scortechinii* King, *l.c.* 319.

Shrub or small tree. Leaves lanceolate or ovate-lanceolate caudate acuminate, narrowed to base; nerves numerous, very fine, 2 to 2·75 in. long, 1 to 1·25 in. wide; petioles ·2 to ·25 in. long. Stipules lanceolate, ·25 in. long. Cymes axillary ·2 to ·3 in. long; peduncle slender, trichotomous. Flowers 3 to 5, ·1 in. long. Calyx-tube campanulate; lobes triangular 5. Petals reniform erose-crenate, clawed, each embracing a stamen. Stamens 10 on a 10-toothed epigynous disc. Ovary 5-celled. *Hab.* Lowland

woods. Not common. Singapore, Changi. Selangor, Petaling; Batu Caves. Perak (Scortechini).

(5) **C. euryoides** Ridl.

A small tree. Branches black, leafy at tips. Leaves coriaceous, elliptic acuminate with a long blunt point, base cuneate, edge serrulate, 1.75 in. long, .5 in. wide; nerves 7 pairs; petioles .25 in. long. Cymes axillary .25 in. long of 3 flowers or compound of 3 branches with 2 flowers on each; pedicels .1 in. long. Flowers .12 in. long. Calyx urn-shaped; lobes 5 lanceolate acute. Petals 5 very narrow linear as long as sepals. Stamens 10. Style stout, as long as sepals. Stigma pulvinate. Fruit ovoid with persistent sepals. *Hab.* Quartzite rocks at 1000 ft. altitude. Selangor, Klang Gates (Ridley).

(6) **C. spinulosa** Ridl. *Journ. Roy. As. Soc. S. Br.* 82, p. 184.

Tree (or shrub). Leaves thin, elliptic abruptly acuminate, base narrowed, edge spinulose; nerves fine, 14 pairs, .4 to 5 in. long, 1.75 to 2 in. wide; petioles .2 in. long. Cymes .4 in. long; peduncles .2 in. long; branches short with numerous rounded imbricating bracts. Flowers sessile .2 in. long. Sepals triangular acute. Petals shorter, obovate reniform, edge crisped, claw short, white. Stamens outer row adnate to sepals, inner wrapped in petals, all shorter than petals. Disc annular, slightly lobed. Fruit ellipsoid, 2-seeded. *Hab.* Rare. Low swampy country near rivers. Pahang, Sungei Lamar, Bentong (Foxworthy). Perak, Tanjong Malim (Ridley). *Distrib.* Tonkin. *Native name:* Gandang.

(7) **C. suffruticosa** Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 6.

A shrub, glabrous. Leaves elliptic acute at both ends, edges closely spinulose, membranous; nerves 12 to 13 pairs, secondaries nearly as prominent, 3 to 5 in. long, 1.5 to 1.75 in. wide; petioles .5 in. long. Stipules lanceolate, keeled .25 in. long. Flowers yellow and white in short axillary racemes .4 in. long. Bracts ovate, keeled. Calyx campanulate, .12 in. long; lobes 5, lanceolate-acute. Petals linear-oblong lacerate nearly to base as long as calyx. Stamens 10. *Hab.* Forests, rare. Selangor, Dusun Tua (Ridley).

2. GYNOTROCHES, Bl.

Medium-sized trees. Leaves coriaceous, opposite. Flowers in small axillary fascicles. Calyx 4- to 5-lobed, ebracteate. Petals 4 to 5 inserted below on an 8- to 10-lobed disc, spathulate fimbriate clawed white. Stamens 8 to 10, on the disc. Ovary superior, ovoid-globose, 3- to 6-celled; style conical, columnar; ovules 4 in a cell. Stigma peltate, 5-lobed. Berry globose, many-seeded. Seed obovoid. Species 2, Malayan.

(1) **G. axillaris** Bl. *Biidr.* 219; *Ann. Mus. Bot. Lugd. Bat.* i. 127, t. xxxi; *King, l.c.* 321.

A slender tree, about 40 ft. tall or less, 6 in. through, glabrous.

Leaves oblong or elliptic acuminate at both ends, dark shining green above, yellowish beneath; nerves 9 to 12 pairs, 3·5 to 5·5 in. long, 1·5 to 2·5 in. wide; petioles ·25 in. long. Fascicles 6- to 10-flowered, ·5 in. long. Flowers less than ·1 in. across, males with perfect white petals; pistil abortive. Female with imperfect stamens and petals. Fruit globular, ·1 in. through, at first red, then black. *Hab.* Common all over the peninsula. In dry woods often a fair-sized tree; in wet swamps very slender, about 12 to 14 ft. tall, with very black bark. *Distrib.* Malay isles. *Native names:* Janggut Keli; Mata-Keli; Membelu and M. Kechil. *Use:* Timber for rafters and posts, rather durable.

3. PELLACALYX, Korth.

Slender trees. Leaves opposite bifarious, petioled sometimes serrate. Stipules interpetiolar, elongate. Flowers solitary or paired, axillary, medium size. Calyx-tube urceolate, adherent to ovary at base; teeth 4 to 6, recurved. Petals 4 to 6, lacerate, on the edge of calyx-tube. Stamens 8 to 12, on the edge of a crenulate disc lining the tube. Ovary half inferior, 5- to 10-celled; style subulate. Stigma discoid lobed. Fruit fleshy, globose, 5- to 10-celled. Seeds many. Species 3 or 4, Malay Peninsula and islands.

Leaves red-pubescent beneath; calyx-teeth 5 or 6 . (1) **P. axillaris**
 Leaves glabrous; calyx-teeth 4 (2) **P. Saccardianus**

(1) **P. axillaris** Korth. in *Van der Hoev. and De Vr. Tijdsch.* iii. 20, t. 2; *Griff. Notulæ* iv. 420; *Ic. Pl. As. t.* 486; *King, l.c.* 320.

A slender tree about 20 to 50 ft. tall, with horizontal branches. Leaves thinly coriaceous, oblong, base round, sparsely stellate hairy or glabrous above, stellate red brown pubescent beneath, boldly reticulate; nerves 12 pairs, elevate beneath, 4·5 to 7 in. long, 1·25 to 2 in. wide; petioles ·2 to ·3 in. long. Stipules lanceolate, pubescent, ·35 in. long. Flowers ·25 to ·35 in. long. Calyx-tube green, pubescent. Petals white. Stamens brown. Fruit pisiform ·25 in. through, brown. Seeds white edged red-hairy, toothed. *Hab.* Common in damp spots in open country and swampy edges of woods. Singapore, Bukit Timah (Kunstler); Bukit Mandai Road; Tanglin. Johor, Kota Tinggi. Malacca (Griffith, Maingay). Selangor. Perak, Larut and Teluk Anson (Kunstler). Province Wellesley, Nibong Tebal (Curtis). Penang Road from Balik Pulau to Pulau Betong (Curtis). *Distrib.* Sumatra.

(2) **P. Saccardianus** Scott. *Nuov. Giorn. Bot. Ital.* xvii. 143; *Hemsl. Hook. Ic. Pl.* 1546; *King, l.c.* 321.

Medium straight, rather slender tree. Leaves thinly coriaceous, oblong short-acuminate, base round, above glabrous, beneath slightly reticulate, glabrous or very slightly puberulous; nerves 7 to 9 pairs, prominent beneath, 4 to 7 in. long, 1·6 to 2 in. wide;

petioles .25 in. long. Flowers .25 in. long, light green. Calyx-tube .2 in. long, glabrous, lobes 4. Petals 4, toothed. Stamens 8. Ovary 9-celled. *Hab.* Very common in low open country and woods. Singapore, Bukit Timah. Pahang, Kuantan (Foxworthy). Negri Sembilan, Seremban. Selangor, Kwala Lumpur; Rawang. Perak, Taiping Hills near the Waterfall (Wray); Ulu Bubong

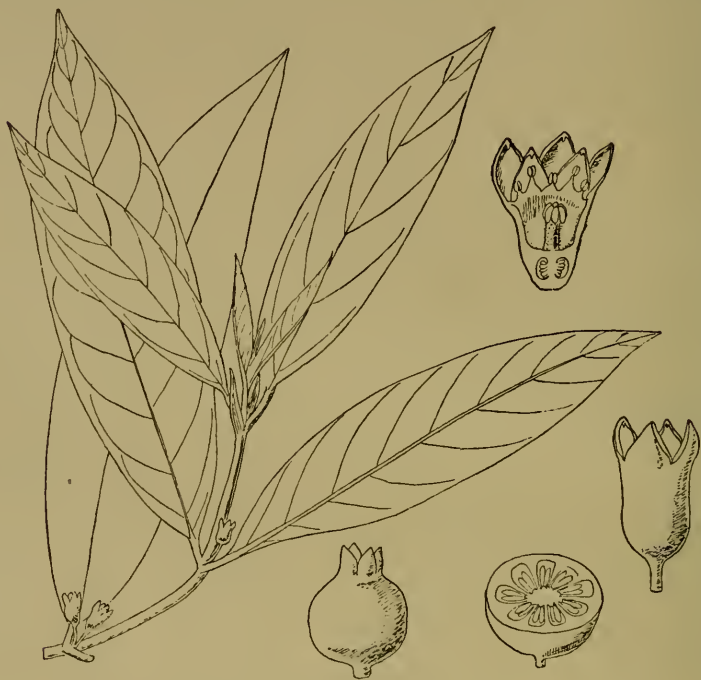


FIG. 62.—*Pellacalyx Saccardianus*.

(Kunstler). Province Wellesley, Nibong Tebal (Curtis). Penang, Penara Bukit and Balik Pulau (Curtis). *Distrib.* Borneo. *Native names*: Kayu Johor; Mumbuloh Rimbah; Piango Jantan.

ORDER LVI. ANISOPHYLLÆ

Trees or shrubs. Leaves alternate, exstipulate. Flowers very small, white, unisexual. Calyx adnate to ovary; lobes 4. Petals 4, sometimes lacerate. Stamens 8. Styles 4; ovary 4-celled, inferior. Fruit more or less drupaceous. Seed 1. Species 10, tropical Asia and Africa.

ANISOPHYLLEA, Br.

Leaves sub-coriaceous, ovate-lanceolate or rhomboid; nerves 3 to 5, radiating from base, rarely pinnate. Flowers in axillary spikes, single or paniced. Calyx-tube in female ovoid. Petals white or pink, very small or o. Stamens 8. Filaments short; anthers small, abortive in females. Ovules 1 in a cell. Fruit drupe or woody oblong or pear-shaped.

Leaves rhomboid, distichous.

- Flowers fascicled below leaves (1) **A. disticha**
 Flowers in 1 in. pubescent spikes (2) **A. Scortechinii**

Leaves ovate or oblong; nerves stout radiating from base.

- Flowers apetalous (3) **A. apetala**

Flowers petalled.

Petals deltoid; leaves and fruit pyriform,

- large (4) **A. Gaudichaudiana**

- Petals divided to base in narrow lobes (5) **A. Curtisii**

- Leaves with pinnate nerves from midrib (6) **A. Griffithii**

(1) **A. disticha** Baill. *Adansonia* xi. 311; King, *l.c.* 322. *Haloragis disticha* Jack, *Mal. Misc.* vii. 19.

Shrub about 8 to 10 ft. tall, with pendent branches. Leaves (young red) dimorphous, densely covering the branches, large ones trapezoid, polished green, sub-falcate acute, base cuneate, subsessile, pubescent or glabrous, .75 in. long, .3 to .4 in. wide, sub-coriaceous; small ones lanceolate from below the big ones, lying flat on branch, .1 to .25 in. long. Flowers, males on the under-side of the branch, fascicled .05 in. across white; racemes very short. Calyx 4-lobed. Petals shorter, fimbriate. Stamens 8. Females solitary, larger, sub-sessile. Calyx-tube elongate, connate with ovary; lobes 4, triangular. Petals and stamens as in male. Drupe oblong truncate, pulpy, bright red; seed oblong 8-ribbed. *Hab.* Common in low woods and secondary growth. Singapore common, to Perak, Waterfall, Thaiping (Wray), Kedah, Kulim (Haniff) and Gurun (Robinson). *Distrib.* Borneo, Sumatra. *Native names*: Poko Kanchil; Kayu Pachat.

(2) **A. Scortechinii** King, *l.c.* 325.

Shrub or treelet 25 ft. tall, habit of *A. disticha*. Branchlets tomentose. Leaves falcate rhomboid, long acuminate, base oblique acute, glabrous except a few hairs on back and nerves pubescent; nerves 3 to 5 from base, prominent beneath, 2.5 to 3 in. long, .6 to 1.25 in. wide; petioles .15 in. long. Panicles .5 to 1 in. long, pubescent 1 to 2 branches. Male flowers .1 in. across; pedicels as long. Sepals 4 to 5, ovate acute. Petals shorter, trifid, white. Stamens 8. Fruit ellipsoid, .75 in. long, .4 in. through, red. *Hab.* Dry open woods, local. Pahang, Baloh Residency, Kwantan (Foxworthy). Dindings at Simpit. Perak, Ulu Kerling (Kunstler). Province Wellesley, Tasek Gelugur. *Native name*: Kayu Ribu-Ribu.

(3) **A. apetala** *Scort. King, l.c.* 323.

Tree 30 to 40 ft. tall, glabrous, 10 to 15 in. through. Branches pendulous. Leaves membranous, elliptic or ovate-elliptic, caudate-acuminate, base round or slightly cuneate; nerves 5 from base, 3 to 8 in. long, 1·25 to 3 in. wide; petioles 25 to 3 in. long. Racemes paniced, few, glabrous. Flowers globular, pink, males pedicelled. Calyx deeply 4- (or 5)-lobed; lobes thick, triangular. Petals 0. Stamens 4. Females with males, sessile. Calyx tubular, lobes short; ovary 4-angled, included in tube. Fruit ovoid or elliptic, light brown, purple striped, 2 to 3 in. long, 1 to 1·25 in. through; pericarp woody. *Hab.* Forests up to 2500 ft. altitude. Malacca, Bukit Naning (Cantley). Selangor, Petaling. Perak, Goping and Larut Hills (Kunstler). Negri Sembilan, Bukit Tampin (Good-enough). Dindings, Pangkor; Gunong Tungul (Curtis); Telok Sera. *Native names*: Dalik Limau Manis; Medang burunit.

(4) **A. Gaudichaudiana** *Baill. Adansonia* xi. 311; *King, l.c.* 324; *Hook. fil. Ic. Pl.* 1551.

Tree 60 to 50 ft. tall, 15 to 20 in. through. Leaves coriaceous, dark, drying yellow green, oblong or elliptic narrowed to a long acuminate point, glabrous, strongly 5-nerved from base, transverse nervules conspicuous, 6 to 10 in. long, 2·5 to 4 in. wide; petioles 25 to 4 in. long, thick. Panicles axillary, 6 in. long; branches reniform with few short branchlets, pubescent. Male flowers globose 0·5 in. across, pedicelled. Sepals 4, triangular. Petals 4 deltoid. Stamens 8. Female flowers sessile, calyx elongate, tubular. Stamens 0. Fruit large, woody, 3 to 4·5 in. long, 2·5 in. through, pear-shaped, rusty-pubescent. *Hab.* Woods up to 2500 ft. altitude. Perak, Larut (Kunstler); Waterfall, Thaiping (Wray). Penang Hill, 1000 ft. altitude (Wallich, Curtis).

(5) **A. Curtisii** *King, l.c.* 326.

Tree 60 to 50 ft. tall. Branchlets slender, pubescent. Leaves thin, coriaceous, elliptic-lanceolate slightly oblique, caudate-acuminate, glabrous; nerves 3 or 5, prominent beneath, 2·5 to 3·5 in. long, 8 to 1·25 in. wide; petioles 2 in. long. Spikes 5 in. long, male and female flowers on different ones. Males 15 in. across, sessile. Calyx-tube elongate, pubescent; lobes 4, broad, triangular. Petals 4 cut into filiform lobes nearly to base. Stamens 8, unequal. Styles subulate. Females 25 in. long. *Hab.* Hill forests. Perak, Thaiping Hills (Haniff). Penang, West Hill (Curtis).

(6) **A. Griffithii** *Oliver, Trans. Linn. Soc.* xxiii. 460, t. 48; *King, l.c.* 325.

Tree 40 to 50 ft. tall, glabrous. Leaves thinly coriaceous, bright green, lanceolate or ovate-lanceolate, cuspidate, acuminate, base cuneate; nerves fine, inconspicuous, pinnate, 2·5 to 3·5 in. long, 1·2 to 2 in. wide; petioles 2 in. long. Spikes slender, solitary to 3 together, 1·5 to 2 in. long, puberulous. Flowers distant

sessile. Male .05 in. long. Calyx-lobes 4, triangular. Petals 4, shorter, sub-quadrate, emarginate. Stamens 8, 4 opposite petals and attached thereto. Females as males, but calyx-tube elongate. Fruit globular, woody, 1.75 in. long, 1.35 in. wide. *Hab.* Lowland forests. Singapore, Chan Chu Kang. Malacca; Ayer Panas (Griffith). Selangor, Kwala Lumpur. Penang, Waterfall (Curtis). *Native names* : Kempas Dadeh; Delek Tembaga.

ORDER LVII. COMBRETACEÆ

Trees or shrubs, often climbing. Leaves simple, entire; stipules 0. Flowers small in spikes or racemes, often paniced. Calyx-tube adnate to ovary and produced above it, lobes 4 to 6. Petals 4 or 5 or 0. Stamens 4 or 5 or 8 to 10 on calyx. Ovary inferior, 1-celled; style simple; ovules 2 to 7. Stigma simple. Fruit a drupe, or winged by calyx-lobes or with 4 to 5 wings from the angles. Species 240, whole tropics and S. Africa.

The *Gyrocarpeæ* formerly included (*Illigera* and *Gyrocarpus*) are excluded from the order and placed in *Apetalæ*.

Petals 0.

Trees with drupes often angled, and some winged

from angles

1. *TERMINALIA*

Shrubs with accrescent calyx wings

2. *CALYOPTERIS*

Petals 4 to 5.

Calyx-limb persistent; fruit a small woody drupe,

seashores

3. *LUMNITZERA*

Calyx-limb deciduous.

Calyx-tube beyond ovary under .5 in. long

4. *COMBRETUM*

Calyx-tube beyond ovary .75 to 2.5 in. long

5. *QUISQUALIS*

1. *TERMINALIA*, Linn.

Large often vast trees. Leaves alternate or sub-opposite, coriaceous. Flowers small, spicate (spikes sometimes paniced), bisexual, but upper flowers sometimes males only. Calyx-tube produced above only; mouth campanulate; lobes 5, triangular. Petals 0. Stamens 10 on calyx tube; disc epigynous, hairy. Ovary 1-celled inferior; ovules 2 to 3. Fruit ovoid, drupaceous or with 2 to 5 wings. Seed 1. Species 135, tropics generally.

Fruit not winged.

Leaves oblong, narrowed upwards; fruit oblong,

5-angled

(1) *T. citrina*

Leaves obovate or broadly elliptic, base rounded;

fruit ovoid tomentose

(2) *T. belerica*

Leaves obovate base long, narrow.

Fruit ellipsoid not flattened

(3) *T. foetidissima*

Fruit flattened.

Leaves 3 to 4 in. by 2 in. wide

(4) *T. phellocarpa*

Leaves 6 to 9 in. long, 1.25 in. wide

(5) *T. Catappa*

Fruit 2-winged, broad.

Leaves blunt oblanceolate

(6) *T. subspathulata*

- Leaves lanceolate acuminate (7) **T. bialata**
 Fruit oblong, 3-winged; leaves small often 1 in.
 long (8) **T. triptera**

(1) **T. citrina** Roxb. *Fl. Ind.* ii. 435.

Tree (woody climber fide Curtis, parasite fide Kunstler). Leaves lanceolate acuminate, thinly coriaceous, base narrowed, 4 in. long, 2 in. wide; nerves sub-horizontal, 12 pairs, reticulations beneath fine; petioles .5 in. long with 2 glands at top. Racemes in axillary and terminal panicles, 4 in. long, 3 in. wide, pubescent. Flowers small, .2 in. wide. Calyx glabrous with villous glands inside. Stamens 10. *Hab.* Forests. Negri Sembilan, Pasir Panjang (Foxworthy). Perak, Larut (Kunstler) Parasite. Penang, Waterfall (Curtis), woody climber. *Distrib.* India.

The Herbarium specimens seem quite indistinguishable from the Indian plant, but both Curtis and Kunstler affirm it is not a big tree, as in India, but a climber. Fruit unknown.

var. *Malayana* Clarke, in Hook. *fl. F.B.I.* ii. 447.

Tree 60 to 80 ft. tall. Leaves coriaceous, elliptic to ovate lanceolate, sub-acute, base rounded; nerves about 12 pairs, slightly elevate, 4 in. long, 2.5 in. wide, minutely reticulate beneath; petioles .75 in. long. Spikes paniced, axillary, at the ends of branches, hairy, 3 in. long. Flowers sessile .2 in. across. Ovary glabrous. Calyx pubescent outside, villous inside. Drupe lanceolate, narrowed to tip, obscurely 5-ridged, 1 in. long. *Hab.* Malacca, Mt. Ophir (Griffith, Maingay). Pahang, Binchal Residency, Kwala Lipis (Foxworthy). *Native name*: Belawan.

This has more coriaceous elliptic leaves round-based, shorter and more hairy panicles. It is probably specifically distinct from *T. citrina*.

(2) **T. belerica** Roxb. *Fl. Ind.* ii. 431; *King, l.c.* 329. var. *laurinoides* Miq.

Tall tree. Leaves clustered at the branch-ends, coriaceous dotted, obovate or elliptic, tip rounded, base cuneate; nerves 6 to 8 pairs, prominent, 4.5 to 8 in. long, 3.5 to 4.75 in. wide; petioles 1.75 to 4 in. long. Spikes slender, 3 to 4 in. long, pubescent. Flowers .25 in. across. Calyx-tube short, tomentose, lobes broad, mouth densely villous. Stamens long-exsert. Drupe ovoid, densely minutely tomentose, obscurely 5-angled, when dry 1 in. long, .75 in. wide. *Hab.* Forests. Selangor, Kwala Lumpur; Batu Road (Foxworthy). Perak (Scortechini and Kunstler). *Distrib.* India and Malay islands. The species here is the Javanese form *laurinoides*, somewhat different from the Indian form, especially in the form of the fruit, and perhaps should be kept specifically distinct. *Native name*: Jilawei.

(3) **T. foetidissima** Griff. *Notulæ* iv. 685; *King, l.c.* 331.

A big tree. Leaves at the branch ends, coriaceous obovate blunt or shortly cuspidate, glabrous except the midrib and 8 pairs of nerves, sometimes sparsely puberulous, 5 to 6.5 in. long, 2.25 to

3·25 in. wide; petioles ·8 in. long. Spikes solitary axillary, 6 in. long, pubescent. Flowers ·2 in. across, fœtid. Calyx-tube elongate, clavate rusty-tomentose; teeth deltoid. Drupe ellipsoid, sub-acute, plano-convex 1·5 in. long. *Hab.* Malacca (Griffith and Maingay). Negri Sembilan, Pasir Panjang (Foxworthy). *Native name*: Jilawei.

(4) **T. phellocarpa** King, *l.c.* 330.

A stout spreading tree about 40 to 60 ft. tall and 2 to 3 ft. through. Leaves crowded at branch ends, obovate blunt, tapering to base, dark green, glabrous; nerves 4 to 6 pairs, 3 to 4 in. long, 1·75 to 2 in. wide; petioles ·8 in. long. Racemes produced with young leaves, red-woolly, 1·5 to 2 in. long. Flowers very small, ·2 in. wide; buds conoid; pedicels short, thick, hairy. Bracts linear hairy. Sepals ovate acuminate, hairy both sides. Stamens 10; filaments longer than sepals. Calyx-tube hairy. Fruit elliptic flattened, round at both ends with a terminal mammilla green; pericarp thick spongy fibrous. *Hab.* Low country in damp ground in the south. Singapore, Tanglin; Bukit Mandai Road; Selitar. Malacca, Bukit Bruang (Derry). *Native names*: Mampelam Babi (Pig's Mango); Pelawei.

(5) **T. Catappa** Linn. *Mantissa* ii. 519; King, *l.c.* 331; *Bot. Mag. t.* 3004.

A stout tree up to 80 or more ft. tall with large spreading branches. Leaves deciduous, obovate narrowed to a cordate base, glabrous; nerves 8 to 12 pairs, 6 to 9 in. long, 3·5 to 5·5 in. wide; petioles ·35 in. long, broad. Spikes axillary, ·6 in. long. Flowers ·2 in. across. Calyx-tube conic, glabrous outside, woolly inside. Ovary glabrous. Drupe ellipsoid, compressed, green flushed pink, keeled all round; pericarp fleshy; endocarp woody, fibrous; 2 in. long, 1·25 in. wide. *Hab.* Common on sandy seacoasts, wild, but now planted or sporadic everywhere in villages and cultivated ground, and known as the Singapore almond. *Native name*: Ketapang. The tree sheds its leaves entirely and flowers after this. The withering red leaves make the tree very conspicuous.

(6) **T. subspathulata** King, *l.c.* 332.

A gigantic buttressed tree 150 ft. tall, 2 to 3 ft. through. Leaves crowded at branch-ends, thinly coriaceous, spathulate, glaucous beneath obtuse; nerves 8 pairs, elevate beneath, reticulations fine, conspicuous, 3·5 in. long, 1 to 1·6 in. wide near tip; petioles 1·15 to 1·5 in. long. Spikes solitary, 3·5 in. long, puberulous. Flowers green, ·15 in. long, upper ones male only, lower bisexual. Calyx-tube narrow, cylindric; teeth 5, broad. Fruit very broadly 2-winged, 1·5 in. long, ·2 in. wide, transversely rounded, oblong striate, pale yellow. *Hab.* Forests, Singapore, Botanic Gardens. Malacca, Sungei Hudang (Derry). Perak, Goping (Kunstler). *Native name*: Jilawei.

(7) **T. bialata** Steud. *Nomencl.* ii. 668; King, *l.c.* 332.

Tree 80 to 100 ft. tall. Leaves crowded at branch-ends, obovate

or obovate-oblong, short cuspidate, narrowed to the oblique base, glabrous; nerves 7 to 9 pairs, 6 to 9 in. long, 2·75 to 4 in. wide; petioles 2·25 to 2·75 in. long. Spikes solitary, puberulous. Flowers ½ in. across, sessile. Calyx pubescent outside, villous inside, lobes triangular. Ovary villous. Fruit ellipsoid 1·75 in. long, ½ to ¾ in. wide with two large coriaceous, puberulous striate wings; 1·75 in. across. *Hab.* Open country in the north. Perlis, Kanga and Chupeng (Ridley). *Distrib.* Andamans and Burma.

(8) **T. triptera** Stapf, *Kew Bulletin* 1895, p. 103.

Medium-sized tree, glabrous with slender branches. Leaves sub-coriaceous elliptic or oblong acuminate glaucous above; nerves 6 to 8 pairs, 1·5 to 2·5 in. long, 1 to 1·75 in. wide; petioles ½ in. long. Spikes ½ to 1 in. long in a terminal panicle, slender puberulous. Flowers 1 in. wide. Calyx-tube ovoid; lobes 4 sub-acute villous inside. Fruit oblong, 3-winged, 1 in. long, ½ in. wide. *Hab.* Lankawi and Terutau isles (Curtis).

2. CALYOPTERIS, Lam.

A diffuse drooping shrub. Leaves opposite, petioled, elliptic or ovate acuminate. Racemes dense crowded at the ends of branches so as to form a panicle. Flowers small greenish yellow. Calyx-tube 5-striate produced above ovary, 5-lobed. Petals 0. Stamens 10, 5 upper between sepals, 5 lower alternate and lower down on tube. Ovary 1-celled, inferior; ovules 3. Fruit narrow-ovoid 1-seeded surmounted by the sepals as long lanceolate spreading wings. Species 1, Indo-Malaya.

(1) **C. floribunda** Lam. *Dict. Supp.* ii. 41; *Ill. t.* 537; *Clarke, in Hook. fil. F.B.I.* ii. 449; *King, l.c.* 333.

Leaves sub-coriaceous, tomentose on both sides; nerves 5 to 6 pairs, 2·5 to 4 in. long, 1 to 2 in. wide; petioles ½ to ¾ in. long. Inflorescence usually 6 to 12 in. long, in fruit 12 in. across. Flowers ¾ in. across, sessile. Fruit ¾ in. long, 5-angled; wings ¾ to 1 in. long, ½ in. across. *Hab.* Penang, near the Waterfall (Curtis, Wallich).

"Singapore, Lobb," must be an error. He no doubt collected it in Penang.

3. LUMNITZERA, Willd.

Tidal swamp and seacoast trees. Leaves clustered towards the branch-ends obovate or oblanceolate, tip rounded, base narrowed at both ends; lobes 5, persistent. Petals 5, oblong. Stamens 5 to 10 in 2 series. Ovary inferior 1-celled; style subulate simple. Fruit woody elliptic, ½ to 1 in. long, woody 1-seeded. Species 2; coasts from Africa to Polynesia.

Racemes elongating lax; flowers white	.	.	.	(1) L. racemosa
Racemes dense; flowers scarlet	.	.	.	(2) L. coccinea

(1) *L. racemosa* Willd. *Ges. Naturf. Fr. Neue Schr.* iv. 187; *Clarke, in Hook. fil. F.B.I.* ii. 452; *King, l.c.* 334.

Shrub or small tree. Leaves oblanceolate or oval obtuse 1 to 3 in. long, .75 to 1.5 in. wide; petioles .7 in. long. Racemes elongating lax 2 in. long. Flowers .3 in. long. Petals small white. Stamens 5 to 10, white. *Hab.* Tidal swamps and sea-shores, but much less common than *L. coccinea*. Malacca, Tanjong Kling to Kelantan, Kamposa. *Distrib.* Mascarene islands to Polynesia.

(2) *L. coccinea* W. and A. *Prodr.* 316; *King, l.c.* 334. *Pyrranthus littoreus* Jack, *Mal. Misc.* ii. 57.

A large tree 40 to 60 ft. tall. Leaves oblanceolate obtuse, coriaceous 2 to 3 in. long, .75 in. wide; petioles .4 in. long. Racemes short, single dense terminal, 1.5 in. long, not lengthening in fruit. Flowers .5 in. long. Petals .25 in. long and stamens 5 to 10, twice as long, all scarlet. *Hab.* Sea-shores in sandy or tidal-mud spots. Singapore, common, Kranji, etc. Johor, Tana Runto. Pahang, Rumpin River. Tringganu, Cherating River. Selangor, Klang (Foxworthy). Province Wellesley, Juru River. Penang, Telok Bahang (Curtis). *Distrib.* Malaya, Australia, Polynesia. *Native names:* Api-Api; Teruntum. *Use:* Timber valued, for axles especially.

4. COMBRETUM, Linn.

Climbing shrubs. Leaves entire, opposite rarely alternate. Flowers in spikes or panicles, small. Calyx-tube constrict above the ovary, urceolate or tubular, lobes 4 to 5. Petals 4 to 5 on the calyx limb. Stamens twice as many insert in 2 series. Ovary inferior, 1-celled; style 1, simple; ovules 2 to 5. Fruit with 4 (or 5) angles or wings dry. Seed 1. Species 160, all tropics.

Flowers 5-merous; fruit 5-angled. (1) *C. trifoliatum*

Flowers 4-merous; fruit 4-angled.

Leaves thin, lanceolate; fruit short .75 to 1 in. long, oblong blunt; flowers small (2) *C. tetralophum*

Leaves coriaceous ovate; fruit 2 in. long, narrowed both ends; flowers large (3) *C. acuminatum*

Flowers 4-merous; fruit 4-winged.

Calyx-tube elongate; flowers not scaly; buds acute.

Racemes globose (4) *C. sundaicum*

Racemes elongate (5) *C. extensum*

Calyx-tube short; buds globose, acute; flowers scaly.

Racemes elongate, lax (6) *C. chinense*

Calyx-tube short; buds not pointed.

Flowers scaly; leaves not cordate petioled.

Fruit not compressed, faces equal; wings thin (7) *C. squamosum*

Fruit ovate; short, thick wings (8) *C. Wrayi*

Flowers not scaly; leaves cordate hardly petioled.

Leaves glabrous; panicle wide spreading slender (9) *C. nigrescens*

Leaves hairy beneath; branches hairy; panicles short, dense (10) *C. Scortechinii*

(1) **C. trifoliatum** Vent. *Choix t.* 58; *King, l.c.* 336.

Big climber. Leaves coriaceous, oblong-lanceolate to oblanceolate, base cuneate, shining; nerves 5 to 7 pairs, indistinct above, 1·75 to 5·5 in. long, ·8 to 2 in. wide; petioles ·2 in. long. Spikes axillary, solitary or paniced, terminal. Flowers ·15 in. wide, crowded. Calyx-tube constrict above; sepals narrow, acuminate, all appressed silky. Petals 5, lanceolate, little longer. Fruit acutely 5-angled, 1·25 in. long, ·5 in. through. *Hab.* Open country in the north. Perlis at Kanga. *Distrib.* Rangoon, Cambodia, Siam, Borneo, Java. *Native name*: Akar Sung-sung Harus.

(2) **C. tetralophum** Clarke, in *Hook. fil. F.B.I.* ii. 454; *King, l.c.* 336.

A big climber with scaly branches. Leaves opposite, thinly coriaceous, oblong-elliptic, short acuminate, base cuneate, glabrous except midrib on back at base pubescent; nerves 7 to 8 pairs, 2·5 to 5·5 in. long, 1 to 2 in. wide; petioles ·3 to ·4 in. long, pubescent. Spikes axillary, solitary or terminal, paniced, scaly. Flowers ·1 in. across. Calyx-tube constrict above ovary, mouth campanulate; lobes 4, ovate, pubescent. Petals little longer, narrow, linear. Stamens and style exsert; disc and mouth of tube villous. Fruit oblong, 4-angled, black, ·75 to 1 in. long. *Hab.* Lowland open country. Malacca, river-bank (Griffith). Pahang, Pekan. Penang, Batu Feringhi (Curtis); Tanjong Tokong. *Distrib.* Siam, Borneo.

(3) **C. acuminatum** Roxb. *Fl. Ind.* ii. 228; *Clarke, l.c.* ii. 455.

Large scandent shrub. Leaves coriaceous, ovate-lanceolate (puberulous) or glabrous, minutely dotted beneath, 4 to 6 in. long, 2 in. wide, base slightly narrowed, tip acute; petioles short. Racemes axillary or terminal, paniced. Flowers ·15 in. wide. Calyx campanulate. Fruit ellipsoid narrowed to both ends with 4 blunt ridges, 2 in. long, ·5 in. through. *Hab.* Open country in the north. Pahang River (Burn-Murdoch). Perlis, Besih Hangat, Kanga (Ridley). *Distrib.* India, Burma.

(4) **C. sundaicum** Miq. *Fl. Ind. Bat. Supp.* 327; *Clarke, l.c.* ii. 458; *King, l.c.* 337.

Large climber. Branchlets densely scaly. Leaves opposite, thinly coriaceous, broadly elliptic abruptly short-acuminate, base round, sometimes unequal, glabrous scaly beneath; nerves 6 pairs, slightly prominent beneath, 2·75 to 4 in. long, 1·8 to 2·75 in. wide; petioles ·4 to ·8 in. long. Panicles axillary, terminal, umbellate; branches terminated by globose spikes ·75 to 1 in. across. Calyx-tube ·35 in. long, pubescent, 4-ridged on ovary above cylindric, mouth funnel-shaped; lobes 4 triangular, acuminate, light green, a ring of hairs inside at base. Petals shorter, white, oval. Fruit elliptic, round, with 4 coriaceous straw-coloured wings 1 in. long and wide. *Hab.* Common on edges of forests. Singapore, Bukit Timah Road; Changi; Bedoh; Jurong. Malacca, Merlimau (Derry). Selangor,

Petaling; Batu Caves; Kwala Lumpur. Perak, Batang Padang district (Kunstler); Thaiping (Haniff). Penang, Ayer hitam (Curtis). *Distrib.* Sumatra. *Native name*: Akar Gegambar. *Use*: This was the "anti-opium" plant which produced a sensational hoax in 1907.

(5) **C. *extensum*** Roxb. *Hort. Beng.* 28; *Fl. Ind.* ii. 229; *Clarke, l.c.* ii. 458; *King, l.c.* 337.

A big climber. Leaves opposite, coriaceous glabrous, broad elliptic, round, tip abruptly short acuminate, base broad, round; nerves 6 to 7 pairs, 4.5 to 7 in. long, 2.75 to 4 in. wide; petioles .6 to 1.5 in. long, stout. Spikes axillary, solitary, sometimes paniced, terminal, puberulous. Flowers .25 in. across; buds ovate-acute. Calyx-tube .35 in. long, infundibuliform a ring of hairs in mouth outside, puberulous, lobes 4 deep, triangular. Petals obovate. Fruit 1.25 to 1.5 in. across, and as broad. *Hab.* Rare, in thickets. Malacca, Ayer Panas (Derry). Penang, Waterfall (Haniff). *Distrib.* India, Burma.

(6) **C. *chinense*** Roxb. *Hort. Beng.* 28; *Clarke, l.c.* ii. 457; *King, l.c.* 338.

Large climbing shrub. Leaves opposite, thinly coriaceous, elliptic acuminate, base slightly narrowed, quite glabrous; nerves 7 to 8 pairs, slightly prominent beneath, 3.25 to 5 in. long, 1.5 to 2.35 in. wide; petioles .15 to .4 in. long. Spikes solitary, axillary, 3 to 4 in. long, many-flowered. Calyx-tube .25 in. long, base slender upwards, funnel-shaped, .15 in. across, lobes 4, deep triangular acute, scaly. Petals obovate, yellowish white, clawed, longer than sepals. Disc and inside of calyx pubescent. Fruit 4-winged, .8 in. long and wide, oblong, apex notched. *Hab.* Edges of forests in the northern part. Penang, road to Balik Pulau (Curtis).

var. *Porterianum*. Leaves stiffer; nerves 8 pairs, more elevate. Penang (Porter).

var. *pubescens*. Leaves stiff, long-acuminate, pubescent beneath. Perak, Sungei Rayah (Kunstler). *Distrib.* India.

(7) **C. *squamosum*** Roxb. *Fl. Ind.* iii. 231; *Clarke, l.c.* ii. 456; *King, l.c.* 339.

A large climbing shrub. Young branches, inflorescence and under-side of leaves and petioles scaly. Leaves opposite, thinly coriaceous, broad elliptic or ovate, short blunt acuminate, base round or short narrowed; nerves 3 to 4 pairs, faint, 3.25 to 4.5 in. long, 1.75 to 2 in. wide; petioles .3 in. long. Spikes axillary or terminal paniced 3 to 4 in. long. Flowers .15 in. across. Calyx-tube shortly constricted above the 4-angled ovary; mouth cupular, teeth 4, broad triangular. Petals small obovate. Disc and base of calyx inside villous. Fruit .75 to 1.5 in. long and as broad with 4 wide membranous wings, scaly in the grooves between the wings. *Hab.* Open country and dry woods. Pahang River, Pulau

Chengei. Penang (Wallich); Waterfall and Western Hill (Curtis).
Distrib. Andamans, India, Burma.

In some of Curtis's plants the flowers are umbellate at the ends of branches. The Indo-Burmese plants have much bigger leaves.

(8) **C. Wrayi** King, *l.c.* 339.

Woody climber hardly scaly. Leaves opposite, coriaceous, narrow elliptic sub-acute or shortly blunt-acuminate, base round, glabrous except a few hairs on base of midrib; nerves 6 to 7 pairs, 2·5 to 3·5 in. wide, 1·15 to 1·5 in. long; petioles 35 to 4 in. long; upper leaves smaller. Spikes solitary, axillary 1 in. long, floriferous part scaly and hairy. Flowers few. Calyx-tube 15 in. long, constrict above ovary, mouth campanulate, 4 triangular acute lobes, scaly. Petals little longer, oblanceolate blunt. Stamens 8, exsert. Fruit ovate, flattened with 4 short wings, 1·2 in. long, 6 in. wide, scaly. *Hab.* Perak, Matang, seashore (Wray).

I have only seen one poor bit of this. It seems to me to be near *C. tetralophum*.

(9) **C. nigrescens** King, *l.c.* 340.

A climber 30 to 60 ft. tall. Branchlets, midrib on both sides, nerves beneath and petioles red-hairy. Leaves opposite, membranous, drying black, narrow, elliptic-oblong, base minutely cordate; nerves 7 pairs, elevate beneath, 2·25 to 2·75 in. long, 75 to 1 in. wide; petioles under 1 in. long. Panicles terminal, lax very hairy, 3 to 4 in. long; branches slender. Calyx-tube 05 in. long; limb longer, campanulate; teeth 4, acute, pubescent; throat hairy. Fruit black oblong, glabrous with 4 narrow wings, 8 in. long, 4 in. wide. *Hab.* River-banks and thick forest, low country. Pahang, Tahan River. Selangor, Batu Caves. Negri Sembilan, Gunong Berumbun (Cantley). Perak, Larut (Kunstler); Kota (Wray).

var. *Kunstleri* C. *Kunstleri* King, *l.c.c.*

Branches and inflorescence nearly glabrous. Pahang, Temerloh (Ridley). Perak, Larut Hills (Kunstler).

(10) **C. Scortechinii** King, *l.c.* 341.

Branches appressed-hairy. Leaves opposite, thin coriaceous, oblong-elliptic acute, base minutely cordate, above when young appressed-hairy, then glabrous, beneath nerves 7 pairs elevate with midrib appressed-hairy, 3·25 to 4·5 in. long, 1·4 to 1·75 in. wide; petioles 1 in. long. Panicles axillary and terminal, 2 in. long or less, silky-tomentose. Calyx-tube cylindric wide campanulate above, teeth broad, acute. Petals 4, ovate-lanceolate pubescent. Fruit glabrous with 4 thin wings pointed at ends, 1·25 in. long, 65 in. wide. *Hab.* Perak, Goping (Scortechini).

5. QUISQUALIS, Linn.

Climbing shrubs. Leaves opposite, oblong or obovate acuminate, thinly coriaceous. Flowers large in short axillary or terminal spikes, red. Calyx-tube long, slender; limb 5-lobed. Petals 5. Stamens 10. Ovary 1-celled; ovules 3 to 4; style filiform, partly adhering to calyx-tube. Stigma capitate. Fruit dry, 5-angled or winged, coriaceous. Seed 1. Species 5, Old World tropics.

Calyx-tube less than 1 in. long (1) *Q. densiflora*
Calyx-tube 2 in. long or more (2) *Q. indica*

(1) *Q. densiflora* Wall. *Cat.* 4011; *King, l.c.* 341.

Climbing shrub. Leaves elliptic-oblong acuminate, base round or minutely cordate, glabrous except midrib above depressed pubescent; nerves 6 pairs, 3·5 in. to 4·5 long, 1·5 to 2 in. wide; petioles ·2 to ·3 in. long, pubescent above. Spikes terminal and axillary, numerous, pubescent; rachis thick gradually lengthening to 4 in. long. Flowers numerous 1 in. long, ·2 in. across. Calyx-tube under 1 in. long, cylindric, tomentose, lobes lanceolate, sub-acute. Petals shorter, red, silvery-pubescent outside. Fruit oblong; wings 5, narrow, 1 in. long, ·5 in. wide. *Hab.* Malacca (Griffith); Negri Sembilan (Cantley); Perak (Wray); Province Wellesley, Ara Kudah. Penang, Telok Bahang; road to Balik Pulau (Curtis); (Wallich). Lankawi, Burau (Robinson). *Native names* : Selimpas; Sumang.

var. *parvifolia* Ridl. Branches slender. Leaves rather stiff, oblong-lanceolate, 2·5 in. long, ·75 in. wide, acuminate blunt mucronate. Corolla dirty mauve. *Hab.* Lankawi isles, Dayang Bunting (Robinson).

(2) *Q. indica* Linn. *Sp. Pl.* 556; *Clarke, l.c.* ii. 459.

A strong climber. Leaves elliptic acuminate, base rounded, dark green, glabrous above, hairy beneath; nerves 6 to 8 pairs, 3 to 4 in. long, 1·5 in. wide; petioles ·3 in. long. Spikes axillary and terminal 1 in. long or more, pubescent. Flowers numerous, pendent, 3 in. long, 1·5 in. wide, at first white, then deep red. Calyx-tube and triangular acute lobes 2·5 in. long, pubescent. Petals lanceolate, acute, ·5 in. long. Fruit ellipsoid acutely 5-angled, glabrous, brown, 1·25 in. long. *Hab.* River-banks and over rocks. Very common in cultivation and known as "Drunken Sailor." Wild on Pahang river-banks near Pekan and Perlis near Kanga. A garden escape in Singapore, etc. *Distrib.* Burma, Malaya. *Native names* : Akar Pontianak; Akar Suloh.

ORDER LVIII. MYRTACEÆ.

Trees or shrubs. Leaves opposite, rarely alternate (*Tristania*, *Barringtoniæ*), simple, usually with an intramarginal nerve, coriaceous. Flowers regular, bisexual; axillary solitary to corymbose, white or pink. Calyx superior; limb 4- to 5-lobed. Petals on the edge of the calyx-tube as many as sepals. Disc lining the tube. Stamens numerous, on edge of disc; filaments long. Ovary inferior, 1-celled, ovules 1 or more, or 2-celled with many ovules. Fruit capsular or drupaceous. Species 2000, tropics and sub-tropics (*King, Journ. As. Soc. Beng.* lxx. ii. 66).

(a) *Fruit capsular.*

Leaves narrow.

Flowers few or solitary.

Stamens 10 or less; leaves very narrow, opposite

Stamens many; leaves broader, alternate

Flowers in spikes or heads; stamens numerous

Leaves broad, alternate; flowers cymose

1. *BÆCKEA*

2. *LEPTOSPERMUM*

3. *MELALEUCA*

4. *TRISTANIA*

(b) *Fruit a berry; leaves opposite.*

Ovary 1-celled; flowers small; leaves 3-nerved

Ovary 1- to 3-celled; flowers large; leaves 3- to 5-nerved

Ovary 5- (or 4-) celled; seeds few; flowers small; leaves not 3-nerved

5. *RHODAMNIA*

6. *RHODOMYRTUS*

7. *DECASPERMUM*

(c) *Fruit a drupe; leaves opposite; seed 1, rarely 2.*

Stamens numerous; flowers cymose usually many; fruit green, fleshy

Stamens 8; flowers few, small axillary; drupe red pulpy

8. *EUGENIA*

9. *PSEUDO-EUGENIA*

(d) *Fruit a drupe, fleshy; leaves alternate.*

Flowers large; fruit oblong; seed 1

10. *BARRINGTONIA*

(e) *Fruit globose; seeds several.*

Inner stamens without anthers

11. *PLANCHONIA*

Outer stamens without anthers

12. *CAREYA*

1. *BÆCKEA*, Linn.

Aromatic glabrous shrubs with narrow linear, glandular leaves. Flowers 5-merous, axillary, small, white. Calyx-tube campanulate; lobes 5. Petals 5, sub-orbicular. Stamens 10, shorter. Ovary half inferior, 2- to 3-celled. Capsule bursting loculicidally. Species about 50, Australian and New Caledonian, 1 Malayan.

(1) *B. frutescens* Linn. *Sp. Pl.* 358; *King, Journ. As. Soc. Beng.* lxx. (2), 68; *Bot. Mag. t.* 2802.

A heath-like shrub from a few inches high to 20 ft. tall, and 1 ft. through the stem. Branches wiry. Leaves .25 to .5 in. long, very narrow, terete acute. Flowers .08 in. wide, on short pedicels, white with a green ring in the centre, becoming red. *Hab.* On all mountains where dry enough above 3000 ft. altitude, common. Pahang, Gunong Tahan, to 7000 ft. altitude; Lambak Camp, Kwantan

(Foxworthy). Malacca, Mt. Ophir at 4000 ft. altitude. Selangor, Klang Gates 1500 ft. altitude. Negri Sembilan, Bukit Senaling (Hudson). Perak, Gunong Berakeh 1491 ft. altitude (Burn-Murdoch). Kemaman, Bukit Besar, Kwala Kemaman (Dr. Johnston). Kedah Peak. *Distrib.* Daun Chuchur Atap. *Use*: Dried leaves sold in markets for an aromatic tea for fever.

2. LEPTOSPERMUM, Forst.

Bushes with narrow oblong-lanceolate coriaceous leaves, subsessile, aromatic; nerves 1 to 3. Flowers solitary or 2 to 3 together on branch-ends, white. Calyx campanulate, 5-lobed. Petals 5, round. Stamens many in 1 row, not longer than petals. Ovary 5- (rarely 3- to 4-)celled. Capsule opening above loculicidally. Seeds linear, numerous. Species about 30 Australian, 1 Malayan.

(1) *L. flavescens* Sm. *Trans. Linn. Soc.* iii. 262; *Bot. Mag.* t. 2695; *King, l.c.* 69.

A bush 1 to 8 ft. tall or a small tree. Leaves often silky on edge, .4 to 1 in. long, .1 to .2 in. wide, sub-acute. Flowers sessile or nearly so .4 to .5 in. wide. Calyx-tube glabrous or silky. Capsule .15 to .25 in. long, 4- to 5-valved, turbinate. *Hab.* Dry spots on mountains, common at 4000 to 7000 ft. altitude.

var. *javamica* King, l.c. Leaves oblanceolate to lanceolate blunt or acute, edges, as well as bracts and calyx, silky at high altitudes, but glabrous at lower ones. Malacca, Mt. Ophir (all collectors). Pahang, Gunong Tahan. Selangor, Gunong Mengkuang Lebah (Robinson). Perak, Gunong Inas (Yapp); Gunong Bubu (Kunstler); Gunong Kerbau (Robinson). Kedah, Gunong Bintang (Kloss). *Distrib.* Moulmein, Malay islands. Type of species Australia.

var. *angustifolia* Ridl. Leaves very narrow, linear-lanceolate, .75 in. long, .1 in. wide, glabrous. Fruit smaller. A very distinct form, resembling some of the Australian forms. Apparently confined to Kedah Peak (Lobb, Ridley). *Native name*: G'lam Bukit. *Use*: The aromatic leaves make a very refreshing tea.

3. MELALEUCA, Linn.

Trees (or shrub). Leaves alternate, lanceolate (or linear), coriaceous. Flowers in spikes (or heads) 5-merous. Calyx-tube sub-globose, lobes 5. Petals 5, white. Stamens very numerous, long. Ovary half inferior; style slender. Capsule dehiscing by 3 valves. Seeds numerous, minute, cuneate. Species 130, all Australian, except 1 Malayan.

(1) *M. Leucadendron* Linn. *Mantissa* 105; *King, l.c.* 70.

A tree about 50 ft. tall, 2 ft. through. Bark papery whitish, peeling off in layers, an inch or more thick. Leaves oblong-elliptic, acuminate sub-acute; nerves vertical, 5 to 7, glabrous (except

when young), 1·5 to 5 in. long, ½ to 1 in. wide (largest on young shoots); petioles short. Spikes 2 to 6 in. long, flowers in whorls, numerous; rachis silky. (The spike is really the end of a branch with axillary flowers, the leaves suppressed. It continues to grow and become leafy and branch after the fall of the perianth.) Fruit sessile, 1·5 in. across, cylindric, short. *Hab.* In wet low-lying spots and sandy heaths; indigenous, but sometimes planted also. Singapore, Changi. Malacca, wet ground near the town. Setul Heaths. Kelantan, near Kota Bharu. Perlis, Kanga. *Distrib.* Mergui, Cambodia, Borneo, Amboina. *Native names:* Gelam; Kayu Putih (white wood). *Uses:* Leaves for making Caje-put (kayu putih) oil. Bark for caulking boats and lighting fires. Timber for poles, etc.

The form here is *M. minor* with silky spikes. It is certainly wild in the north of the peninsula, and there were apparently wild plants in Singapore, on the east side, at one time. The Malacca Gelam forests were said formerly to have been planted by the Dutch, but are probably wild also.

4. **TRISTANIA**, R. Br.

Shrubs or tall trees. Bark red, peeling off in long flakes. Leaves alternate (rarely opposite), coriaceous, glabrous. Flowers small, white, in pedunculate axillary cymes. Calyx-tube turbinate campanulate; lobes persistent. Petals 5, imbricate. Stamens numerous, shorter in 5 bundles, opposite petals. Ovary inferior or half inferior, 3-celled. Capsule loculicidally 3-valved. Seeds linear or winged above. Species 25, Malayan and Australasian. Malay name: Palawan.

- | | |
|--------------------------------------------------------------------------------------|------------------------------|
| Leaves sessile sub-auriculate | (1) T. sub-auriculata |
| Leaves narrowed to petiole; big trees; cymes shorter than leaves; leaves coriaceous. | |
| Leaves 6 to 8 in. by 2·25 in.; petiole winged to base | (2) T. merguensis |
| Leaves lanceolate, distinctly petioled, 1·75 to 3·5 in. long | (3) T. Maingayi |
| Leaves oblanceolate; shrub. | |
| Nerves very numerous; calyx in fruit very short, recurved | (4) T. fruticosa |
| Nerves 13 pairs; calyx cupular one-third length of fruit | (5) T. spathulata |
| Tree. Cymes longer than leaves; leaves thin; flowers very small | (6) T. Whiteana |

(1) **T. sub-auriculata** *King, l.c. 72.*

Tree 10 to 40 ft. tall, up to 20 in. through. Leaves very coriaceous, sessile, obovate-oblong, blunt or sub-acute, base auricled, glabrous, 2·5 to 6 in. long, 1·5 to 2·5 in. wide. Cymes few-flowered, 5 to 7·5 in. long; peduncle stout, silky. Flowers 2·5 in. across. Calyx tubular, campanulate, pubescent; teeth triangular, short. Petals round, pale yellow. Capsule sub-globular, 2·5 in. across.

Hab. Limestone rocks, local. Perak, Kwala Dipang and Gunong Malacca (Kunstler).

(2) **T. merguensis** *Griff. Journ. As. Soc. Beng.* 1854, p. 637. *Ic. Pl. Asiat. t.* 636, f. 3; *King, l.c.* 72.

Tree. Leaves obovate or oblanceolate, blunt or blunt-acuminate decurrent to the base of the petiole, 6 to 8 in. long, 1·25 to 2·25 in. wide. Cymes stout, 1·5 to 2 in. long, pubescent. Flowers densely crowded at the tips, ·25 in. across. Calyx pubescent, broad cupular. Petals transversely oblong, clawed. Capsule ·4 in. through, half enclosed by calyx. *Hab.* Woods on mountains and coast. Singapore, Sungei Morai. Johor, Gunong Pantai. Malacca, Cape Rachado (Finlayson, Wall. Herb. 3648, 3649); Mt. Ophir (Griffith and all collectors). Negri Sembilan, Bukit Senaling (Hudson); Pasir Putih (Foxworthy); Pahang, Pekan; K'luang Terbang (Barnes). Perak (Scortechini), Dindings, Lumut. *Distrib.* Tenasserim.

The mountain forms have usually smaller and thicker leaves than the coast forms.

(3) **T. Maingayi** *Duthie, in Hook. fil. F.B.I.* ii. 467.

Tree. Bark yellowish white, not peeling (Maingay). Leaves narrow oblanceolate acute or blunt acuminate, narrowed gradually to base, 1·75 to 3·5 in. long, ·5 to 1·25 in. wide; petioles ·1 to ·2 in. long, not winged. Cymes ·5 to 1·25 in. long, pubescent. Flowers few, crowded, ·2 in. across. Calyx cup-shaped; teeth sub-acute. Petals round. Capsule globose, ·3 in. long covered by the calyx to the top. Seeds winged. *Hab.* Penang Hill at 2000 ft. altitude (Maingay, Curtis). *Native name* : Pasir Lingga.

(4) **T. fruticosa** *Ridl. Journ. F.M.S. Mus.* vi. 147.

Bushy shrub 3 to 4 ft. tall. Bark red, flaking. Leaves stiff coriaceous, oblanceolate, blunt, slightly narrowed at tip, long narrowed at base, decurrent on petiole, dark green, 2 to 4 in. long, 1 to 2 in. wide. Cymes axillary and terminal, 1 in. long, puberulous. Flowers ·25 in. across, glabrous. Calyx cupular; lobes spreading. Petals obovate small. Capsule ·25 in. long, only attached to calyx at base. Seeds 3 in each cell. *Hab.* In woods on rocky slopes at high altitudes, local. Pahang, Gunong Tahan on the Padang at 4500 ft. altitude.

The nerves of the leaf are very numerous, and the calyx in fruit remarkably short and saucer-shaped.

(5) **T. spathulata** *Ridl. Journ. Roy. As. Soc. S. Br.* 82, p. 185. *T. obovata* *King, l.c.* 73, *not of Bennett.*

Shrub about 12 ft. tall. Leaves stiff coriaceous, oblanceolate blunt, spathulate or lanceolate narrowed to a blunt point, base long acuminate, midrib prominent on back; nerves faint 13 pairs, intramarginal conspicuous, 2·5 to 2·75 in. long, ·75 to 1 in. wide; petioles ·25 in. long. Flowers not seen. Fruit ·25 in. long. Calyx

cupular with very short points, 1 in. long; valves broad, oblong, tip round, blunt. *Hab.* Rocky places near sea, Pulau Battam (Ridley).

This species grows just outside our area, but so close that we may expect it on our southern coasts.

(6) **T. Whiteana** Griff. *Pl. Cantor.* 18; *King, l.c.* 73. *T. Wightiana* Duthie, in Hook. *fil. F.B.I.* ii. 466 (by error).

Tree. Leaves oblanceolate, thinly coriaceous, blunt acuminate, long, narrowed to the base, .3 to 5.5 in. long, .75 to 1.75 in. wide; petioles .25 to .5 in. long. Cymes corymbose paniced; peduncles 5 to 6 in. long. Inflorescence 2 to 3 in. wide, pubescent velvety. Flowers .1 in. across, white. Calyx obconic, pubescent. Petals orbicular. Capsule .1 in. across, free from calyx except at base. *Hab.* Woods by the sea and along rivers in the lowlands. Singapore (Wallich); Pulau Ubin; Raffles Lighthouse. Johor, Kota Tinggi; Scudai River. Pahang, Tahan River; Kerat Road, Bentong and Sungei Riau, Kwantan (Foxworthy). *Distrib.* Sumatra. *Native names* : Pelawan; Chagal.

5. RHODAMNIA, Jack.

Small trees. Leaves opposite, 3-nerved, silky pubescent beneath. Flowers small, white, fascicled or shortly racemed. Calyx-tube ovoid; lobes 4, persistent. Petals 4. Stamens numerous. Ovary 1-celled, placentas parietal; style filiform. Stigma peltate. Berry globose with few reniform seeds. Species 6, Malaya and Australia, Burma and Siam.

(1) **R. cinerea** Jack, *Mal. Musc.* ii. No. 7, 48. *R. trinervia* Bl. *Ann. Mus. Bot. Lugd. Bat.* i. 79; *King, l.c.* 74. *R. spectabilis* Bl. *l.c.* 78.

Tree about 30 ft. or more tall. Leaves ovate-oblong, acuminate, above glabrous reticulate, beneath white silky (or in shady places green on both sides), 1.75 to 4.5 in. long, .72 to 2 in. wide; petioles .2 to .35 in. long. Peduncles fascicled, silky, 4 to 6 together, .25 in. long. Flowers .25 in. across, white. Berry black. *Hab.* Common in secondary jungle and woods all over the peninsula. King's var. *concolor*, with the leaves green on both sides, is merely a state of the plant grown in the shade. *Distrib.* Tavoy, Siam, Malay islands and Australia. *Native names* : Empoyan; Empoyan Batu; Munkoyan Pinang; Rusa Babi (Johor); Sedomang (Malacca). *Use* : Timber hard though small.

var. *caudata* Ridl. Leaves rather stiffly coriaceous; nervules more prominent, minutely conspicuously reticulate above, ovate-elliptic 2.5 to 4 in. long, with a long narrow acute point .5 to 1 in. long. Pedicels very slender, 2 to .5 in. long, nearly glabrous, as is the narrow, funnel-shaped calyx. Petals glabrous, .2 in. long. *Hab.* Mountains at 4000 to 5000 ft. altitude. Pahang at Wray's

Camp, Tahan. Perak, Gunong Kerbau (Robinson). A plant collected by Robinson at Koh Pennam, just outside of the boundary, has the leaves of *cinerea*, though more acuminate and reticulate, and the flowers and pedicels of *caudata*, except that the petals are silky.

var. *uniflora* Ridl. *Journ. F.M.S. Mus.* vi. 146.

Shrub 10 to 12 ft. tall. Leaves coriaceous stiff elliptic acuminate, fugaciously silky above, dotted silvery beneath, 1·2 in. long, '5 to '75 in. wide; petioles '4 in. long. Flowers 1 to 2 in each axil; pedicel '15 in. long silky. Petals glabrous. Fruit silky. *Hab.* Mountains over 4000 ft. altitude. Pahang, Gunong Tahan at Wray's Camp and upwards. Malacca, Mt. Ophir (Griffith). Perak, Gunong Kerbau at 5500 ft. altitude (Robinson).

6. RHODOMYRTUS, DC.

Bushes, tomentose. Leaves opposite, 3-nerved. Flowers large axillary. Calyx turbinate oblong; lobes 5 (rarely 4). Petals 5 (rarely 4) spreading. Stamens indefinite. Ovary 1- to 3-celled; style filiform. Berry ovoid, sweet with many reniform seeds. Species 5, Australian, 1 Indo-Malayan.

(1) *R. tomentosa* Wight *Spicil. Neilgh.* i. 60, t. 71; *King, l.c.* 75.

Shrub 4 or 5 ft. tall, tomentose. Leaves glabrous above, tomentose beneath, elliptic-obovate blunt, 1·5 to 2·5 in. long, '65 to 1 in. wide; petioles '15 in. long. Flowers 1 to 3 together. Petals rose pink turning white, obovate. Fruit oblong ovoid tomentose, light purple, pulp sweet. *Hab.* Common in open lowland dry country and sandy heaths, Singapore, Johor, Malacca, Perak, Tringganu, Penang, Setul. *Distrib.* China, S. India, Malay islands to Philippines, Cambodia. *Native name*: Kamunting.

7. DECASPERMUM, Forst.

Small bushy trees. Leaves opposite. Flowers small white in axillary and terminal panicles. Calyx campanulate, lobes 4 to 5. Petals 4 to 5. Stamens numerous in several series. Ovary 4- to 5-celled. Ovules 2 or few in each cell. Berry globose. Seeds 8 to 10, reniform, sub-globose. Species about 6, tropical Asia, Australia, Polynesia.

Tree. Leaves oblong to ovate-lanceolate; flowers

panicked

Shrub. Leaves obovate; flowers racemose

(1) *D. paniculatum*

(2) *D. montanum*

(1) *D. paniculatum* Kurz, *Journ. As. Soc. Beng.* xlvi. (2), 61; *Wight, Ill.* ii. t. 97, fig. 10.

A small tree about 30 ft. tall. Young parts and inflorescence silky tomentose; nerves 10 fine, glabrous except midrib on both sides and edges, 1·25 to 3·5 in. long, '4 to 1 in. wide; petioles '1 to '3 in. long. Panicles axillary 1 to 2 in., terminal one 3 in. long.

Flowers .2 to .3 in. wide. Petals white hairy. Berry globose, .1 in. through, black. *Hab.* Common in woods all over the peninsula from Singapore to Lankawi, in lowland districts. The plant varies to some extent in form of leaves and hairiness, and is sometimes unisexual, and some of these forms have received names. *Distrib.* Burma, India, Malay Archipelago. *Native names:* Kelintat Nyamok; Kelintat Kring; Kelapit Nyamok; Empoyan Padang; Kamuning Batu.

(2) **D. montanum** *Ridl. in Journ. Roy. As. Soc. S. Br.* 61, p. 6.

A shrub. Leaves opposite, coriaceous, obovate blunt, base narrowed; nerves 5, inconspicuous, 2 to 3 in. long, 1 to 1.5 in. wide; petioles .1 in. long. Flowers 6 in axillary racemes 1 in. long, small, white, often unisexual. Male flowers larger than female. Sepals orbicular, ciliate. Petals obovate. Female flowers clove-shaped with abortive stamens. Berry .13 in. long, globular. Seeds 4 to 5 reniform. *Hab.* Mountains at 4000 ft. altitude. Malacca, Mt. Ophir and Kedah Peak (Ridley).

8. EUGENIA, Linn.

Trees, shrubs, very rarely climbers, glabrous, rarely hairy. Leaves opposite, usually coriaceous; nerves pinnate, inarching in an intramarginal vein. Inflorescence paniced or cymose, usually terminal, with some panicles in the upper axils, occasionally fascicled, rarely racemose, sometimes on the old wood. Bracts very small, usually caducous. Flowers small or moderate, few or very many. Calyx campanulate or funnel-shaped, narrowed to a pseudo-stalk; lobes 4 to 5. Petals from mouth of calyx caducous, free or joined into a cap (calyptrate). Stamens numerous, white, red or green, in one or more circles; filaments filiform; anthers minute. Style filiform. Ovary inferior. Fruit 1- or 2-seeded; pericarp pulpy or pithy. Species about 1000, whole of the tropics. A very difficult genus to break up into sections or to give a suitable key to species.

i. JAMBOSA. Leaves usually large. Flowers in small fascicles usually large and terminal. Calyx funnel-shaped (in 1 species fusiform); lobes large, persistent. Petals free, large. Staminal disc thickened. Stamens long. Fruit usually large, fleshy or pulpy.

Trees.

Flowers fascicled on old wood, 2 to 3 in. wide.

Flowers on branches, crimson; fruit oblong large; leaves oblong .

(1) **E. malaccensis**

Flowers on trunk, crimson; fruit small; leaves lanceolate .

(2) **E. trunciflora**

Flowers on ends of branches, white, 1 in. across or more.

Fruit large, pear-shaped; leaves narrow .

(3) **E. Jambos**

Fruit turbinate; leaves broader .

(4) **E. aquea**

- Fruit globose; leaves elliptic lanceolate (5) *E. pseudo-formosa*
 Leaves very narrow, willow-like (6) *E. tiumanensis*
 Leaves elliptic, round; flowers 2 in. wide (7) *E. johorensis*
 Flowers red; leaves oblong; fruit oblong 5 in. long (8) *E. Scortechinii*
 Flowers pink and white; leaves thin, lanceolate (9) *E. siamensis*
 Flowers terminal and below the leaves; leaves elliptic petioled; flowers cymose white (10) *E. javanica*
 Leaves sub-sessile 12 to 18 in. long, cordate (11) *E. perakensis*
 Leaves 6 to 9 in. long, base auricled (12) *E. auriculata*
 Flowers smaller .5 in. wide in terminal cymes.
 Calyx campanulate; leaves elliptic; flowers white (13) *E. pendens*
 Calyx funnel-shaped; leaves lanceolate; flowers white (14) *E. Rostadonis*
 Calyx fusiform; flowers white (15) *E. fusiformis*
 Flowers red in terminal raceme; calyx campanulate (16) *E. porphyrantha*
 Flowers pale green; leaves few-nerved (17) *E. plumbea*
Mountain shrub; leaves round or obovate, stiff coriaceous (18) *E. jugalis*
Stream-shrub; leaves coriaceous, very narrow (19) *E. salictoides*
- ii. JAMBOSELLÆ. Flowers smaller, hardly .5 in. wide in single terminal panicles; petals free.
 Panicles spreading, hairy, wide (20) *E. mollis*
 Panicle spreading, glabrous, moderate (21) *E. Foxworthyi*
 Panicles compact, glabrous.
 Trees with red, flaky bark.
 Flowers numerous, crowded; leaves elliptic, sub-acute; nerves few (22) *E. densiflora*
 Flowers fewer, smaller; leaves lanceolate acuminate or cuspidate; nerves many (23) *E. limnæa*
 Flowers numerous; leaves stiff, coriaceous lanceolate acuminate (24) *E. Gageana*
 Bark not red-flaky; leaves elliptic, sub-obtuse; panicle rather few-flowered.
 Calyx not ribbed (25) *E. grandis*
 Calyx ribbed (26) *E. lepidocarpa*
 Leaves short, very coriaceous; panicle branches thick (27) *E. selangorensis*
 Leaves 7 to 12 in. long, oblong-elliptic; branches 4-angled (28) *E. quadrata*
 Branches terete; base of leaves narrowed, petiolate; panicle glabrous (29) *E. garcinifolia*
 Leaves amplexicaul; panicle velvety
 Panicles several fascicled, peduncled from upper axils and terminal branches short; flowers small. (30) *E. papillosa*

- Leaves 5 in. long.
 Nerves slightly elevate (31) *E. Griffithii*
 Nerves strongly elevate (32) *E. Duthieana*
 Nerves very close, parallel numerous (33) *E. Goodenovii*
- Leaves 6 to 12 in. long; flowers small.
 Calyx ribbed (34) *E. Hemsleyana*
 Fruit ribbed, 2-seeded, large (35) *E. corrugata*
 Calyx not ribbed.
- Leaves 4 in. long or less; flowers
 2 in. across (36) *E. Koordersiana*
- Leaves 9 in. long, drying black;
 flowers 25 to 4 in. wide (37) *E. Dyeriana*
- Leaves 12 in. long; flowers 75 in.
 wide; fruit smooth, dries black (38) *E. pergamentacea*
- Leaves stiff, coriaceous, 6 in. long;
 flowers and fruit small, dries
 brown (39) *E. subrufa*
- Leaves sub-ovate 6 in. long; flowers
 5 in. wide; bark whitish (40) *E. pachyphylla*
- Leaves elliptic, cuspidate; panicles
 very short and dense; bark
 whitish (41) *E. Hoseana*
- Panicles fascicled with spreading branches
 and fruit small.
- Leaves lanceolate (42) *E. subhorizontalis*
 Leaves elliptic dry black; nerves few (43) *E. Thumra*
 Leaves elliptic pale beneath; nerves
 many, close (44) *E. Robinsoniana*
- Panicles axillary and terminal short few-
 flowered.
- Flowers bright pink; leaves 6 in. long (45) *E. chlorantha*
 Flowers white; leaves elliptic cuspidate. (46) *E. Benjamina*
- Panicles terminal only, large; leaves
 drying green; nerves very fine;
 leaves 3 in. long; flowers
 moderate.
- Panicles short 1.5 in. long, few-branched. (47) *E. Helferi*
- Panicles 3 in. long, few-branched;
 reticulations obscure (48) *E. Hullettiana*
- Panicles 4 in. across; reticulations con-
 spicuous (49) *E. Burkilliana*
- Panicles rather small, few-flowered; leaves
 dry fuscous.
- Leaves 6 in. long; nerves about 6 pairs,
 remote; flowers light green (50) *E. Ridleyi*
 Leaves 4 in. long narrow, many-nerved (51) *E. anisosepala*
 Leaves elliptic cordate; petioles very
 short (52) *E. cordifoliata*
- Panicles short, dense, few-flowered; leaves
 6 in. long dry greenish; branches
 pustular (53) *E. pustulata*
- Flowers in very short axillary and ter-
 minal racemes of 5 flowers (54) *E. variolosa*
- Leaves coriaceous, glaucous beneath;
 panicles few-flowered, lax.
- Leaves obovate, short, mucronate (55) *E. glauca*
 Leaves larger narrowed to tip (56) *E. pseudo-glauca*
 Leaves not glaucous, small, elliptic cus-
 pidate; flowers small chiefly in
 axillary cymes (57) *E. cymosa*

- Leaves thin coriaceous, fine-nerved;
panicles large, terminal; calyx
funnel-shaped.
- Stamens 1 in. long; calyx ribbed;
fruit 1 in. long (58) *E. pyrifolia*
- Stamens .5 in. long; calyx not ribbed;
fruit .5 in. long (59) *E. lineata*
- Panicles small, dense, axillary and ter-
minal; leaves stiff coriaceous
small.
- Calyx sub-obconic; small trees or shrubs;
bark red, flaky.
- Tree, calyx pustular; bract short . . . (60) *E. zeylanica*
- Small tree; calyx ribbed; bracts
short (61) *E. grata*
- Small tree; calyx ribbed; bracts
broad, oblong, truncate (62) *E. polita*
- Leaves ovate minutely cordate, sessile,
broad; cymes few-flowered,
terminal.
- Tree; nerves inconspicuous (63) *E. tecta*
- Shrub 2 ft. tall; nerves strongly
elevate (64) *E. pseudo-tetraptera*
- Leaves ovate cordate 1 in. long; flowers
very small; bracts broad (65) *E. jasminifolia*
- Leaves elliptic cordate; flowers few on
slender branches and pedicels.
- Pedicels 1 in. long; leaves long,
caudate (66) *E. caudata*
- Pedicels filiform, nearly 1 in. long;
leaves shorter caudate (67) *E. filiformis*
- Flowers with long narrow calyx-tube.
- Flowers small in terminal clusters . . . (68) *E. penangiana*
- Flowers larger orange or yellow, all in
very short axillary racemes.
- Leaves thin coriaceous; flowers pale
orange; calyx and pedicel .25
in. long (69) *E. leptantha*
- Leaves stiff coriaceous; flowers
white; calyx and pedicel .75 in.
long (70) *E. claviflora*
- Flowers on numerous short panicles or
cymes axillary below the leaves.
- Leaves coriaceous; cymes .25 in.
long, dense (71) *E. conglomerata*
- Leaves thinly coriaceous; cymes
spreading 1 in. or more.
- Leaves 6 in. long; flowers very
crowded often in short cymes . . . (72) *E. urceolata*
- Leaves 4 to 6; panicles spreading
1 in. or more; calyx lobed (73) *E. polyantha*
- Cymes short axillary in all axils;
flowers large (74) *E. Graeme-Andersoniæ*
- iii. SYZYGIIUM. Flowers small 4- to 5-merous; calyx disc not thickened;
lobes 4 to 5 or 0; petals calyptate (connate falling off as a cap); drupes
small; panicles terminal.
- Leaves 9 in. long; panicle large; branches
not winged; nerves very
prominent (75) *E. valdevenosa*

- Leaves 6 to 8 in. long; branches winged . (76) **E. alata**
 Leaves 4 to 5 in. long; nerves fine, not prominent.
 Panicles terminal compact; leaves elliptic cuspidate . (77) **E. oblongifolia**
 Panicles several fascicled, terminal.
 Leaves broad; nerves 5 pairs, faint . (78) **E. cinerea**
 Leaves light green; nerves numerous faint; panicles 1 in. or less long (79) **E. chloroleuca**
 Leaves 4 to 5 in. long; panicles lax of few rather large flowers.
 Nerves over 20 pairs distinct; flowers .5 in. wide . (80) **E. Klossii**
 Nerves over 20 pairs, faint; flowers .25 in wide . (81) **E. expansa**
 Nerves 12 pairs; flowers in very short panicles (under .5 in. long) . (82) **E. pauper**
 Leaves 4 to 5 in. long; nerves about 8 pairs ascending distinct; panicles fasciculate, spreading; flowers and fruit very small.
 Leaves coriaceous.
 Leaves 4 to 6 by 2 in., elliptic . . (83) **E. microcalyx**
 Leaves 2 by .3 in., lanceolate or oblanceolate . . (84) **E. myriantha**
 Leaves elliptic or obovate, blunt; panicles small usually . . (85) **E. pseudo-subtilis**
 Leaves thin; nerves 8 pairs, prominent 5 by 1.5 in. . . (86) **E. Kunstleri**
 Leaves thick coriaceous, obovate blunt; nerves faint, numerous; fruit .5 in. long . . (87) **E. venulosa**
 Nerves numerous, faint, parallel, hardly ascending; leaves obovate, dry greenish; panicle small, terminal; flowers small.
 Bracts conspicuous; leaves narrowed at tip . . (88) **E. bracteolata**
 Bracts 0; leaves obovate often retuse. (89) **E. punctulata**
 Leaves 4 to 6 in. long, dry pale green; nerves very fine and inconspicuous, nearly parallel; leaves thin coriaceous; panicles wide; flowers very small.
 Leaves lanceolate acuminate 4 in. long; fruit .5 in. long, blue . . (90) **E. acuminatissima**
 Leaves elliptic-oblong, abrupt acuminate 6 in. long . . (91) **E. Evansii**
 Leaves elliptic, base long acuminate, 2.5 in. long . . (92) **E. pallidula**
 Leaves lanceolate, long acuminate 2 in. long, panicle wide; flowers minute . . (93) **E. verecunda**
 Leaves elliptic acuminate, 2 in. long, stiff; panicle short . . (94) **E. scoparia**
 Leaves lanceolate-elliptic; panicles dense; flowers rather large.
 Flowers large .5 in. wide; leaves lanceolate acuminate . . (95) **E. oblata**

- Flowers .2 in. wide, dense crowded;
leaves lanceolate-acuminate . . . (96) *E. Curtisii*
- Flowers .3 in. wide, dense; leaves
lanceolate caudate . . . (97) *E. linocierioidea*
- Flowers .1 in. wide; panicles of few
branches; leaves coriaceous, stiff,
bluntly caudate (mountains) . . . (98) *E. cyrtophylloides*
- Flowers .25 in. wide, few; panicles
very lax; leaves small, lanceo-
late . . . (99) *E. myrtifolia*
- Leaves stiff coriaceous, narrowed to
base; nerves very fine, parallel
drying black; panicle large,
dense, many-flowered.
- Flowers .25 in. wide; leaves oblong-
lanceolate acuminate, broad . . . (100) *E. inophylla*
- Flowers .5 in. wide; leaves narrow
lanceolate . . . (101) *E. laxiuscula*
- Flowers .25 in. wide; leaves more
rigid; fruit large, a prolonged
cylindric calyx-tube . . . (102) *E. Prainiana*
- Flowers smaller and fewer; leaves
shorter abruptly cuspidate . . . (103) *E. nigricans*
- Leaves broad elliptic narrowed to base;
panicles short . . . (104) *E. inasensis*
- Leaves stiff coriaceous; nerves close
horizontal, numerous; leaves
round, blunt or very shortly
narrowed.
- Leaves 5 by 3 in., base narrowed, edge
crenulate . . . (105) *E. crenulata*
- Leaves 4 by 2.5 in., base very short
narrowed not crenulate, bright
green . . . (106) *E. pahangensis*
- Leaves obovate 4 by 2.5 in.; nerves
8 pairs . . . (107) *E. tahanensis*
- Base of leaves rounded quite blunt;
nerves fine and close.
- Leaves nearly sessile, ovate or oblong. (108) *E. subdecussata*
- Leaves sub-sessile, oblong, pale green
(mountains) . . . (109) *E. viridescens*
- Mountain shrubs or small trees; leaves
very coriaceous, small, crowded;
flowers rather large in dense
heads, sub-sessile.
- Leaves lanceolate elongate long acu-
minate; calyx campanulate,
warty . . . (110) *E. longicauda*
- Leaves narrowed to base, lanceolate
rhomboid, petioled, 1.75 in. long. (111) *E. rhomboidea*
- Leaves obovate, slightly narrowed at
base .5 in. long . . . (112) *E. Stapfiana*
- Leaves obovate, 1.25 by 1 in.; flowers
1 in. long . . . (113) *E. oreophila*
- Leaves round cordate, sub-sessile.
- Leaves 2 by 1.75; flowers .2 in.
long . . . (114) *E. spissifolia*
- Leaves 1 by 1 in.; flowers .3 in. long (115) *E. Wrayi*

- Leaves .75 by .75 in.; flowers .1 in.
 long (116) *E. clypeolata*
 Trees, panicles below the leaves; flowers
 small, no calyx-lobes.
 Leaves finely close-ribbed (117) *E. Jambolana*
 Leaves with few distant nerves (118) *E. operculata*
 Leaves lanceolate, densely punctate
 beneath; nerves 13 pairs (119) *E. balsamea*
 Climber with bristly stems (120) *E. setosa*

(1) *E. malaccensis* Linn. *Sp. Pl.* 470; *Duthie, in Hook. fil. F.B.I.* ii. 82.

Tree about 40 to 60 ft. tall, 12 in. through. Leaves stiff coriaceous dark green, oblong; nerves rather slender, conspicuous, 8 to 12 in. long, 3 in. wide, base narrowed; petioles thick .2 in. long. Flowers on the branches below the leaves, 2 in. across, crimson pink. Fruit oblong pear-shaped, 3 in. long, 1 to 2 in. through, white, or blotched pink or entirely light or dark pink. *Hab.* Orchards, cultivated. Origin unknown. *Native name:* Jambu Bol. *Use:* Fruit eaten raw, cooked or in syrup.

(2) *E. trunciflora* Ridl. *E. cauliflora* Ridl. *Trans. Linn. Soc.* iii. 299, *not of Bergius*.

Tree about 40 ft. tall. Leaves elongate, cordate acuminate acute, sessile, coriaceous, glaucous beneath, 18 in. long, 2 in. wide; nerves over 30 pairs. Panicles short, few-branched. Branches slender, 2 in. long, on the trunk, 8-flowered. Flowers 1 in. long; pedicels .25 in. long, entirely crimson. Calyx short obconic lobes 4, ovate. Petals ovate, round, .35 in. long. Stamens 1 in. long. Fruit small. *Hab.* Local in dense forests. Pahang, Tahan River woods (Ridley).

(3) *E. Jambos* Linn. *Sp. Pl.* 470; *King, l.c.* 82.

Shrub about 12 to 14 ft. tall or small tree. Leaves narrow lanceolate acuminate, base narrowed; nerves prominent 10 pairs, secondaries nearly as prominent, 4 to 6 in. long, 1 to 1.5 in. wide; petioles thickened at base, .2 in. long. Flowers white, about 2 in. across in a terminal corymb of about 5. Calyx turbinate, lobes large, round. Fruit pear-shaped, 3 in. long or more, 1 to 2 in. through, white. *Hab.* Cultivated in gardens; probably of Indian origin. *Native name:* Jambu Mawar. Rose apple. *Use:* Fruit eaten.

(4) *E. aquea* Burm. *Fl. Ind.* 114; *Duthie, in Hook. fil. F.B.I.* ii. 473.

Small tree. Branchlets 4-angled. Leaves oblong-lanceolate, short acuminate; nerves prominent about 10 pairs, inarching .1 in. from edge, 6 to 12 in. long, 2 to 3 in. wide; petioles .05 to .1 in. long. Flowers about 4 or 5 in a cyme, 1 in. across, white. Calyx turbinate, .5 in. long; lobes rounded. Fruit turbinate, 1 to 1.5 in. long, translucent pink or white, juicy. *Hab.* Cultivated in gardens, probably native of India. *Native name:* Jambu Ayer. *Use:* Fruit eaten.

(5) **E. pseudo-formosa** King, *l.c.* 83. *E. formosa*, King, *l.c.* 80, *not of Wallich*. *E. nemoricola* Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 9. *Jambosa lanceolata* Miq. *Fl. Ind. Bat.* i. 1426.

A shrubby plant or straggling tree. Branchlets pale. Leaves elliptic-lanceolate or narrow lanceolate, base cordate, rather stiffly coriaceous, pale when dry; nerves 12 to 14 pairs, prominent, in-arching .2 in. from the edge, 8 to over 12 in. long, 2.5 to 4 in. wide; petioles thick, corky; .2 in. long. Flowers white, 1 in. across or more, 3 to 5 shortly stalked, at the end of the branch. Calyx campanulate with a rather long pseudo-stalk; lobes short, round, 1 in. long on pedicel .5 in. long. Fruit globose, medium-sized. *Hab.* Thick forests up to 2000 ft. altitude. Singapore, Garden Jungle. Selangor, Weld's Hill, Kwala Lumpur (Foxworthy). Perak, Larut (Kunstler). Penang, Richmond Pool; Moniot's Road (Curtis). *Distrib.* Sumatra.

The Burmese *E. formosa* Wall. differs in being a big tree with axillary pink flowers and a different venation. A plant collected by me at Klang Gates may possibly be this, but it was in too poor a condition to be certain.

(6) **E. tiumanensis** Ridl. *Trans. Linn. Soc.* iii. 299.

A big tree. Branches slender. Leaves thin, narrow lanceolate acuminate, 4 in. long, 1 in. wide; petioles 1 in. long, slender. Flowers sessile in a terminal head, white. Calyx campanulate; lobes large round, .5 in. long. Petals short, oblong, round. Stamens .5 in. long. *Hab.* Rare in rocky jungle. Pulau Tiuman (Ridley).

(7) **E. johorensis** Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 8.

Tree. Branches 4-angled. Leaves elliptic acuminate blunt, base round, coriaceous; nerves beneath elevate 8 pairs, secondaries nearly as prominent, intramarginal .25 in. from the edge, 4 to 5 in. long, 2 in. wide; petioles .25 in. long stout. Raceme terminal, 1 in. long. Flowers in pairs 2 in. across. Calyx short, campanulate, abruptly narrowed; lobes 4, ovate obtuse. Petals .5 in. long. Stamens 1 in. long. *Hab.* Forests. Johor, Gunong Pulau (Ridley).

(8) **E. Scortechinii** King, *l.c.* 85.

Tree 20 to 30 ft. tall. Branches angled. Leaves sub-coriaceous, ovate oblong to lanceolate acute, base rounded, narrowed; nerves prominent, 7 to 10 pairs inarching to form an intramarginal .2 in. from edge, with another much finer near the edge, 4 to 6 in. long, 1.35 to 2.35 in. wide; petioles .15 in. long or 0. Racemes terminal, condensed, about 7-flowered, 1.5 in. long. Flowers 1 in. across, red. Calyx campanulate, narrowed to a short pseudo-stalk .4 in. long; lobes broad, short, unequal. Petals red, orbicular. Fruit oblong .5 in. long, crowned by a deep-cupped calyx. *Hab.* Swampy forests. Johor, Kota Tinggi. Malacca (Maingay). Perak, Ulu Bubong and Goping (Kunstler).

var. *parvifolia* King. Leaves narrow lanceolate. *Hab.* Pulau Tiuman (Burkill). Perak, Ulu Bubong (Kunstler).

- (9) **E. siamensis** Craib, *Kew Bulletin*, 1911, p. 153.

Small tree. Leaves thinly coriaceous lanceolate acuminate, base narrowed, cuneate; nerves distinct 13 pairs, intramarginal inarching, 7·5 in. long, 2·5 in. wide; petioles 2·5 in. long. Flowers 3 to 4, terminal; pedicels 5 in. long. Calyx-tube funnel-shaped, 5 in. long, base rose, upper part white. Sepals ovate, 2·5 in. long. Petals rounded, oblong, 5 in. long. Stamens rose pink, twice as long. *Hab.* Rocky Hill base. Kelantan, base of Gunong, Kota Bharu (Ridley). *Distrib.* Siam.

- (10) **E. javanica** Lam. *Dict.* iii. 200; *King, l.c.* 81.

Large tree about 60 ft. tall or more. Stem 2 ft. or more through. Leaves elliptic, narrowed slightly to rounded base, blunt; nerves about 12, inarching, 2·5 in. from the edge, 6 to 10 in. long, 3 to 4·5 in. wide; petioles 2 in. long. Cymes terminal and axillary of 3 to 5 flowers stalked, on a peduncle 1 to 3 in. long. Calyx cup-shaped 4 in. long, pseudo-stalk 2 in. long, lobes round. Whole flower white, 1 in. across. Fruit 75 in. long, globose, green or whitish, uneatable. *Hab.* Sea-shores and sandy country near the sea. Singapore, Gardens. Malacca (Hervey). Pahang, Pekan. Kedah, Yan. *Distrib.* Andamans and Malay isles.

- (11) **E. perakensis** King, *l.c.* 81. *E. scalarinervis* King, *l.c.* 87.

Tree 50 to 70 ft. tall. Stem 12 to 18 in. through. Leaves very large, coriaceous, oblong-elliptic, sub-acute, base broad, cordate, nearly sessile; nerves very prominent beneath, inarching 2 to 4 in. from the edge, about 20; 12 to 18 in. long, 5 to 8 in. wide; petioles very thick and short. Flowers 6 to 8, fascicled on the branch below the leaves, and terminal; peduncles 5 in. wide, reddish pink. Petals white, 1 to 1·5 in. across. Calyx campanulate, 5 in. long. Stamens long. Fruit globular, ovoid. *Hab.* Dense low wet jungle. Perak, Larut; Goping (Kunstler). Dindings, Lumut.

- (12) **E. auriculata** Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 7.

Tree. Leaves stiff coriaceous, elliptic obtuse, base round, auricled; nerves 12 pairs, inconspicuous beneath, 6 to 9 in. long, 3 in. wide. Flowers fascicled on a short stout peduncle, axillary or terminal, white. Calyx campanulate, narrow to base, no pseudo-stalk, 36 in. long and as wide; lobes obscure 4. Petals oblong 25 in. long. *Hab.* Dindings, Lumut (Ridley).

- (13) **E. pendens** Duthie, *l.c.* ii. 475; *King, l.c.* 94.

A small tree about 20 ft. tall. Leaves rather thin, elliptic shortly acuminate, base narrowed acuminate; nerves 10 elevate beneath, inarching 1 in. from the edge, light green, 4·5 to 6 in. long, 1·5 to 2·5 in. wide; petioles 2 in. long. Cymes few-flowered, 3 to 5 flowers axillary and terminal, 2 in. long; peduncle short or 0. Branches 3. Flowers white 5 in. across. Calyx broad, cup-shaped, 3 in. long, pseudo-stalk very short or 0. Petals pustular.

Fruit globose .75 in. through, crowned by calyx-ring. *Hab.* Common in woods in south. Johor, Gunong Pulai; Gunong Pantai. Malacca, Pulau Besar (Griffith); Tebong. Perak (Wray). Kelantan, Chaning woods (Ridley).

(14) **E. Rostadonis** *Ridl. Journ. Roy. As. Soc. S. Br.* 61, p. 8.

Branches slender. Leaves lanceolate acuminate, base narrowed, thinly coriaceous, 4 to 6 in. long, 1 to 1.75 in. wide; nerves 6 to 7 in. long, elevate beneath, inarching .12 in. from the edge; petioles .25 in. long. Cyme terminal 4- to 5-flowered. Flowers .75 in. across; pedicels .12 in. long. Calyx funnel-shaped, gradually narrowed to the pseudo-stalk, .5 in. long; lobes ovate, over .25 in. long. Petals white, orbicular, .25 in. long. Stamens .5 in. long. *Hab.* Tringgangu, Bundi (Rostado).

(15) **E. fusiformis** *Duthie, l.c.* ii. 479.

Large tree. Leaves thin or rather stiffly coriaceous, elliptic or obovate-lanceolate, sub-acute, base cuneate; nerves numerous or 13 pairs, inarching .15 to 2 in. from edge, with a second intra-marginal near edge, 3.5 to 7 in. long, 2 to 3 in. wide; petioles .3 to .4 in. long. Panicle 1.5 to 2 in. long, terminal, few-flowered; branches few, 4-angled. Flowers pedicelled. Calyx narrow, fusiform, pseudo-stalk with broad campanulate top, lobes rounded. Petals oblong or orbicular .2 in. long. Stamens .3 in. long. Style long persistent. *Hab.* Forests. Johor, Sungei Tempayang (Ridley). Malacca (Maingay). *Distrib.* Borneo, Labuan.

(16) **E. porphyrantha** *Ridl. Journ. Roy. As. Soc. S. Br.* 618.

Tree. Branches terete, slender. Leaves lanceolate acuminate, sub-coriaceous, cordate, 6 in. long, 2 in. wide; nerves 16 pairs, elevate inarching .12 in. from edge; petioles thick, .12 in. long. Raceme short, terminal, 2- to 3-flowered, .25 in. long. Calyx .5 in. long, obconic narrowed to pseudo-stalk; lobes very indistinct. Petals ovate. Stamens .5 in. long, purple. *Hab.* Rare in hill woods. Selangor, Bukit Kutu (Ridley).

(17) **E. plumbea** *King, l.c.* 35.

Tree. Leaves thin coriaceous lanceolate-acuminate, base a little narrowed blunt, shining lead colour when dry; nerves 10 to 12 pairs, sunk above, prominent beneath, inarching into an undulating vein .1 in. from edge, 3 to 6 in. long, 1 to 1.75 in. wide; petioles .1 in. long. Cyme 1- to 3-flowered; peduncle .5 in. long, terminal. Flowers delicate green, 1 in. across. Calyx funnel-shaped .4 in. long. Petals round, reniform. *Hab.* Perak, Gunong Batu Putih (Wray).

(18) **E. jugalis** *Ridl. Journ. F.M.S. Mus.* vi. 47.

Shrub. Branchlets pale. Leaves very coriaceous, elliptic, blunt or round or obovate dotted beneath; nerves 8 pairs, faint on both sides, secondaries and reticulations conspicuous, 1.75 to 2.5 in. long, 1.25 to 1.5 in. wide; petioles thick, .2 in. long, channelled. Corymbs terminal, 1 to 1.5 in. long; branches few, slender; pedicels

·4 in. long. Calyx campanulate ·2 in. long, lobes ovate, rather large. Petals white. Stamens ·5 in. long. *Hab.* Mountains at high altitudes, local. Perak, Gunong Kerbau from 4000 to 6000 ft. altitude (Robinson).

(19) ***E. salictoides*** *Ridl. Journ. Roy. As. Soc. S. Br.* 68, p. 12.

A willow-like bush or small tree. Leaves coriaceous, linear-lanceolate acuminate at both ends, blunt; nerves very fine, numerous, parallel, 4 in. long, ·3 to ·5 in. wide; petioles ·25 in. long. Panicles ·5 in. long; peduncles 1·5 to 2 in. long. Buds pear-shaped, sub-sessile. Flowers white ·5 in. across. Calyx funnel-shaped, narrowed to base, lobes round. Petals ovate 1 in. long. Fruit globose, pithy white, ·5 in. through, on pedicels ·75 in. long. *Hab.* On gravelly banks and islands by rapid streams. Pahang, Tahan River, abundant (Ridley).

(20) ***E. mollis*** *King, l.c.* 86.

Tree 15 to 40 ft. tall, 8 to 15 in. through. Leaves oblong-lanceolate, finely acuminate, base cordate, glabrous above, velvety beneath, as are branchlets and panicle, 9 in. long, 3 to 3·25 in. wide; petioles thick, ·2 in. long. Panicles terminal very lax, spreading about 8 in. long; lower branches 3·25 in. long, upper ones in whorls of 4 ending in cymes of 3 to 5 white flowers about ·5 in. across. Calyx puberulous, funnel-shaped, ·2 in. long, the large round lobes as long; pedicels ·1 in. long. *Hab.* Low dense wet forests, rare. Perak, Larut (Kunstler).

(21) ***E. Foxworthyi*** *Ridl.*

Tree. Leaves lanceolate shortly blunt acuminate, base narrowed, thinly coriaceous; midrib sunk above, prominent beneath; nerves fine, 18 to 20 pairs hardly elevate inarching within the margin, secondary ones often as conspicuous, reticulations fine, small, 6 to 7·5 in. long, 1·5 to 2·5 in. wide; petioles ·25 in. long. Cymes terminal panicked; panicles 4 in. long, 3 in. wide. Branches few eventually angled. Flowers in cymes of 3; pedicels stout, ·25 in. long or less. Calyx-tube funnel-shaped, ·12 in. long; lobes large, round 4 ovate persistent. Petals round white. Stamens long. *Hab.* Pahang, Bukit Goh, Reserve (Foxworthy). Tahan River (Seimund).

(22) ***E. densiflora*** *Duthie, l.c.* ii. 473; *King, l.c.* 84.

Tree about 40 to 60 ft. tall. Leaves coriaceous elliptic oblong acuminate, base cuneate; nerves fine, distinct inarching irregularly, 5 to 7 in. long, 2·5 in. wide; petioles ·2 in. long. Panicle terminal, many-flowered, dense, 4 in. long and wide. Flowers ·75 in. across, white, flushed with pink. Calyx short and broad, cup-shaped. Petals rather large orbicular. Fruit globose with persistent calyx-lobes. *Hab.* Low wet jungle, river-banks. Singapore, Bukit Mandai; Changi. Malacca (Maingay). Pahang, Kwala Tembeling. Perak, Chanderiang and Goping (Kunstler); Kwala Kangsa.

Dindings, Bruas (Burn-Murdoch), Penang, Waterfall. Tomoh (Machado). Kelantan, Chaning.

var. *angustifolia* Ridl., with narrow lanceolate leaves 8 in. long, 2 in. wide. Perak, Ulu Temengoh. Kelantan (Yapp). *Distrib.* Borneo, Java. *Native names*: Kelat Putih Bukit; Jambu Ayer Mawar Antan or Hutan.

(23) *E. limnæa* Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 64. *E. oblongifolia* var. *robusta* King, *l.c.* 112.

Tree. Bark of branches red-flaky. Leaves elliptic coriaceous, base very shortly narrowed, tip acuminate blunt; nerves very fine and numerous, distinctly raised beneath, inarching close to edge, 5·5 in. wide; petioles ·3 to ·4 in. long. Panicles terminal 2 in. long, 2·5 in. wide, on peduncles 1·5 in. long. Flowers numerous, crowded into a dense mass. Calyx campanulate with a slender pseudo-stalk ·2 in. long and as wide; lobes short rounded. Petals free orbicular glandular ·1 in. long. Stamens ·3 in. long. *Hab.* Open country, local. Province Wellesley, Nibong Tebal and Krian (Ridley). Perak (Scortechini).

This resembles *E. densiflora*, but the flowers are hardly half as big. It has no relationship to *E. oblongifolia*, of which King made it a variety.

(24) *E. Gageana* King, *l.c.* 96.

Tree 40 to 50 ft. tall, 6 to 8 in. through. Bark of twigs thin bright brown. Leaves thick coriaceous, oblong-lanceolate blunt acuminate, base cuneate (drying brown); nerves fine 12 to 18 pairs, faint elevate beneath, secondaries and reticulations numerous distinct, 5 to 6 in. long, 1·5 to 2·25 in. wide; petioles ·25 to ·3 in. long. Panicles terminal sessile, 3 in. long, 4·5 in. wide, much branched. Branches 4-angled. Flowers sessile in threes at ends of branches. Calyx narrow campanulate, rather abruptly narrowed to a pseudo-stalk, ·05 in. long; lobes small, waxy white, tinged with red. *Hab.* Dense jungle. Perak, Larut (Kunstler).

The only specimen seen in very young bud looks like *E. densiflora*, but the calyx-lobes are smaller.

(25) *E. grandis* Wight, *Ill.* ii. 17; *Ic. t.* 535; King, *l.c.* 91.

Big tree 60 to 80 ft. tall, 2 ft. through. Bark pale. Leaves stiff coriaceous dark green with numerous fine ribs and reticulations, 4 to 6 in. long, 3 to 4 in. wide, elliptic or oblong or ovate blunt or short acuminate, base narrowed; petioles ·4 in. long, channelled. Panicles terminal and in the uppermost axils 6 in. long and wide. Flowers numerous, white, 1 in. across. Calyx funnel-shaped, smooth, sessile ·3 in. long, lobes short, round. Petals short, round. Stamens ·5 in. long. Fruit globose or elliptic, about ·5 in. through, green. *Hab.* Common on sea shores and now planted largely as a roadside tree. Singapore to Penang and Perlis. *Distrib.* Siam. *Native names*: Jambu Ayer Laut; Krian Batu.

(26) **E. lepidocarpa** Wall. Cat. 3618; King, l.c. 89.

Tree about 40 to 60 ft. tall. Leaves smooth dark green, elliptic stiffly coriaceous blunt to cuspidate, very shortly narrowed at the base; nerves very fine, hardly elevate, about 20 pairs inarching close to the edge, 4·5 to 6 in. long, 2·5 to 3 in. wide; petioles ·5 to 1 in. long. Panicles terminal, 3 in. long, 4 in. wide, many-flowered. Flowers white clustered on the ends of branches 1 in. across. Calyx campanulate narrowed to a short pseudo-stalk, ·2 in. long, longitudinally ribbed; lobes short rounded. Stamens short. Fruit sub-globose, crowned by the conspicuous calyx-rim, ribbed. *Hab.* Common in woods and thickets, Singapore, Johor, Malacca, Perak. *Distrib.* Burma. *Native names:* Samak Tebrau; Samak Ular. *Use:* Bark for tanning nets.

(27) **E. selangorensis** Ridl. Journ. F.M.S. Mus. v. 32.

Tree. Branches thick. Leaves thickly coriaceous elliptic with short deflexed point, base cuneate; nerves very numerous with secondaries and reticulations fine and conspicuous on both sides, 4·5 in. long, 2 in. wide; petioles thick, grooved, ·5 in. long. Panicles sessile terminal, 2 in. long with numerous very thick 4-angled branches (longest ·1 to ·75 in. long). Calyx-tube campanulate, narrowed to a short thick ribbed pseudo-stalk; lobes short, caducous in flower, ·3 in. long. Petals short, oblong, soon falling. Stamens ·3 in. long. *Hab.* Mountains. Selangor, Mengkuang Lebah at 5000 ft. altitude (Robinson).

(28) **E. quadrata** King, l.c. 86.

Tree 20 to 30 ft. tall, 3 to 4 in. through. Branches 4-angled. Leaves thin coriaceous, narrow oblong acuminate, base round cordate; nerves 20 to 25 pairs, inarching ·1 in. from the margin, 8 to 10 in. long, 1·75 to 2·75 in. wide; petioles ·05 in. long. Cymes axillary and terminal, 3 to 5 together or fewer, short; peduncles 1·5 to 2 in. long. Flowers ·5 in. across, white. Calyx campanulate, gradually narrowed into a pseudo-stalk ·5 in. long. Petals orbicular. *Hab.* Low wet ground. Perak, Larut (Kunstler).

(29) **E. garcinifolia** King, l.c. 90.

Tree 70 to 80 ft. tall, 2 to 4 ft. through. Leaves glossy bright green stiffly coriaceous, elliptic-oblong blunt or with a short point, base narrowed; nerves 10 to 12 pairs, fine but conspicuous, inarching ·2 in. from the edge with an intramarginal nerve close to edge, reticulations conspicuous on both sides, 7 to 8 in. long, 3·5 to 4 in. wide; petioles channelled 1 in. long. Panicles 3 in. long, 3·5 in. wide, sessile. Flowers 2 to 3, terminal on branches, white tinted pink. Calyx narrow, campanulate, ·4 in. long, no pseudo-stalk; lobes ovate. Petals orbicular. Fruit (young) globular, ovoid. *Hab.* Perak, Goping and Larut (Kunstler). *Distrib.* Sumatra.

(30) **E. papillosa** Duthie, l.c. ii. 495; King, l.c. 84.

Big tree. Leaves stiffly coriaceous, amplexicaul oblong-elliptic,

blunt; nerves about 18 pairs, strong, elevate, 8 to 12 in. long, 3 to 5 in. wide; petioles very thick, .1 in. long or less. Panicles sub-terminal, velvety, 4 in. long, wide-spreading. Flower white, .2 in. wide glabrous. Calyx club-shaped, sessile, .2 in. long; lobes ovate, sub-acute. Petals orbicular. Stamens short. *Hab.* Low-lying wet swamps. Singapore, Tanglin. Malacca, Bukit Bruang; Ayer Panas (Holmberg). Selangor, Kwala Lumpur; Sungei Buluh (Foxworthy). Perak, Larut (Kunstler). *Native name*: Samak Bukit.

(31) **E. Griffithii** Duthie, *l.c.* ii. 481; King, *l.c.* 92. *E. Valettoniana* King, *l.c.* 112.

Small tree 50 to 80 ft. tall. Leaves coriaceous, oblong or narrowly elliptic, shortly acuminate, base cuneate; nerves fine, 15 to 20 pairs, inconspicuous above, inarching .1 in. from the edge, reticulations faint or invisible, 4.5 to 6 in. long, 2 to 2.5 in. wide; petioles .5 in. long. Panicles terminal and in upper axils, about 8, terminal 2 to 6 in. long, with distant flowers solitary or in cymes of 3, pedicelled. Calyx campanulate, barely .2 in. long, narrowed to the pedicel .2 in. long, lobes short. Petals free, orbicular. Stamens .2 in. long. Fruit globular ovoid, green, .5 in. through. *Hab.* Lowland woods. Singapore, Changi; Garden Jungle. Malacca, Bukit Bruang; Merlimau (Derry). Perak, Goping (Kunstler). Matang (Wray). *Native name*: Kelat Bising.

E. Valettoniana King, seems to me to be the same thing.

(32) **E. Duthieana** King, *l.c.* 103.

Tree 40 to 50 ft. tall. Leaves coriaceous elliptic, or ovate-elliptic acuminate (caudate-acuminate); nerves 4 to 8 pairs, inarching .2 in. from the edge, impressed above, elevate beneath, reticulations faint, 3 to 5 in. long, 1.25 to 2.25 in. wide; petioles .15 to .2 in. long. Racemes axillary and terminal, as many as 6 together. Flowers few sessile, white, .3 in. across. Calyx campanulate, with pseudo-stalk, .2 in. long; mouth wide, lobes rounded. Petals orbicular. Fruit globular, .75 in. long, green. *Hab.* Dense jungle, sea level to 2500 ft. antitide. Singapore, common, Garden Jungle; Bukit Timah; Jurong. Johor, Bukit Banang. Malacca, Mt. Ophir. Pahang, Pekan. Perak, Larut (Kunstler) up to 2500 ft. altitude. Penang Hill (Curtis).

(33) **E. Goodenovii** King, *l.c.* 117.

Tree 50 to 70 ft. tall. Leaves coriaceous, elliptic or oblong, cuneate acuminate (drying pale green); nerves numerous very fine, invisible above, 3.5 to 5.5 in. long, 1.5 to 2 in. wide; petioles .3 in. long. Panicles fascicled, terminal and axillary, 1 to 1.5 in. long and as wide. Branches few. Flowers shortly pedicelled when adult, .2 to .3 in. across. Buds club-shaped, as long. Calyx funnel-shaped, gradually narrowed downwards into a rather thick pseudo-stalk; lobes broad round, 4. Petals calyptrate. Fruit broad, urn-shaped, apex truncate with a thick calyx ring, with the

conic style-base in centre, '5 in. through and '6 in. long, greenish white. *Hab.* Lowland jungle. Singapore (Wallich *Syzygium rigidum* 3581). Malacca, Ayer Keroh (Goodenough). Selangor, Ulu Selangor (Kunstler). *Distrib.* Sumatra.

(34) **E. Hemsleyana** King, *l.c.* 88.

A tree 30 to 40 ft. tall, very closely resembling *E. Dyeriana* in all points except that the nerves are more numerous and more slender, and the young fruit is ribbed. *Hab.* Perak, Ulu Kerling and Goping (Kunstler).

(35) **E. corrugata** King, *l.c.* 93.

Tree 30 to 40 ft. tall, 10 to 15 in. through. Leaves elliptic-lanceolate acuminate, '5 in. long, '2 in. wide, drying black with globular ribbed. Fruit over 2 in. through, corrugate. Seeds 2. Perak, Larut Hills 3000 to 4000 ft. altitude (Kunstler). Penang, Muka Head (Curtis) is probably fruiting *E. Hemsleyana* King.

(36) **E. Koordersiana** King, *l.c.* 128.

Tree 40 to 80 ft. tall, 8 to 10 in. through. Leaves coriaceous drying black, elliptic or ovate caudate acuminate, base cuneate; nerves 8 to 10 pairs, fine but conspicuous beneath, inarching in an intramarginal nerve '1 in. from the edge, 3 to 4'5 in. long, 1'5 to 2 in. wide; petioles '2 in. long. Panicles axillary and terminal, peduncled (peduncles 1 to 2 in. long), 4 to 4'5 in. long, 2'5 in. wide; branches angled. Flowers white. Calyx obconic, with no pseudo-stalk, ribbed, '2 in. long and as wide, 4-lobed. Petals 4, oblong, round, not calyptrate. *Hab.* Perak, Larut (Kunstler).

(37) **E. Dyeriana** King, *l.c.* 88. *E. Clarkeana* King, *l.c.* 93.

Tree 25 to 70 ft. tall, 15 to 24 in. through. Leaves stiffly coriaceous, drying dark brown, elliptic to oblong, base slightly narrowed; nerves 13 to 20 pairs prominent beneath, inarching near the edge, 7 to 9 in. long, 3'5 to 5 in. wide; petioles '4 to '6 in. long, thick. Panicles axillary and terminal, 5 to 8 in. long, stout with short, thick-angled branches 1 in. long, lower ones occasionally longer, re-branched. Flowers white, sessile in clusters on the branch ends, '25 to '4 in. long. Calyx obconic, shortly narrowed to a short pseudo-stalk. Petals orbicular. Stamens '25 in. long. Fruit globose smooth, or oblong, 1 in. long, 1'2 in. wide. *Hab.* In forests. King's two species seem to me the same thing. Perak, Gunong Pondok; Larut (Kunstler).

var. *oblonga* King. Form with narrow leaves, 4 to 8 in. long, 1'25 to 2'75 in. wide. *Hab.* Perak, Gunong Pondok (Kunstler).

(38) **E. pergamentacea** King, *l.c.* 87.

Small tree. Leaves papery coriaceous, narrow oblong short acuminate, base narrowed blunt; nerves 28 to 32 pairs, prominent beneath, parallel joining a nearly straight intramarginal one, 12 to 14 in. long, 3 to 4 in. wide; petioles thick, 2 in. long. Panicles terminal, 4 in. long with no peduncle; branches few rather distant, thick with 3 to 4 flowers, '5 in. across, sessile. Calyx

broad obconic, .25 in. long, pseudo-stalk very short. Fruit globose 1 in. through. *Hab.* Stony woods, local. Penang, Muka Head and Waterfall near Hindu Temple (Curtis). *Native name*: Krian.

(39) **E. subrufa** King, *l.c.* 102.

Tree 20 to 30 ft. tall. Bark flaky red. Leaves thickly coriaceous, narrowly elliptic shortly acuminate, base cuneate; midrib and 7 pairs of fine nerves prominent beneath; nerves inarching in loops .1 in. from edge, 3.5 to 5 in. long, 1.5 to 2 in. wide; petioles .3 to .4 in. long. Panicles terminal and axillary peduncled; branches few crowded at tip. Flowers .5 in. long, sessile in threes. Calyx campanulate funnel-shaped, mouth undulate, 4-toothed. Fruit ovoid, smooth, crowned by the calyx-ring. *Hab.* Rare in forests. Singapore, Bukit Timah; Changi Road. Penang Hill (Curtis).

var. *robusta*. Leaves larger; panicles longer, branches more numerous. Penang (Curtis).

(40) **E. pachyphylla** Kurz, *Journ. As. Soc. Beng.* xlii. (2), 332.

Tree. Branches with white bark. Leaves obovate to oblanceolate, thin coriaceous, shortly blunt apiculate, base cuneate; nerves over 20 pairs, slender inarching close to the edge, 3.5 to 5 in. long, 1.5 to 2.5 in. wide; petioles thick, .2 in. long. Inflorescence 2.5 to 6 in. long, of peduncled few-flowered racemes; peduncles thick angled. Flowers 2 to 3, sessile on the ends of the branches. Calyx .4 in. wide, funnel-shaped, limb undulate spreading, .4 in. across; lobes .2 in. long round. Petals orbicular. Stamens .4 in. long. *Hab.* Malacca (Griffith). Perak, Taiping Hills at 2000 ft. altitude (Curtis).

(41) **E. Hoseana** King, *l.c.* 106.

Tree 30 to 40 ft. tall. Branches pale. Leaves coriaceous, elliptic shortly caudate acuminate, base cuneate; nerves 15 to 20 pairs elevate beneath, inarching .1 in. from edge, 4.5 to 7 in. long, 1.75 to 2.5 in. wide; petioles .15 in. long. Flowers white, sessile in dense terminal and axillary racemose heads, 1 in. long with several ovate persistent bracts as long as themselves. Calyx widely campanulate, contracted at base, no pseudo-stalk, leathery, .5 in. across; lobes blunt. Stamens .3 in. long. Fruit globose campanulate crowned by lobes .5 in. long, .4 in. through. *Hab.* Rather rare in lowland woods. Johor town (Ridley). Perak, Larut (Kunstler).

(42) **E. subhorizontalis** King, *l.c.* 112.

Small tree. Leaves thin coriaceous oblong acuminate both ends; nerves fine with secondaries numerous (20 pairs or more) inarching .05 to .1 in. from edge, 4.5 to 7 in. long, 1.5 to 2.3 in. wide; petioles .5 in. long. Panicles axillary and terminal, axillary ones 1- to 4-fascicled, terminal one 2.5 to 3 in. long; branches few, lax. Flowers sessile white in clusters at ends of branchlets. Calyx .25 in. long, funnel-shaped; lobes 4, round or sub-acute. Rare.

Hab. Perak, Thaiping and Asam Kumbang (Wray). *Distrib.* Sumatra.

(43) **E. *Thumra* var. *penangiana* King, l.c. 92.**

Medium-sized tree. Leaves thinly coriaceous, oblong-elliptic or oblong-lanceolate, shortly acuminate, base cuneate; nerves 15 to 20 pairs, slender elevete beneath inarching 1 in. from the edge, 4 to 5 in. long, 1·8 to 2 in. wide; petioles 3 to 5 in. long. Panicles 3 to 6 in. long, terminal and in upper axil; branches distant 2 in. long, bearing at the end 2 to 3 branchlets ending in 3 to 6 or 8 sessile flowers. Calyx short, cup-shaped, suddenly narrowed to a ribbed pseudo-stalk, 15 in. long. Flowers white, 2 in. across. Petals ovate. Stamens short. *Hab.* Hill forests. Penang, Waterfall and Highlands (Curtis). *Distrib.* Of typical *Thumra*, Roxb. Burma.

(44) **E. *Robinsoniana* Ridl. Journ. F.M.S. Mus. iv. 13.**

Large tree. Bark pale. Leaves thinly coriaceous, elliptic shortly acuminate blunt, base narrowed; nerves slender, 25 pairs, intramarginal straight, 5 in. from edge, 6 to 7 in. long, 3 in. wide; petioles less than 25 in. long. Panicle 2 in. long or less; branches few (4) as long. Flowers sessile, 25 in. long. Calyx funnel-shaped, truncate. Petals small, orbicular, white. Stamens short. Fruit globose crowned with the ring-shaped calyx mouth, 5 in. through. *Hab.* Forests at 4000 ft. altitude. Pahang, Telom (Ridley).

(45) **E. *chlorantha* Duthie, l.c. ii. 487; King, l.c. 97.**

Tree about 40 to 50 ft. tall. Stem 10 to 15 in. through. Leaves coriaceous, elliptic shortly acuminate, base cuneate (drying green); nerves fine, very numerous and parallel with a fine intramarginal near the edge, 4·5 to 6 in. long, 2 to 3 in. wide; petioles 3 to 35 in. long. Panicles sessile, 2 in. long; branches thick, 4-angled. Calyx 35 in. long, cylindric, ribbed; lobes short, thick. Petals orbicular, greenish white. Stamens 2 in. long, brilliant crimson. Fruit sub-globular crowned by the prominent calyx-lobes, 3 to 4 in. through. *Hab.* Common, especially in the south in woods up to 2500 ft. altitude in Penang. Singapore (Wallich); Bukit Timah: Tanglin. Johor, Pengerang (Cantley). Malacca (Griffith and Maingay). Pahang, Pekan. Perak, Chanderiang (Kunstler). Penang, Balik Pulau; West Hill (Curtis). *Distrib.* Sumatra.

An unfortunate name of Duthie's; the petals are truly greenish white, but fall off very quickly, exposing the brilliant crimson stamens.

(46) **E. *Benjaminia* King, l.c. 106.**

Shrub 4 to 6 ft. tall. Leaves thinly coriaceous, dotted, elliptic caudate, base cuneate; nerves numerous, very fine, distinct, 3 in. long, 1·5 in. wide; petioles slender 15 in. long. Racemes terminal and in upper axils about 5-flowered, 1 in. long. Flowers 5 in. across. Calyx clavate; lobes broad. Petals orbicular. Fruit depressed, globular, 1 in. long and as broad, claret-coloured, waxy. *Hab.* Mountains in forests, rare. Perak, Larut, 1500 to 2000 ft. altitude (Kunstler). *Distrib.* Sumatra.

(47) **E. Helferi** Duthie, in Hook. fl. F.B.I. ii. 480; King, l.c. 95.

Low, bushy tree, sometimes large. Leaves narrowly elliptic narrowed to both ends, tip blunt, coriaceous drying yellowish; nerves 12 pairs, very inconspicuous above, intramarginal near edge, 2·5 to 3·25 in. long, 1 to 1·25 in. wide; petioles ·2 in. long. Panicles terminal 1·5 in. long and a little wider; branches with red scaling bark. Flowers ·5 in. across. Calyx funnel-shaped attenuated to slender pseudo-stalk, ·2 in. long; lobes 4, unequal. Petals larger orbicular, glandular on the back. *Hab.* Sandy ground near sea or in rocky forest. Perak, Larut (Kunstler). Penang, Waterfall and Government Hill at 500 ft. altitude (Curtis). *Distrib.* Burma.

(48) **E. Hullettiana** King, l.c. 97.

Tree 20 to 30 ft. tall. Stem 5 to 7 in. through. Leaves coriaceous elliptic long-acuminate blunt, base cuneate, smooth deep green above, beneath nerves very faint, reticulations visible but very fine, 3·25 to 4·5 in. long, 1·5 to 2 in. wide; petioles ·3 to ·4 in. long. Panicles in upper axils and terminal about 3 in. long; branchlets angled. Flowers pale green. Calyx cylindric funnel-shaped ribbed, ·2 in. long, mouth expanded, recurved; lobes short and broad. Petals ovate. Stamens white, slightly red towards centre, ·2 in. long. *Hab.* Perak, Larut (Kunstler). *Distrib.* Sumatra.

This species is very close to *E. Helferi*.

(49) **E. Burkilliana** King, l.c. 94.

Tree 40 to 60 ft. tall, 15 to 20 in. through. Leaves light green, lanceolate acuminate, base cuneate, coriaceous; nerves many very fine with reticulations conspicuous on each side, 2·25 to 3·5 in. long, ·9 to 1·25 in. wide; petioles ·35 to ·5 in. long. Panicles sessile, terminal, much branched, 2 in. long, 4 in. wide; branches 4-angled. Flowers ·7 in. long, pale red in bud, white when open, sessile in threes at branch-ends. Calyx ·35 to ·4 in. long, funnel-shaped, narrowed to a rather long pseudo-stalk; lobes ovate. Stamens ·2 in. long. Petals glandular on back. *Hab.* Perak, Asam Kumbang (Wray); Goping (Kunstler).

(50) **E. Ridleyi** King, l.c. 98.

A big tree about 80 ft. tall. Leaves thinly coriaceous, oblong or ovate-lanceolate shortly acuminate, base cuneate; nerves 7 to 10 pairs, fine but prominent forming large loops, ·1 to ·2 in. from edge, 3·5 to 7 in. long, 1·25 to 2·25 in. wide; petioles ·4 to ·5 in. long. Panicles terminal and in upper axils, 2 to 3 in. long; the long branches 2 in. long, spreading. Flowers 3 to 5 in terminal clusters, apple green, ·2 in. across. Calyx funnel-shaped, narrowed to a slender pseudo-stalk ·2 in. long; lobes large, ovate. Petals ovate, round. Stamens short. *Hab.* Woods, low country. Singa-

pore, Garden Jungle. Negri Sembilan, Senaling (Burkill); Seremban (Kinsey); Penang, Penara Bukit (Curtis).

This tree is conspicuous from having the flowers bright apple green. It is almost the only green-flowered species in our region.

(51) **E. anisosepala** *Duthie, l.c. ii. 481; King, l.c. 96.*

A large tree. Leaves thinly coriaceous ovate to ovate-lanceolate, short acuminate, base cuneate; nerves fine, 12 to 14 pairs, secondaries nearly as conspicuous, 2.5 to 3.5 in. long, 1 to 1.75 in. wide; petioles .2 to .25 in. long. Panicles terminal, corymbose; branches angled, rather thick, 2 to 4 in. long. Flowers .5 in. long, sessile in threes at ends of branches. Calyx .3 in. long, campanulate, lower half contracted to a pseudo-stalk; lobes 4, unequal, 2 larger sub-petaloid. Petals free. *Hab.* Malacca (Griffith and Maingay). Sungei Hudang (Derry).

(52) **E. cordifoliata** *Ridl. Journ. Roy. As. Soc. S. Br. 79, p. 66. E. Swettenhamiana King, l.c. 126, in part.*

Branches pale whitish. Leaves thickly membranous, elliptic shortly acuminate blunt, base narrowed blunt sub-cordate; nerves slender, raised beneath, about 18 pairs inarching far from margin, 4 in. long, 1.5 in. wide; petioles .1 in. long. Panicles terminal spreading; peduncles 2 in. long; longest branch 3 in. long. Flowers in threes on branchlets crowded at top. Buds pyriform with a long pseudo-stalk. Calyx-lobes ovate. *Hab.* Perak (no locality, Scortechini).

The only specimen seen is very young, but it is totally different from Kunstler's 7590 from Larut, Perak, which is also King's *Swettenhamiana*.

(53) **E. pustulata** *Duthie, l.c. ii. 495; King, l.c. 127.*

Small tree. Leaves lanceolate-oblong cuspidate, base cuneate, sub-coriaceous, green when dry, 6 in. long, 2 in. wide; nerves 18 to 20, fine sunk above, elevate, slender beneath, inarching .05 in. from the edge; petioles .3 in. long. Panicles terminal and axillary 3 in. long; branches thick, 4-angled, few, distant minutely pustular. Flowers crowded about 6 at the ends of the short branches. Calyx broad campanulate, hardly lobed; lobes rounded, no pseudo-stalk, .2 in. long and wide. Petals oblong not calyptrate. Stamens short, sulphur yellow. Fruit globose, base narrowed. Calyx ring persistent. *Hab.* Open rocky creeks and stony forests. Singapore, Garden Jungle; Changi; Jurong. Malacca (Maingay); Ayer Panas Residency (Foxworthy). Perak, Larut (Kunstler). *Native name:* Glam Tikus.

(54) **E. variolosa** *King, l.c. 107.*

A small slender tree 20 to 30 ft. tall. Branches, leaves and flowers minutely pustular. Leaves thinly coriaceous dark green, oblong-lanceolate caudate-acuminate, base cuneate; nerves 10 to 12 pairs, prominent beneath, inarching .1 in. from edge, 5.5 in. long, 2.5 in. wide. Racemes 3- to 4-flowered, 1 in. long, mostly

axillary, sometimes terminal. Flowers .5 in. across, greenish yellow, base inside reticulated red. Calyx .2 in. long, narrow campanulate; lobes round in two unequal pairs. Petals orbicular. Stamens .75 in. long. Fruit globose, .8 in. through, green. *Hab.* In lowland woods, common. Singapore Gardens; Bukit Timah. Johor, Sungei Tebrau; Gunong Pulai. Selangor, Kwala Lumpur; Sungei Buluh (Foxworthy). Perak, Goping (Kunstler); Sungkai (Burn-Murdoch).

(55) *E. glauca* King, *l.c.* 102.

Tree 40 to 50 ft. tall. Bark of branches red flaky. Leaves stiffly coriaceous, oblong to ovate-lanceolate, sub-acute with a short point above shining, beneath glaucous; nerves fine, conspicuous, numerous, as are the reticulations on both sides, intramarginal close to edge, 2.25 to 4 in. long, 1 to 2 in. wide; petioles .25 to .3 in. long. Flowers sessile, .3 in. across in racemes or few-branched panicles, 1.5 to 3 in. long, terminal or in upper axils. Calyx a wide truncate saucer on a short pseudo-stalk, .15 in. long. Petals 4, clawed, free. *Hab.* Malacca, Sungei Hudang; Bukit Bruang (Derry). Perak. Penang (Curtis).

(56) *E. pseudo-glauca* Ridt. *E. glauca* var. *pseudoglauca* King, *l.c.* 102.

Tree, medium size. Leaves stiffly coriaceous elliptic, acuminate at both ends, finely and conspicuously reticulate; nerves numerous, intramarginals 2, very fine, 4 to 4.5 in. long, 2 in. wide; petioles .2 in. long. Panicles lax, 2 to 3 in. long; branches few, spreading 1.5 in. long. Flowers sessile, white, .4 in. across. Calyx truncate, saucer-shaped with a pseudo-stalk red, no lobes. Petals oblong. Stamens .2 in. long. *Hab.* Local, but abundant, apparently quite distinct from *glauca*. Dindings, Lumut; Pangkor (Curtis).

(57) *E. cymosa* Lam. *Dict.* iii. 109; King, *l.c.* 100.

A small tree. Leaves thinly coriaceous ovate or ovate-lanceolate caudate-acuminate, base cuneate; nerves very numerous and fine 2 to 3 in. long, 1 to 1.5 in. wide; petioles .15 to .3 in. long. Panicles small, few-flowered, spreading 1.5 in. long, lowest branches .5 in. long, terminal and axillary for some way down the branches. Flowers .1 in. across, white, sessile. Calyx campanulate abruptly pseudo-stalked .1 in. long; lobes minute obscure. Petals oblong. Stamens .1 in. long. Fruit as big as a pea, purple. *Hab.* Open woods. Singapore, Tampinis; Changi. Johor, Tanjong Kupang. Malacca, Bukit China (Maingay); Merlimau (Cantley). Perak, Larut (Kunstler). Dindings, Bruas; Lumut; Pangkor (Foxworthy). Penang, Waterfall (Curtis). Lankawi, Kesap (Haniff).

var. *concinna* King, *l.c.*

Shrub 6 to 10 ft. tall, bushy. Leaves more coriaceous narrow, .75 in. wide, oblong-lanceolate caudate. Branches and inflorescence scurfy. Perak, Ulu Bubong (Kunstler). *Distrib.* Burma, Assam, Java. *Native names:* Kelat Jantan; Kelat Penaga.

(58) **E. pyrifolia** *Duthie, l.c. ii. 487; King, l.c. 99.* *E. tumida Duthie, l.c.c.*

Medium-sized tree, about 40 to 60 ft. tall. Leaves coriaceous elliptic-oblong cuspidate, base cuneate; nerves very numerous, fine and close, parallel, intramarginal fine close to edge, 2·5 to 4 in. long, 1 to 1·75 in. wide; petioles ·25 to ·35 in. long. Panicles in upper axils and terminal numerous, 2 to 2·5 in. long, lax; branches slender. Flowers sessile, white, 3 in. across. Calyx obconic, funnel-shaped, ribbed, 2 in. long, teeth 4, shallow. Petals orbicular. Stamens very short, 1 in. long. Fruit globose, 1 in. long. *Hab.* Open country, on edges of woods up to about 2000 ft. altitude. Common in the south. Singapore, Tanglin. Johor, Sungei Tebrau; Muar, Sungei Tegal. Malacca, Batang Malakka (Derry). Selangor, Bukit Hitam. *Native names*: Kelat Putih; Kelat Lapis; Samak Darat.

(59) **E. lineata** *Duthie, l.c. ii. 487; King, l.c. 99.*

Tree about 60 ft. tall. Leaves very similar to those of *E. pyrifolia*, but usually narrower in proportion to length. Panicles larger and more dense-flowered; branches thicker. Calyx cylindric funnel-shaped, 2 in. long; lobes oblong-ovate ·05 in. long, persistent. Petals 1·2 in. long. Stamens 5 in. long. Fruit globose, white 5 in. through. *Hab.* Common in open country all over the peninsula. Singapore, Tanglin. Johor, Malacca, Mt. Ophir; Bukit Sadanen (Foxworthy). Negri Sembilan, Tampinis; Ulu Bendol (Foxworthy). Selangor, Kwala Lumpur (Foxworthy). Perak, Goping (Kunstler). Penang, Batu Feringhi (Curtis). Kedah, Alor Sta. Lankawi, Burau. *Distrib.* Malay isles. *Native names*: Kelat Lapis; Kelat Merah; Kelat putih; Tupoh Lalat; Kelat Payah; Katcham (Johor).

(60) **E. zeylanica** *Wight, Ill. ii. 15; King, l.c. 108.*

Bushy tree about 30 ft. tall, with bright red flaky bark. Branches slender. Leaves coriaceous, lanceolate or ovate-lanceolate acuminate blunt, pale beneath; nerves numerous slender faint, intramarginal nerve straight fine close to edge, 1·5 to 3·5 in. long, 35 to 1·5 in. wide; petioles ·05 to 1 in. long. Panicles terminal and axillary 1 to 1·5 in. long; branches few, slender, distant. Flowers numerous, 35 in. long, white. Calyx funnel-shaped, 2 in. long, sessile or pedicelled, tubercled; lobes 4 or 5 round deciduous. Petals orbicular 4 to 5. Fruit pisiform, white aromatic pithy. *Hab.* Common in open country and near tidal rivers. Singapore, Tanglin; Kranji. Johor, Batu Pahat. Malacca (Griffith). Pahang, Pekan. Negri Sembilan, Port Dickson; Selangor, Sungei Buluh (Foxworthy). Dindings, Lumut (Foxworthy). Perak, Kinta (Wray); Penang Hill. *Distrib.* India, Ceylon. *Native names*: Nasi-Nasi; Merkasih; Glam Tikus Laut; Beti; Kelat Nasi-Nasi. *Use*: Fruit eatable, sweet and aromatic.

(61) **E. grata** Wight, *Ill.* ii. 15; *King, l.c.* 109.

Shrub or small tree. Leaves coriaceous ovate-lanceolate acuminate blunt; nerves faint, numerous, intramarginal close to edge, 2 to 3.5 in. long, .85 to 1.5 in. wide; petioles .15 to .25 in. long. Panicles 1 in. long, axillary and terminal. Flowers numerous. Calyx longer than in *E. zeylanica* and ribbed, not pustular, .25 in. across. Fruit ovoid .2 in. long, black. *Hab.* River-banks and edges of woods. A pretty shrub or treelet. Johor, Sempang Kanan, Batu Pahat; Panchur. Pahang, Pekan. Dindings, Lumut and Pangkor, Perak, Larut (Kunstler). Penang, Telok Bahang; Batu Feringhi. Province Wellesley, Tasek Gelugur. Adang islands. Lankawi, Kwala Kwah. *Distrib.* Andamans, Tenasserim, Siam, Sumatra. *Native name*: Gelam Tikus (Penang).

(62) **E. polita** King, *l.c.* 110.

Shrub or small tree up to 40 ft. tall and 6 to 10 in. through. Branches 4-angled. Leaves coriaceous, lanceolate or ovate blunt acuminate, base cuneate; nerves 10 to 12 pairs, secondaries numerous, hardly visible above, fine beneath, 1.5 to 2.25 in. long, .75 to 1 in. wide; petioles under .1 in. long. Panicles axillary and terminal, condensed 1 in. long; branches short, thick, 4-angled and winged. Bracts oblong-lanceolate blunt as long as calyx. Flowers sessile .35 in. long, white. Calyx strongly angled, oblong funnel-shaped; lobes 5. Petals orbicular. Stamens few, short. Fruit globular, small. *Hab.* Johor, Kwala Sembrong (Kelsall). Malacca, Sungei Hudang (Holmberg). Dindings, Lumut (Curtis). Perak, Ulu Kerling and Larut (Kunstler). Penang (Wallich); Hill at 1200 ft. altitude (Curtis).

(63) **E. tecta** King, *l.c.* 109.

Tree 20 to 25 ft. tall. Branches slender 4-angled; bark loose, red. Leaves ovate, thin, coriaceous acuminate, base round; nerves fine inconspicuous, midrib tubercled; 2.5 to 3.25 in. long, 1.1 to 1.6 in. wide; petioles .05 to 1 in. long, thick densely black tubercled. Flowers .5 in. long, in dense fascicles terminal or axillary "golden" sessile. Calyx wide funnel-shaped, 5-lobed. *Hab.* Perak, Larut, below 500 ft. altitude (Kunstler).

(64) **E. pseudo-tetraptera** King, *l.c.* 109.

Shrub about 2 ft. tall. Branchlets 4-angled and with 4 crenulate wings. Leaves ovate short acuminate, base round; nerves 14 to 18 pairs, deep depressed above, elevate beneath intramarginal .1 in from edge, 2 to 2.75 in. long, 1.5 in. wide; petioles minute wrinkled. Flowers in terminal and upper-axillary heads, sessile, about 14 in. a head, white, about 25 in. Bracts as long as flowers, oblong, blunt. Calyx cylindric, lobes 5. Fruit globular, .25 in. through. *Hab.* In forests, not rare, but very seldom flowering. Johor, Gunong Pantai (Ridley). Selangor; Sungei Buluh (Ridley). *Distrib.* Carimon isles.

(65) **E. jasminifolia** Ridl. *Journ. F.M.S. Mus.* x. 133.

Small bushy tree, slender. Leaves thinly coriaceous, ovate blunt, caudate, base cuneate; nerves numerous, but quite invisible above and often so beneath, 1 in. long, .25 in. wide; petioles .1 in. long. Flowers small, sessile in sessile heads 1 to 5 in axils and terminal. Bracts broad, oblong, papery. Calyx cylindric, narrowed at base, .12 in. long; lobes broad persistent. Petals free, small, rounded oblong. Stamens numerous, very short. *Hab.* Forests. Negri Sembilan, Tampin Hill near the top (Ridley).

(66) **E. caudata** King, *l.c.* 105.

Tree 30 to 40 ft. tall, 4 to 6 in. through. Leaves thin coriaceous lanceolate or ovate-lanceolate caudate, tail blunt, base cuneate; nerves numerous, very faint or invisible, 1.75 to 3 in. long, .75 to 1.1 in. wide; petioles .15 to .3 in. long. Panicles axillary or terminal, 1 in. long, slender, lax; pedicels slender. Flowers white .15 in. across. Calyx broad, campanulate, .2 in. long; lobes very obscure. Petals orbicular. Stamens very short. Fruit ovoid, then globular, .5 in. long. *Hab.* Mountains, woods at about 2000 ft. altitude. Johor, Bukit Banang, Batu Pahat. Malacca, Mt. Ophir. Selangor, Semangkok Pass (Curtis). Perak, Thaiping Hills (Curtis). Penang, West Hill (Curtis).

King gives "Singapore, Wallich *Myrtus caudata* 3631," as a synonym. The type sheet contains flowerless sprays of two gatherings, the greater part of which is *Pseudo-eugenia singaporensis*. One spray looks more like *E. caudata* King, but possibly Wallich got this in Penang. It is a mountain plant, and has never otherwise been collected in the lowlands.

(67) **E. filiformis** Wall. *Cat.* 3578; King, *l.c.* 105.

Small tree about 20 to 40 ft. tall. Branches slender. Leaves coriaceous lanceolate or ovate-lanceolate caudate-acuminate, base short narrowed; nerves numerous, faint, 1.75 to 3 in. long, .75 to 1.2 in. wide; petioles .15 to .2 in. long. Flowers white, fragrant, axillary, solitary or in terminal lax racemes of about 4 on very slender, filiform peduncles, 1.5 to 2 in. long. Calyx cup-shaped, narrowed to pseudo-stalk .2 in. long, .25 in. across; lobes short, ovate. Fruit elliptic-ovoid, .75 in. long. *Hab.* Common in lowland woods up to about 2000 ft. altitude. Singapore (Wallich); Garden Jungle. Johor, Genuang; Gunong Pulai. Pahang, Kwantan (Foxworthy). Malacca, Bukit Bruang; Panchur (Derry). Selangor, Federal Hill, Kwala Lumpur (Foxworthy). Negri Sembilan, Pasir Panjang road (Foxworthy). Perak, Tapah (Burn-Murdoch); Bujong Malacca; Goping (Kunstler); Gunong Batu Putih (Wray). Penang (Wallich); West Hill at 2000 ft. altitude (Curtis). *Native names:* Kelat Api; Kelat Belian; Kelat Lapis; Kelat Jambu Ayer; Gising; Kelat Minyak.

(68) **E. penangiana** Duthie, *l.c.* ii. 486; King, *l.c.* 98.

Slender tree 40 to 80 ft. tall. Leaves thinly coriaceous, caudate-acuminate lanceolate, blunt, base cuneate; nerves very fine,

innumerable parallel, sometimes invisible beneath, 2 to 3 in. long, 1 to 1·2 in. wide; petioles ½ in. long. Flowers in small terminal cymes, ¾ in. long. Flowers small, ⅓ in. long, under ⅓ in. wide, white, pustular. Calyx cup-shaped with a long cylindric stalk. Petals very small. Stamens short. Fruit clubbed from a narrow base upwards crowned by the cupular calyx limb, ½ to ⅔ in. long. *Hab.* Dry woods. Malacca, Merlimau (Derry). Selangor, Klang Gates (Brooks). Penang Hill (Curtis, Maingay). Waterfall to 500 ft. altitude.

(69) *E. leptantha* Wight, *Ill.* ii. 15; *l.c.* t. 528; *Duthie, l.c.*



FIG. 63.—*Eugenia claviflora*.

ii. 484. *Syzygium longiflorum* Wall. *Cat.* 3572. *E. claviflora* var. *leptantha*, King, *l.c.* 108.

Tree about 60 ft. tall. Leaves thinly coriaceous, lanceolate acuminate, base cuneate; nerves slender, very numerous and indistinct, 4 in. long, 1·5 in. wide; petioles ⅓ in. long. Cymes racemose, axillary often below the leaves, 1 to 1·5 in. long. Flowers club-shaped. Calyx obovoid ⅓ in. with a long cylindric pseudo-stalk, ⅓ in. long; lobes very short, pale orange colour. Stamens ⅓ in. or less long. Fruit clavate oblong. *Hab.* Sea coasts and open country. Singapore (Wallich). Malacca (Griffith). Paliang, Pekan. Dindings, Pangkor. Penang (Wallich). Perlis, Bukit Lagi. *Distrib.* Tenasserim.

(70) **E. claviflora** Roxb. *Hort. Beng.* 37; *Fl. Ind.* ii. 488. *King, l.c.* 107. *E. Maingayi*, *Duthie, l.c.* 484. (Fig. 63, p. 741.)

Tree about 40 to 60 ft. tall. Leaves coriaceous, often stiffly oblong acuminate, base shortly cuneate; nerves numerous, fine, 5 to 6 in. long, 1·5 to 2·5 in. wide; petioles 1 in. long or less. Flowers in dense fascicled cymes from the old wood, cymes 2 in. long or less. Calyx clavate, thick fleshy 75 in. long, truncate, white, narrowed much at base. Stamens 2 in. long. Fruit cylindric oblong, deep purple. *Hab.* Dry woods, open country to 2000 ft. altitude. Singapore, one tree on Government Hill. Malacca, Mt. Ophir (Hullett). Perak, Gunong Bubu 500 to 1000 ft. altitude (Kunstler). Province Wellesley, Permatang Bertam. Penang, Richmond Pool; Muka Head (Curtis). Perlis, Besi Hangat. *Distrib.* India. *Native names*: Banko; Sedong.

This species varies much in several points. In some forms the nerves are distinct, 17 pairs, inarching 1 in. from the edge. *E. Maingayi* Duthie is a form with corky bark, very stiff leaves and shorter condensed flowers. It grows at Richmond Pool in Penang. The var. *glandulosa* King of Mt. Ophir only differs in the branchlets being 4-angled.

(71) **E. conglomerata** Duthie, *l.c.* ii. 497; *King, l.c.* 101.

A big tree over 80 ft. tall. Leaves coriaceous, deep shining green oblanceolate or lanceolate, base long narrowed; nerves very faint, 18 to 20 pairs, 3 to 4·5 in. long, 8 to 1·75 in. wide; petioles 2 to 35 in. long. Inflorescence of numerous racemes 4 in. long, on tubercles on bare parts of branches below leaves. Flowers 1 in. across, very small, crowded, sessile. Calyx cup-shaped, as broad as long, hardly any pseudo-stalk, 05 in. long; lobes very short, round. Stamens very short. Fruit as large as small pea, bright red, pulpy. *Hab.* Forests, apparently scarce. Singapore, Gardens. Malacca (Maingay); Mt. Ophir (Ridley).

(72) **E. urceolata** King, *l.c.* 101.

Tree 30 to 60 ft. tall. Branches 4-angled. Leaves coriaceous, elliptic-oblong to obovate, shortly acuminate, base cuneate, black-dotted beneath; nerves 12 to 18 pairs, inarching, 1 in. from edge, 5 to 9 in. long, 2 to 4·5 in. wide; petioles 25 to 5 in. long. Simple or paniced cymes 1 or several from lower-axillary tubercles 5 to 2 in. long. Flowers 2 in. across, white or pink. Calyx an open rotate cup; lobes orbicular blunt. Fruit turbinate 5 in. across, black. *Hab.* Open forests. Singapore, Bukit Timah; Chan Chu Kang. Malacca, Gunong Mering, Ophir. Pahang, Pekan. Selangor, Rawang. Perak, Goping and Ulu Slim (Kunstler); Relau Tujor (Wray).

(73) **E. polyantha** Wight, *Ill.* 17; *Ic.* 543; *King, l.c.* 103.

Tree 30 to 70 ft. tall, 15 to 20 in. through. Leaves thinly coriaceous, elliptic or lanceolate shortly acuminate, base cuneate, black-dotted beneath; nerves 8 to 10 pairs, inarching 1 to 2 in. from edge, 3 to 4·5 in. long, 1 to 1·5 in. wide; petioles 2 to 3 in.

long. Panicles below the leaves, 1 to 1·5 in. long with few short branches. Flowers white, ½ in. across. Calyx campanulate, 1 in. long, narrowed to short pseudo-stalk; lobes ovate. Fruit depressed, globular with 1 seed or transversely oblong with 2 seeds, green. *Hab.* Woods up to 5000 ft. altitude, common. Singapore, Sungei Morai; Bukit Timah. Malacca, Ayer Panas (Griffith); Brisu (Derry). Pahang, Kwala Lipis (Machado); Chanang Road, Bentong (Foxworthy). Selangor, Rantau Panjang (Kloss). Dindings. Perak, Ulu Bubong, and Padang River (Kunstler); Thaiping Hills at 5000 ft. altitude (Hullett); Temoh (Foxworthy), Penang, hill at 1200 ft. altitude (Curtis). Kedah, Alor Sta. *Distrib.* Burma, Malay isles. *Native names*: Kelat Putih; Kelat Merah; Kelat Samak.

(74) **E. Graeme-Andersoniæ** *Ridl. Journ. F.M.S. Mus.* x. 134.

Tree with long pendent branches. Leaves thinly coriaceous, narrow lanceolate long-acuminate, deflexed, base narrowed; nerves very fine, numerous, parallel, 4 in. long, ⅞ to 1 in. wide; petioles 1½ in. long. Cymes axillary, erect in the axils of all leaves, 1 in. long; branches angled. Calyx obconic with very short teeth. Petals small free, rounded, white. Stamens very numerous, fine, ⅕ in. long; anthers minute. *Hab.* River-banks, a very handsome and striking tree with leaves deflexed and erect axillary cymes. *Hab.* River-banks. Kelantan River near Chaning, abundant (Ridley). Pahang, Kwala Tahan (Seimund).

(75) **E. valdevenosa** *Duthie, l.c.* ii. 489.

Tree 15 to 50 ft. tall. Branches angled. Leaves coriaceous elliptic apiculate, base cuneate; nerves 14 to 24 pairs strongly elevate beneath, intramarginal 2 in. from edge, 6 to 10 in. long, 2½ to 3½ in. wide; petioles 2½ in. long. Panicles terminal, peduncled, wide spreading; branches many, 7 to 9 in. long and as wide. Flowers numerous, ½ in. across. Calyx ⅓ in. long, funnel-shaped; lobes o. Petals calyptrate. Fruit depressed globular, ⅞ in. through. *Hab.* Mountain forests 2000 ft. altitude. Johor, Kota Tinggi. Malacca, Selandor (Goodenough). Selangor, Sempang Mines, Semangkok; Gunong Mengkuang Lebah (Robinson). Perak, Larut Hills to 4500 ft. altitude (Kunstler). Penang Hill (Wallich, Maingay); Sungei Pinang (Curtis). *Native name*: Kelat Bunga.

(76) **E. alata** *Ridl.*

Tree, glabrous. Branches 4-angled and winged with narrow wings. Leaves elliptic acuminate-cuspidate, thinly coriaceous; nerves prominent beneath, 14 pairs, secondaries nearly as prominent, intramarginal nerve 1 in. from the edge, 6 to 8 in. long, 2½ to 5 in. wide; petioles thick, grooved, 4 in. long. Corymb of compound cymes, 4 in. long and as wide. Flowers crowded on the branch-ends; branches flattened, 4-angled. Calyx and pedicel club-shaped 2 in. long. Corolla calyptrate, small, white. Stamens

short and few. *Hab.* Hill woods, Selangor, Semangkok Pass, Track to Bukit Telaga (Ridley).

(77) ***E. oblongifolia*** *Duthie, l.c. ii. 491. King, l.c. 111.*

A tree 60 to 80 ft. tall, 10 to 20 in. through. Branchlets 4-angled. Leaves thinly coriaceous, elliptic short acuminate, base cuneate; nerves 10 to 16 pairs thin, with reticulations visible on both sides when dry, intramarginal vein near the edge, 3 to 4.5 in. long, 1.25 to 2 in. wide; petioles .3 in. long. Panicle terminal corymbose, spreading 2 to 3 in. long and as wide; branches many, angled; peduncle short. Flowers .4 in. across. Calyx .2 in. long, campanulate, gradually contracted to a slender pseudo-stalk truncate. Petals 4, calyptrate, green. Fruit globular, .35 in. through. *Hab.* In forests. Singapore, Garden Jungle; Chan Chu Kang. Malacca (Maingay). Selangor, Ulu Selangor (Kunstler). Perak, Goping and Ulu Kerling (Kunstler).

Of King's two varieties, var. *robusta* is *E. limnæa* Ridl. and var. *parviflora*, a slightly smaller form of this with lanceolate leaves.

(78) ***E. cinerea*** *Wall. Cat. 3576 (Syzygium). E. pseudo-subtilis King, in part: E. brachiata, Duthie, l.c. ii. 496, not of Roxburgh.*

Tree. Branchlets white. Leaves rather thinly coriaceous, elliptic rounded or blunt at tip, narrowed at base, drying dark above, reddish beneath; nerves 7 to 8 pairs, somewhat conspicuous beneath, inarching .15 in. from the edge, 4 to 6 in. long, 2.25 in. wide; petioles .3 to .4 in. long, broad flat, grooved above. Panicles lax terminal, several together, 3.5 in. long, lower branches 1.5 in. long or less. Flowers sessile. Calyx obconic, no pseudo-stalk, less than .1 in. long, truncate. Petals calyptrate. Stamens very short, barely 1 mm. long. *Hab.* Open country in the north. Penang (Wallich), Kedah, Alor Sta. *Distrib.* Tenasserim and Mergui. *Native name:* Krian Lada.

(79) ***E. chloroleuca*** *King, l.c. 113.*

Tree 15 to 40 ft. tall. Leaves coriaceous (drying pale green) oblanceolate, abruptly shortly acuminate; nerves 12 to 16 pairs, very inconspicuous above, 3 to 6 in. long, 1 to 2 in. wide; petioles .4 in. long. Panicles axillary and terminal, trichotomous 1.5 in. long or less; branchlets angled. Bracts ovate acute, persistent. Flowers in threes, .4 in. long, white. Calyx .15 in. long, wrinkled, teeth 4. Fruit ellipsoid crowned with the calyx teeth, .3 in. long, white. *Hab.* Hill forests, local. Malacca, Selangor; Jus (Cantley). Perak, Thaiping Hills at 1500 ft. altitude (Kunstler).

(80) ***E. Klossii*** *Ridl. Journ. Roy. As. Soc. S. Br. 79, p. 65.*

Tree. Leaves thinly coriaceous elliptic acuminate acute, base cuneate; nerves faint above, elevate beneath, about 20 pairs, parallel remote inarching .1 in. from edge; 5.5 in. long, 2.25 to 2.5 in. wide; petioles .2 in. long. Panicles 1 to 2 terminal lax, 3 in. long. Flowers few on the ends of short branchlets. Calyx .3 in. long, campanulate, .25 in. across, abruptly narrowed to a

slender pseudo-stalk, truncate, edge recurved. Petals calyptrate, small. Stamens numerous, .4 in. long. *Hab.* Selangor, Rantau Panjang (Kloss).

(81) **E. expansa** Duthie, *l.c.* ii. 491; *King, l.c.* 113.

Shrub or tree 15 to 40 ft. tall. Leaves thinly coriaceous oblong-lanceolate or elliptic acuminate, base cuneate; nerves 20 to 24 pairs slender elevate beneath, inconspicuous above, intramarginal slender close to edge, reticulations fine conspicuous, 4 to 6 in. long, 1 to 2.25 in. wide; petioles .15 to .2 in. long. Panicles axillary and terminal 1 to 4 in. long; branches few. Flowers white, sessile 5 to 8 at branch ends, .3 in. long. Calyx .15 in. long, funnel-shaped. Petals calyptrate. *Hab.* Forests. Malacca, Merlimau. Perak, Gunong Batu Putih, 3400 ft. altitude (Wray); Goping 300 to 800 ft. altitude (Kunstler). Penang (Wallich), Batu Feringhi and the Hill (Curtis).

(82) **E. pauper** Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 55.

Small tree. Leaves thinly coriaceous elliptic cuspidate, base cuneate; nerves 10 to 12 pairs, depressed above, elevate beneath, inarching in a bold intramarginal nerve .1 in. from the margin, 5.5 in. long, 2 in. wide; petioles .2 in. long. Cymes chiefly axillary .5 to .75 in. long of about 5 flowers, short-pedicelled with minute bracts at base. Calyx cup-shaped, truncate, pustular .1 in. long, narrowed abruptly with a slender pseudo-stalk. Petals calyptrate. *Hab.* Hills forests in the south. Johor, Gunong Pantai and Gunong Pulau (Ridley).

(83) **E. microcalyx** Duthie, *l.c.* ii. 493; *King, l.c.* 124.

Tree about 60 ft. tall. Leaves lanceolate or elliptic (rarely obovate), blunt acuminate; nerves conspicuous beneath, hardly visible above, 8 to 10 pairs inarching .15 in. from the edge, drying blackish above, red beneath, 4 to 7 in. long, 1.5 to 2.4 in. wide; petioles .3 to .5 in. long. Panicles 2.5 to 3 in. long and as wide, many-branched, terminal with numerous very small white flowers with persistent small bracts. Calyx obconic, no pseudo-stalk, nearly .1 in. long, yellow, truncate. Petals calyptrate. Stamens very short. Fruit .1 in. through, globose, red. *Hab.* Not rare in forests. Singapore, Tanglin; Bukit Mandai. Johor, Mt. Austin. Malacca, Bukit Bruang (Derry). Pahang, Telom. Selangor, Kwala Lumpur (Burn-Murdoch); Hulu Semangkok. Dindings. Perak, Ulu Bubong (Kunstler). Penang, Batu Feringhi.

var. *obovata* King.

Leaves obovate, 2.5 in. long, 1.5 in. wide. Fruit waxy-white tinged red. Possibly a distinct species. Perak, Goping (Kunstler). *Native name*: Kelat Putih.

(84) **E. myriantha** King, *l.c.* 125.

A tall tree. Leaves very coriaceous, oblanceolate sub-acute, base much narrowed; nerves 3 to 4 pairs, faint hardly visible, 1 to 1.75 in. long, .5 to .75 in. wide; petioles .25 to .3 in. long.

Panicles very numerous, 3 in. long, peduncled with few spreading branches. Flowers small, sessile with ovate bracts at base, crowded at tip 1 in. long. Calyx cylindric, truncate. *Hab.* Perak (without locality) (Scortechini).

Allied to *E. microcalyx*, but leaves and flowers very much smaller (probably a high mountain plant).

(85) ***E. pseudo-subtilis*** King, *l.c.* 123, *in part*.

Small bushy conical tree about 20 ft. tall. Bark red flaky; branchlets pale. Leaves coriaceous, obovate or lanceolate, blunt narrowed at base; nerves faint, 5 to 7 pairs, visible beneath, in-arching within the margin, intramarginal invisible, 2.5 to 3.5 in. long, 1.5 in. wide; petioles .5 in. long. Panicles spreading, lax, 2.5 to 4 in. long. Flowers small, sessile. Calyx .05 in. long, urn-shaped to globular, rim of mouth projecting, teeth 4. Fruit small, globose, as big as a peppercorn, red. *Hab.* Hilly forests. Singapore, Tanglin, perhaps planted here. Malacca, Bukit Sadanen (Derry).

var. *subacuminata*. Leaves lanceolate, acuminate. Penang and Perak (Kunstler).

(86) ***E. Kunstleri*** King, *l.c.* 127.

Tree 50 to 80 ft. tall, over 3 ft. through. Leaves thinly subcoriaceous elliptic acuminate, narrowed to base; nerves about 10 pairs elevate beneath and conspicuously inarching .2 in. from the edge; 5 in. long, 1.5 in. wide; petioles .3 in. long. Panicles terminal from upper axils, 1.5 to 3 in. long, peduncled, branching at the top about 1.5 in. across. Flowers small, greenish yellow about .1 in. wide. Calyx obconic, no pseudo-stalk 1 in. long, teeth obscure 4. Petals orbicular, calyptrate. Stamens very short. Fruit obovoid, .5 to .6 in. long, green with a reddish tinge. *Hab.* Forests. Perak, Larut Hills up to 800 ft. altitude (Kunstler). Penang (Curtis).

(87) ***E. venulosa*** Wall. *Cat.*; *Duthie, l.c.* ii. 490; King, *l.c.* 123.

Tree about 20 to 30 ft. tall. Leaves coriaceous, obovate or oblanceolate blunt or round, base cuneate; nerves 10 to 14 pairs, with the secondaries and reticulations fine but conspicuous on the paler underside, less so above, 2 to 3 in. long, .8 to 2.2 in. wide; petioles .15 in. long. Panicles terminal wide lax, many-flowered 6 in. long and as wide or less; peduncle and branches 4-angled, ebracteate. Calyx .2 in. long, campanulate, narrowed to a pseudo-stalk as long as the cup, truncate. Petals calyptrate. Fruit globose. *Hab.* Common in the south in open woody country. Singapore, Tampinis road. Johor, Kota Tinggi; Gunong Pantai road. Malacca, Bukit Bruang (Derry); Bukit Bharu (Maingay). Perak, Haram River (Scortechini). *Distrib.* Karimon isles. *Native name*: Kelat Putih.

King's var. *macrothyrsa* is not worth keeping up. It is only based on good specimens.

(88) **E. bracteolata** Wight, *Ill.* ii. 15; *Ic. Pl. t.* 531; *King, l.c.* 122.

Tree 30 to 40 ft. tall, 2 to 3 ft. through. Branches angled. Leaves coriaceous, oblanceolate to obovate, base long-narrowed; nerves numerous, parallel, distinct beneath, 3 to 5 in. long, 1.5 to 2 in. wide; petioles .3 to .5 in. long. Panicles terminal 2.5 to 4 in. long, 3 in. across; branches numerous with a pair of conspicuous bracteoles at each branch and branchlet. Flowers white .3 in. long. Calyx .15 in. long, funnel-shaped with round lobes. Petals calyptrate. Fruit oblong, .4 in. long narrowed slightly both ends, white. *Hab.* Lowland woods. Johor, Kota Tinggi. Malacca, (Maingay). Selangor, Ulu Selangor (Kunstler); Weld's Hill, Kwala Lumpur (Foxworthy). Perak, Goping (Kunstler); Chanderiang (Kunstler); Ipoh (Curtis). Kelantan, Kota Bharu (a large shrub). *Distrib.* Burma. *Native name*: Kelat Putih.

(89) **E. punctulata** King, *l.c.* 122.

Tree 30 to 50 ft. tall. Branches red flaky. Leaves coriaceous obovate or oblanceolate, rounded, base narrowed, 1.5 to 3 in. long, 1 to 1.75 in. wide; nerves very faint beneath, invisible above; petioles .2 to .25 in. long. Panicles lax, terminal; branches numerous 4-angled, 6 in. or more long. Flowers numerous, small, white. Calyx campanulate, .1 in. long, obscurely toothed. Fruit ovoid, white, pulpy, .4 in. through. Singapore (Wallich), (*Syzygium punctatum*); Sungei Morai; Kranji. Malacca, Sungei Hudang; Bukit Sadanen (Derry). Pahang, Baloh, Kwantan (Foxworthy). Perak, Larut (Kunstler); Blanda Mabok (Wray). *Native names*: Kelat Penaga; Kelat Kobo; Jambu Chili; Jiwat padi; Kelat Pasir.

(90) **E. acuminatissima** Kurz, *Journ. As. Soc. Beng.* xlvi. (2), 67; *Duthie, l.c.* ii. 483; *King, l.c.* 126.

Big tree about 80 ft. tall. Leaves thin coriaceous, elliptic lanceolate long acuminate base short narrowed, drying pale, 3.5 to 4 in. long, 1.5 in. wide; nerves 15 to 20 pairs, slender but distinct beneath, inarching some way from the margin and from the intra-marginal vein. Panicles terminal lax 2 in. long, 3 in. across or less; branches few, spreading. Flowers crowded at the ends under .1 in. long, white. Calyx cup-shaped small with a longer pseudo-stalk, .06 in. long, truncate. Petals calyptrate, but often separating. Stamens very short, much shorter than petals. Fruit globose, .5 in. through, blackish purple with pink pulp. *Hab.* Forests common. Singapore, Garden Jungle; Changi. Malacca, Sungei Siput and Ayer Panas (Derry). Perak, Goping (Kunstler); Batu Gajah. Penang, Penara Bukit (Curtis). *Distrib.* Burma, Sumatra. *Native name*: Kelat Asam.

(91) **E. Evansii** Ridl. *Journ. F.M.S. Mus.* x. 134.

Branchlets dark brown. Leaves thinly coriaceous, elliptic to oblong abruptly acuminate, base very shortly cuneate; nerves

very fine and parallel, numerous, intramarginal close to the edge, 6 in. long, 2.75 in. wide; petioles .2 in. long. Cymes terminal and in upper axils; branches angled, spreading, few and short, 1.5 in. long and as wide. Flowers few, small. Calyx goblet-shaped, entire, .1 in. long. Petals calyptrate, very small. Stamens white, .1 in. long, fairly numerous. *Hab.* Pahang, Gunong Senyum (Evans).

(92) ***E. pallidula* Ridl.**

Tree. Branches slender, whitish. Leaves thinly coriaceous, elliptic shortly abruptly blunt-acuminate, base long-narrowed, drying pale greenish, midrib prominent beneath, channelled above; nerves faint 12 pairs, parallel and inarching into a continuous nerve along the edge, reticulations very faint, 2.5 in. long, 1.5 in. wide; petioles .2 in. long. Cyme-panicles lax terminal ones 3 in. long, 2 terminal and 1 in upper axil; branches .5 in. long with few small flowers in cymes of 3; pedicels slender, .1 in. long. Calyx cup-shaped, narrowed at base .1 in. long and wide; lobes very small, rounded, caducous. Petals calyptrate. Stamens numerous, but short. Pahang, Rembau, Temerloh (Foxworthy). *Native name:* Kelat putih.

(93) ***E. verecunda* Duthie, l.c. ii. 496; King, l.c. 125.**

Small or large tree. Branches pale. Leaves thinly coriaceous, lanceolate or elliptic long acuminate, base long narrowed; nerves and reticulations very fine and close numerous inconspicuous, intramarginal close to edge, very fine, 2 to 3 in. long, 1.1 to 1.25 in. wide; petioles .2 in. long. Panicles terminal and in upper axil, 1.5 to 2 in. long, wide spreading; branches numerous, slender. Flowers .05 in. long or less, white. Buds club-shaped. Calyx wide, cup-shaped, .05 in. across with a distinct pseudo-stalk. Corolla small calyptrate. Stamens very short. Fruit globose, .4 in. through. *Hab.* Hill woods to 2000 ft. altitude. Penang Hill (Phillips, Wallich). Penara Bukit; Hill 2000 ft. altitude.

var. major Ridl.

Leaves elliptic broad, acuminate, base shortly cuneate, more coriaceous, 3.5 in. long, 1.75 in. wide; petioles .5 in. long. Apparently a lowland form. Singapore, Pulau Ubin. Dindings, Pangkor (Scortechini).

(94) ***E. scoparia* Wall. Cat. 3594; King, l.c. 125.**

Small tree. Branches slender. Leaves coriaceous oblanceolate to obovate, tip sub-acute, base cuneate; nerves invisible, black-dotted beneath, minutely pitted above, 1.25 to 2.25 in. long, .6 to 1.1 in. wide. Panicles terminal and from upper axils, 1.5 to 2 in. long; branches slender few, 4-angled ending in cymes of 2 to 3 flowers. Calyx very short cup-shaped ribbed, .05 in. long and little wider, lobes small. Fruit globular .1 in. through. *Hab.* River-banks, not common. Singapore (Wallich). Johor, Hadji Senawi near Batu Pahat (Ridley).

(95) **E. oblata** Roxb. *Hort. Beng.* 37; *King, l.c.* 114. *E. lævicaulis* Duthie, *l.c.* ii. 492.

Tree 40 to 50 ft. tall. Leaves elliptic acuminate, base shortly cuneate; nerves as in *inophylla*, 3·5 to 5 in. long, 1 to 2·5 in. wide; petioles ·5 in. long. Panicle 1·5 in. long, terminal and axillary. Calyx funnel-shaped, narrowed to base and with distinct rounded lobes ·2 in. long. Petals calyptrate. Fruit depressed globose ·5 in. through when dry. *Hab.* Forests. Johor, Pengerang (Cantley); Sungei Tebrau. Malacca, Merlimau (Cantley). Pahang, Pekan; Rumpin River mouth (Evans). Perak (Scortechini). Penang, Batu Feringhi; Balik Pulau. Province Wellesley, Kubang Ulu (Curtis); Nibong Tebal. *Distrib.* Assam to Tenasserim and Yunnan.

This is hardly distinct from *E. inophylla* except in the shorter panicles and shape of calyx and larger flowers.

(96) **E. Curtisii** King, *l.c.* 129.

A tree 60 to 80 ft. tall, 10 to 15 in. through. Leaves coriaceous, oblong-lanceolate short, blunt, acuminate (grey when dry) pustulate beneath; nerves very fine, numerous faint joining the intramarginal, which is ·1 in. or more from the edge, 3 to 5·5 in. long, 1 to 2 in. wide; petioles ·15 to ·2 in. long. Panicles terminal, sessile; branches rather thick with red flaky bark, scurfy 4-angled, 3 in. long and as wide. Flowers numerous, white, densely crowded. Calyx campanulate, narrowed to the base, pseudo-stalk minute or 0, ·1 in. long and wide, lobes 5, very small. Petals 5, free, orbicular. Stamens numerous short. *Hab.* Open jungle, low ground, Pahang, Bentong (Foxworthy). Perak, Gopong (Kunstler); Tapah (Wray).

var. *minor* King is a form or state with narrower lanceolate leaves. It was found in Malacca by Hervey and at Tapah by Wray.

(97) **E. linocieroidea** King, *l.c.* 118.

Tree 40 to 50 ft. tall. Stem 10 to 20 in. through; branches rather slender. Leaves thinly coriaceous, lanceolate caudate, base acuminate; nerves very fine, numerous inconspicuous, intramarginal close to edge, 2 to 3 in. long, ·6 to 1 in. wide; petioles ·1 in. long. Panicles terminal, corymbose, many-flowered, 2 to 3 in. long, 2 in. or more wide; branches many-angled. Flowers ·4 in. long, sessile, white; buds club-shaped. Calyx ·3 in. long, gradually narrowed to a ribbed pseudo-stalk, lobes round 4. Petals free. Fruit oblong vertically ridged, apex crowned by calyx-tube enlarged, and 4 inflexed teeth, ·35 in. long, pale red. *Hab.* Forests, Perak, Relau Tujor (Wray); Batang Padang (Kunstler).

(98) **E. cyrtophylloides** Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 65.

Tree. Leaves stiffly coriaceous lanceolate acute or cuspidate, base rounded, beneath black-dotted; nerves very numerous, fine above, very inconspicuous beneath; midrib strongly elevate, 2·5 to 4 in. long, 1 to 1·5 in. wide; petioles ·2 in. long. Panicles

terminal, 2·5 to 3 in. long, peduncled; branches terete, branchlets ending in a cluster of 3 to 5 sessile flowers. Bracts caducous. Calyx urn-shaped, ·1 in. long; lobes small ovate. Corolla calyptrate. Stamens very short. *Hab.* Rare in mountain forests. Pahang, Wray's Camp, Gunong Tahan at 3500 ft. altitude (Ridley).

(99) ***E. myrtifolia* Roxb.** *Hort. Beng.* 37; *King, l.c.* 118.

Small bushy tree about 15 to 20 ft. tall. Leaves thinly coriaceous lanceolate to ovate acuminate, base acute; nerves close, numerous fine hardly distinct, 1·5 to 2·5 in. long, ·75 to 1·35 in. wide; petioles ·15 to ·2 in. long. Panicles mostly terminal, ·75 to 3 in. long, spreading when large, lax corymbose. Flowers ·3 in. long, white. Fruit pea-shaped, blue black. *Hab.* Usually near the sea. Singapore, Tanglin; Sungei Morai; Changi. Johor, Kota Tinggi; Batu Pahat. Perak, Thaiping (Kunstler). *Distrib.* India.

(100) ***E. inophylla* Roxb.** *Hort. Beng.* 37; *King, l.c.* 114.

A tree 30 to 50 ft. tall, 8 to 12 in. through. Leaves coriaceous, elliptic-cuspidate, base cuneate; nerves very numerous, fine faint, parallel; 3 to 5 in. long, 1·25 to 2·25 in. wide; petioles ·2 to ·4 in. long. Panicles terminal and in upper axils large 4·5 in. long, 6 in. wide, corymbose, peduncles 2·5 in. long. Flowers cream-colour ·4 in. long. Calyx campanulate, shortly narrowed to a rather slender pseudo-stalk, truncate. Petals calyptrate. Stamens ·2 in. long. Fruit large, pear-shaped. *Hab.* Forests Pahang, Pekan; Perak, Goping and Larut (Kunstler). Province Wellesley, Kubang Ulu (Curtis). Penang, top of West Hill. Setul, Bukit Rajah Wang. Lankawi (Curtis).

var. *Bernardi* Ridl. *E. Bernardi* *King, l.c.* 115.

Differs only in the calyx often tapering gradually to the base without a pseudo-stalk. *Hab.* Mountain forests. Selangor, Semangkok Pass. Perak (Scortechini). Penang Hill (Curtis). *Distrib.* Silhet, Mergui, Borneo. *Native names:* Samak Paya; Glam Tikus.

(101) ***E. laxiuscula* Ridl.** *Journ. F.M.S. Mus.* x. 133.

Bark of twigs red. Leaves narrow oblong-lanceolate acuminate, base cuneate, 6 in. long, 2 in. wide; nerves sub-parallel, very numerous, fine. Panicles wide, spreading, 6 in. long, 4 in. wide, lax. Calyx goblet-shaped with a distinct pseudo-stalk ·2 in. long; lobes short oblong, rounded. Corolla calyptrate. Stamens very numerous, ·4 in. long. *Hab.* Penang; Pulau Betong (Curtis 975).

This is somewhat like *E. laxiflora* Bl. of Java, but the calyx is much longer.

(102) ***E. Prainiana* King, l.c.** 116.

Tree 60 to 80 ft. tall, 2 to 3 ft. through. Leaves thick coriaceous elliptic cuspidate or acute, base narrowed; nerves very numerous and fine, visible above, hardly so beneath, 4 to 4·5 in. long, 1·75 to 2 in. across; petioles ·4 in. long. Panicle dense,

sessile, corymbose, 1.75 in. long, 3 in. across. Flowers white; branches thick, angled. Calyx .4 in. long, funnel-shaped, narrowed to base gradually; lobes rounded, short. Petals calyptrate. Fruit globular, ovoid, .75 to 1 in. long, .75 in. through crowned by the calyx-tube, 5-toothed and tubular, .25 in. long. *Hab.* Local in forests. Perak, Larut (Kunstler); Blanda Mabok (Wray).

var. *Pearsoniana* Ridl. *E. Pearsoniana* King, *l.c.*

Branchlets white. Calyx-tube truncate with no lobes. Perak, same locality (Kunstler).

(103) ***E. nigricans*** King, *l.c.* 114.

Large tree. Leaves stiffly coriaceous, oblong cuspidate, base shortly narrowed; nerves and reticulations very numerous and fine on the upper surface, nerves less and reticulations not visible on back, 2.5 to 4 in. long, 1.4 to 2 in. wide; petioles .3 to .4 in. long, thick, wrinkled. Panicles terminal and axillary; branches few, about 3, each 1 in. long with flowers in threes on apices. Flowers white, .3 in. long, sessile. Calyx .15 in. long campanulate, pseudo-stalk short, truncate. *Hab.* Perak; Waterfall Hill (Wray) at 1000 ft. altitude.

(104) ***E. inasensis*** King, *l.c.* 120.

Small tree. Bark pale. Leaves coriaceous, broad elliptic or obovate, long-tapered to base, tip blunt acuminate, edges recurved; nerves inconspicuous, 2.5 to 4 in. long, 1.25 to 2.25 in. wide; petioles .2 to .4 in. long. Panicles short, 1 or more terminal and upper-axillary peduncled. Flowers in threes, white, .3 to .4 in. across. Calyx campanulate, no pseudo-stalk; lobes 5, small. *Hab.* Mountains, Perak, Gunong Inas (Wray).

(105) ***E. crenulata*** Duthie, *l.c.* ii. 490.

Tree. Leaves thickly coriaceous, elliptic round, base narrowed, cuneate, tip shortly apiculate, edge crenulate; nerves and reticulations very numerous, intramarginal straight close to edge, 5 in. long, 3.25 in. wide; petioles .5 in. long. Panicles terminal 4 in. long; peduncle 1.5 in. long; branches about 5, with branchlets bearing rather numerous small flowers. Calyx .2 in. long, campanulate, truncate, pseudo-stalk for half the length. Petals calyptrate. *Hab.* Forests, rare. Singapore, Selitar (Ridley). Malacca (Maingay).

The only species with crenulate leaves.

(106) ***E. pahangensis*** Ridl. *Journ. Linn. Soc.* xxxviii. 307.

Small tree 20 ft. tall. Bark white. Leaves very coriaceous, thick, elliptic blunt; nerves very many, slender parallel, 3 to 4 in. long, 2 in. wide; petioles .5 in. long thick. Panicles terminal, dense 2 in. long with a few angled branches. Flowers yellowish white tinted pink, sessile, hardly .25 in. long. Calyx obconic, angled; lobes triangular, acute. Petals small orbicular. Fruit 1- to 2-seeded, globose with persistent calyx-tube at top, .75 in.

long. *Hab.* On rocky slopes of high mountains, Pahang, Gunong Tahan 5000 to 6000 ft. altitude (Ridley).

(107) *E. tahanensis* Ridl. *Journ. F.M.S. Mus.* vi. 146.

Shrub about 5 ft. tall. Leaves stiffly coriaceous obovate obtuse rounded or shortly acute, base narrowed; nerves 5 to 7 pairs, very slender and conspicuous beneath, 3.5 in. long, 2.5 in. wide; petioles .25 in. long. Cymes compound in upper axils 2 to 3 in. long, many-flowered. Pedicels short, angled. Flowers white. Calyx obconic .12 in. long; lobes ovate. Fruit oblong globose, 6 in. through. *Hab.* Local on high rocky mountains. Pahang, Gunong Tahan at 7186 ft. altitude (Ridley).

(108) *E. subdecussata* Duthie, *l.c.* ii. 491; *King, l.c.* 121.

Tree or bush 4 to 80 ft. tall. Leaves stiff coriaceous elliptic blunt, base round, shining green; nerves numerous, slender hardly elevate beneath, 3 to 5 in. long, 1.35 to 3 in. wide; petioles short or absent. Panicles terminal usually 3 in. long, sometimes longer; branchlets angled thick. Flowers .35 in. long, white. Calyx funnel-shaped, teeth 5. Petals calyptrate. Fruit globular, .5 or .6 in. through. *Hab.* Woods and open places, from sea level to about 3000 ft. altitude common. Singapore, Tanglin; Changi. Johor, Biawak (Curtis); Scudai River. Pahang, Kwala Tenok; K'luang Terbang (Barnes). Malacca, Ayer Panas; Sungei Hudang. Perak Batang Padang; Ulu Bubong and Thaiping (Kunstler). Penang, Hill (Maingay).

var. *montana* King, *l.c.*

Small tree 6 to 8 ft. tall. Leaves 1 to 2 in. long, .5 to 1 in. wide; a reduced form on mountains, Selangor, Ulu Semangkok. Perak, Gunong Batu Putih 4500 ft. altitude (Wray). Kedah Peak.

var. *colorata* King. *E. colorata*, Duthie, *l.c.* ii. 492.

Leaves lanceolate drying red, not black. Flower-buds larger. Malacca (Maingay). *Native names*: Kelat Belian; Kelat Kobu; Kelat Asam; Samak Pulut.

(109) *E. viridescens* Ridl. *Journ. Linn. Soc.* xxxviii. 308.

Shrub. Leaves stiffly coriaceous sessile or shortly petioled, obovate, tip rounded, base narrowed and blunt; nerves numerous, very slender and inconspicuous, drying green, 2.5 to 4.5 in. long, 1.5 in. wide. Panicle terminal, 2 in. long; branches thick. Flowers .25 in. long, white, tipped with pink. Calyx campanulate, edge undulate, entire. Petals 4, rounded. Stamens short on a large annular disc, greenish. *Hab.* High rocky mountains, Pahang, Gunong Tahan at 5000 ft. altitude (Ridley).

(110) *E. longicauda* Ridl. *Journ. Roy. As. Soc. S. Br.* 6, p. 7.

Tree. Branches slender. Leaves lanceolate elongate long acuminate, very coriaceous punctate above; nerves faint, 8 pairs with intramarginal close to edge, 1 to 1.5 in. long, .12 to .24 in. wide; petioles .12 in. long. Racemes axillary and terminal, few-flowered; peduncle .12 in. long. Calyx campanulate, tessell-

late verrucose; lobes 5, ovate round. *Hab.* Rare; high mountains Pahang, K'luang Terbang (Barnes).

(111) **E. rhomboidea** *Ridl. Journ. F.M.S. Mus.* v. 33.

Shrub. Leaves stiffly coriaceous, obovate acuminate, lanceolate or rhomboid blunt, base narrowed; nerves almost completely invisible, numerous parallel, underside punctate; 1.5 in. long, .6 to .7 in. wide; petioles .1 to .2 in. long. Panicles about 1 in. long; branches 4; peduncles thick, 4-angled. Calyx-tube .5 in. long, .2 in. wide at mouth, gradually narrowed to a thick pseudo-stalk. Petals calyptrate, orbicular. Stamens .1 in. long. *Hab.* Mountains at 5000 ft. altitude; rare. Selangor, Gunong Mengkuang Lebah (Robinson).

(112) **E. Stapfiana** *King, l.c.* 119.

A branching low bush. Leaves oblong to obovate or lanceolate obtuse, narrowed slightly at base, short, stiff coriaceous, pale beneath, above pitted, .5 to 1 in. long, .4 to .8 in. wide; petioles .05 in. long. Panicles terminal dense, .5 in. long, many-flowered; branches very short winged. Flowers .3 in. long. Calyx narrow, campanulate, dilate in the middle, papillose; lobes 4 or 5, acute. Petals orbicular, free. Stamens .15 in. long. Fruit sub-globular, .3 in. long. *Hab.* Mountains above 4000 to 7000 ft. altitudes. Selangor, Hulu Semangkok; Gunong Ulu Kali (Robinson). Perak, Gunong Kerbau (Robinson); Gunong Berumbun Pahang (Wray); Gunong Batu Putih (Wray).

(113) **E. oreophila** *Ridl. Journ. Roy. As. Soc. S. Br.* 61, p. 9.

Shrub with thick branches. Leaves crowded at the ends, obovate blunt rounded, coriaceous, 1.25 in. long, 1 in. wide; nerves 9 pairs, secondary nerves and reticulations elevate both sides; petioles .12 in. long. Flowers few in terminal cymes, 1 in. long; pedicels short and thick. Calyx clove-shaped, narrowed to base, lobes orbicular, half as long as tube, .12 in. long. Petals larger orbicular white. Stamens .25 in. long. *Hab.* Mountains, Selangor, Ulu Semangkok (Dennys). *Native name:* Kelat Bukit.

(114) **E. spissifolia** *Ridl. Journ. F.M.S. Mus.* v. 32.

Shrub. Leaves stiffly coriaceous, sessile, elliptic or orbicular cordate, edge thickened; nerves 10 pairs, faint, 1.75 in. long, 1.6 to 1.7 in. wide. Panicles terminal 1.5 in. long, 2 in. wide; branches stout, 4-angled. Peduncles and pedicels thick. Calyx clubbed, .3 in. long, thick, very gradually narrowed to base; lobes 4 ovate. Petals very small, white, orbicular, free. Stamens hardly longer. *Hab.* Mountains at 5000 ft. altitude. Rare. Selangor, Gunong Mengkuang Lebah (Robinson).

(115) **E. Wrayi** *King, l.c.* 119.

Small tree. Leaves thick coriaceous, broad elliptic or round, blunt, base rounded; nerves and reticulations very numerous, faint, .75 to 1.35 in. long, .65 to 1.15 in. wide; petioles .1 in. long or less. Panicles very dense forming a small head, about 1 in.

long. Flowers greenish white .35 in. long in clusters of 3 to 4. Calyx funnel-shaped, .15 in. long; lobes 5, unequal. Petals calyptrate. Stamens short. *Hab.* Mountains at 5000 to 7000 ft. altitude. Selangor, Gunong Mengkuang Lebah (Robinson). Perak, Ulu Batang Padang (Wray); Gunong Kerbau at 7000 ft. altitude (Haniff).

(116) **E. clypeolata** Ridl. *Journ. Roy. As. Soc. S. Br.* 82, p. 185.

Shrub with angled branchlets. Leaves ovate-cordate blunt, imbricating, stiff coriaceous; nerves very faint, 8 pairs, 1 in. long, .6 in. wide; petioles .05 in. long. Flowers in dense heads, terminal, hardly appearing above leaves. Calyx ribbed, .18 in. long, not pustular, gradually dilate from base; lobes round, 5, persistent. Petals calyptrate, white. Stamens rather short; style rather stout. *Hab.* On mountain slopes at 5500 ft. altitude. Pahang, Gunong Tahan across the Teku River (Ridley).

(117) **E. Jambolana** Lam. *Dict.* 3, p. 198; *King, l.c.* 131.

Tree about 30 ft. tall. Leaves coriaceous, elliptic-lanceolate to ovate blunt acuminate, base cuneate; nerves very fine close parallel numerous, beneath dotted, 2.5 to 5 in. long, 1.5 to 2.5 in. wide; petioles .6 to .75 in. long. Panicles below leaves, 1.5 to 3 in. long and as wide. Flowers white, .3 in. across, sessile. Calyx campanulate suddenly pseudo-stalked, .1 in. long, truncate. Petals falling off in a cap. Fruit ovoid, oblong, 1 in. long, pulpy, deep purple. Seed 1. *Hab.* Occasionally planted here and there. Native of India. Singapore, Holland Road. Malacca and Penang, Government Hill (Curtis). *Native names:* Jambelan; Jiwat; Salam. *Use:* Fruit eaten.

(118) **E. operculata** Roxb. *Hort. Beng.* 37; *Wight, Ic. t.* 552; *King, l.c.* 129.

Tree 30 to 50 ft. tall. Leaves thinly coriaceous ovate-oblong to elliptic-acuminate, base cuneate; nerves 8 to 12 pairs, leaf beneath dotted, 4 to 6 in. long, 1.6 to 2.2 in. wide; petioles .2 to .3 in. long. Panicles below leaves, 2 to 3 in. long, lax spreading; branches trichotomous 4-angled. Flowers greenish, sessile, .1 in. across. Calyx campanulate, base narrowed, smooth, mouth truncate, no lobes. Petals free. Fruit small, pea-shaped, purple, 1-seeded. *Hab.* Rather scarce in forests. Perak, Matang (Wray). The var. *coriacea* of King with slightly more coriaceous leaves, Penang, Penara Bukit (Curtis). *Distrib.* India.

(119) **E. balsamea** Wight, *Ill.* ii. 16; *Duthie, l.c.* ii. 499.

Tree 40 to 50 ft. tall. Leaves rather thin, oblong-lanceolate, shortly blunt cuspidate long-narrowed to base, densely punctate on the lower surface which is shining coppery; nerves 13 pairs, fine, inarching with marginal nerve, 4.5 in. long, 1.5 in. wide; petioles .25 in. long, slender. Cyme-panicles below the leaves, 1 in. long and wide. Flowers very small, .05 in. long. Bracts

minute, acute. Calyx-tube funnel-shaped with 4 very short lobes. *Hab.* Lankawi, Kesap (Haniff). *Distrib.* India, Burma.

This species is very common in India, and variable, and I believe the plant described above is a variety of it, but the flowers are only in young bud. They show distinct traces of lobes in the calyx which I do not see in *E. balsamea* type.

(120) *E. setosa* King, *l.c.* 120.

A shrub or creeper 40 to 60 ft. long. Branches covered with short black bristles. Leaves oblong-lanceolate long-cuspidate, glabrous except base of midrib below, base round, 1·35 to 2·75 in. long, .4 to .85 in. wide; petioles very short. Panicles hairy, axillary and terminal, 2 in. long and wide. Flowers small, glabrous .4 in. long, greenish yellow. Fruit turbinate, glandular .35 in. long and wide. *Hab.* Climbing on trees, forests. Perak, Larut (Kunstler).

EXCLUDED SPECIES

E. SWETTENHAMIANA King, *l.c.* 126.

The specimens so named by King in the Kew Herbarium, and quoted as types in the original description, are of two very distinct plants, one *E. cordifoliata* Ridl., the other, a totally different plant collected by Scortechini, does not appear to be a myrtaceous plant at all. The description is a combination of characters from the two specimens.

9. PSEUDO-EUGENIA, Scort.

Small trees. Leaves opposite. Panicles small, axillary, few-flowered. Calyx turbinate 4-lobed. Petals 4, orbicular, clawed. Stamens 8, in two rows on an annular disc. Ovary 2-celled. Drupe 1- to 2-seeded. Species 2, Malayan.

Leaves 4 to 5 in. long, 1 in. wide; flowers 3 to 4 on short peduncles

(1) *P. perakiana*

Leaves 2 in. long, .6 in. wide; panicles peduncled, branched, 1 in. long.

(2) *P. singaporensis*

(1) *P. perakiana* Scortechini, *Journ. Bot.* 1885, p. 153; King, *l.c.* 133. *Eugenia skiophila* Duthie, *l.c.* ii. 486.

Tree 15 (to 40 ft. fide Scortechini) ft. tall. Leaves thinly coriaceous elliptic-lanceolate, base narrower, apex caudate-acuminate; nerves very fine and close, 4 to 6 in. long, 1·5 to 2 in. wide; petioles .1 in. long. Flowers 3 to 4 on a short .05 in. long axillary peduncle, white. Calyx .1 in. long. Drupe .25 in. long, oblong, globose, bright red. *Hab.* In thick forests. Perak, source of Larut River (Scortechini). Penang, Richmond Pool; Telok Bahang (Curtis). *Distrib.* Sumatra.

(2) *P. singaporensis* King, *l.c.* 133. *Myrtus caudata* Wall. *Cat.* 3631.

Tree 30 to 40 ft. tall with slender branches. Leaves thin cori-

aceous, elliptic-lanceolate bluntly caudate (drying black) 2 in. long (tail .5 in.), .6 in. wide; petioles .1 in. long, slender. Peduncles .5 in. long with 3 or 4 short branches, each bearing 3 minute greenish white flowers .02 in. long. *Hab.* Woods; not rare in the south. Singapore, Bukit Timah. Johor, Bukit Banang. Selangor, Sungei Buluh (Foxworthy). Perak (Scortechini); Tapah.

10. BARRINGTONIA, Forst.

Trees or shrubs, generally growing in tidal mud or sand, close to the sea. Leaves alternate, crowded at the branch ends, entire or crenate. Flowers in long terminal and lateral pendulous racemes or spikes, large or small, pink or white. Calyx-tube turbinate, closed in bud and splitting into 2 or 3 lobes (§ *Butonica*) or 3 to 5 imbricate lobes (§ *Stravadium*). Petals 4 or 5, falling off very quickly. Stamens numerous, long, connate at the base, white or pink. Ovary 2- to 4-celled with an annular disc; style filiform. Fruit large, fibrous or somewhat pulpy, 4-angled, or rounded, oblong, 1-seeded. Species 25, Africa, Asia, Polynesia. Malay name for genus, Putat.

i. BUTONICA. Calyx splitting into 2 to 3 lobes.

Racemes short, erect; flowers 3 in. wide; fruit

4-angled, very large (1) *B. speciosa*

Racemes sub-erect; flowers under 1 in. wide;

fruit with 8 wings at base. (2) *B. conoidea*

Racemes pendulous, long; fruit ovoid (3) *B. racemosa*

ii. STRAVADIUM. Calyx 4-(or 3- or 5-)lobed.

Raceme terminal, erect (4) *B. pauciflora*

Racemes lateral, pendulous, long; flowers many.

Flowers over 5 in. wide, white.

Petioles short, thick; leaves broad, elliptic-oblong, 6 by 2 in. (5) *B. Scortechinii*

Petioles long, slender; leaves long, lanceolate; fruit ovoid, smooth.

Leaves rather thin; nerves prominent sunk above (6) *B. macrostachya*

Leaves stiff, coriaceous; nerves inconspicuous; fruit oblong, 4-angled.

Fruit 1.75 in. long by .65 in. through; shrub (7) *B. sumatrana*

Fruit 4 to 5 in. by 1.5 in.; tree (8) *B. musiformis*

Flowers small .25 in. wide, pink.

Flowers pedicelled; fruit fusiform; leaves with blunt cordate base (9) *B. fusiformis*

Flowers long-pedicelled; leaves thin, narrowed to base (10) *B. pedicellata*

Flowers sessile; fruit globose (11) *B. spicata*

(1) *B. speciosa* Forst. *Char. Gen. t.* 38 & *t.* 38A B; *King, l.c.* 135.

Tree with stout stem, 30 to 50 ft. tall. Branches thick. Leaves thinly coriaceous, obovate, tip rounded, base much narrowed,

sessile, 6 to 14 in. long, 3·5 to 7 in. wide. Panicles 4 to 8 in. long, erect. Flowers 6 to 12, 2 in. long, 5 in. across, pedicelled. Calyx 2-lobed. Petals 4, white, 2·5 in. across. Stamens very numerous and long. Fruit 3 to 5 in. long, fibrous, 4-angled, base broad, 4 in. or more through, narrowed to tip; pericarp very thick, spongy. *Hab.* Seashores in sandy places not very common. Singapore, Kampong Glam; Kranji. Dindings, Pangkor (Scortechini). Pulau Jarak (Foxworthy). Penang (Curtis). Kedah, Pulau Song-Song (Curtis). Adang Group, Pulau Rawei. *Distrib.* Indo-Malaya, Polynesia.

(2) **B. conoidea** Griff. *Notulæ, Ic.* 635, 636, fig. 1; *King, l.c.* 136.

Large erect branched shrub about 12 to 15 ft. tall, thick-branched. Leaves thickly membranous, oblong-lanceolate, base narrowed, sub-cordate, edges often crenulate; nerves 9 to 13 pairs, 4·5 to 10 in. long, 2 to 4 in. wide; petioles ·2 in. long. Racemes sub-erect about 4 in. long, few-flowered. Flowers an inch long and as wide; pedicels ·5 in. long. Calyx-tube sub-cylindric with 8 processes at base, limb bilobed. Petals 4, fleshy, white. Stamens white. Fruit green, conoid, the base with 8 fleshy semi-cordate wing-like processes, 2·5 in. long, 1·75 in. wide at base. *Hab.* In tidal mud by rivers and mangrove swamps. Singapore, Kranji; Chan Chu Kang. Malacca River (Griffith). Perak (Scortechini). *Distrib.* Borneo, Burma.

(3) **B. racemosa** Roxb. *Hort. Beng.* 52; *King, l.c.* 136.

Shrub or small tree. Leaves membranous, oblong-obovate or oblanceolate acuminate, base narrowed blunt, crenulate, 6 to 12 in. long, 2 to 4 in. wide; petioles ·1 to ·25 in. long. Racemes 24 in. long, pendulous axillary. Flowers distant 2 in. across; pedicels ·2 in. long. Calyx obconic. Petals 4, white. Stamens white. Fruit egg-shaped, green, smooth 3 in. long. *Hab.* Open country, damp places near the sea or tidal rivers, common. Singapore, Tanglin; Kranji; Blakan Mati. Johor, Kota Tinggi. Muar, Sungei Pauh (Fox). Malacca, Kampong Mata Kuching. Pahang, Pekan. Selangor, Belongkok Road, Kwala Lumpur (Foxworthy). Penang (Wallich). Pulau Tikus. Setul, Rajah Wang. Lankawi (Curtis). *Distrib.* Indo-Malaya. *Native name:* Putat Kampong.

(4) **B. pauciflora** King, *l.c.* 137.

Tree 30 to 40 ft. tall. Leaves thickly membranous, broad oblanceolate, narrowed to petiole, abruptly caudate-acuminate, 3 to 4·5 in. long, 1·25 to 2 in. wide; petioles ·4 to ·8 in. long. Raceme terminal, 1·5 to 2 in. long, with 1 to 3 flowers about 1·75 in. long, white and pink. Calyx-tube funnel-shaped, 4-angled, red mealy; lobes 4, ovate round blunt. Petals 4, ovate, oblong 1 in. long. *Hab.* Rare. Open jungle at 1500 to 2000 ft. altitude. Perak, Larut (Kunstler).

(5) **B. Scortechinii** King, *l.c.* 138.

Tree 50 to 60 ft. tall. Leaves thin coriaceous elliptic-oblong,

tapering to petiole, apex acute, margins dentate; nerves prominent beneath, 6 to 7 pairs, 3 to 6·5 in. long, 1·5 to 2·5 in. wide; petioles ·5 to ·8 in. long. Spikes pendulous 18 in. long, thick. Flowers white 2 in. long, sessile. Calyx obconic, 4-angled; lobes short, broad 4; filaments 2 in. long. Fruit oblong, truncate, 3 in. long, 1 in. through. *Hab.* Low country. Sungei Ujong, Gunong Berumbun (Cantley). Selangor, base of Bukit Kutu; Ginting Bidai; Sungei Buluh (Foxworthy). Perak, Thaiping (Wray, Kunstler). Province Wellesley, Krian. Penang Hill (Curtis). *Native name*: Putat Gajah. *Use*: Fruit used as a Sambal (Wray).

(6) **B. macrostachya** Kurz, *Journ. As. Soc. Beng.* xlvi. (2), 71; *King, l.c.* 138.

Large shrub or small tree. Leaves thinly coriaceous, oblong-oblancheolate narrowed to the slender petiole, abruptly acuminate, edge crenate; nerves 14 to 18 pairs, depressed above, prominent beneath, 5 to 12 in. long, 2 to 5 in. wide; petioles 1 to 4·5 in. long. Spikes axillary below, leaves 1 to 2 ft. long, thickened in fruit. Flowers sessile 2 in. long, 1 in. across. Calyx-tube obconic, 4-angled; lobes 4. Fruit ovoid or elliptic, smooth, 2 in. long. *Hab.* Dry woods. Singapore, Bajau; Malacca, Lubok Kedondong; Bukit Sadanen (Derry). Negri Sembilan, Tampin. Perak, Larut (Kunstler). Kedah, base of Kedah Peak; Alor Sta. Lankawi at Burau. *Distrib.* Borneo. *Native names*: Putat hutan; Putat bukit putih.

(7) **B. sumatrana** Miq. *Fl. Ind. Bat. Supp.* 315.

Large spreading shrub. Leaves coriaceous, elliptic acuminate, base narrowed, edge nearly entire; nerves very slender about 12 pairs with reticulations conspicuous on both sides, 4·5 to 7·5 in. long, 3 in. wide, petioles 2 in. long or more. Spikes long, pendulous, 15 in. long. Calyx funnel-shaped, 4-angled; lobes half as long. Petals blunt, oblong, ·65 in. long. Stamens ·75 in. long. Fruit oblong, 4-angled, narrowed to base, 1·75 in. long, ·65 in. through. *Hab.* Sandy woods near the sea. Singapore, Toas; Jurong; Pulau Tekong. Johor, Castlewood; Kwala Sembrong (Kelsall); Pulau Dayong (Feilding). Pahang, Pulau Tawar. Penang Hill. *Distrib.* Sumatra, Celebes. *Native names*: Putat Darat; Putat Gajah.

(8) **B. musiformis** King, *l.c.* 139.

Large tree 60 to 80 ft. tall, 2 to 3 ft. through. Leaves coriaceous, oblong-lanceolate sub-entire; nerves 8 to 12 pairs, slender elevate beneath, reticulations visible, ·5 to 10 in. long, 1·75 to 3·25 in. wide; petioles ·75 to 2·25 in. long. Spikes axillary, sub-erect, 12 to 14 in. long, thick. Calyx campanulate, 1·25 in. across, pubescent; tube ·2 in. long; lobes larger, ovate 4. Petals round. Stamens white tipped pink. Fruit oblong 4-angled, sub-truncate, 4 to 5 in. long, 1 to 1·5 in. through. *Hab.* Forests inland. Perak, Goping and Chandleriang (Kunstler).

(9) **B. fusiformis** King, *l.c.* 140.

Small tree 10 to 20 ft. tall, 3 to 5 in. through. Leaves membranous, oblanceolate, narrowed to the broad, cordate base, tip sub-acute, sessile serrate; nerves 12 to 16, 4 to 8 in. long, 1.4 to 2.4 in. wide. Racemes pendulous, long, slender, 1 to 2 ft. long. Flowers .4 in. across, deep crimson on pedicels 1 in. long. Fruit fusiform tapering to each end, 4-angled, 2.25 in. long, .5 in. through. *Hab.* Dense bamboo forest and thin woods. Pahang, Tahan River. Selangor, Batu Caves. Perak, Ulu Bubong (Kunstler). Kelantan. *Native name*: Putat Padi.

(10) **B. pedicellata** Ridl. *Journ. F.M.S. Mus.* x. 134.

Leaves thin membranous, broadly lanceolate-acuminate, narrowed to the base; nerves 10 pairs, edge denticulate, 6 in. long, 2 in. wide; petioles .2 in. long. Racemes terminal, very slender 12 in. long. Flowers distant; pedicels .4 in. long, slender. Bracts .1 in. long, oblong blunt. Calyx-tube campanulate, lobes ovate, blunt. Corolla .5 in. across. Stamens long; style .4 in. long. *Hab.* Pahang, Labong, Endau (Evans).

This has the foliage of *B. spicata*, but the flowers long-pedicelled.

(11) **B. spicata** Bl. *Bijdr.* 1097; King, *l.c.* 141.

Usually a shrub about 4 to 5 ft. or more tall. Leaves oblong-oblanceolate, narrowed to the petiole, sub-acute, serrate; nerves 8 to 10 pairs, 4 to 8 in. long, 1.4 to 2.4 in. wide; petioles .2 to .3 in. long. Spikes long, slender, pendulous, 12 in. long or more. Flowers remote .5 in. across, rose pink, nearly or quite sessile. Calyx pubescent, teeth 4. Fruit sub-globose, .6 in. through. *Hab.* River-banks. Johor, Kwala Sembrong (Kelsall). Pahang, Pekan; Sungei Chenei (Foxworthy). Malacca, Alor Gajah; Malaka Pindah; Merlimau (Derry); Dindings. Perak, Kwala Temengoh; Goping (Kunstler). Province Wellesley, Permatang Bertam. Kelantan, Chaning. Kedah, Gunong Geriang River. Setul. *Distrib.* S. Siam, Borneo, Java. *Native name*: Juri-Juri.

I have not seen anything here exactly like the Indian *B. acutangula* Gaertn., which has distinctly pedicelled flowers. King includes it in the Materials, *l.c.* 140, with some doubt.

11. **PLANCHONIA**, Bl.

Trees. Leaves alternate or pinnate-nerved. Flowers white or yellowish green in terminal racemes. Calyx-tube turbinate, 4-lobed. Petals 4. Stamens very numerous in several series united at base, inner ones without anthers; filaments filiform. Ovary 3- to 4-celled with an annular disc; style slender. Fruit large, fibrous or fleshy, 1- to 3-celled. Seeds several; testa coriaceous. Species 4, Andamans to Australia.

Leaves obovate, thin serrate	.	.	.	(1) P. valida
Leaves oblong, stiff coriaceous, hardly serrate	.	.	.	(2) P. grandis

(1) **P. valida** *Bl. Fl. de Serres* xiii. 24. *Pl. sundaica* *Miq. Fl. Ind. Bot.* i. 493; *King, l.c.* 142.

Tree 50 to 70 ft. tall, 1·5 to 2 ft. through. Leaves obovate, apiculate crenulate, membranous; nerves 12 to 18 pairs, 3 to 6·5 in. long, 1·75 to 3 in. wide; petioles ·3 to ·6 in. long. Racemes 2 in. long, about 10-flowered. Flowers large, white, sessile. Calyx campanulate. Stamens white, base pink. Fruit oblong-ovoid. *Hab.* Rare in forests. Perak, Gunong Malacca, Kinta (*Kunstler*). *Distrib.* Sumatra.

(2) **P. grandis** *Ridl. Journ. Roy. As. Soc. S. Br.* 61, p. 9.

Big tree 80 ft. tall and 3 ft. through. Leaves very coriaceous, obovate-oblong, short acuminate entire; nerves prominent 15 pairs, 6 in. long, 3·25 in. wide; petioles ·5 in. long. Spikes short, terminal, many-flowered. Calyx obconic, lobes orbicular, ovate. Petals green, ·75 in. long. Staminal whorl 4 in. across, white, base crimson. Fruit oblong globose green fleshy, white inside, 3 in. long, 2 in. through. Seeds 3 or more, brown. *Hab.* Singapore; Garden Jungle, one tree.

12. CAREYA, Roxb.

Trees or shrubs. Leaves alternate crowded at the branch ends, membranous, crenate. Flowers large, racemed or spicate. Calyx-tube campanulate; lobes 4. Petals 4. Stamens many in several series, connate at base; filaments filiform, inner- and outer-most without anthers. Ovary 4- to 5-celled with an annular disc; ovules numerous on axile placentas in 2 rows in a cell. Fruit globose. Seeds numerous in pulp. Species 3, India.

(1) **C. arborea** *Roxb. Cor. Pl.* iii. 14, t. 218; *Clarke, in Hook. fil. F.B.I.* ii. 511.

Tree 30 to 60 ft. tall. Leaves obovate 12 in. long, 6 in. wide; petioles ·2 to 1 in. long. Spikes 3-flowered, 3 to 8 in. long. Calyx 1 in. long. Petals 1·75 in. long, white; filaments red, 2 in. long. Fruit globose, 2·5 in. long, 2 in. wide. *Hab.* Open sandy country in the north; Setul. Perlis, Ginting Kabok. Lankawi. *Distrib.* India, Siam. *Native name*: Putat Kedang.

ORDER LIX. MELASTOMACEÆ.

Herbs, shrubs, or small trees. Leaves opposite 3- to 5- or 7-nerved from base, except *Memecylon*. Stipules 0. Flowers pink or white or blue, regular, cymose or paniced, rarely solitary. Calyx inferior adnate to ovary. Petals on margin of calyx-limb. Stamens 4, 8 or 10, all similar, or 4 smaller; anthers opening by 1 or 2 terminal pores, connective often appendaged at base with bristles, tubercles or a spur. Ovary 4- to 6-celled (1-celled in

Memecylon); style simple, filiform. Fruit a capsule breaking up irregularly or by slits in the tops of the cells, a berry or a drupe (*Memecylon*). Seed numerous, minute (except *Memecylon*, one seed).

Species 2700, tropical, a few sub-tropical; whole world. (*King, Journ. As. Soc. Beng.* lxix. (2), p. 1. The *Sonerilas* by Stapf, p. 18.)

A. Melastomaceæ. Ovary 3- to 6-celled; anthers opening by 1 rarely 2 pores. Seeds many.

i. OSBECKIÆ. Seeds curved.

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|---------------------------------------------|--------------|
| Stamens 8, similar; fruit capsular . . . | 1. OSBECKIA |
| Stamens 10, dissimilar; fruit baccate . . . | 2. MELASTOMA |

ii. OXYSPORÆ. Seeds straight.

Inflorescence terminal; stamens 8.

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|------------------------------------------------------------------|------------------|
| Panicles large, showy; fruit funnel-shaped . | 3. OXYSPORA |
| Panicles small; flowers small; fruit ellipsoid | 4. ALLOMORPHIA |
| Cymes of few large flowers; fruit urceolate or obconic | 5. ORITREPHES |
| Cymes of few large flowers; fruit campanulate, obconic | 6. PERILIMNASTES |

Inflorescence axillary.

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|------------------------------------------------------------------------------------|-------------------|
| Stamens 4 | 7. BLASTUS |
| Stamens 10 (inflorescence occasionally terminal); fruit dehiscing very irregularly | 8. OCHTHOCHARIS |
| Stamens 8. | |
| Trees or large shrubs; flowers umbelled . | 9. ANERINCLEISTUS |
| Shrubs. Cymes small, few-flowered . | 10. PHAULANTHUS |
| Shrublets. Cymes scorpioid, many-flowered | 11. CAMPIMIA |

iii. SONERILEÆ. Herbs, rarely shrublets. Capsule turbinate.

Herbs.

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|--------------------------------------------------------------------------|------------------|
| Petals 3; stamens 3 (in one 6); flowers few in scorpioid cymes | 12. SONERILA |
| Petals 4; stamens 8; flowers in terminal cluster | 13. SARCOPYRAMIS |

Half shrubby.

- | | |
|-----------------------------------------------------------------|------------------|
| Petals 4; stamens 8; flowers many umbelled or paniced | 14. PHYLLAGATHIS |
|-----------------------------------------------------------------|------------------|

iv. MEDINILLEÆ. Fruit baccate; shrubs.

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|----------------------------------------------------------------------------------|------------------|
| Stamens 8, unequal, long ones with 2 long bristles at connective base; climbers. | |
| Cymes lateral | 15. MARUMIA |
| Panicles terminal | 16. DISSOCHÆTA |
| Long stamens with no bristles | 17. ANPLECTRUM |
| Stamens unequal 8 to 10; epiphytes. | |
| Anther-connective with 2 tubercles in front and spur behind | 18. MEDINILLA |
| Anther-connective bearded behind | 19. POGONANTHERA |
| Anther-connective spurred behind, no tubercles | 20. PACHYCENTRIA |
| Stamens 20 to 25 | 21. PLETHIANDRA |

B. Miconiææ (*American*).

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|----------------------------------------------|--------------|
| Hairy herb; stamens 8 similar; fruit berry . | 22. CLIDEMIA |
|----------------------------------------------|--------------|

- C. Astronieæ.** Ovary 4- to 5-celled; seeds many; anthers with slits; trees.
 Panicles terminal 23. *ASTRONIA*
 Cymes axillary, rarely paniced.
 Flowers blue or white 24. *PTERNANDRA*
- D. Memecyleæ.** Trees or shrubs; ovary 1-celled; fruit drupe; stamens 8.
 Leaves pinnate-nerved 25. *MEMECYLON*

1. OSBECKIA, Linn.

Herbs or shrubs, usually bristly. Leaves sub-coriaceous, often sessile 3- to 7-nerved from base. Flowers terminal solitary, capitate (or paniced) showy, pink, often involucrate. Calyx-tube ovoid or urceolate, scaly or bristly; lobes subulate or lanceolate 4 to 5. Petals obovate, 4 to 5. Stamens 8 to 10, all similar. Fruit capsular opening by 4 or 5 pores. Species 32, Indian, with 2 or 3 Malaya and Australia.

Herbs erect branched. Stamens 4 or 8.

Leaves oblong or linear (1) *O. chinensis*

Leaves ovate-oblong (2) *O. cochinchinensis*

Shrub with short broad coriaceous leaves; stamens 10.

Calyx covered with whorls of hairs on short pedicels (3) *O. perakensis*

(1) *O. chinensis* Linn. *Sp. Pl.* 490; *Roxb. Fl. Ind.* ii. 224; *Clarke, in Hook. fil. F.B.I.* ii. 515.

Herb, erect branched, wiry, 6 in. to 2 ft. tall. Leaves oblong or linear, narrowed at base, hairy, 1.5 to 2 in. long, .2 in. wide. Flowers capitate, 1 in. across, mauve. Bracts ovate. Calyx campanulate, sub-glabrous, teeth lanceolate, ciliate on edge. Stamens 8. Fruit ovoid, glabrous or with a few bristles, .2 in. long. *Hab.* Open country, Setul (Haniff). *Distrib.* India, Cambodia, Malay islands.

(2) *O. cochinchinensis* Cogn. *Mon. Phan. l.c.* 331.

A dwarf wiry herb about 6 in. tall. Stems 4-angled. Leaves ovate-oblong, blunt 3- to 5-nerved, sparsely bristly, about 1 in. long. Flowers 1 or several. Calyx hairy, .25 in. long; lobes narrow, triangular, long ciliate. Petals 4. Stamens 4. *Hab.* Heathy country, Setul (Ridley). *Distrib.* Cochin-China.

(3) *O. perakensis* Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 66.

Shrub about 8 ft. tall, branching. Young parts, petioles, upper surface and nerves of leaves beneath covered thickly with short, stiff bristles. Leaves coriaceous elliptic-ovate obtuse, base round, 1.25 in. long, .75 in. wide; petioles .15 in. long. Flowers 3 to 5 in a head, sessile with a few bracts at base, in fruit pedicelled; pedicel .1 in. long. Calyx ovoid, densely covered with simple bristles and whorls of bristles on short stalks; lobes long narrow, acuminate. Petals 1 in. long, obovate, deep rose pink. Stamens 10. Style stout. Capsule covered with bristles as in flower, .4 in. long, .3 in. through. *Hab.* Mountains local. Perak, Gunong Hijau on Thaiping Hills (Mrs. Bland; J. W. Anderson).

2. MELASTOMA, Linn.

Shrubs scaly or strigose. Leaves oblong or lanceolate. Flowers terminal, solitary or clustered, rose or white, 5-merous. Calyx-tube ovoid campanulate, strigose or hairy, lobes deciduous. Stamens twice as many as petals very dissimilar (except *M. muticum*) longer ones, anthers purple, connective long, produced at base, bilobed, shorter ones alternate, yellow, connective not produced, 2-tubercled in front. Ovary bristly at top. Fruit baccate, pulpy, dehiscing transversely or (rarely) vertically. Seed minute in black, sweet pulp. Species 40, Asia, Australasia.

Stamens of 2 unequal series.

Stems covered with long black hairs; leaves glabrous.

Flowers large, white or rose; fruit dehiscing irregularly

(1) *M. decemfidum*

Flowers large white or rose; fruit dehiscing longitudinally

(2) *M. schizocarpa*

Stems and leaves densely soft, hairy

(3) *M. molle*

Stems and calyx scaly; leaves hairy beneath; flowers 2 in. across.

Bracts large, oblong; calyx scaly

(4) *M. malabathricum*

Bracts large oblong; calyx hairy

(5) *M. perakense*

Bracts small linear or o.

Leaves narrow lanceolate 2 in. long; scales short, ovate

(6) *M. polyanthum*

Leaves lanceolate 3 in. long; calyx densely covered with linear acuminate scales

(7) *M. normale*

Leaves ovate or oblong, 4 to 6 in. long

(8) *M. imbricatum*

Leaves and stem hairless; flowers 3 in. across

(9) *M. scabrum*

Stamens all similar

(10) *M. muticum*

(1) *M. decemfidum* Roxb. Hort. Beng. 90; King, l.c. 4. *M. sanguineum* Sims, Bot. Mag. t. 2241; Clarke, in Hook. fil. F.B.I. ii. 524.

Large lax shrub about 6 ft. tall. Branchlets and petioles covered with stiff bristles. Leaves lanceolate or ovate-lanceolate, 3- to 5-nerved, glabrous except for a few scattered hairs above, 2.5 to 5 in. long, .6 to 1.8 in. wide; petioles .25 to .5 in. long. Flowers solitary or 2 to 3 together, 2 to 3 in. across. Calyx-tube .25 to .5 in. long, densely clothed with long stiff pink hairs; teeth linear acuminate, about half as long as the globose urceolate tube. Petals 1.5 in. long, broadly obovate, pale rose. Stamens shorter. *Hab.* Mountain woods from about 1200 ft. altitude upwards, common. Malacca, Mt. Ophir. Pahang, Tahan River. Perak (Kunstler). Selangor, Ginting Sempah. Penang Hill (Curtis); Telok Bahang (Foxworthy). Kedah Peak. *Distrib.* Burma, Cochin-China.

(2) **M. schizocarpa** *Ridl. Journ. Roy. As. Soc. S. Br.* 59, p. 104.

Shrub 6 ft. tall, thickly sprinkled with long red hairs. Leaves lanceolate-acute, glabrous except some hair on midrib and nerves, 4 in. long, 2 in. wide; petioles .5 in. long, hairy. Flowers 2 to 3 terminal, 2 in. across. Bracts ovate cuspidate, .12 in. long. Calyx urceolate, .75 in. long, densely hairy; teeth 5, short. Petals bright rose colour, obovate. Stamens 10; anthers yellow, connective with two short linear processes, smaller ones one-third as long. Fruit .75 in. long dull red, densely hairy, dehiscing vertically on one side. *Hab.* On heaths, rare. Perlis, Ginting Kabok, Kanga (Ridley).

(3) **M. molle** *Wall. Cat.* 4046. *M. sanguineum* *Sims*, var. *molle* *Clarke, l.c.* ii. 524. *M. decemfidum* *Roxb.* var. *molle* *King, l.c.* 5. *M. crinitum* *Naud, Ann. Sc. Nat.* 3, iii. 524.

Low shrub. Branches (densely) and leaves covered with stiff pale hairs. Leaves elliptic-acuminate rather flaccid; nerves 5, with hairs longer than on the rest of the leaf. Corymb of 4 or 5 flowers, dense. Calyx .75 in. long, densely covered with long subulate pale hairs, lobes lanceolate about as half as long. Petals 1 in. long, edges and back with tufts of long hairs. Stamens shorter. *Hab.* Dense forest, extremely rare; probably extinct here. Singapore (Wallich 4046). A single plant without flowers was found by me in the forests of Bukit Timah many years ago, but has since disappeared. Johor, Gunong Pantai. *Distrib.* Sumatra, Philippines.

(4) **M. malabathricum** *Linn. Sp. Pl.* 559; *Clarke, l.c.* ii. 523; *King, l.c.* 6 (*in part*).

Shrub 3 to 8 ft. tall. Branches, petioles and pedicels densely clothed with short acute pale scales. Leaves lanceolate acute, base narrowed, blunt, 3- to 5-nerved, strigose on both sides, 2 to 2.5 in. long, 1 to 1.25 in. wide; petioles .2 in. long. Corymbs few-flowered. Bracts large, .2 to .5 in. long and broad, ovate truncate, backs scaly. Calyx-tube cylindric .5 in. long; scales linear-acuminate; lobes ovate acute, shorter than tube. Petals 1 in. long, rosy mauve. Fruit urceolate, globular, .25 in. through, dehiscing transversely. *Hab.* Open country to about 3000 ft. altitude in the north. Perak, Thaiping. Selangor, Bukit Hitam at 3000 ft. altitude. Penang (Wallich 4040). Dindings, Lumut, Province Wellesley, Permatang Bertam. Setul, Tomoh (Machado). Tringganu, Bundi (Rostado). Kelantan, Kwala Lebir (Gimlette). Kedah Yan. *Distrib.* India. *Uses and names*: as in *M. polyanthum*.

(5) **M. perakense** *Ridl.* *M. malabathricum* var. *perakense* *King, l.c.* 7.

Large lax-branched shrub. Branches clothed with linear-acuminate scales. Leaves ovate acuminate, base narrowed, nerves 5, strigose above, velvety hairy beneath, 3.5 to 4.5 in. long, 1 to 3 in. wide; petioles 1 in. long, hairy. Corymbs of 3 to 8 flowers. Bracts broad, oblong, .5 in. long, scales on back linear-acuminate. Calyx-tube urceolate, .5 in. long, densely covered with hair-like scales,

lobes broad lanceolate caudate as long as tube. Petals 1.5 in. long, pink. Stamens shorter. *Hab.* Hill forests at about 3000 ft. altitude. Johor, Kampong Simpai, Batu Pahat (Kelsall). Pahang, Gunong Lesang, Kwantan (Foxworthy); Telom. Selangor, Bukit Hitam. Perak, Thaiping Hills; Hermitage Hill (Curtis). *Distrib.* Java, Lingga.

(6) **M. polyanthum** *Bl. Flora* 1831, p. 480. *M. appressum* *Benth. in Wall Cat.* 4081. *M. malabathricum* *var. polyanthum* *Clarke, l.c.* ii. 523.

Shrub 3 to 8 ft. tall. Scales usually shorter than in *M. malabathricum*. Leaves narrow lanceolate acute, narrowed to the base, 2 to 3.5 in. long, .5 to 1.5 in. wide; petioles .3 in. long. Corymb of 8 to 10 flowers. Bracts minute or none. Calyx cylindric, .3 in. long; scales short ovate acute; lobes .15 in. long, linear-acute. Petals .5 in. long, rose mauve, rarely white or pink and white. Stamens .6 in. long. Fruit .3 in. through, pink, dehiscing transversely, pulp black. *Hab.* Very common in open country in the south of the peninsula. Singapore, Malacca, Selangor, Perak, Gunong Keledang. Penang (Porter, *Wall Cat.* 4081). Kelantan, Kuala Aring (Yapp); Kampong Kota (Gimlette). *Distrib.* Java. *Native names:* Sendudok; The Singapore Rhododendron. *Use:* Fruit for thrush in children. A decoction of the branches as an astringent in diarrhoea. Roots as a mouth-wash for toothache.

This chiefly differs from *M. malabathricum* L. in the absence of the large bracts in that species.

var. angustifolia *Ridl.* A variety with very narrow linear acute leaves, was collected on the Tahan River by Seimund.

(7) **M. normale** *Don, Prod. Fl. Nep.* 220; *Clarke, l.c.* ii. 524. *M. malabathricum* *var. normale* *King, l.c.* 7.

Shrub 12 ft. tall. Branchlets and ribs of leaves covered with lanceolate scales. Leaves lanceolate acute, base shortly narrowed rounded, densely velvety with fine hairs except the nerves beneath 3 in. long, 1 to 1.25 in. wide; petioles .3 in. long. Corymbs of 4 to 5 flowers. Bracts linear .2 in. long. Calyx urceolate densely covered with linear acuminate narrow, ciliate scales, lobes linear-acuminate, .3 in. long, as long as the tube, hairy on both sides. Petals 1 in. long, dark pink, edges ciliate. Stamens .75 in. long. *Hab.* Mountains 3000 to 6000 ft. altitude. Perak, Gunong Batu Putih at 6700 ft. altitude (Wray); Gunong Kerbau 6000 ft. altitude (Robinson). *Distrib.* Nepal.

var. glabrescens.

Leaves almost glabrous above. Pahang, Telom. Selangor, Bukit Hitam. Perak, Gunong Keledang (a sub-variety with scales on calyx red strongly ciliate) (Ridley).

(8) **M. imbricatum** *Wall. Cat.* 4047; *King, l.c.* 5.

Large spreading shrub 5 to 15 ft. tall, covered with short blunt scales. Leaves ovate to oblong sub-acute, base shortly cuneate,

with scales short lanceolate acuminate; nerves 3, prominent, 4 to 6 in. long, 1.5 to 3.5 in. wide; petioles 1.5 in. long. Corymbs of about 10 flowers, dense. Bracts small. Calyx sub-globose, urceolate, .2 in. long, covered with short lanceolate acute scales; lobes much shorter. Petals .5 in. long, light rose pink. Fruit globose urceolate, .3 in. long, green. *Hab.* Common in forest on main range 1500 to 5000 ft. altitude. Selangor, Bukit Hitam; Ulu Gombak; Ginting Sempah. Perak, Gunong Keledang; Thaiping Hills. Dindings, Telok Sera. Penang (Wallich). *Distrib.* Assam, Cambodia, Sumatra. *Native name*: Sendudok Rimbah.

(9) **M. scabrum** Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 60.

Shrub about 5 ft. tall. Branchlets sparsely covered with small ovate to lanceolate acuminate scales. Leaves narrow lanceolate, sub-acute, base rounded or shortly cuneate, above scabrid with short thorn-like scales; nerves 5 with larger scales, 4 to 4.75 in. long, 1.25 to 1.50 in. wide, petioles .6 in. long. Flowers as large as in *M. decemfidum*. Calyx .4 in. long campanulate, sparsely covered with lanceolate-acuminate scales, lobes linear acuminate, scales long, linear sub-acute. Petals glabrous, 1.5 in. long, pale rose pink. Stamens much shorter. *Hab.* Rocky woods. Lankawi, Bureau at Telaya Tujoh (Ridley).

(10) **M. muticum** Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 4.

Bush. Branches with flat lanceolate triangular often lacinate scales. Leaves lanceolate-acuminate pubescent; nerves 5, hairy beneath 3 to 6 in. long, 1.5 to 2 in. wide; petioles .5 in. long dense hairy. Flowers few. Bracts ovate or lanceolate, hairy, .5 in. long and as wide. Calyx .5 in. long, covered with yellow hairs. Petals broad, obovate, 1.12 in. long. Stamens all similar; anthers cylindric acuminate, base bilobed. *Hab.* Mountain woods, at 4000 ft. altitude, rare. Selangor, Hulu Semangkok (Ridley).

3. OXYSPORA, DC.

Shrubs, large. Leaves opposite, large, long-petioled, ovate sub-coriaceous. Panicles terminal, large. Flowers rather large. Calyx-tube ovate to funnel-shaped; teeth 4, small. Petals pink or white. Stamens 8, unequal or equal; anthers opening by one pore, base bilobed. Ovary 4-celled. Capsule fusiform or short cupular 8-ribbed. Seeds falcate. Species about 15, Indo-Malayan.

It is difficult botanically to separate this genus from *Allo-morphia*. The original species, including *O. stellulata*, have the stamens conspicuously unequal, but in the remainder closely resembling it in habit, foliage, panicle and large flowers, the stamens are nearly or quite equal. I had referred most of these to *Allo-morphia*, but think it advisable to retain for that only the herbaceous or nearly herbaceous plants with small flowers, thin leaves and globose capsules.

Stamens unequal of 2 kinds.

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|----------------------------------------------------|-----|----------------------|
| Big shrub or tree, glabrous | (1) | <i>O. stellulata</i> |
| Dwarf shrubs, hairy | (2) | <i>O. hispida</i> |
| Dwarf shrub, velvety; fruit semi-globose | (3) | <i>O. microcarpa</i> |

Stamens similar and equal.

Tall shrub.

Leaves ovate, pubescent beneath.

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| Fruit goblet-shaped | (4) | <i>O. floribunda</i> |
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Low shrubs.

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| Leaves elliptic cordate; petiole hairy | (5) | <i>O. hirta</i> |
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|------------------------------------------------------------------|-----|-------------------|
| Leaves glabrous, membranous; flowers sub-umbelled, few | (6) | <i>O. collina</i> |
|------------------------------------------------------------------|-----|-------------------|

Leaves glabrous membranous; panicle large.

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| Capsule obconic | (7) | <i>O. rosea</i> |
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|----------------------------|-----|--------------------|
| Capsule fusiform | (8) | <i>O. Curtisii</i> |
|----------------------------|-----|--------------------|

Leaves glabrous coriaceous.

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|------------------------------------------|-----|----------------------|
| Branches terete; panicle hairy | (9) | <i>O. hirticalyx</i> |
|------------------------------------------|-----|----------------------|

Branches 4-angled; panicle.

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|-----------------------------|------|----------------------|
| Leaves puberulous | (10) | <i>O. acutangula</i> |
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(1) *O. stellulata* King, l.c. 9.

A large shrub or tree, 5 to 30 ft. tall. Branches scurfy with minute scales. Leaves ovate acuminate, base round cordate, 5- to 7-nerved, scurfy, 5 to 9 in. long, 2·25 to 4·5 in. wide; petioles 1·25 to 4 in. long. Panicles large, terminal, 8 in. long, 10 in. wide, scurfy. Flowers rose pink in umbels of 4 to 6 on the terminal branchlets. Calyx-tube funnel-shaped, teeth 4 short, base narrowed into the pedicel, ·2 in. long. Petals 4, orbicular-ovate, small. Stamens 8, 4 linear, purple, 4 half as long, yellow. Capsule clavate, opening by 4 truncate valves. *Hab.* Mountain forests, 2000 ft. altitude upwards, a very handsome plant in flower. Perak, Thaiping Hills; Gunong Batu Putih (Wray); Gunong Kerbau (Haniff). Kelantan, Chaning. *Distrib.* Sumatra.

(2) *O. hispida* Ridl. *Journ. Roy. As. Soc. S. Br.* 57, p. 34.

Shrub. Branches, panicles and nerves covered with cylindric subulate processes. Leaves ovate or orbicular-ovate acuminate, base cordate covered thinly above, thickly beneath with small processes; nerves 9, more hairy, reticulations and transverse nerves conspicuous beneath, 7 in. long, 6 in. wide; petioles 2·5 in. long, hairy. Panicles 12 to 18 in. long, lower branches 6 in. long. Flowers and pedicels ·5 in. long hairy. Calyx goblet-shaped, narrowed into pedicel, lobes small, triangular. Petals 4, ovate-acuminate. Stamens 8, longer ones ·12 in. long, acuminate, shorter ones less curved and acuminate, all yellow. Capsule urn-shaped ·12 in. long; lobes ovate acute. *Hab.* Mountains. Selangor, Mengkuang Lebah at 5400 ft. altitude (F. Dennys; Robinson).

(3) *O. microcarpa* Ridl. *Journ. Roy. As. Soc. S. Br.* 57, p. 34. *Allomorphia rosea* Ridl. *Journ. F.M.S. Mus.* iv. 14 (not of *Trans. Linn. Soc. Ser.* 2, iii. 301).

Much-branched shrub 8 to 9 ft. tall, velvety. Leaves ovate-cordate above glabrous, beneath hairy on nerves 7, and nervules,

4 to 6 in. long, 3 to 4 in. wide; petioles hairy, 2 in. long. Panicles hairy 8 to 12 in. long, 4 to 6 in. across. Flowers small pink. Calyx obovoid, strigose, 4 small acute points, pink. Petals 4, lanceolate-acuminate, small. Stamens 8, 4 narrow linear-oblong, 4 oblong-obtuse half as long. Capsule urn-shaped, strigose, .1 in. long. *Hab.* Mountain ridges. Pahang, Telom on ridges at 4000 ft. altitude (Ridley).

(4) *O. floribunda* Ridl. *Anerincleistus floribundus* King, l.c. 17.

Shrub 15 ft. tall, velvety. Leaves ovate acuminate, base round unequally obscurely cordate, 7-nerved, above shortly bristly, beneath shortly hairy, nerves on both sides densely hairy, 5 to 9 in. long, 4 to 5.5 in. wide; petioles 1 to 2 in. long. Panicles 16 in. long, 7 in. across, spreading; branches sub-whorled. Calyx-tube funnel-shaped, pink, pilose, .2 in. long; teeth 4, triangular with tufts of hairs between. Petals 4, broad, triangular, pink. Stamens 8, equal or occasionally 2 smaller or wanting. Capsule obovoid, truncate. *Hab.* Perak, Hermitage Hill (Curtis; Scoretchini).

(5) *O. hirta* Ridl. *Journ. F.M.S. Mus.* vi. 148.

Shrubby stems and petioles, densely covered with stiff black hairs. Leaves elliptic sub-acute, base cordate, above glabrous, beneath sparsely hairy; nerves 5 pairs, hairy, transverse nerves prominent, 7 in. long, .3 to .5 in. wide; petioles 2.5 in. long. Panicle few-branched, 8 in. long, hairy. Flowers not seen. Fruit urn-shaped, pink, narrowed to base, .25 in. long. *Hab.* Damp woods on mountains. Pahang, Gunong Tahan about 4500 ft. altitude (Ridley).

(6) *O. collina* Ridl. *Anerincleistus collinus* Ridl. *Journ. Roy. As. Soc. S. Br.* 57, p. 47.

Shrub, hairy, 5 ft. tall. Leaves obovate to lanceolate acuminate-caudate, base cuneate, equally, 5-nerved; nerves pubescent from base pale or pink beneath, 4 to 6 in. long, 1.5 to 3 in. wide; petioles .5 to 1 in. long, scabrid, hairy. Peduncles 2 in. long, pubescent terminal. Flowers .4 in. long in 1 or 2 whorls or umbels. Calyx funnel-shaped, pubescent; lobes 5. Petals lanceolate, pink. Stamens nearly equal, yellow, with a short process on back. Capsule short cup-shaped, .2 in. long, narrowed to pedicel. *Hab.* Forests. Perak, Temengoh Woods (Ridley). Lankawi, Burau (Robinson), a form with larger flowers than type.

(7) *O. rosea* Ridl. *Journ. Roy. As. Soc. S. Br.* 57, p. 35. *Allo-morphia rosea* Ridl. *Trans. Linn. Soc. Ser.* iii. 301.

Low nearly glabrous shrub, scurfy papillose. Leaves lanceolate-acuminate 12 in. long, 4 in. wide; petioles 3 in. long. Panicles large; branches over 6 in. long, scaly. Flowers pink .3 in. long. Calyx obconic, lobes blunt, triangular. Petals oblong. Stamens 8; filaments pubescent, similar; anthers linear-oblong. Capsule pink,

obconic, .25 in. long, 4-angled. *Hab.* Forests. Pahang, Tahan Woods (Ridley).

(8) *O. Curtisii* King, *l.c.* 9.

Puberulous shrub. Leaves ovate acuminate, base round, above strigose, below glabrous, edges serrulate; nerves 7, 5 to 7 in. long, 3 to 4 in. wide; petioles 1.5 to 2.5 in. long, broadly winged. Panicles longer; branches 4-angled. Flowers pedicelled. Calyx cylindric, 8-ribbed, tapering both ends, teeth 4 minute. Petals 4 as long as filaments. Capsule fusiform .2 in. long, mouth expanded. *Hab.* Perak, Hermitage Hill (Curtis).

(9) *O. hirticalyx* Ridl. *Allomorpha hirticalyx* Ridl. *Journ. F.M.S. Mus.* vi. 46.

Woody shrub, scurfy. Leaves sub-coriaceous, oblong or ovate oblong, glabrous, base rounded or very short cuneate; nerves 5; nervules prominent, all scurfy beneath, 3 to 5 in. long, 1.5 to 2.5 in. wide; petioles 1 to 1.5 in. long. Panicles slender, hairy; peduncles 3 in. long. Inflorescence 2 in. long. Flowers .5 in. long. Calyx funnel-shaped, ribbed; lobes ovate, blunt, all hairy. Petals oblong-ovate, blunt, white. Stamens yellow, much longer. Capsule .2 in. long, urceolate more or less hairy, ribbed. *Hab.* Perak, Gunong Kerbau (Haniff, Robinson) at 4000 to 7000 ft. altitude.

(10) *O. acutangula* King, *l.c.* 9.

Bush. Young branches 4-angled, glabrous; nerves beneath and inflorescence scurfy. Leaves sub-coriaceous, elliptic-oblong, base narrowed, rounded, tip acute; nerves 5, prominent beneath, 4 to 6 in. long, 1.75 to 2.5 in. wide; petioles .6 to .75 in. long. Panicle 4 in. long and nearly 4 in. across in fruit. Flowers numerous .5 in. long. Calyx funnel-shaped, scurfy; teeth 4, triangular. Petals ovate, blunt, white. Stamens 7 to 8 lanceolate a narrow process on the back behind. Capsule ovoid, narrowed at base, glabrous, ribbed, .25 in. long. *Hab.* Perak, Gunong Batu Putih at 6700 ft. altitude (Wray).

4. ALLOMORPHIA, Bl.

Half shrubby herbs with thin membranous leaves, equal or nearly so. Panicles terminal of small green or white flowers. Calyx 3- to 4-toothed. Petals 3 to 4. Stamens 6 to 8, equal or alternately long and short; base sagittate with a spur behind or muticous. Capsule small urn-shaped, ribbed, opening at top by 3 to 4 valves. Species 3 or 4.

Stem not winged.

Shrubby 5 to 10 ft. tall; flowers numerous,
green

Dwarf, 6 to 24 in. tall; flowers few white;
stamens pink or purple.

Panicle glabrous

Panicle red-scurfy

Stem and branches winged

(1) *A. malaccensis*

(2) *A. exigua*

(3) *A. porphyranthra*

(4) *A. alata*

(1) **A. malaccensis** Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 69. *A. exigua* Clarke, in *Hook fil. F.B.I.* ii. 527; King, *l.c.* 10 partly, not of Blume.

Half shrubby about 6 ft. tall, glabrous. Leaves ovate-acuminate, base round or very shortly narrow; nerves prominent beneath 5 from base, 10 in. long, 6 in. wide; petioles 3 to 4 in. long. Panicles 6 to 12 in. long, spreading. Flowers in small cymes, small, yellowish green or whitish. Calyx goblet-shaped, .1 in. long; lobes triangular. Petals oblong-ovate. Capsule urn-shaped, 8-ribbed. *Hab.* Common in woods in low country. Malacca. Negri Sembilan, Tampin. Selangor, Sungei Buluh; Sempang, Semangkok Pass. Perak, Tapah; Selama (Yapp, Kunstler). Penang Hill (Wallich 4048); (Curtis). *Distrib.* Sumatra. *Native names:* Kayu Kadok Gajah; Pakan Rimbah; Senduduk Gajah; S. hutan; Panghong; Kerukup Rimaui; Endebi. *Use:* In leprosy (Hervey).

(2) **A. exigua** Bl. *Flora* 1831, ii. 523, not of others. *Melastoma exigua* Jack. *Trans. Linn. Soc.* xiv. 10, t. 1, fig. 2.

Glabrous shrublet about 2 ft. tall, slender. Leaves lanceolate acuminate, base rounded or cuneate, pale beneath; nerves 5 from base, 3.5 to 6 in. long, 1.25 to 2.5 in. wide; petioles 1 to 2 in. long (there is a slight difference in the size of the leaves in pairs). Panicles 4 in. long, lax, slender branched 2.5 in. wide. Flowers 3 to 4 together, umbelled. Calyx .1 in. long; lobes short acute. Petals white, oblong-lanceolate, acute. Stamens pink, twice as long. Capsule urn-shaped .12 in. long, ribs 8 low. *Hab.* Rocky places in woods. Penang Hill (Wallich, Curtis, etc.).

var. *capillaris* Ridl. *A. capillaris* Ridl. *Journ. Roy. As. Soc. S. Br.* 57, p. 38.

More slender. Leaves almost caudate, sometimes long cuneate. Panicle very slender, pendulous, with very slender branches few-flowered. *Hab.* Dindings Bruas. Perak, Waterloo; Temengoh; Thaiping Hills (Kunstler 2302).

(3) **A. porphyranthera** Ridl. *Journ. Roy. As. Soc. S. Br.* 57, p. 38.

Slender low shrub, red-scurfy, papillose, glabrous. Leaves nearly equal, rather thin, ovate lanceolate, long acuminate, base round; nerves 5, 4 to 6 in. long, 1.25 to 2.25 in. wide; petiole 1 to 1.25 in. long. Panicles 2 to 2.5 in. long, red-scurfy. Cymes umbellate dense, few-flowered. Flowers .15 in. long. Calyx goblet-shaped, scabrid, lobes triangular, acute. Petals lanceolate acuminate. Stamens longer; anthers purple. Capsule obovoid, urn-shaped, glabrous, ribbed, .1 in. long. *Hab.* Perak, woods at Temengoh (Ridley).

(4) **A. alata** Scott. in King, *l.c.* 12.

Glabrous shrub 3 to 6 ft. tall. Branchlets winged. Leaves ovate or elliptic-ovate, short acuminate, base narrowed, edges

bristle-toothed, 5 to 10 in. long, 2·5 to 4·5 in. wide; petioles ·75 to 4 in. long. Panicles 4 to 5 in. long, spreading; branches angled and winged, rusty. Flowers in small umbels. Calyx-tube cylindric, ovoid; teeth small. Petals white, twice as long. Stamens longer, violet. Capsule sub-globular, 8-ribbed, ·1 in. long. *Hab.* In forests. Perak, Tapah; Goping (Wray, Kunstler). Kedah, Gunong Bintang (Kloss). Kelantan, Chaning; Kwala Lebir (Ridley).

Dubiæ.

A. bullata *Cogn. Monogr.* 465. *Sonerila bullata*, *Griff. Notulæ*, iv. 675.

Malacca (Griffith). The description by Griffith is too obscure to identify this plant.

5. ORITREPHEs, Ridl.

Large branching shrubs. Leaves coriaceous, elliptic or lanceolate, large; nerves 3 to 5 from base; nervules horizontal, prominent. Inflorescence cymose, terminal of few large white flowers. Calyx obconic, sometimes angled; lobes 4, rounded. Petals 4. Stamens 8, similar, acuminate, occasionally with a dorsal process. Capsule obconic, dehiscing at the top by valves. Species 5, Malay Peninsula.

- | | |
|--------------------------------------------------------------|---------------------------|
| Calyx strongly angled obcuneate | (1) O. grandiflora |
| Calyx funnel-shaped not angled; branches of panicles angled. | |
| Calyx ·4 in. long | (2) O. pulchra |
| Calyx ·25 in. long | (3) O. Barnesii |
| Branches terete; flowers ·1 in. long | (4) O. albiflora |
| Calyx obovoid; branches terete | (5) O. Robinsonii |

(1) **O. grandiflora** *Ridl. Anerincleistus grandiflora Ridl. Journ. Roy. As. Soc. S. Br.* 57, p. 45. (Fig. 64, p. 772.)

A shrub or treelet 12 ft. tall. Branches angled. Leaves equal, coriaceous, elliptic acuminate, base round or cuneate; nerves, 2 outer very fine from the base, inner pair rising from the base or from the midrib 1 in. above the base, 6 to 7 in. long, 3 in. wide; petioles 1 to 3 in. long. Cymes on peduncles 2 to 3 in. long, stout angled; branches stout, 1 to 3 in. long, bearing 3 flowers; pedicels ·3 in. long. Calyx white, 4-angled, obconic ·5 in. long and as wide at top; lobes subovate. Petals oblong, white. Capsule ·75 in. long, valves broad, thick. *Hab.* Mountain woods. Selangor, Semangkok Pass; Gunong Mengkuang Lebah (Robinson).

(2) **O. pulchra** *Ridl. Journ. Linn. Soc.* xxxviii. 309.

Large shrub. Branches angled. Leaves lanceolate caudate-acuminate, base narrowed, outer pair of nerves slender from base, upper ones from midrib ·5 in. above base, 7 in. long, ·2 to ·5 in. wide; petioles 1 in. long; peduncles angled ·2 in. long. Flowers few, in cymes, 1 in. long. Calyx funnel-shaped terete, ·25 in. long;

lobes hardly distinct. Petals white. Fruit obovoid .5 in. long. *Hab.* Mountains in thickets 4500 to 5000 ft. altitude. Pahang, Gunong Tahan (Robinson, Ridley).

(3) *O. Barnesii* Ridl. *Anerincleistus Barnesii* Ridl. *Journ. Roy. As. Soc. S. Br.* 57, p. 47.

Shrub. Leaves coriaceous lanceolate acuminate, narrowed to base, 6 in. long, 2 in. wide; petioles 1.25 in. long. Cymes 1 to 3 on peduncle 1.5 in. long, angled, stout. Calyx-tube .25 in. long,

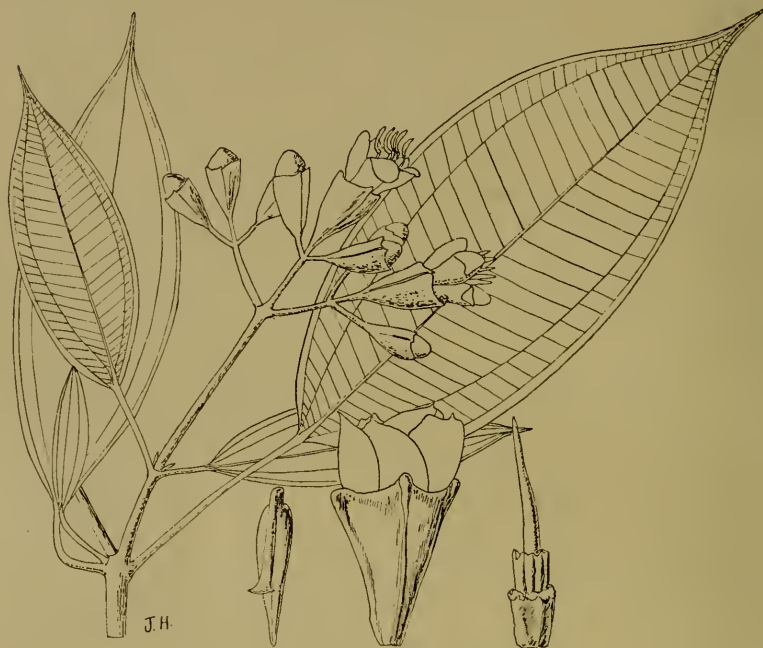


FIG. 64.—*Oritrephes grandiflora*.

scurfy, dilate upwards; lobes ovate, sub-acute. Petals ovate, round. Capsule .3 in. long, valves large. *Hab.* Mountains. Pahang, K'luang Terbang (Barnes).

(4) *O. albiflora* Ridl. *Anerincleistus albiflora* Ridl. *Journ. F.M.S. Mus.* iv. 15.

Glabrous shrub. Branches terete. Leaves sub-coriaceous equal, lanceolate ovate acuminate; nerves 5 from base, 4 in. long, 2 in. wide; petioles .5 to 1 in. long. Panicles terminal, 4 in. long, lax. Calyx funnel-shaped, .1 in. long; lobes 4 ovate. Petals oblong, obtuse, .1 in. long, white. Stamens 8, equal. Anthers with a small process at back. Capsule urn-shaped, ribbed, dehis-

cing longitudinally, .12 in. long. *Hab.* Perak, Gunong Berumbun near Telom (Ridley), at 5000 ft. altitude.

(5) **O. Robinsonii** Ridl. *Anerincleistus Robinsonii* Ridl. *Journ. Roy. As. Soc. S. Br.* 57, p. 46.

Big shrub. Branches terete. Leaves coriaceous, lanceolate acuminate, red-scurfy beneath; base shortly cuneate; nerves as in *O. grandiflora*; nervules prominent, 4 to 6 in. long, 1 to 2.25 in. wide; petioles .5 to 1 in. long. Peduncles axillary and terminal, 3.5 in. long with 2 or 3 terminal cymes. Flowers .5 in. long, white and pink. Calyx-tube obconic not angled, red-scurfy; lobes ovate, blunt. Petals ovate-oblong. Capsule .5 in. long not angled, conic. *Hab.* Mountain woods. Pahang, Gunong Tahan (Robinson, Ridley).

6. PERILIMNASTES, Ridl.

Glabrous shrub forming compact tussocks. Leaves coriaceous, narrow lanceolate entire, opposite equal, 3-nerved. Cymes short, terminal, few-flowered. Calyx sub-cylindric; sepals long, linear. Petals lanceolate, acute. Stamens 8, all equal. Style slender. Fruit short, campanulate, pale shining, dehiscence apical, valves 4, broad inflexed. Species 1, endemic.

(1) **P. fruticosa** Ridl. *Anerincleistus fruticosus* Ridl. *Journ. Linn. Soc.* xxxviii. 309.

Much branched, branches black. Leaves 1.75 in. long, .2 to .3 in. wide, acuminate, blunt, winged to base. Peduncles .1 in. long, red; pedicels .15 in. long. Calyx red, cylindric, base dilate, 4-ridged .2 in. long; lobes linear, .2 in. long. Petals spreading, pinkish white. Stamen filaments .2 in. long; anthers yellow as long, acuminate. Capsule .2 in. long and as wide on a pedicel .3 in. long. *Hab.* On rocks in mountain streams. Pahang, Gunong Tahan (Robinson, Ridley).

This forms cushions about 12 in. tall in cracks of rocks in the streams.

7. BLASTUS, Lour.

Shrubs, scaly or puberulous. Leaves membranous, ovate to lanceolate. Panicles cymose of small flowers, axillary and terminal. Calyx-lobes 4. Petals 4, ovate. Stamens 4. Capsule sub-globular. Species 4 or 5, Malaya, Cochin-China, China.

Leaves lanceolate; flowers hardly .1 in. long . (1) **B. Cogniauxii**
 Leaves ovate; flowers with stamens .5 in. long . (2) **B. pulverulentus**

(1) **B. Cogniauxii** Stapf. *Hook. Ic. Pl. t.* 2311; *King, l.c.* 12. *Ochthocharis parviflora* Cogn. *Mon. Phan.* vii. 421.

A slender much-branched twiggy shrub 6 to 10 ft. tall, scaly or puberulous. Leaves oblong-lanceolate long-acuminate, base narrowed, thin glabrous scaly beneath; nerves 5 with nervules conspicuous scurfy, 4 to 7 in. long, 1 to 2.25 in. wide; petioles

·3 to ·75 in. long. Panicles axillary and terminal, slender, 1·5 in. long with 6 to 9 small green flowers at ends of the few branches, densely crowded. Calyx tubular nearly ·1 in. long scaly; teeth minute. Stamens short; anthers ovate, glandular at base. Capsule sub-globular, ·1 in. long. *Hab.* Common in hill woods. Selangor, Bukit Kutu; Ginting Bidai. Pahang, Telom; Kwala Lipis. Perak, Goping (Kunstler). Kelantan, Chaning. *Distrib.* Borneo.

(2) **B. pulverulentus** *Ridl. Journ. Linn. Soc.* xli. 290.

Branchlets scurfy, tomentose. Leaves ovate acuminate, base cuneate, glabrous above, scaly beneath; nerves tomentose, 5 in. long, 2·5 in. wide; petioles 1·25 in. long. Cymes axillary and sub-terminal, scurfy tomentose, few-flowered 1·5 in. long. Flowers ·5 in. long. Calyx sub-globose, tomentose, lobes 4. Petals 4, ovate. Stamens 4, equal; anthers with short processes at base in front; filaments glandular. *Hab.* Selangor, Ulu Langat (Kloss).

8. OCHTHOCHARIS, Bl.

Small, little-branched, wiry shrubs with ovate or lanceolate serrulate leaves and small pinkish white flowers in axillary clusters or terminal panicles. Calyx-tube ovoid, 5-toothed. Petals 5. Stamens 8 or 10; anthers oblong opening with 1 pore. Ovary 4- to 5-celled; style filiform. Capsule globose, dehiscent irregularly. Seeds very numerous. Species about 8, Malayan.

- | | |
|-----------------------------------------------------------------|--------------------------|
| Panicle terminal; stamens 10 inappendiculate . . . | (1) O. paniculata |
| Panicle terminal; stamens 8 with a glandular boss on back . . . | (2) O. ovalifolia |
| Flowers in axillary fascicles; petals 4; stamens 8. | |
| Anthers inappendiculate . . . | (3) O. borneensis |
| Anthers with a boss on the back. | |
| Leaves elliptic lanceolate . . . | (4) O. decumbens |
| Leaves ovate lanceolate . . . | (5) O. sylvestris |
| Petals 5; stamens 5 . . . | (6) O. javanica |

(1) **O. paniculata** *Korth. Verh. Nat. Gesch. Bot.* 247, t. 64; *Clarke, in Hook. fil. F.B.I.* ii. 528; *King, l.c.* 13.

Low shrub about 3 ft. tall, branched, angled, pubescent at tip. Leaves membranous, elliptic-lanceolate, tapering at both ends, serrulate, 5- to 7-nerved, nearly glabrous, 2·5 to 6 in. long, 1·25 to 2 in. wide; petioles ·3 to 1·25 in. long. Panicles terminal, spreading, 1·5 to 2 in. long. Flowers ·2 in. long. Calyx cup-shaped. Petals acute, 5. Stamens 10, muticous. Capsule depressed, globular, ·2 in. through. *Hab.* Rare in wet river forest. Singapore (Wallich 4083). Not seen again in the Malay Peninsula. *Distrib.* Borneo, Sumatra.

(2) **O. ovalifolia** *Ridl. Journ. Roy. As. Soc. S. Br.* 54, p. 41.

Shrublet branched. Young parts red-hairy. Leaves ovate acute, base round, edge crenulate setulose, glabrous, except midrib,

base above and nerves and reticulations beneath red woolly, 1·5 to 2·5 in. long, 1·25 in. wide; petioles ·5 in. long, woolly. Panicles terminal, short, nodes woolly. Bracts oblong, ·1 in. long, hairy. Calyx ·12 in. long, campanulate; lobes lanceolate, edged with gland-tipped hairs. Petals 5, lanceolate-acuminate. Stamens 8 similar; anthers linear-oblong with a glandular boss on back. Capsule sub-globose, dehiscence irregular. *Hab.* Dense swampy woods. Johor, Sedenah (Ridley).

(3) **O. borneensis** *Bl. Ann. Mus. Bot. Lugd. Bat.* i. 40; *King, l.c.* 14.

A slender shrub 3 to 4 ft. tall. Leaves membranous elliptic lanceolate acuminate, base slightly narrowed, 5-nerved (3 conspicuous), edge dentate, glabrous except nerves beneath, sometimes scurfy hairy, 3 to 4·25 in. long, 1·25 to 1·75 in. wide; petioles ·3 to 1·8 in. long. Flowers in fascicles of 4 to 7 below the leaves, ·1 in. long; pedicels ·25 to ·3 in. long. Calyx urceolate. Petals 4, ovate-acuminate, white. Stamens 8; anthers oblong muticous. Capsule depressed globular, 5-grooved, ·2 in. long. *Hab.* Tidal mud. Not rare in the south. Singapore, Selitar. Johor, Sempang Kanan; Kota Tinggi. *Distrib.* Borneo, Buru. *Native name:* Sakalan.

(4) **O. decumbens** *King, l.c.* 15.

Erect slender little or not branched shrub 3 to 5 ft. tall. Leaves thinly coriaceous, elliptic lanceolate to ovate acuminate, base round or shortly cuneate, edges occasionally minutely serrate, 5- to 7-nerved, glabrous, 5 to 8 in. long, 1·75 to 3·5 in. wide; petioles 1 to 2·5 in. long. Cymes axillary, ·2 to ·3 in. long; pedicels short. Calyx urceolate ·1 in. long or less; teeth 4. Petals 4, ovate, pinkish white. Stamens 8; anthers with a minute tubercle behind. Capsule depressed, globose, ·18 in. through. *Hab.* Damp spots in dense forest in the low country. Johor, Mt. Austen. Selangor, Sungei Buluh. Perak, Ulu Bubong (Kunstler).

(5) **O. sylvestris** *Ridl. Journ. Roy. As. Soc. S. Br.* 61, p. 4.

Stems slender 2 ft. tall. Leaves ovate lanceolate or acuminate, glabrous except base, entire; nerves 5 from base, 7 in. long, 3 in. wide; petioles 1 to 2 in. long, upper edge hairy. Flowers in short axillary fascicles; pedicels short. Calyx glabrous, urn-shaped; lobes triangular, mucronate. Petals broad oblong. Stamens 8; anthers oblong obtuse all similar, tips divaricate, appendage one conic. Capsule ·13 in. long, globose. *Hab.* Wet spots in forests in the south. Johor, Tanjong Kupang; Mt. Austen. Malacca, Merlimau (Cantley).

(6) **O. javanica** *Bl. Flor.* 1831, p. 523; *Clarke, l.c.* ii. 528; *King, l.c.* 14.

Shrublet 2 to 3 ft. tall. Leaves sub-coriaceous, lanceolate or oblong-lanceolate acute, base cuneate; nerves 3, pale beneath, edges at tip distinctly serrate, 2 to 3 in. long, ·6 to ·1 in. wide;

petioles .5 in. long. Cymes .5 in. long; flowers few, crowded .15 in. long, pedicelled. Calyx-tube obovoid, limb hardly toothed. Petals 5, broad, ovate-acuminate, white; anthers 5. Capsule sub-globular, 5-grooved, .15 to .2 in. through. *Hab.* Tidal mud. Common in the south. Singapore, Changi. Johor, Tebrau River. Malacca (Griffith). *Distrib.* Borneo, Java. *Native name* : Silokan.

9. ANERINCLEISTUS, Korth.

Small trees, more or less hairy. Leaves membranous; nerves 2 pairs, one from base, the other from some way above the base. Panicles axillary and terminal, short or long; bracts conspicuous large. Flowers small rose or white. Calyx-tube funnel-shaped or urceolate, hairy. Petals 4. Stamens 8; anthers with a short boss behind. Ovary 4-celled; style filiform. Capsule globose. Species 3, Malayan.

Nearly glabrous; flowers umbellate (1) **A. macranthus**
Nerves of leaf beneath, petiole, bract, calyx, fruit,
hairy; flowers racemose (2) **A. pauciflora**

(1) **A. macranthus** *King, l.c.* 15.

Small tree 12 to 20 ft. tall, glabrous. Leaves elliptic caudate, base narrowed equal; nerves prominent one pair from shortly above the base, the other very fine from base, 2.5 to 4 in. long, .8 to 1.5 in. wide; petioles .4 to .8 in. long. Umbels axillary and terminal of 7 or 8 flowers, .25 in. long, with large lanceolate-acuminate caducous bracts 1 in. long, .25 in. wide. Calyx-tube funnel-shaped, pilose, pedicelled; teeth triangular 4. Petals 4, ovate, white. Stamens 8, alternate ones shorter, with a short process behind. Capsule globose-ovoid .25 to .3 in. long, valves large. *Hab.* Mountains in forests. Perak, Gunong Batu Putih (Wray); Gunong Berumbun, Telom; Gunong Kerbau (Haniff).

(2) **A. pauciflora** *Ridl. Journ. Roy. As. Soc. S. Br.* 54, p. 41.

Shrub 6 ft. tall. Stems terete. Leaves elliptic-ovate acuminate, glabrous except hairy midrib beneath, 7 in. long, 3 in. wide; petioles 1 in. long, hairy, winged above. Flowers 2 to 3 in terminal racemes. Bracts ovate hairy, .25 in. long. Calyx urceolate hairy, .1 in. long. Petals ovate acute, pink, edges ciliate. Stamens 8, equal. Capsule .25 in. long, hairy splitting into 8 lobes. *Hab.* Forests. Selangor, Klang Gates; Ginting Bidai (Ridley).

10. PHAULANTHUS, Ridl.

Low shrubs. Leaves usually equal, ovate or lanceolate. Cymes axillary, small of few flowers. Calyx campanulate; lobes short, 4. Petals 4. Stamens 8 equal similar, bases shortly prolonged, back spurred. Capsule urceolate dehiscent at top; valves 4. Species 5, Assam, Tenasserim and Malaya.

Exstipulate.

Peduncles very short; flowers in cymes of 3; leaf base cuneate (1) **P. Helferi**

Peduncles very short; flowers umbellate 4; leaf base cordate (2) **P. rudis**

Peduncles slender, long (3) **P. Curtisii**

Stipulate.

Leaves narrowed acuminate (4) **P. stipularis**

(1) **P. Helferi** *Ridl. Journ. Roy. As. Soc. S. Br.* 57, p. 42. *Anerincleistus Helferi* *Hook. fil. Triana Trans. Linn. Soc.* xxviii. 75; *Clarke, l.c.* ii. 529.

Branched shrub. Stem solid, hairy above. Leaves ovate or ovate-lanceolate, acuminate, base cuneate; nerves 5 to 7, slender, transverse nervules conspicuous, hairy on both sides, 7 to 12 in. long, 3.5 to 6 in. wide; petioles 1 to 3 in. long. Cymes .5 in. long of 3 or more hairy flowers. Calyx urceolate, lobes 4 sub-triangular, hairy. Petals very small. Capsule .25 in. long, urceolate, hairy, pink. *Hab.* Dense forests. Pahang, Khol River and Tahan woods (Ridley). *Distrib.* Mergui.

(2) **P. rudis** *Ridl. l.c.* 43.

Shrub 6 to 8 ft. tall. Stem woody .4 in. through. Young parts hairy above, more thickly hairy beneath; nerves 4 to 7, slender, more hairy, .8 in. long, 7.5 in. wide; petioles densely hairy 2 to 3 in. long. Flowers 4, umbellate, pink on very short peduncle; pedicels .5 in. long. Calyx-tube urn-shaped; lobes 4, acute. Capsule urceolate, pink hairy, .12 in. long, valves smooth, triangular 4. *Hab.* Dense forests. Selangor, Ginting Bidai; Ginting Peras (Ridley).

(3) **P. Curtisii** *Ridl. l.c.* 44. *Anerincleistus Scortechinii* *King, l.c.* 16. *A. Curtisii* *Stapf, Kew Bulletin* 1892, p. 196.

Slender branched hairy shrub 3 to 4 ft. tall. Leaves thin, lanceolate-oblong acuminate, base narrowed blunt truncate, very unequal, glabrous or sparsely hairy, edges hairy; nerves hairy 3; larger leaf 2.5 to 4 in. long, .8 to 1.4 in. wide, smaller, one-fourth to one-half as long. Flowers very small, 6 to 10, green, umbellate, cymose on a slender peduncle 1 in. long. Calyx globose, campanulate, tomentose or hairy; teeth 4, hairy. Petals 4, ovate, shorter. Capsule nearly .1 in. long, sub-globose, more or less hairy. *Hab.* Dense forests. Perak, Bukit Kapayung, Sungei Siput; Taiping Hills; Temengoh. Province Wellesley, Tasek Gelugur (Curtis).

(4) **P. stipularis** *Ridl. l.c.* 43.

Shrub. Stem hairy. Leaves ovate-lanceolate or oblanceolate narrowed to base, acuminate, young ones golden-velvety, adult sparsely hairy; nerves 5, lowest from base and upper 2 from the midrib, all densely hairy, 5 to 7 in. long, 2 in. wide; petioles .5 to 1.5 in. long. Stipules .25 in. long, orbicular. Cymes of 2 to 3; peduncle very short. Capsule urceolate, hairy; valves oblong, on pedicel .1 in. long. *Hab.* Tringganu, Bundi (Rostado).

11. CAMPIMIA, Ridl.

Shrub. Stem hollow. Leaves opposite, equal, ovate. Inflorescences axillary and terminal, scorpioid. Flowers small, articulate. Calyx-tube campanulate, hardly lobed. Petals 4. Stamens 8, equal; anthers oblong prolonged below with a linear process at the back. Capsule campanulate. Species 2, 1 Malayan, 1 Borneo.

C. Wrayi Ridl. *Journ. Roy. As. Soc. S. Br.* 57, p. 40. Allomorphia Wrayi King, *l.c.* 11.

Shrub 2 to 4 ft. tall. Leaves glabrous, acuminate, base shortly cuneate, thin, nerves 7, margin ciliate; 7 in. long, 3.5 to 5 in. long; petioles 2.5 in. long, hairy along upper edge. Panicles 1.5 to 4 in. long, few and short-branched. Flowers small, secund. Petals ovate. Stamens similar; anthers short, oblong, process large, spathulate. Capsule cup-shaped, .1 in. long, narrowed to thick pedicel, smooth. *Hab.* Mountain forests, local. Perak, Thaiping Hills at 1000 to 2000 ft. altitude (Wray, Ridley).

12. SONERILA, Roxb.

Low herbs, more rarely shrubby. Leaves membranous or fleshy, opposite, similar in shape and size, or unequal in size, 1 much smaller and different in shape, usually slightly oblique, 3- to 7-nerved from base. Flowers pink or white in scorpioid simple or false-umbelled cymes. Calyx sub-cylindric or turbinate, 3-toothed. Petals 3, ovate or oblong acute. Stamens 3 (in one species 6); anthers linear-oblong, blunt or lanceolate acuminate, base lobed dehiscing with apical pores. Style filiform; ovary 3-celled. Fruit trigonous, turbinate, smooth or muricate, dehiscing at the top. Seeds minute. Species over 100, tropical Asiatic. (*Stapf, in Journ. As. Soc. Beng.* lxxix. (2), 18.)

A. Eu-Sonerila. *Stamens 3; leaves similar in each pair.*

i. **ERECTÆ.** Ascending wiry herbs, branched.

Calyx and fruit narrow, cylindric.

- | | |
|---------------------------------------------|-------------------------------|
| Leaves linear, spatulate | (1) S. linearis |
| Leaves lanceolate | (2) S. erecta |
| Leaves oblong, toothed, very diffuse plant. | (3) S. calaminthifolia |
| Leaves ovate, fleshy, .7 to .9 in. across . | (4) S. tenera |

Erect wiry little-branched herbs with turbinate fruit.

- | | |
|-------------------------------------------------------------------|--------------------------|
| Leaves ovate, toothed, sparsely hairy;
flowers small | (5) S. tenuifolia |
| Leaves ovate, toothed, densely hairy;
flowers large | (6) S. hirsuta |
| Slender prostrate plant with minute
flowers | (7) S. prostrata |

ii. **VALIDULÆ.** Branched shrubby hairy plants;

Leaves similar but unequal; fruit turbinate.

Capsule smooth; flowers small, white in
cymes of 3 or 4.

- | | |
|----------------------------------------------------------|----------------------|
| Leaves lanceolate, narrow .4 to .5 in.
wide | (8) S. patula |
|----------------------------------------------------------|----------------------|

- Leaves elliptic, acute, 1 to 1·5 in. wide . (9) *S. albiflora*
 Capsule muricate; leaves lanceolate.
 Flowers solitary axillary large, white . (10) *S. ramosa*
 Flowers in cymes of 3 or 4 in lower axils (11) *S. suffruticosa*
 Flowers in terminal axils only; leaves
 broad ovate.
 Leaves hairy above; flowers large,
 rose . (12) *S. rudis*
 Leaves glabrous above; capsule
 smooth . (13) *S. mollis*
 Flowers in terminal axils; leaves lan-
 ceolate acuminate . (14) *S. pallida*
 Succulent little herbs, glabrous or nearly so,
 little or not branched; leaves similar
 and nearly or quite equal; stamens 3.
 Leaves 3-nerved from the base, not con-
 gested at the top of the stem.
 Leaves sub-peltate, base unequal . (15) *S. populifolia*
 Leaves sub-peltate, base equal . (16) *S. elliptica*
 Leaves 3- to 7-nerved from base, succulent;
 flowers white.
 Leaves large; peduncle with several
 erect branches . (17) *S. succulenta*
 Leaves smaller; peduncles 1 or 2 not
 branched . (18) *S. repens*
 Leaves 3-nerved, lanceolate acuminate;
 stem nodose, hairy . (19) *S. nodosa*
 Leaves pinnate-nerved, not congested;
 flowers pink.
 Plant branched, glabrous . (20) *S. picta*
 Plant simple, hairy . (21) *S. muscicola*
 Leaves congested at the top of the stem;
 small delicate plants; flowers pink.
 Leaf base broad, rounded.
 Leaves ovate 1·25 in. wide, glabrous . (22) *S. congesta*
 Leaves lanceolate, ovate, variegated,
 often hairy . (23) *S. cyclaminella*
 Leaves oblong, edge spinulose . (24) *S. calophylla*
 Leaf base narrowed.
 Leaves ovate, setose, denticulate . (25) *S. Griffithii*
 Leaves lanceolate, 5 in. wide . (26) *S. saxosa*
 Leaves lanceolate, 2·5 in. wide . (27) *S. bellula*

B. Sonerilopsis. *Stamens 6.*

- Herb. Leaves ovate acuminate; flowers pink . (28) *S. heterostemon*

C. Hexodon. *Stamens 3; leaves of each pair very dissimilar, one very small and round; cymes from axils of the small leaves; fruit turbinate; valves always splitting into 3.*

Cymes with rather large persistent bracts.

- Fruit glabrous . (29) *S. glabriflora*
 Fruit muricate.

Leaves broad, oblique ovate; petiole long.

- Leaves acuminate . (30) *S. capitata*

- Leaves round, blunt at tip . (31) *S. cæsia*

Leaves oblong, petiole short; peduncle
 long . (32) *S. bracteata*

Cymes with minute caducous bracts.

- Leaves quite glabrous, base narrow . (33) *S. integrifolia*

- Leaves quite glabrous, base unequally lobed. (34) **S. barbata**
 Leaves glabrous above, nerves beneath hairy.
 Fruit muricate (35) **S. nidularia**
 Fruit smooth, few-flowered (36) **S. calyculata**
 Fruit smooth; flowers many; petiole winged (37) **S. Gimlettei**
 Leaves hairy on both sides, oblong, sparsely hairy above.
 Tall, with dense setose axillary cymes; flowers small (38) **S. setosa**
 Dwarf; cymes terminal.
 Petioles long (39) **S. costulata**
 Petioles short (40) **S. microcarpa**
 Leaves ovate oblique, sparsely hairy above; dwarf plants.
 Stem short; cymes long peduncled (41) **S. begoniæfolia**
 Stem long.
 Cymes terminal, sessile (42) **S. macrophylla**
 Cymes sessile or nearly axillary (43) **S. brachyantha**
 Leaves velvety, hairy above.
 Stem elongate; leaves ovate (44) **S. elatostemoides**
 Dwarf; leaves oblong acuminate (45) **S. bicolor**

(1) **S. linearis** Hook *fil.*; *Triana, Trans. Linn. Soc.* xxviii. 76; *Clarke, in Hook fil. F.B.I.* ii. 536.

Slender wiry glabrous herb, 6 to 14 in. tall. Leaves linear, spathulate, sessile, minutely toothed or entire, 1 in. long, .05 to .1 in. wide. Racemes terminal, few-flowered. Calyx-tube cylindric, campanulate .2 in. long. Petals .25 in. long, .1 in. wide, mauve pink; anthers orange, long acuminate, shorter than petals. Fruit cylindric oblong smooth, narrow at base, .3 in. long. *Hab.* Kedah Peak, Gunong Jerai (Lobb; at 3000 ft. altitude, Robinson).

(2) **S. erecta** Jack, *Mal. Misc.* i. 7; *Stapf and King, l.c.* 23.

Wiry herb, usually widely branched, upper parts hairy, 3 to 18 in. tall. Leaves similar, ovate or lanceolate, hairy, .4 to 1.2 in. long, .2 to .4 in. wide, faintly 3-nerved; petioles 0 to .3 in. long. Cymes 2- to 9-flowered, glabrous, elongating peduncles .4 to 2 in. long slender; pedicels .04 in. long. Calyx sub-cylindric, .15 to .2 in. long; teeth short. Petals elliptic cuspidate, pink, .15 in. long. Anthers ovate lanceolate. Capsule sub-cylindric, .3 to .45 in. long, .06 to .08 in. wide. *Hab.* On rocks and stony paths or mossy banks on mountains. Local, but abundant where it occurs, variable in size, Perak, Thaiping Hills (all collectors), Penang Hill (all collectors). *Distrib.* Mountains.

The varieties *flexuosa* and *discolor* Stapf, are merely large fully grown forms, not worth keeping up. *S. hyssopifolia* Stapf, *l.c.*, from Gunong Hijau, the top of the Thaiping Hills, appears to be a state with rather larger fruits, much like the form *discolor*, probably a wet-wood form.

(3) **S. calaminthifolia** Stapf and King, *l.c.* 23.

Wiry branched ascending herb up to 12 in. tall, hairy. Stem 4-angled above, crimson. Leaves equal, oblong or elliptic toothed,

thick membranous, pale green, midrib purple, 1- to 3-nerved, .3 to .5 in. long; .1 to .2 in. wide; petioles .08 to .12 in. long or less. Cymes 2- to 5-flowered; peduncle filiform .4 to .8 in. long. Calyx slender, obconic, oblong .15 to .2 in. long; teeth triangular, acute. Petals elliptic cuspidate, .33 in. long, pink. Capsule oblong, sub-trigonus, smooth, .25 to .3 in. wide. *Hab.* Perak, Gunong Batu Putih at 4300 ft. altitude (Wray).

(4) *S. tenera* Royle, *Ill.* 215, t. 45, var *robustior* Guill. *S. epilobioides* Stapf, *l.c.* 22.

A glabrous herb 6 in. tall. Leaves similar sub-equal ovate acute, base narrowed, denticulate, thin membranous, glabrous or sparsely hairy, 5-nerved from base, 1 to 1.75 in. long, .7 to .9 in. wide; petioles .4 to .5 in. long. Cymes 5- or 6-flowered; peduncles .6 to .8 in. long; pedicels .2 in. long, very slender. Calyx very slender, obconic, .25 to .3 in. long; teeth triangular, broad. Petals elliptic acuminate, .2 in. long, pink. Anthers .12 in. long, lanceolate, much shorter than the long filament. *Hab.* Lankawi islands; Terutau (Curtis). *Distrib.* Cochinchina, the typical form from India and Siam.

(5) *S. tenuifolia* Bl. *Flora* 1831, p. 491; *Benn. Pl. Jav. Rar.* 211, t. 44; *Clarke, l.c.* ii. 536.

Erect or decumbent wiry herb 6 to 12 in. tall, base bare, branched above, more or less hairy above and on the leaves. Leaves membranous very unequal, ovate to lanceolate, base round, tip acute, edge dentate 3-(rarely 5)-nerved from base, 1 to 2 in. long, .4 to 1 in. wide; petioles slender, 1 to 1.5 in. long. Cymes 1- to 6-flowered, sub-umbelled; peduncles .5 to 1 in. long, purple; pedicels .25 to .3 in. long. Calyx campanulate, oblong, .15 in. long; teeth triangular. Petals elliptic apiculate, rose pink, .3 in. long. Anthers lanceolate. Capsule obconic, 3-angled, .23 to .27 in. long, .23 in. wide. *Hab.* Damp rocks in mountain forest. Pahang, Telom. Malacca, Mt. Ophir (Maingay). Perak, Gunong Kerbau (Robinson). *Distrib.* Java and Borneo.

(6) *S. hirsuta* Ridl. *Journ. F.M.S. Mus.* iv. 16. *S. tenuifolia*, var *hirsuta* Stapf, *l.c.* 25.

Herb decumbent erect 6 in. tall, densely hairy, hairs often with swollen bases. Leaves crowded, 1 to 1.5 in. long, .5 in. wide, strongly toothed ovate lanceolate, densely hairy with long hairs. Flowers solitary rarely 3, terminal and axillary; pedicels short. Calyx cylindric. Petals often .5 in. long, rose pink. Fruit small .15 to 2 in. long; pedicel .2 in. long. *Hab.* Mossy spots on mountains from 3000 to 3600 ft. altitude. Selangor, Gunong Mengkuang Lebah (Robinson). Pahang, Gunong Tahan. Malacca, Mt. Ophir (Lobb). Perak, Gunong Bubu (Wray); Gunong Berumbun (Ridley).

This differs from *S. tenuifolia* in its smaller size, densely hairy leaves and stem, solitary larger flowers, often axillary and smaller capsule on a shorter pedicel, but it might be considered a mountain variety.

(7) ***S. prostrata* Ridl.**

A very slender creeping plant forming mats. Stems filiform hairy red. Leaves equal-paired, ovate round with white hairs on upper surface, edge serrate, .25 in. long and wide; petioles slender .1 in. long. Flowers 1 to 2 shortly pedicelled on slender terminal peduncles. Calyx urn-shaped with very short teeth acute, hairy. Corolla .25 in. wide, bright pink of 3 or 4 petals obovate, minutely apiculate. Stamens 3, nearly as long. Anthers yellow. Capsule urn-shaped, smooth, nearly truncate, .25 in. long. *Hab.* On shady rocks on the roadside, Selangor, Klang Gates, flowering January (Ridley).

(8) ***S. patula* Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 71.**

Stem branched widely from near the base woody red-hairy, about 12 in. tall. Leaves lanceolate acute, base acute, appressed hairy all over, equal; nerves 3, 1.75 to 2.5 in. long, .3 to .5 in. wide; petioles .1 in. long. Cymes axillary and terminal; peduncle .1 in. long. Flowers small, white, 2 to 5 in a cyme. Calyx .15 in. long, campanulate; lobes lanceolate, subulate. Petals triangular lanceolate, acuminate .1 in. long. Stamens elliptic, blunt. Capsule trigonous obconic, smooth, .2 in. long; pedicel stout, .4 in. long. *Hab.* Rare. Forests in mountainous regions. Pahang, Tahan woods, below Wray's Camp, 3000 ft. altitude (Ridley).

(9) ***S. albiflora* Stapf, *l.c.* 28.**

Woody shrublet ascending or erect branched, 18 in. tall, appressed bristly. Leaves sub-equal or quite unequal, lanceolate or ovate lanceolate acute, dark green, glabrous above, pale beneath and appressed-hairy or glabrous; nerves 1 to 2 pairs, appressed hairy beneath, 1 to 3.5 in. long, .5 to 1.25 in. wide; petioles .2 to .4 in. long. Flowers axillary and terminal, solitary or paired or 5 in a cyme, small, white; pedicels very slender. Calyx small, obconic, glabrous, .08 in. long. Petals oblong, apiculate, .1 to .15 in. long. Anthers oblong, blunt. Capsule obconic, scantily muricate, .2 in. long. *Hab.* Mountain woods. Selangor, Semangkok, 3000 to 4000 ft. altitude. Perak, Gunong Keledang; Bujong Malacca (Curtis, Goldham, Kunstler).

(10) ***S. ramosa* Ridl. *Journ. F.M.S. Mus.* v. 33.**

Slender woody lax-branched bristly shrub, over a foot tall. Leaves unequal narrow lanceolate, acuminate, narrow at base, hairy 2.5 in. long, .3 in. wide, small leaves linear-lanceolate, .4 by .1 in. long. Flowers solitary axillary sub-sessile. Calyx narrow, cylindric; teeth lanceolate setaceous, hairy, .3 in. long. Petals white, obovate rounded, sparsely hairy, .5 in. long, .4 in. wide. Stamens 3, about half as long; anthers orange, curved acuminate. Capsule sub-sessile obconic, sparsely hairy, lobes lanceolate; valves large. *Hab.* Selangor, Gunong Mengkuang Lebah (Robinson).

(11) *S. suffruticosa* Stapf, l.c. 29.

A shrublet over 12 in. tall, hairy all over with dense crimson hairs. Leaves crowded at branch-tips unequal oblong or oblong-ovate acute, asymmetric toothed, 3- to 5-nerved from near the base, larger leaves 1 to 1.4 in. long, .4 to .6 in. wide; petioles .25 in. long or less. Flowers white axillary in pairs, small. Capsule obconic, .2 in. long, strigose muricate. *Hab.* Perak, Gunong Bubu at 5000 ft. altitude (Wray).

var. *lasiantha* Ridl. *S. lasiantha* Stapf, l.c.c.

Leaves larger lanceolate, 1.5 to 3 in. long, .6 to .8 in. wide; petioles .3 to .6 in. long. Capsule hairy, .15 to .18 in. long. Petals oblong, cuspidate. This came from the same gathering as *S. suffruticosa*, and is probably a fully evolved state of this little known plant.

(12) *S. rudis* Stapf, l.c. 27. *S. velutina* Ridl. *Journ. F.M.S. Mus.* iv. 18.

A decumbent rarely branched herb 12 in. tall, densely hairy with red hairs (when dry). Leaves similar or very unequal, ovate to elliptic acute, base round entire, pale beneath, glabrous or hairy above; nerves hairy on both sides, 7-nerved, 1 to 3.5 in. long, .4 to 2.5 in. wide; petioles .75 in. long. Cymes 2- to 6-flowered, sub-terminal; peduncles .5 to 1 in. long. Calyx slender, narrow, funnel-shaped, .12 to .15 in. long. Petals elliptic to obovoid, pink, a line of hairs on the back, .4 in. long. Capsule obconic, muricate. *Hab.* Mountain forests, Selangor, Semangkok. Pahang, Telom and Gunong Berumbun. Perak, Tumbung Parhat (Scortechini); Gunong Kerbau (Robinson); Bujong Malacca (Curtis).

My *S. velutina* seems to be a more densely hairy form than the typical plant. *S. mollis* Stapf, is also very closely allied, but is taller, with red velvety leaves and smooth fruit.

(13) *S. mollis* Stapf, l.c. 28.

Decumbent with erect red velvety stems, little or not branched, 12 to 18 in. tall. Leaves unequal elliptic sub-acute, base round or blunt; nerves 2 to 3 pairs from lower part of midrib red velvety, otherwise leaf is glabrous, rarely hairy on upper surface and midrib, often asymmetric, 2 to 3 in. long, 1 to 2 in. wide (small leaf 1 in. long); petioles red-hairy, .4 to 1 in. long. Cymes 1- to 2-flowered, terminal, glabrous. Calyx narrow, cylindric. Petals .4 in. long, elliptic oblong. Capsule obconic, .2 in. long, glabrous, smooth. *Hab.* Perak, Gunong Batu Putih 6700 ft. altitude (Wray).

(14) *S. pallida* Stapf, l.c. 27.

Ascending hairy herb, base woody branched. Leaves oblong or ovate acute, base narrowed, densely hairy especially on edge; nerves 3 pairs, 1 or 2 from the base, very hairy, 1.5 to 4 in. long, .8 to 1.8 in. wide, often asymmetrical; petioles .6 to .75 in. long. Cymes axillary terminal on 1 to 2 in. peduncles, 3- to 8-flowered. Calyx hairy, slender, obconic, campanulate, .15 to 2 in. long.

Petals elliptic oblong apiculate, .45 to .5 in. long, a line of hairs on back, pale pink. Capsule obconic muricate, .25 in. long. *Hab.* Mountain forests, Selangor, Bukit Hitam (Kelsall). Perak, Gunong Inas (Wray); Bujong Malacca (Curtis).

(15) ***S. populifolia*** Stapf, l.c. 26.

Erect or ascending herb, 6 to 9 in. tall, shortly tomentose with longer curved hairs, mixed in. Leaves unequal, ovate sub-acuminate, base minutely cordate, sub-entire or toothed, membranous; nerves 2 pairs from base, 1 pair from midrib, 1.5 to 3 in. long, 1.2 to 1.75 in. wide; petioles slender, 1 to 2 in. long, tomentose. Cymes terminal to 12-flowered umbelliform; peduncles .5 to 1.2 in. long. Calyx cylindric, .2 in. long pubescent. Petals elliptic, pink, .3 to .4 in. long. Fruit oblong, obconic, .2 to .25 in. long pubescent; pedicels .2 in. long. *Hab.* Forests, Perak, Chanderiang (Kunstler); Tapah (Curtis); Briah (Wray). *Disirib.* Sumatra.

(16) ***S. elliptica*** Stapf, l.c. 30.

A fleshy herb 6 to 9 in. tall, scurfy puberulous above. Leaves unequal elliptic to nearly orbicular, tip and base round; nerves 5 from base, glabrous deep green paler beneath, 1 to 2.5 in. long, .72 to 2 in. wide; petioles 1 to 2 in. long. Cymes many-flowered, dense, .75 in. long; peduncles 1 to 2.5 in. long; pedicels .2 in. long. Calyx obconic, .12 in. long; teeth triangular. Petals oblong, apiculate, .2 to .23 in. long, pinkish white; anthers oblong. Capsule obconic, .15 in. long, smooth. *Hab.* Limestone rocks, local. Perak, Kinta district, Gunong Malacca (Kunstler); Sungei Siput (Curtis).

(17) ***S. succulenta*** Stapf, l.c. 30.

A succulent herb with thick stems, glabrous. Leaves equal, symmetric elliptic to ovate, sub-acute, base round; nerves 7 from base, transverse nervules conspicuous when dry, 6 to 7 in. long, 3 to 4 in. wide; petioles thick 2 to 4 in. long. Cymes 2, 3 or 4 on a common peduncle, 3 in. long, secondary peduncles as long. Flowers white. Calyx oblong campanulate, .25 in. long; teeth short. Petals oblong, cuspidate, .18 in. long. Anthers long-acuminate. Fruit obconic trigonous smooth .25 in. long. *Hab.* Mountain forests on banks, Perak, Thaiping Hills at 3000 ft. altitude (Scortechini and other collectors).

(18) ***S. repens*** Stapf, l.c. 30.

Fleshy herb with creeping rhizome. Stem erect 2 to 3 in. long, sparsely hairy. Leaves usually unequal, ovate long acuminate acute, base round, sparsely hairy both sides, 7-nerved from base, 3 to 7 in. long, 2 to 4.5 in. wide; petioles 1 to 2.5 in. long. Cymes glabrous, 2 to 3 terminal on peduncles 4 to 6 in. long. Calyx narrow, obconic, .23 in. long; teeth triangular. Petals elliptic acute, white, .2 to .25 in. long. Anthers slender acuminate. Fruit obconic smooth, trigonous, .3 in. long. *Hab.* Banks in forests,

at 1500 to 2000 ft. altitude. Perak. Thaiping Hills (all collectors), Bujong Malacca (Curtis).

(19) *S. nodosa* Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 5.

Stem slender fleshy, red, 3 in. tall, swollen at the nodes, sparsely hairy. Leaves unequal or nearly equal lanceolate, long acuminate, base round oblique, edge spine-toothed, fleshy sparsely hairy above; nerves 3 from the base, 3·5 in. long or less, ·75 in. wide; petioles 1 in. long. Small leaves ·25 to ·5 in. long. Cymes in upper axils; pedicels ·25 in. long. Flowers white. Calyx 1 in. long; lobes acute. Fruit campanulate, smooth, base broad, 1·2 in. long. *Hab.* Mountain forests, rare. Perak, Bujong Malacca (Ridley).

(20) *S. picta* Korth, *Verh. Nat. Gesch. Bot.* 249, t. 52. *S. flaccida* Stapf, *l.c.* 25.

A succulent ascending herb 3 to 12 in. tall, scurfy above. Leaves lanceolate to ovate, narrowed to base, tip acute, unequal, edge serrate dark green above, marbled, spotted, or veined with white or plain green glaucescent beneath; nerves 3 pairs, fine, alternate from midrib, 1·25 to 4 in. long, ·75 to 1·75 in. wide; petioles ·5 to 1·5 in. long. Cymes axillary and terminal; peduncles 1 to 1·5 in. long. Flowers 6 or 7; pedicels ·08 to ·1 in. long. Calyx narrow, cylindric; teeth triangular acuminate. Petals 1·5 in. long, rose pink. Capsule obconic trigonous smooth, 2 in. long, 1 in. wide. *Hab.* Damp lowland forests up to about 3000 ft. altitude.

var. *a. concolor* Ridl.

Leaves lanceolate, plain green; plant 12 in. tall. Selangor, Bukit Hitam; Bukit Kutu. Malacca, Mt. Ophir. Pahang, Kota Glanggi; Tahan woods; Telom. Perak, Ulu Batang Padang (Kunstler). Thaiping Hills.

var. *b. maculata* Ridl. *S. flaccida* Stapf, *l.c.*

Johor, Gunong Pantai. Pahang, Telom. Perak, Gunong Inas (Wray); Temengoh (Ridley). *Distrib.* Borneo, Sumatra, Lingga.

(21) *S. muscicola* Stapf, *l.c.* 31.

Flaccid unbranched herb 4 to 6 in. tall, rhizome creeping, all hairy. Leaves similar oblong to lanceolate-oblong, acute both ends, minutely toothed, pale green, thin, 2 to 3·7 in. long, ·8 to 1·4 in. wide; nerves pinnate 3 to 4 pairs, fine; petioles ·3 to ·8 in. long. Cyme terminal; peduncle slender, 1·5 in. long. Flowers 3 to 4. Calyx cylindric-campanulate; teeth short. Petals 4 in. long, pink. Stamens long acuminate, orange. *Hab.* On mossy trees. Lankawi, Gunong Raya (Curtis).

(22) *S. congesta* Stapf, *l.c.* 31.

A delicate unbranched herb 3 in. tall, glabrous. Stem 1 to 1·5 in. tall. Leaves crowded at top about 6, similar, ovate to elliptic blunt, base round, membranous, 9 to 1·7 in. long, 6 to 1·12 in. wide; nerves 3 pairs (2 pairs from base); petioles 6 to 7 in. long. Peduncle 2·5 in. long. Cyme of about 10 flowers, pink, quite resembling those of *S. muscicola*, but glabrous. Fruit

obovoid-oblong. *Hab.* Lankawi, Gunong Chinchang at 1000 ft. altitude (Curtis).

(23) *S. cyclaminella* Stapf, *l.c.* 33.

A delicate erect unbranched herb. Stem 1 in. tall or less. Leaves 4 pairs, crowded, similar, ovate or oblong blunt, base blunt, undulate or entire, light or dark green with silver veins, purple beneath, glabrous (except in var. *canescens*) .8 to 1.4 in. long, .4 to .6 in. wide, 5- to 7-nerved; petiole .4 to 1 in. long. Cymes 1 or 2; peduncle 2 to 5 in. long. Calyx slender campanulate, .12 to .15 in. long; teeth triangular. Petals elliptic cuspidate, .25 in. long, pink. Anthers acuminate. Fruit obconic angled, smooth, .12 in. long. *Hab.* Mountains at 1000 to 3000 ft. altitude. Perak, Ulu Bubong (Kunstler).

var. *canescens* Stapf, *l.c.*

Leaves hairy, more lanceolate up to 3 in. long. *Hab.* Selangor, Bukit Kutu (Ridley). Perak, Ulu Bubong (Kunstler).

(24) *S. calophylla* Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 5.

Tuberous, succulent simple or branched 2 to 8 in. long, glabrous. Leaves congested at top, green or brown, marbled white, oblong to ovate-oblong blunt, base round, edge spinulose, 2 to 3 in. long, 1 in. wide; petioles .5 in. long. Flowers 3 to 4 in a cyme; peduncle 1 to 2 in. long. Calyx sub-cylindric, .25 in. long; teeth acute. Petals oblong-lanceolate cuspidate, .25 in. long, rose or white. Capsule funnel-shaped, smooth .25 in. long. *Hab.* Kedah Peak, (Ridley).

(25) *S. Griffithii* Clarke, in *Hook. fil. F.B.I.* ii. 539; Stapf, *l.c.* 32.

Slender fleshy herb, 3 to 6 in. tall, rhizome thick. Stem 1 to 4 in. tall, fleshy. Leaves crowded at top, ovate or round elliptic blunt, membranous, edge and upper surface sparsely hairy, .4 to .8 in. long and nearly as wide; nerves 5; petioles .3 to .5 in. long. Peduncles 1 or 2, erect 2 to 3 in. long. Cymes 3- to 6-flowered. Calyx slender, cylindric, lobes ovate, glabrous. Petals elliptic cuspidate, dark mauve, .25 in. long. Fruit obovoid-oblong smooth, .23 in. long. *Hab.* Malacca, Mt. Ophir at 3000 ft. altitude in damp spots, not rare, but local. (All collectors.)

(26) *S. saxosa* Stapf, *l.c.* 31.

Erect delicate herb 3 to 6 in. tall, base creeping. Stem slender unbranched. Leaves lanceolate sub-acute or obtuse, sparsely hairy above and on edge glabrous, purple beneath, pairs equal, 5- to 7-nerved, .8 to 1.7 in. long, .3 to .6 in. wide; petioles .2 to .3 in. long. Peduncle 1 in. tall; flowers 1 to 3, pink. Calyx slender. Petals .3 in. long; anthers orange, acuminate. Capsule .2 in. long; pedicel .1 in. long, obconic angled smooth. *Hab.* Penang Hill at 2500 ft. altitude, rare on rocks in shady ravines (Curtis).

(27) **S. bellula** Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 70
(by misprint *belluta*).

Delicate unbranched herb, 2 to 4 in. tall, base creeping quite glabrous. Leaves crowded, narrow lanceolate, narrowed to base sub-acute, spine-toothed, pale beneath, .75 to 1.25 in. long, .2 in. across; petioles .3 in. long or less, slender. Peduncles terminal axillary 1 or 2, .75 in. to 1.25 in. long. Cymes 5-flowered. Calyx slender, cylindric-campanulate, teeth short triangular. Petals pink, oblong cuspidate, .2 in. long; anthers short acuminate. Capsule obconic, smooth .2 in. long. *Hab.* On rocks in forest, rare. Johor, Gunong Banang near Batu Pahat (Ridley).

(28) **S. heterostemon** Naud. *Ann. Sc. Nat. Ser. 3*, xv. 326, t. xviii. fig. 4; Clarke, in *Hook. fil. F.B.I.* ii. 540; Stapf, *l.c.* 33. *S. obliqua* Cogn. *Monogr.* vii. 515, not of Korthals.

A glabrous herb, 3 to 18 in. tall. Stem angled, branched. Leaves unequal, oblique ovate acuminate, base cuneate asymmetric, pale green, when young spotted white; nerves 5 or 6, transverse; nervules conspicuous, 1.5 to 4.5 in. long, 1 to 2.3 in. wide; petioles .5 to 2 in. long. Cymes axillary and terminal. Flowers up to 16 or even more, sessile; peduncles .6 to 1.25 in. long. Bracts spatulate, persistent. Calyx obconic, .15 in. long; teeth obtuse. Petals elliptic, .15 in. long, bright pink. Stamens 6, 3 curved purple, 3 straight yellow. Capsule sessile turbinate .25 in. long, smooth. *Hab.* On rocks and banks in forests from Singapore to Selangor and Perak, Pahang and Tringganu. The commonest species. *Distrib.* Sumatra, Borneo. *Native names* : Ati-Ati Gajah; Ati-Ati hutan; Kerukap Ayer.

(29) **S. glabriflora** Stapf, *l.c.* 42.

Ascending herb, 6 in. tall. Stem, petioles, nerves beneath appressed hairy. Leaves dissimilar, large one oblique elliptic, blunt or sub-acute, unequally cordate, glabrous, green, above pale; nerves purple beneath, 3 to 6 in. long, 2 to 3.5 in. wide; petioles 1 to 2.5 in. long, small leaves sessile reniform, .25 in. wide. Cymes terminal, axillary; peduncles 1 to 2 in. long. Calyx campanulate-ovoid, glabrous, .15 in. long. Petals elliptic acute .25 in. long, white or pinkish; anthers linear-oblong, blunt. Capsule quite smooth, campanulate, .16 in. long. *Hab.* Perak, Larut (Kunstler).

(30) **S. capitata** Stapf, *l.c.* 35.

Ascending, simple, bristly stemmed herb about 12 in. tall, base nude. Leaves dissimilar, larger obliquely obovate, abruptly cuspidate, base oblique cordate, sparsely bristly above, densely on the nerves beneath, 4 to 6 in. long, 1.75 to 3 in. wide; nerves 5 to 8; nervules oblique conspicuous; petioles thick, .5 to 1.5 in. long. Small leaves orbicular reniform .4 in. long or less. Cymes axillary capitate, .2 in. across; pedicels slender, .6 in. long. Bracts numerous, linear. Calyx oblong, shaggy, .07 to .09 in. long; teeth triangular. Petals oblong acuminate, white or pink, .12 in. long.

Fruit campanulate, muricate, .15 in. long. *Hab.* Mountain forests at 4000 ft. altitude. Selangor, Semangkok. Perak, Gunong Batu Putih (Wray, Kunstler).

var. *longipetiolata* Ridl. in *Journ. F.M.S. Mus.* iv. 18.

Leaves ovate with rounded oblique base; petioles 2.5 in. long, sometimes covered with long crimson hair. Peduncles longer, slender hairy or glabrous. *Hab.* Pahang, Telom. Kedah, Gunong Bintang (Kloss). This form has even longer peduncles, 4 in. long and quite glabrous and slender.

(31) *S. cæsia* Stapf, *l.c.* 36.

Ascending herb. Stem 3 in. long, densely hairy as are petioles; nerves beneath and inflorescence. Leaves dissimilar, large ones oblique elliptic blunt, base unequally cordate, fleshy blue green above; nerves 6 to 7 from near base, red beneath, 3 to 5 in. long, 1.75 to 2.75 in. wide; petioles 1 to 3.5 in. long. Small leaves minute ovate cordate. Cymes axillary, terminal 2 to 3 in umbel; peduncle 2.5 in. long. Flowers few or many, pink or white. Bracts oblong, blunt. Calyx obconic, scabrid, crimson, .12 in. long; teeth triangular acute. Petals oblong, cuspidate, .22 in. long. Capsule campanulate, tubercled. *Hab.* Perak, Gunong Batu Putih (Wray); Temengoh (Ridley).

(32) *S. bracteata* Stapf, *l.c.* 35.

Erect hairy, unbranched herb, 6 to 18 in. tall, densely hirsute. Leaves very unlike, large ones oblanceolate-acuminate, base cordate asymmetric, sub-glabrous above, hairy beneath on the nerves, 3 to 7 in. long, 1 to 7 in. long, 1 to 1.7 in. wide, 5-nerved; petioles .2 to .4 in. long. Small leaves reniform, minute. Cymes axillary and terminal; peduncle 2 in. long, hairy. Flowers numerous. Bracts lanceolate, hairy, .1 in. long. Calyx short, campanulate, hairy; teeth lanceolate, narrow. Petals oblong cuspidate, white. Fruit turbinate, muricate. *Hab.* Perak, Thaiping Hills (Kunstler).

(33) *S. integrifolia* Stapf, *Ann. Bot.* vi. 312; *Journ. As. Soc. Beng.* lxxix. 34.

A simple, rarely branched erect herb with creeping base rather stout, appressed hairy. Leaves very unequal and unlike, the larger ones oblong lanceolate inæquilateral, acuminate base narrowed cordate or acute, glabrous, plain dull green or with 2 or 4 rows of white spots, 3.5 in. long, 1 to 1.5 in. wide, 3- to 5-nerved, transverse nervules ascending; petioles .1 in. long. Small leaf minute ovate. Cymes axillary several .5 in. long with 4 or more flowers, hairy. Calyx hairy .2 in. long. Petals oblong acute, .15 in. long, pink or white. Capsule campanulate muricate, sub-sessile, .2 in. long. *Hab.* Dense hill jungle, common on the main mountain range. Selangor, Ginting Peras; Dusun Tua; Batu Caves. Perak, Changkat Serdang (Wray); Thaiping Hills.

Stapf's var. *acuminatissima*, *l.c.*, is a narrow-leaved acuminate form with wavy leaf-edges. It occurs in the Thaiping Hills.

(34) **S. barbata** Ridl. *Journ. F.M.S. Mus.* x. 135.

Stem woody 6 to 14 in. tall, densely covered with rough brown hair. Leaves oblique, oblanceolate or obovate sub-acute, base unequally bilobed, membranous; nerves from base 5, glabrous, 6 to 8 in. long, 2·75 to 3 in. wide; petioles 1 in. long, thickly brown-hairy. Cymes in upper axils 1·75 to 3 in. long; peduncle slender, hairy. Flowers about 15 second, mauve. Capsule campanulate pustular, ·25 in. long; pedicel densely hairy, ·12 in. long. *Hab.* Kelantan, Chaning and Kwala Lebir Woods; abundant (Ridley).

(35) **S. nidularia** Stapf, *l.c.* 37.

Ascending simple herb. Stem stout, tomentose, about 6 in. tall (erect part). Leaves very dissimilar, larger ones oblong or ovate-oblong sub-acute, base unequally cordate, inæquilateral rather fleshy, deep green, often with two large rows of white spots, glabrous except nerves 5, beneath, 3 to 4·5 in. long, 1 to 2 in. wide; petioles stout, tomentose, ·15 to ·6 in. long. Small leaves orbicular reniform ·2 in. across. Cymes sessile terminal and axillary; bracts minute; flowers few or many; pedicels ·1 to ·3 in. long. Calyx campanulate, obconic, ·12 in. long; teeth acuminate. Petals obovate, elliptic cuspidate, ·25 in. long, dark mauve. Anthers oblong. Capsule turbinate muricate, ·25 in. long. *Hab.* Mountain forests. Perak, Thaiping Hills; Waterloo (Curtis); Chanderiang (Kunstler).

(36) **S. calycula** Stapf, *l.c.* 43.

An ascending herb 4 in. long, tomentose on the stem, petioles and peduncles. Leaves very dissimilar, large ones nearly symmetric lanceolate, tapering to both ends, somewhat fleshy, 5-nerved from base pubescent beneath, 3·5 to 5·5 in. long, ·8 to 1·25 in. wide; petioles ·35 to ·4 in. long; small leaves reniform, ·05 in. long or less. Cymes terminal and axillary; peduncles filiform, ·4 to ·5 in. wide. Capsule semi-globose, smooth, ·08 to ·1 in. long, ·12 in. wide; teeth of calyx margin triangular cuspidate. *Hab.* Dense woods. Pahang, Tahan River (Ridley). Flowers not seen.

(37) **S. Gimlettei** Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 5.

Stem woody 6 in. tall, smooth. Leaves unequal, large ones ovate lanceolate acuminate glabrous, winged to base of hairy petioles, midrib hairy; nerves 5 from base, 6 to 8 in. long, 3 in. wide; smaller leaves 4 in. long, 2 in. wide. Cymes scorpioid, many-flowered; peduncles hairy 1·5 to 2 in. long. Capsule smooth with faint traces of warts, ·12 in. long; pedicel as long, ribbed. *Hab.* Forests, local. Kelantan, Kwala Lebir (Gimlette).

(38) **S. setosa** Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 71.

Stem over 8 in. tall, densely bristly-hairy as are the petioles; nerves beneath, inflorescence and calyx. Leaves very dissimilar, large ones elliptic-oblong acuminate, base unequal cordate, sprinkled with coarse hairs above, membranous, 4·5 to 5 in. long, 1·5 to 2 in. wide; petioles 1 to 1·5 in. long; small leaves orbicular ·1 in. long.

Cymes dense, many-flowered axillary; peduncles .2 in. long. Calyx .1 in. long, bristly cylindric-campanulate, red. Petals small, linear-oblong acute, white, bristly on back. Stamens 3; anthers oblong, blunt. Capsule campanulate muricate bristly narrowed to a short thick peduncle .2 in. long. *Hab.* Damp muddy spots at 4000 ft. altitude. Pahang, Gunong Tahan, in the Gully below the Plateau (Ridley).

(39) ***S. costulata* Stapf, l.c. 39.**

Dwarf herb. Stem 1 to 2 in. tall, hairy. Leaves large ones obliquely obovate-oblong sub-acute, base unequally cordate, dark green often red beneath, above sparsely bristly, margins ciliate beneath, hairy on the nerves; nerves 7, prominent beneath, 3 to 6 in. long, 1.3 to 2.5 in. wide; petioles hairy, .3 to 5 in. long; small leaves ovate cordate or reniform. Cymes terminal and in upper axils solitary or 2 on a short common peduncle ebracteate. Fruit semiglobose muricate, .15 to .18 in. wide. *Hab.* Local in lowland forests. Johor, woods at the foot of Gunong Pantai (Kunstler, Ridley).

This is really near *S. begoniæfolia*, but the leaves are stiffer, nerves more prominent and the cyme-peduncle very short.

(40) ***S. microcarpa* Stapf, l.c. 38.**

Habit of *S. brachyantha*, but hardly 6 in. tall. Stem hairy. Leaves dissimilar, large ones oblong to lanceolate acuminate, base unequally cordate, above sparsely hairy, dark, often with 4 or more rows of small white spots, beneath soft hairy, 2.5 to 4 in. long, 1 to 1.5 in. wide; petioles .15 to .4 in. long; small leaves reniform sessile, .2 in. long. Cymes axillary terminal, sub-sessile or peduncled up to .5 in. long. Calyx campanulate short-toothed, hairy; teeth triangular. Petals oblong acute .25 in. long, pink. Anthers oblong blunt. Capsule pink turbinate, minutely muricate .11 in. long. *Hab.* Perak; upper, at 300 ft. altitude (Wray).

(41) ***S. begoniæfolia* Bl. Flora 1831, p. 490; Stapf, l.c. 41.** *S. paradoxa* Naud, *Ann. Sc. Nat. Ser. iii.* xv. 321. *S. moluccana* Jack, *Mal. Misc.* i. 8 (*not of Roxburgh*).

An ascending herb 6 in. tall, seldom branched, softly hairy all over or the leaves glabrous above. Leaves very dissimilar, large ones obliquely oblong acuminate, unequally cordate, 3 to 6 in. long, 1.2 to 2.5 in. wide; nerves 6 to 8; petioles .4 to 2 in. long; small leaves round cordate, petioled, .4 in. long. Cymes terminal axillary 1 to 4, dense; peduncles .5 to 2 in. long. Calyx cylindric-campanulate, .15 in. long, hairy. Petals oblong acute, white or pink. Stamens 3, oblong. Capsule turbinate, .15 in. long, muricate, hairy. *Hab.* Lowland and low hill woods, usually sporadic, variable in hairiness, Singapore, Bukit Timah; Chanchu Kang. Johor, Gunong Pantai. Pahang, Tahan River; Gunong Tahan (Robinson), Negri Sembilan Seremban (Napier); Bukit Tumiang (Cantley). Selangor, Bukit Hitam. Perak, Keledang; Bujong Malacca. Dindings, Lumut.

Province Wellesley, Ara Kudah. Penang (Wallich, Jack and all collectors). *Distrib.* Sumatra, Lingga, Borneo and Java.

The Penang Hill plant is more softly-hairy and has longer peduncles. It is the *S. moluccana* of Jack and Wallich, and is separated by Stapf as *S. paradoxa*. Roxburgh's description of *S. moluccana* is too short, and no specimens of his type are to be seen. I have seen no species of *Sonerila* from the Moluccas at all, and it seems quite likely that Roxburgh got it from Penang and localised it wrongly.

(42) *S. macrophylla* Stapf, *l.c.* 39.

Ascending herb 3 to 8 in. tall, internodes 1·5 in. long, hairy. Leaves unequal asymmetric, oblique elliptic acuminate unequally cordate, thickly hairy all over, 4 to 6 in. long, 1·5 to 2·3 in. wide; petioles 1 in. long; small leaf ovate cordate, 2 in. wide. Cymes dense, terminal-axillary, 1 or 2 on a peduncle many-flowered, densely hairy. Calyx narrow cylindric, densely long-hairy 1·4 in. long. Petals oblong, acute, 3 to 3·5 in. long. Fruit turbinate muricate 2 in. long and wide. *Hab.* Perak, locality unknown (Scortechini).

var. *laxipilosa* Stapf, *l.c.*

All parts hairy. Leaves to 6 in. long, 3 to 5 in. wide. Peduncles to 3 in. long. *Hab.* Perak, Ipoh (Curtis). Penang, Pulau Betong (Curtis).

(43) *S. brachyantha* Stapf, *l.c.* 37. *S. trachyantha*, Stapf, in *Herb. Kew.*

An ascending simple or sparse-branched herb about 8 in. tall, entirely softly crimson-hairy. Leaves very dissimilar, larger oblique ovate cordate acuminate, inæquilateral, membranous, dark green above, red beneath, 2 to 4 in. long, 1 to 1·5 in. wide, 5-nerved; petioles 5 in. long to none; small leaves ovate cordate reniform 1·5 in. long. Cymes axillary, terminal, 1 to 3 together, sub-sessile, dense; bracts small filiform. Calyx narrow, campanulate, 1·2 to 1·5 in. long; teeth lanceolate. Petals oblong acute, 2·5 in. long, pinkish white or pink, a line of hair on back; anthers oblong blunt. Capsule campanulate closely tubercled hairy, 2 in. long. *Hab.* Mountains, not rare, Pahang, Wray's Camp, Tahan. Selangor, Gunong Mengkuang Lebah (Robinson); Perak, Gunong Kerbau at 4500 ft. altitude (Robinson); Gunong Inas 5000 ft. altitude (Wray); Goping (Kunstler); Chanderiang (Kunstler).

(44) *S. elatostemoides* Stapf, *l.c.* 42.

An ascending, unbranched herb 12 in. tall or less, softly tomentose all over. Leaves dissimilar, larger one asymmetric, oblique obovate or elliptic acute, unequally cordate 2·2 to 2·8 in. long, 1 to 1·2 in. wide, 6- to 7-nerved from the base; petioles 1·8 to 4 in. long; small leaf reniform, 1·5 in. wide. Cymes terminal axillary, few-flowered; peduncles 6 to 1 in. long. Calyx oblong campanulate, 0·8 in. long. Petals oblong, acute, hairy on the back; anthers oblong. Fruit semi-globose muricate 1·2 in. long. *Hab.* Mountains, rare, Perak, Gunong Bubu at 5000 ft. altitude (Wray).

(45) **S. bicolor** *Stapf, l.c.* 43.

Ascending herb, 3 to 9 in. tall, softly hairy all over. Leaves, larger one oblique-oblong to lanceolate-oblong acuminate unequally cordate, membranous, dark green or purple with light green central band above, purple beneath; nerves 5 from near base, 3 to 6 in. long, 1 to 1.5 in. wide; petioles .2 to .6 in. long; small leaves ovate-cordate, .4 in. long or less. Cymes terminal axillary, few to 10-flowered; peduncles .4 to 1.2 in. long. Calyx oblong-campanulate, .12 in. long. Petals elliptic-oblong, acute, pink, .35 in. long. Anthers linear-oblong. Fruit .12 to .15 in. long, semi-globose, muricate. *Hab.* Woods, Selangor, Gombak (Ridley). Perak, Ulu Selama (Wray); Chanderiang (Kunstler); Tapah (Baldwin).

13. SARCOPYRAMIS, Wall.

Weak herb. Leaves ovate or lanceolate, serrulate, 3-nerved, equal, similar, membranous. Flowers in a terminal cluster, short peduncled, pink, surrounded by leaf-like bracts. Calyx obpyramidal 4-winged, 4-toothed. Petals 4, ovate. Stamens 8 equal; anther oblong, spurred at back. Capsule crowned with 4 long scales, 4-valved. Species 2 to 3, India, Philippines, China.

(1) **S. nepalensis** Wall. *Tent. Fl. Nep. t.* 23; *Clarke, in Hook. fil. F.B.I.* ii. 541.

Stem 2 to 6 in. long, rarely more. Leaves 2 to 4 in. long, 1 in. wide, glabrous, thin, ovate-lanceolate acuminate; petioles .25 to .5 in. long. Petals hardly .25 in. long. Fruit 4-angled, campanulate, smooth; scales large veined. *Hab.* Rare in mountain woods, Pahang, Telom (Ridley). *Distrib.* India, Burma, China.

14. PHYLLAGATHIS, Bl.

Herbs creeping or rarely erect shrubby. Leaves large orbicular, rarely oblanceolate, 7- to 9-nerved. Flowers umbelled or in a dense head or paniced, magenta, rose or white, showy. Calyx-tube campanulate; teeth 4 or 5, setose. Petals 4 or 5, ovate acute. Stamens 5 or 8, equal; anthers elongate not appendaged. Ovary 4-celled, glabrous. Capsule funnel-shaped opening by 4 valves at the tip.

An erect shrub; leaves oblanceolate.

Flowers in compound umbels (1) **P. tuberculata**

Herbs creeping; leaves orbicular or ovate.

Flowers paniced or racemose, small, white.

Plant glabrous; leaves round, cordate entire (2) **P. Griffithii**

Stem and petioles red hairy; leaves ovate toothed (3) **P. cordata**

Flowers large umbelled, pink.

Plant glabrous (4) **P. Scortechinii**

Plant hairy (5) **P. hispida**

Flowers magenta in an involucrate head (6) **P. rotundifolia**

(1) **P. tuberculata** *King, l.c.* 44.

Stem woody, 2 to 3 ft. tall, stout. Leaves in a whorl at the

top, several oblanceolate gradually narrowed to the base, cuspidate, hairy on both sides especially on the 9 slender nerves and nervules beneath and on the edge, 10 to 16 in. long, 3 to 6 in. wide; petioles hairy winged to base or nude for an inch. Umbellules umbellate in several terminal umbels (11 or more) on a peduncle 8 in. long, hairy. Bracts to umbel oblong, blunt .2 in. long. Peduncles of umbellules 1 in. long, with bracts .2 in. long. Flowers in umbellule 3 or 4; pedicels .2 in. long. Calyx cylindric .2 in. long with numerous fleshy stalked glands. Petals oblong acuminate; deep magenta .25 in. long. Stamens 8; filaments bright pink. Capsule trigonous, obovoid .3 in. long. *Hab.* Mountain forests on damp rocks, 2000 to 5000 ft. altitude. Selangor, Gunong Mengkuang Lebah (Robinson); Perak, Bujong Malacca (Curtis).

This very remarkable and handsome plant differs entirely from the rest of the genus in its habit, compound umbels and the curious stalked glands on the calyx.

(2) **P. Griffithii** King, *l.c.* 45. *Allomorpha Griffithii* Hook. *fl. F.B.I.* ii. 527; *Bot. Mag. t.* 7334.

Stem woody, creeping slender, 2 in. long. Leaves 2 to 3, round, cordate, entire, glabrous; nerves 7, from base transverse, numerous conspicuous; nervules horizontal; 5 to 8 in. long, 4.8 to 8 in. wide, dull green above, red beneath; petioles 4 to 8 in. long. Panicles sub-terminal, slender 8 to 9 in. long, with 5 or 6 distant clusters of small white flowers; pedicels .2 in. long, slender pubescent. Calyx cylindric as long. Petals 4, small oblong. Stamens 8, yellow. *Hab.* Common in low country woods. Malacca (Griffith); Ayer Panas (Hullett); Jasin; Bukit Sadanen (Derry). Negri Sembilan, Sulu (Cantley). Selangor, Rantau Panjang (Kloss); Kwang; Kwala Lumpur. Perak, Goping (Kunstler); Thaiping Hills; Changkat Mentri (Kloss). *Native names:* Kapo-Kapo; Kurukap Rimbah; Tutup Bumi Rimbah.

(3) **P. cordata** Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 4.

Stem hairy. Leaves ovate cordate, abruptly acuminate, edge crenate-dentate, teeth with one long red hair; nerves 9 from base with transverse nervules prominent, hairy beneath, above glabrous, 9 in. long, 7 in. wide; petioles stout, 6 in. long, red-hairy. Panicle 4 to 5 in. long on peduncle 12 in. long; branches at base few, short, above racemose. Flowers 3 on a branch, glabrous, small. Bracts minute, lanceolate. Calyx .25 in. long, cylindric; teeth 5. Petals lanceolate. Stamens 5, similar; anthers mucous. Capsule sub-globose, base truncate, valves broad; pedicels .5 in. long. *Hab.* Johor, Gunong Janeng (Kelsall). *Native name:* Kaka pullum.

(4) **P. Scortechinii** King, *l.c.* 45.

Glabrous. Stem short stout, woody. Leaves orbicular-ovate cordate apiculate, glabrous; nerves 9, and nervules prominent beneath, 5 to 10 in. long, 5 to 9 in. wide; petioles 4 to 9 in. long. Peduncles 10 to 12 in. long; umbel of about 16 flowers, ebracteate;

pedicels .25 in. long. Flowers pink. Calyx narrow, campanulate. Petals round-ovate. Stamens 8. Capsule 4-angled, campanulate .2 in. long; pedicels stout. *Hab.* Mountain woods. Selangor, Ginting Bidai; Bukit Kutu. Perak, Goping (Kunstler); Bujong Malacca.

(5) ***P. hispida* King, l.c. 46.**

Stem short woody hispid. Leaves 2 to 3, ovate cordate acuminate dentate, glabrous or nerves and nervules beneath hairy, 5 to 10 in. long, 3 to 7 in. wide; petioles hispid 4 to 12 in. long. Peduncle 6 to 9 in. long, glabrous or hispid, red; umbel 7-flowered; pedicels slender .2 in. long; bracts none. Calyx cylindric, red glabrescent. Petals ovate acute .5 in. long, rose pink. Stamens 8, base yellow, above violet. Capsule bristly semi-globose. *Hab.* Common in mountain woods, Pahang, Tahan River and Telom. Selangor, Semangkok Pass. Perak, Ulu Batang Padang; Thaiping Hills; Temengoh. Kedah, Gunong Bintang (Kloss). Tomoh (Machado).

(6) ***P. rotundifolia* Bl. Flor. 1831, 507; Clarke, in Hook. fil. F.B.I. ii. 541; Korth. Verh. Nat. Bot. t. 57; Bot. Mag. t. 5282.**

Stem creeping short. Leaves orbicular or obovate cordate, shining dark green above, red, beneath 7-nerved transverse; nervules conspicuous, glabrous or sparsely hairy above, glabrous beneath, 3 to 6 in. long, 2.5 to 4.5 in. wide; petioles 2 to 4 in. long, red bristly along upper edge. Capitulum dense, 1 in. through; peduncle 1 to 3 in. long. Bracts .5 in. wide, ovate, magenta. Flowers 12 to 20 in the head; pedicels .1 in. long, magenta. Calyx campanulate; teeth bristly 2 in. long. Capsule cupular quadrangular .2 in. long; pedicel .2 in. long smooth. *Hab.* Common in woods, whole peninsula, from Johor Ulu Batu Pahat (Kelsall) to Perak and Kedah, Gurun (Robinson). *Distrib.* Sumatra. *Native names*: Banau or Banal Hutan; Poko Fatimah. *Uses*: A decoction of the leaves used in fever.

15. MARUMIA, Bl.

Twining shrubs. Stems rather slender and long. Leaves coriaceous, cordate 5-nerved, stellate tomentose beneath. Cymes axillary. Flowers few, white or rose-coloured. Calyx narrow campanulate, tomentose bristly or stellate-hairy, 4-lobed. Petals 4, obovate. Stamens 8, unequal; anthers elongate with 1 pore, connective of the larger ones with 2 bristles in front and 1 or 2 spurs or twisted bristles behind. Ovary 4-celled, tip hairy. Berry ellipsoid, limb persistent. Species 10, Malayan.

- | | |
|------------------------------------------------------------------------|---------------------------------|
| Calyx-tube without bristles; petals pink | (1) <i>M. nemorosa</i> |
| Calyx-tube bristly. | |
| Flowers solitary axillary white | (2) <i>M. rhodocarpa</i> |
| Flowers in axillary and terminal cymes of 2 and 3, peduncled | (3) <i>M. reticulata</i> |

(1) **M. nemorosa** *Bl. Flor.* xiv. 505; *Clarke, in Hook. fil. F.B.I.* ii. 542; *King, l.c.* 47.

A tall slender climber covered entirely except upper side of leaves, petals and stamens with dense reddish tomentum, no bristles. Leaves oblong-lanceolate sub-cordate, 3 to 6 in. long, 1·35 to 2·75 in. wide; petioles ·2 to ·4 in. long. Flowers 1 to 3 in a cyme, 1·75 in. wide. Calyx-tube ·75 in. long, constrict below the lobes, narrowed at base, lobes long triangular. Petals rose pink. Fruit 1 in. long, stellate-tomentose. *Hab.* Common on borders of forests. Johor, Kwala Sembrong (Kelsall); Gunong Pantai. Malacca, Tebong (Griffith). Pahang, Kwala Tahan. Selangor, Rantau Panjang (Kloss); Bukit Kutu; Semangkok Pass. Negri Sembilan, Berumbun (Cantley); Perhentian Tinggi. Perak, Jarah (Wray); Ipoh (Fox). Province Wellesley, Tasek Gelugur (Fox). Penang (all collectors). Tringganu, Bundi (Rostado). Kedah Peak, Semling (Haniff). *Distrib.* Sumatra, Borneo.

var. *verrucosa* *Ridl. M. verrucosa Cogn. Mon. Phan.* vii. 549.

Calyx with short warty processes, and shorter lobes. Johor, Kwala Sembrong. Malacca (Maingay). Negri Sembilan, Tampin (Burkill). Selangor, Klang (Kehding); Dusun Tua; Langat. Perak, Thaiping Hills at 5000 ft. altitude. *Native names:* Akar Sanudo; Akar Salan hutan.

(2) **M. rhodocarpa** *Cogn. Mon. Phan.* vii. 550; *King, l.c.* 48. *M. zeylanica Clarke, in Hook. fil. F.B.I.* ii. 542.

A tall slender climber entirely covered except the upper side of the leaves, petals and stamens with thin tomentum and stiff black bristles. Leaves oblong, apiculate, base round, glabrous above, light brown tomentose beneath, 3·5 to 5 in. long, 1 to 2 in. wide; petioles ·15 to ·2 in. long. Flowers in axillary cymes of 3 on peduncle ·5 in. long, and pedicels as long or shorter, 2 in. across. Calyx ·5 in. long, red-hairy. Petals white with a purple spot at the base. *Hab.* Edges of woods. Singapore (Wallich); Garden Jungle; Bukit Timah; Pulau Buru. Malacca (Cuming, Griffith).

Clarke's var. *subglabrata* is based on the leaves of a young plant, which are nearly glabrous.

(3) **M. reticulata** *Bl. Ann. Mus. Bot. Lugd. Bat.* i. 34; *King, l.c.* 49.

Climber. Stem angled, rusty-tomentose with black hairs, as is the inflorescence and calyx. Leaves ovate lanceolate acuminate, cordate, above glabrous, beneath scurfy and stellate tomentose; nerves and transverse nervules strongly elevate, 2 to 3·5 in. long, 8 to 1·5 in. wide; petioles ·1 in. long. Flowers 1·25 in. across, solitary or in peduncled cymes of 3. Calyx ·5 in. long, densely covered with long bristly hairs. Petals ovate-oblong, pink. Stamens lilac, the shorter ones white. *Hab.* Malacca, Kesang (Griffith, Maingay). *Distrib.* Sumatra, Java.

Owing to the suppression of the leaves at the ends of the shoots, the inflorescence is often practically a terminal panicle, as in *Dissochæta*.

16. DISSOCHÆTA, Bl.

Slender, twining tall shrubs. Leaves elliptic or oblong-lanceolate, base round, 5-nerved from base. Panicles terminal. Flowers rather small, rosy or white. Bracts sometimes large. Calyx campanulate or funnel-shaped, tomentose, pubescent or glabrous, 4-toothed. Petals 4. Stamens 8, 4 of which are sometimes imperfect, shorter or suppressed, the four longer ones have 2 long bristles in front from the base. Ovary 4-celled. Berry ovoid or elliptic. Species 25, Malayan.

Stamens 8 (4 sometimes imperfect).

Young parts and underside of leaf persistently tomentose.

Plants not bristly.

Flowers large, 1·5 in. long (1) *D. annulata*

Flowers smaller, .75 in. long (2) *D. punctulata*

Plants covered with long bristles (3) *D. hirsuta*

Young parts deciduously tomentose.

Bracts large, ovate (4) *D. bracteata*

Bracts small, linear (5) *D. pallida*

Young parts scaly, not tomentose (6) *D. gracilis*

Stamens 4 only.

Bracts caducous or o.

Leaves rufous beneath; petals oblong blunt (7) *D. celebica*

Leaves hardly rufous; petals ovate acute (8) *D. intermedia*

Bracts oblong persistent.

Panicle spreading (9) *D. anomala*

Panicle dense (10) *D. Scortechinii*

(1) *D. annulata* Hook. *fil. Triana. Trans. Linn. Soc.* xxviii. 83; *King, l.c.* 50.

Young branches. Underside of leaves and inflorescence tomentose, nodes thickened annulate. Leaves ovate-oblong cordate acuminate, above glabrous; nerves and nervules prominent, 2·5 to 3·5 in. long, 1 to 1·8 in. wide; petioles .2 to .5 in. long. Panicles 6 in. long. Bracts small. Flowers 1·5 in. long. Calyx narrow, campanulate, .5 in. long. Petals obovate rose pink. Stamens 8. *Hab.* Edges of forests, climbing high on trees. Singapore, Bukit Timah. Johor, Gunong Pantai. Malacca, Mt. Ophir (with white flowers). Perak, Maxwell's Hill at 2500 ft. altitude. Penang Hill at 3000 ft. altitude (Curtis). *Distrib.* Borneo.

(2) *D. punctulata* Hook. *fil. Triana l.c.*; *Clarke, in Hook. fil. F.B.I.* ii. 543; *King, l.c.* 51.

Branchlets, nodes thickened, not annulate, with petioles, under-surface of leaves and inflorescence covered with rusty scales. Leaves oblong-ovate, base round, entire, acute, above glabrous, 3 to 4·5 in. long, .75 to 1·75 in. wide; petioles .25 to .4 in. long. Panicles 4 to 6 in. long; branches short. Flowers .75 in. long. Calyx funnel-shaped. Petals ovate; stamens 8. Fruit urceolate, sub-glabrous. *Hab.* Forest edges. Singapore, Pungul Road

(Murton); Bukit Timah. Johor, Pinerong (Cantley); Tana Runto; Gunong Pulai. Malacca, Sungei Hudang (Derry); Bukit Bruang. Selangor, Sempang. Penang, Balik Pulau (Foxworthy). *Native name* : Akar Meroyan Busuk.

(3) **D. hirsuta** Hook. *fil. Triana l.c.*; *King, l.c.* 51.

Plant covered except upper surface of leaves and petals with stellate hairs mixed with long stiff hairs. Leaves lanceolate or ovate lanceolate cordate acuminate 3 to 4.5 in. long, 1 to 1.75 in. wide; petioles .15 in. long. Panicles 5 to 6 in. long and as wide on peduncles 3 in. long. Flowers bright pink. Calyx .3 in. long, funnel-shaped on a pedicel as long. Petals lanceolate. Stamens 8. Fruit ovoid-globose. *Hab.* Thickets in lowlands, very local. Johor, open country towards Gunong Pantai (Kunstler, Ridley). *Distrib.* Borneo.

(4) **D. bracteata** Bl. *Flora* 1831, p. 495; *Clarke, l.c.* ii. 543; *King, l.c.* 52.

Stem, leaves beneath, petioles and panicles sprinkled with rusty scurf. Leaves ovate-lanceolate, base round, acute, glabrous above, sparsely scurfy beneath, 3 to 4.5 in. long, 1.25 in. wide; petioles .2 in. long. Panicles lax, 12 in. long. Flowers .75 in. long; pedicels short, clustered at ends of branches with broad oblong obovate bracts. Calyx funnel-shaped. Petals elliptic. Stamens 8. Fruit ellipsoid, .6 in. long. *Hab.* Penang Hill (all collectors). *Native name* : Akar Meroyan Sejuk.

(5) **D. pallida** Bl. *Flora* 1831, p. 500; *Clarke, l.c.* ii. 544.

Climber. Branches, underside of leaves and panicles very sparsely hairy. Leaves elliptic-ovate or ovate acuminate, base round, 2.5 to 5 in. long, 1.2 to 2.2 in. wide; petioles .3 to .5 in. long. Panicles axillary and terminal; branches divaricate. Bracts linear deciduous. Flowers nearly 1 in. long. Calyx funnel-shaped, densely scaly. Petals obovate-oblong lilac. Stamens 8 (4 sometimes shorter or absent), large ones pink, shorter ones pale. Fruit cylindric-campanulate, sub-glabrous, .25 in. long. *Hab.* Woods; not rare. Singapore, Reservoir Woods. Malacca, Tebong (Griffith). Selangor, Bukit Kutu; Batu Caves; Kwala Lumpur. Dindings, Gunong Tungul, Perak, Ulu Batang Padang up to Telom; Maxwell's Hill. Province Wellesley, Ara Kudah. Penang Hill (Curtis). *Distrib.* Malay islands.

(6) **D. gracilis** Bl. *Flora* 1831, 498; *King, l.c.* 53.

A slender climber. Branches very slender, ringed at nodes, almost completely glabrous all over. Leaves lanceolate-acuminate, base rounded, 3 to 4.5 in. long, 1.5 to 1.8 in. wide; petioles .2 in. long. Panicles axillary and terminal, latter over a foot long, lax, slender, spreading. Flowers many, white, .25 in. long. Calyx campanulate, .1 in. long. Petals ovate to orbicular. Stamens 8, pink, 4 large and 4 small, imperfect. Fruit sub-globular, .15 in. long. *Hab.* Common on the edges of woods. Singapore, Bukit

Timah; Bukit Mandai. Pahang, Kwala Tahan. Selangor, Batu Caves; Rawang. Perak, Thaiping Waterfall. Kelantan, Chaning. *Distrib.* Java, Borneo.

(7) **D. celebica** *Bl. Ann. Mus. Bot. Lugd. Bat.* i. 36; *Clarke, l.c.* ii. 544; *King, l.c.* 54.

Slender climber. Branchlets, petioles, leaves beneath, panicles densely red-tomentose. Leaves membranous lanceolate, base round, acuminate, glabrous (except midrib above), 2·5 to 5 in. long, 1 to 2 in. wide; petioles 25 in. long. Panicles lateral and terminal 4 in. long, 2·5 in. wide, spreading. Flowers 3 in. long. Calyx campanulate. Petals oblong blunt, pale pink. Stamens 4. Fruit sub-globular, 15 in. long, purple. *Hab.* Common on edges of woods. Singapore, Bukit Mandai; Chua Chu Kang. Johor, Castlewood; Gunong Pantai; Gunong Banang, Batu Pahat, Pahang, Kwala Lipis (Machado); Kwantan (Foxworthy); Malacca, Merlimau, Selangor, Kwala Lumpur; Petaling. Negri Sembilan, Seremban (Cantley). Perak, Ulu Bubong (Kunstler). Tringganu, Bundi (Rostado). Penang, Batu Feringhi and the hill (Curtis). *Distrib.* Malay isles. *Native names:* Akar Meroyan jantan; Akar Meroyan Paya; Akar Berbuah.

(8) **D. intermedia** *Bl. Flora* 1831, p. 493; *King, l.c.* 54.

Slender climber. Branches red-scurfy. Leaves lanceolate blunt acuminate, base round, 3·5 in. long, 1·5 in. wide; petioles 2 in. long. Panicles lax, 8 in. long. Flowers 4 to 5 in. long. Calyx-tube truncate, entire. Petals ovate, acute. Stamens 4, narrowed to apex and appendiculate. *Hab.* Edges of forests, Singapore, Bukit Mandai. Johor, Bukit Patani, Batu Pahat, Pahang, near Raub (Machado). Selangor, Rawang; Sepang. Penang Hill (Ridley). *Distrib.* Java; but the Javanese form has much larger leaves and panicles.

(9) **D. anomala** *King, l.c.* 55.

A rather slender, woody climber. Young branches sparsely hairy becoming glabrous. Leaves oblong-ovate, bluntly cuspidate, base round, broad, above glabrous, beneath sparsely stellate-hairy on the nerves, 3·5 to 6·5 in. long, 1·75 to 2·75 in. wide; petioles short, thick, bristly. Panicles numerous axillary, terminal, wide spreading 3 to 4 in. long, the branchlets ending in cymes of 3 small white flowers. Bracts to branches and cymes oblong blunt hairy, 2 in. long. Calyx campanulate, tomentose, truncate. Petals ovate acuminate. Stamens 4, with filamentous appendages. Fruit campanulate, 15 in. through, bluish black or purple. *Hab.* Forests, not common, Perak, Larut 500 to 800 ft. altitude (Kunstler). Kelantan, Chaning (Ridley).

(10) **D. Scortechinii** *King, l.c.* 55.

Branches thinly clothed with pale stellate hairs. Leaves ovate-lanceolate, base broad cordate, tip blunt acuminate, glabrous above, rusty and stellate hairy beneath, 2 to 3·75 in. long, 1·5 to

2 in. wide; petioles tomentose, .1 in. long. Panicles terminal, 2 in. long, dense, tomentose; bracts many, oblong or spatulate. Flowers .3 in. long, short pedicelled. Calyx narrow campanulate truncate tomentose. Petals orbicular-ovate acuminate. Stamens 4, ovate with 2 long filiform appendages. *Hab.* Rare and seldom collected. Perak (Scortechini). Penang (Curtis).

17. ANPLECTRUM, A. Gray.

Slender twining shrubs. Leaves sub-coriaceous, oblong-lanceolate, 3- to 5-nerved from base. Flowers white or pink in terminal panicles. Calyx-tube funnel-shaped or ovoid, limb shortly 4-lobed or truncate. Petals 4. Stamens 4 or 8, four perfect; anthers acuminate, opening by one pore; connective shortly appendaged, rarely with a long appendage, never with 2 long bristles in front. Ovary 4-celled. Berry ovoid or globose. Species about 18, Malayan.

Stamens 4, perfect.

Nodes of branches and panicle bristly . . . (1) **A. lepidi-setosum**

Nodes hairless, ringed; stamens 4, perfect.

Calyx funnel-shaped; stamens 4 only . . . (2) **A. glaucum**

Calyx ovoid; stamens 8, 4 imperfect . . . (3) **A. pallens**

Stamens 8, 4 smaller (4) **A. divaricatum**

Stamens 8, all perfect (5) **A. anomalum**

(1) **A. lepidi-setosum** *King, l.c.* 56.

Branches strongly ringed at nodes, stiff, bristly. Leaves oblong-lanceolate, caudate acuminate, base cordate, glabrous except a few hairs at base, 4.5 to 6 in. long, 1.1 to 1.8 in. wide; petioles .1 in. long or more, very bristly. Panicles terminal, 3 to 4 in. long, bristly. Calyx-tube cylindric scaly, mouth bristly. Petals ovate. Stamens 4 large broad, 4 small linear. Capsule ovoid, globular, .15 in. long. *Hab.* Perak (Scortechini). Penang Hill (Curtis). *Distrib.* Borneo.

(2) **A. glaucum** *Triana, Trans. Linn. Soc.* xxviii. 84; *Clarke, in Hook. fil. F.B.I.* ii. 545; *King, l.c.* 57.

Sparingly pubescent or nearly glabrous. Leaves oblong-lanceolate acute, base round; nerves 3, elevate, 3 to 5 in. long, 1 to 2 in. wide; petioles .05 to .2 in. long. Panicles 4.5 in. long, 3.5 in. wide, many-flowered. Flowers .5 in. long. Calyx funnel-shaped truncate. Petals ovate-lanceolate acute, pale purple or white. Stamens 4. Fruit sub-globular, purple .2 in. long. *Hab.* Fairly common to 2500 ft. altitude. In forest. Singapore, Garden Jungle. Johor, Castlewood. Malacca, Batang Malaka (Derry); Selandor (Cantley). Negri Sembilan, Bukit Kupayang (Cantley). Perak, Thaiping (Wray); Gunong Keledang. Penang Hill (Main-gay). *Distrib.* Sumatra, Java, Borneo. *Native names:* Akar Dumah Bukit; Akar Sendudok Rimbah.

(3) **A. pallens** *Bl. Ann. Mus. Bot. Lugd. Bat.* i. 38; *Clarke, l.c.* ii. 545; *King, l.c.* 57.

Slender climber. Young parts rufous-tomentose. Leaves oblong caudate-acuminate, base round or cordate, 3 to 4 in. long, 1·5 in. wide; petioles ·2 in. long, edge bristly. Panicles terminal with one or two smaller ones in upper axils, 3 to 6 in. long rufous-tomentose; flowers cymose ·2 in. long, white. Bracts linear oblong, ·3 in. long. Calyx pubescent when young, cylindric, ·1 in. long. Bud acute. Anthers 4 large, curved, 4 small linear. Fruit globose, ·15 in. through. *Hab.* Hill forests, scarce, Penang, West Hill (Curtis). Perak, Taiping Hills (Derry).

var. *b. petiolare* *Ridl. Melastoma petiolare Wall. Cat.* 4053.

Leaves lanceolate acuminate, 2 in. long, ·75 in. wide, base narrowed shortly or rounded, not cordate; petioles ·1 to ·2 in. long. Cymes axillary 1 in. long, numerous, terminal one, if present, small 3- to 4-flowered. Flowers white ·1 in. long. Calyx cylindric, urn-shaped. Petals short. Fruit ·12 in. long, globose, narrowed at top below the limb. *Hab.* Common in woods. Singapore, Pulau Ubin; Selitar. Johor, Tebing Tinggi. Malacca (Maingay). Perak, Taiping Hills; Gunong Keledang; Ulu Bubong (Kunstler). Penang, West Hill. Province Wellesley, Batu Kawan (Curtis). *Distrib.* Borneo and Sumatra.

(4) **A. divaricatum** *Triana, Trans. Linn. Soc.* xxviii. 84, *t. vii.* f. 90b. *Clarke, l.c.* ii. 546; *King, l.c.* 58.

Climber. Branches slender covered, as are petioles; nerves of leaf and inflorescence with scaly scurf. Leaves lanceolate acute, base cordate, 2 to 3 in. long, ·6 to 1·1 in. wide; petioles ·15 to ·25 in. long. Panicles terminal, 4 to 6 in. long; branchlets spreading with two ovate-lanceolate scurfy bracts at the base. Cymes 3-flowered. Flowers ·4 in. long. Buds violet. Calyx obovoid, tomentose, violet. Petals oblong acute, white; anthers 8, 4 large, thick, 4 narrow, smaller. Fruit globose-obovoid, ·2 in. long. *Hab.* Edges of forests climbing on trees. Johor, Bukit Banang. Malacca, Merlimau and Sungei Hudang (Derry). Selangor, Rantau Panjang (Kloss); Kwala Lumpur; Dusan Tua. Negri Sembilan, Gunong Angsi; Perhentian Tinggi; Bukit Tangga, Seremban (Napier). Perak, Taiping Hills; Kamuning. Province Wellesley, Permatang Bertam. Penang Waterfall. *Distrib.* Sumatra, Borneo, Java. *Native names:* Akar Kamunting; Akar Kamunting Bukit; Akar Chambai Hantu.

(5) **A. anomalum** *King, l.c.* 58.

A woody creeper 20 to 30 ft. long, epiphytic on tree-tops, roots encircling the branches. Young parts scurfy. Leaves small obovate, tip round, base narrowed, coriaceous, glabrous above, stellate hairy beneath; midrib strongly elevate beneath with a pair of nerves from the base, other nerves and reticulations invisible, 1 to 1·5 in. long, ·6 to ·9 in. wide; petioles ·2 in. long. Panicles

3 to 6 in. long, lax, many-flowered. Bracts minute. Flowers .35 in. long green with light pink petals. Calyx cylindric, campanulate truncate, .2 in. long. Petals oblong blunt, reflexed. Fruit small, globose crowned with the truncate calyx. *Hab.* Epiphytic, rare. Perak, Goping (Kunstler).

18. MEDINILLA, Gaud.

Epiphytic shrubs, rarely climbing. Leaves opposite or whorled (rarely alternate) fleshy 3- to 9-nerved from base. Flowers in lateral or terminal cymes or panicles, white or rose, 4- or 5- (rarely 6-)merous, often showy. Calyx-tube ovoid or cylindric, limb truncate or teeth obscure. Stamens 8 or 10; anthers opening by 1 pore; connective with 2 tubercles beneath and 1 spur behind. Ovary 4- to 6-celled. Fruit, a berry. Species 100, mostly Malayan, India, Ceylon, a few Polynesian and African.

Flowers 4-merous.

- Leaves alternate, a creeper on trees (1) *M. scandens*
- Leaves whorled, large, erect; shrubs with big panicle (2) *M. speciosa*
- Leaves opposite; compound cymes terminal.
- Cymes axillary; flowers 1 in. wide; leaves elliptic (3) *M. heteranthera*
- Cymes axillary; leaves lanceolate (4) *M. venusta*
- Flowers small under .5 in. long.
- Leaves petiolate, narrowed at base (5) *M. Hasseltii*
- Leaves petiolate, base round (6) *M. pendens*
- Leaves sessile; panicles brilliant red (7) *M. Scortechinii*
- Leaves obovate, nerveless, .65 in. long (8) *M. Maingayi*

Flowers 5-merous.

- Leaves small, obovate tip round.
- Nerves 3, visible (9) *M. Clarkei*
- Nerves invisible (10) *M. pahangensis*
- Leaves large, coriaceous, elliptic-orbicular (11) *M. perakensis*
- Leaves lanceolate, petioled; flowers large in fascicles (12) *M. crassinervia*
- Leaves thin, elliptic-lanceolate, sessile; flowers in a long pendent cyme (13) *M. penduliflora*

(1) *M. scandens* King, *l.c.* 60.

A creeper on trees with many short roots. Leaves alternate, sub-coriaceous, glabrous, elliptic or ovate-oblong, shortly acuminate, base cuneate, 4.5 to 9 in. long, 2.5 to 6 in. wide; petioles 1.5 to 7 in. long. Flowers in dense fascicles in axils of fallen leaves. Calyx-tube campanulate .15 in. long, limb truncate. Petals 4, ovate oblong acute, dull pink. Stamens 8. *Hab.* Mountain woods. Perak, Bujong Malacca (Curtis); Tapah; Thaiping Hills.

(2) *M. speciosa* Bl. *Flora* 1831, p. 515; *Bot. Mag. t.* 4321; *Clarke, in Hook. fil. F.B.I.* ii. 549; *King, l.c.* 60.

A big shrub about 5 ft. tall with thick 4-angled branches, nodes bristly. Leaves sub-coriaceous, whorled in threes, sessile or nearly so, light green, oblanceolate or obovate-oblong, base cuneate,

6 to 12 in. long, 2·75 to 5 in. wide. Panicles lateral and terminal, pendulous 4 to 14 in. long, many-flowered, entirely pale rose, on peduncles as long. Bracts whorled, pink. Calyx cupular red, ·25 in. long. Petals sub-acute pale rose. Stamens 8, dark red. Fruit ovoid, pulpy, black. *Hab.* Rocks in hill forests. Selangor, Semangkok Pass. Perak, Thaiping Hills at 3000 ft. altitude (Derry); Bujong Malacca. Penang Hill, Moniot's Road (Maingay, Curtis, etc.). *Distrib.* Java, Sumatra, Borneo, Celebes.

(3) ***M. heteranthera* King, l.c. 61.**

Shrubby epiphyte 3 to 6 ft. tall. Leaves ovate-lanceolate or lanceolate to elliptic cuspidate acuminate, base shortly narrowed, 2 to 5 in. long, 1 to 2 in. wide; petioles ·3 to ·8 in. long. Compound cymes terminal, 1·5 to 2 in. long. Flowers few, about 9, white tinted pink. Calyx cylindric, ·2 in. long; teeth broad. Petals 4, ovate, lanceolate, acute. Stamens 8; anthers 4 large, 4 small, curved acuminate, base 2-tubercled. Fruit globular-ovoid, ·35 in. long. *Hab.* Mountain forests. Perak, Thaiping Hills, 3500 to 4800 ft. altitude (Kunstler, Curtis); Batang Padang (Kunstler); Gunung Batu Putih (Wray).

var. latifolia King.

A form or state with leaves rather larger than in some specimens occurs in the same area.

(4) ***M. venusta* King, l.c. 61.**

A shrubby epiphyte 2 to 4 ft. long. Stems pale, tubercled. Leaves fleshy, coriaceous, sessile or very shortly petioled, elliptic acuminate, base narrowed; nerves one pair ascending to the leaf tip from the midrib 1 in. from the base, 6 to 9 in. long, 2·75 to 4 in. wide. Cymes axillary, 6-flowered, 1·5 in. long; pedicels slender. Flowers nearly 1 in. across, white. Calyx campanulate, hardly toothed, ·35 in. long. Petals broad, ovate, blunt. Stamens 8, equal, white, connective and appendages yellow. *Hab.* Mountain forests, 4000 to 5000 ft. altitude. Perak, Thaiping Hills (Kunstler). Pahang, Telom (Ridley).

var. chionantha Stapf, *Kew Bulletin* 1906, p. 733, is a variety with 10 stamens sent home alive from Perak by Curtis and cultivated by Veitch.

(5) ***M. Hasseltii* Bl. *Flora* 1831, p. 513; Clarke, in *Hook. fil. F.B.I.* ii. 62; King, l.c. 62 and *var. Griffithii* Clarke, l.c.c.**

An epiphyte. Stems few, slender, 2 to 3 ft. tall, warted. Leaves coriaceous, oblong lanceolate acuminate, base narrowed, rounded, 4·5 to 5·5 in. long, 1·25 to 1·75 in. wide; petioles ·25 in. long. Cymes axillary, below leaves, 1·3 to 2 in. long, 1 to 3 in. wide. Flowers 8 to 12, pinkish white, ·35 in. long. Calyx cylindric, campanulate, 4-toothed. Petals 4, obovate. Stamens 8 equal, linear oblong, 2 short conic processes in front and one behind at base. Fruit ·25 in. through, orange scarlet, as is the whole infructescence. *Hab.* Low country in wet woods up to 4500 ft. altitude,

somewhat variable in leaf according to its altitude. Singapore, Bukit Timah; Kranji. Johor, Tempayan River; Gunong Pulau. Malacca, Mt. Ophir (Griffith). Pahang, Pekan; Tahan River. Sungei Ujong (Cantley). Selangor, Kwala Lumpur (Curtis). Perak, Thaiping; Bujong Malacca (Curtis). Dindings, Pangkor; Bruas. *Distrib.* Borneo, Java, Sumatra. *Native names:* Asam Lokan putih; Lokan jantan; Akar Nubal.

(6) **M. pendens** *Ridl. Journ. Roy. As. Soc. S. Br.* 61, p. 6.

Stems 4 to 5 ft. long, pendulous, warted. Leaves sub-fleshy ovate acuminate, blunt, base broad, 4 in. long, 1·25 in. wide; petioles 1·2 in. long, stout. Cymes axillary, 1·25 in. long. Flowers 1·25 in. long. Calyx urn-shaped. Petals oblong-ovate, blunt 1·2 in. long, white. Stamens 7 (or 8?) violet; anther lanceolate-acuminate. *Hab.* Rare on trees overhanging river. Johor, Kota Tinggi (Ridley).

(7) **M. Scortechinii** *King, l.c.* 62.

Epiphyte. Stems warty, 3 to 4 ft. tall. Leaves coriaceous, sessile oblong-ovate short acuminate, sub-cordate, 4·5 to 6·5 in. long, 1·5 to 2·75 in. wide. Panicles cymose, lax, many-flowered, 4 in. long, entirely bright cherry red. Flowers 4 in. long; pedicels as long. Calyx campanulate; limb very short. Petals 4, acute, oblong. Stamens 8; anthers linear-lanceolate with a short spur at base and linear curved tubercle at base of each anther-cell. Fruit sub-globular, 1·2 in. long. *Hab.* On trees in dense forest on mountains at about 3000 to 4000 ft. altitude. Selangor, Bukit Hitam. Perak, Thaiping Hills (Scortechini, Kunstler); Gunong Batu Putih (Wray); Hermitage Hill (Curtis); Bujong Malacca.

(8) **M. Maingayi** *Clarke, in Hook. fil. F.B.I.* ii. 549; *King, l.c.* 63.

A little bushy epiphyte 6 to 8 in. through and as tall. Branches thin, re-branched. Leaves coriaceous, obovate round, base cuneate; nerves invisible, 1·65 to 1 in. long, 1·5 to 1·75 in. wide; petioles to 1·2 in. long. Cymes axillary very short, under an inch long. Flowers 1·25 in. long, pink. Calyx narrow campanulate, pink. Petals 4, lanceolate, pink. Stamens 8; anthers lanceolate, no process in front, a spur behind, backs crimson. Fruit campanulate, globose, 1·25 in. long, pink. *Hab.* Common in low country up to about 2000 ft. altitude. Singapore, Sungei Buluh; Bukit Timah. Johor, Sedenah; Gunong Pantai. Malacca, Gunong Mering, Ophir. Pahang, Tahan River. Selangor, Ginting Simpah; Semangkok Pass. Kedah Peak (Robinson and Kloss).

(9) **M. Clarkei** *King, l.c.* 63. *M. rosea, Clarke, l.c.* ii. 547 (not of Gaudichaud).

Bushy epiphyte about 2 ft. tall. Branches tubercled. Leaves in whorls of 3 to 4, coriaceous, elliptic to obovate, blunt or sub-acute; nerves 3, often invisible, 1 to 2·75 in. long, 1·75 to 1·8 in. wide; petioles 1·4 to 1·8 in. long. Cymes spreading, lax 1·5 to 3 in. long, in lower axils. Flowers 20 to 30 rosy white, 1·3 in. long. Calyx cupular. Petals 5, round or ovate blunt. Stamens 10;

anthers linear-lanceolate, 2 small tubercles in front, one small spur behind. Fruit globular truncate, .15 in. through. *Hab.* Mountains from 3000 to 5000 ft. altitude. Malacca, Mt. Ophir (Griffith). Pahang, Bukit Fraser (Foxworthy). Selangor, Gunong Semangkok; Menuang Gasing (Kloss); Mengkuang Lebah (Robinson); Bukit Kutu. Perak, Gunong Bubu (Kunstler); Gunong Inas (Wray); Gunong Batu Putih (Wray); Gunong Kerbau (Robinson). *Distrib.* Sumatra.

The Selangor plants have larger, thinner leaves with conspicuous nerves and larger cymes, those of Mt. Ophir, Gunong Kerbau, etc., have small fleshy leaves with no visible nerves except the midrib, and with dense cymes.

(10) **M. pahangensis** *Ridl. Journ. Linn. Soc.* xxxviii. 310.

Stems slender warted 1 ft. long. Leaves whorled, lanceolate or oblanceolate, base narrow, coriaceous, nerveless, 2 in. long, .75 in. wide; petioles .25 in. long. Flowers white .5 in. long, in cymes 1 in. long. Calyx cup-shaped, 5-toothed. Petals 5, obovate, round. Stamens 10. *Hab.* Pahang, Gunong Tahan, 4000 to 5000 ft. altitude (Robinson).

(11) **M. perakensis** *King, l.c.* 64.

A bushy epiphyte with tubercled branches. Leaves 3 or 4 in a whorl, coriaceous, elliptic round, base round sub-cordate, 2 to 5 in. long, 1.75 to 3.75 in. wide; petioles .6 to 1.2 in. long, red. Panicles axillary, cymose, 3 in. long, peduncled, 12- to 20-flowered. Flowers .5 in. long, pedicels .35 in. long, red in fruit. Calyx cupular, teeth 5, broad. Petals 5, oblong; anthers 10 with 2 yellow tubercles at base in front and a spur behind. Fruit .35 in. through, pink on dark pink stalks. *Hab.* Mountain forests. Selangor, Mengkuang Lebah (Robinson). Perak, Gunong Batu Putih 6000 ft. altitude (Wray).

(12) **M. crassinervia** *Bl. Flora* 1831, 510; *King, l.c.* 64. *M. macrocarpa* *Clarke, l.c.* ii. 547 (*not of Blume*).

Tall epiphyte, not tubercled. Leaves in whorls of 3, coriaceous oblanceolate shortly and abruptly acuminate, base long narrowed, 3-nerved, 3 to 5 in. long, 1.5 to 2 in. wide; petioles .35 to .75 in. long. Cymes fascicled below the leaves, 1.25 to 1.5 in. long. Flowers few, 1 in. across. Calyx ovoid-campanulate, pink. Petals ovate, blunt, white. Stamens 10, sub-equal with 2 tubercles at the base as long as the spur. Fruit oblong-cylindric truncate, deep purple .5 in. long. *Hab.* Forests from sea-level to about 3000 ft. altitude. Singapore. Pahang, Tahan River. Malacca (Maingay). Selangor, Semangkok Pass. Perak, Taiping Waterfall (Wray); Batang Padang valley. Penang Hill (Curtis). *Distrib.* Borneo.

(13) **M. penduliflora** *Ridl. Journ. F.M.S. Mus.* iv. 19.

Large shrub. Stems 4-angled, smooth. Leaves sessile, paired, fleshy ovate acuminate, 6 in. long, 2.5 in. wide. Inflorescence

pendulous; peduncles 6 to 8 in. long, cymose branched at top. Cymes nearly 3 in. across, spreading. Flowers 1 to 3 in cyme, white fragrant; pedicels .5 in. long. Calyx cupular, edge undulate. Petals 5, obovate, rounded .3 in. long. Stamens 10; anthers with blunt bilobed bases and a keeled point and a spur on back. *Hab.* Very rare on rocks in forest, a charming plant. Perak, Gunong Berumbun near Telom at 6000 ft. altitude (Ridley).

19. POGONANTHERA, Bl.

Shrubs, epiphytic or rock-growing. Leaves opposite oblong or ovate 3-nerved. Flowers small, white in red-branched terminal panicles. Calyx narrow, campanulate, 4-toothed. Petals 4. Stamens 8, equal; anthers oblong, acute, connective with a tuft of hairs at the base behind, not spurred. Ovary 4-celled with a tuft of hairs at top. Berry small, globose. Species 8, Malayan.

(1) **P. pulverulenta** Bl. *Flora* 1831, 521; Korth. *Verh. Nat. Gesch. Bot. t.* 65; Clarke, *l.c.* ii. 550; King, *l.c.* 65. *P. reflexa* Bl. *l.c.c.*

Spreading shrub about 4 ft. tall, scaly. Leaves coriaceous, ovate or oblong-lanceolate acute, dull green above, 3 to 6 in. long, 2.25 to 3 in. wide, base rounded, 2-tubercled, glabrous. Panicles terminal, spreading 2 to 3 in. long, red. Flowers numerous, small, .1 in. long. Calyx very scaly, sub-cylindric 4-toothed. Petals 4, scaly outside, white. Stamens 8; anthers lanceolate connective with a tuft of hairs on the back. Fruit pea-shaped, .15 in. long. *Hab.* Common on rocks on sea-coasts and on trees often high up. Singapore, Pulau Ubin (Hullett); Bukit Timah. Johor, Scudai River. Pahang, Pekan; Rumpin River (Evans). Malacca, Cape Rachado (Finlayson, Wall. Cat. 4086); Sungei Hudang. Selangor, Semangkok Pass. Perak, Goping (Kunstler); Thaiping Hills. Dindings, Lumut. Penang, Batu Feringhi (Curtis). Kelantan, Gunong, Kota Bharu, on rocks. *Distrib.* Borneo, Java.

20. PACHYCENTRIA, Bl.

Glabrous epiphytic shrubs. Leaves fleshy. Flowers usually small, corymbose, terminal. Calyx dilate at base, above tubular 4-toothed. Petals 4, ovate or oblong. Stamens 8, equal; anthers linear-oblong opening by a terminal pore; connective spurred. Ovary 4-celled. Berry globose. Species 12, Malayan.

Flowers small, .2 in. long in a spreading panicle . (1) **P. tuberculata**
Flowers showy, .5 in. wide, in a short lax cyme . (2) **P. speciosa**

(1) **P. tuberculata** Korth. *Ver. Nat. Gesch. Bot.* 246, t. 63; King, *l.c.* 66.

A glabrous shrub about 6 in. to 2 ft. tall. Roots tuberous, woody. Leaves fleshy coriaceous, elliptic-oblong sub-acute, base

narrowed, 2·5 to 4·5 in. long, '9 to 1·25 in. wide; petioles '15 to '2 in. long. Panicles terminal or axillary; branches cymose, spreading, 2 to 2·5 in. long and wide. Flowers '25 in. long. Calyx campanulate, truncate, 4-lobed. Petals lanceolate acute, white tinted pink at base. Stamens spurred at base, behind crimson. Fruit globular, narrowed at top with dilate calyx-limb above. *Hab.* On trees. Not rare, from sea-coast to 3300 ft. altitude. Singapore, Selitar; Sungei Morai. Johor, Tanjong Bunga. Malacca, Mt. Ophir. Pahang, Gunong Tahan at 3300 ft. altitude (Robinson). Perak, Telom; Ulu Bubong (Kunstler). Penang Hill at 2000 ft. altitude (Curtis). *Distrib.* Tenasserim, Borneo. *Native name*: Daun Menumpang.

(2) *P. speciosa* Ridl. *Journ. F.M.S. Mus.* vi. 149.

A viscid epiphyte woody, over 12 in. tall, branched. Leaves fleshy coriaceous, ovate-lanceolate, blunt acuminate, base cuneate, 2 to 3·75 in. long, 1 in. wide; petioles '3 in. long. Cymes umbelled, viscid 1·5 in. long. Calyx base globose, above tubular, 4-lobed, red. Petals rose pink, '25 in. long, ovate-cuspidate. Stamens unequal; anthers yellow; connective with a short linear spur. *Hab.* On palm trees, rare. Pahang at Wray's Camp, Gunong Tahan at 3300 ft. altitude (Ridley).

21. PLETHIANDRA, Hook. fil.

Epiphytic glabrous shrubs. Leaves sessile ovate stiff; nerves 3 pairs from midrib. Flowers axillary, fascicled or solitary, small. Calyx campanulate; limb truncate, 6-toothed. Petals 6, acute, ovate-lanceolate. Stamens 20 to 25; anthers linear with 1 pore, mucous. Ovary 3-locular; style filiform. Stigma minute. Berry oblong, globose. Seeds many minute, ovoid or oblong. Species 3 or 4, Borneo.

(1) *P. sessiliflora* Ridl. *Medinillopsis sessiliflora* Cogn. *Mon. Phan.* vii. 603.

A spreading shrub about 2 ft. tall. Leaves 3 to 3·5 in. long, 2·5 in. wide, sessile, ovate blunt or elliptic, base round. Flowers solitary '3 in. long; buds acute; pedicel '1 in. long. Calyx urceolate entire. Petals ovate lanceolate, '24 in. long, outer ones waxy flushed pink, inner white. Anthers pink, 24. Fruit ovoid, pulpy red, '2 in. long. *Hab.* On mangrove trees. Singapore, Kranji; Toas; Selitar. Johor, Castlewood.

This genus is very near *Medinilla* in general habit, but has numerous stamens.

22. CLIDEMIA, Don.

Hairy shrubs. Leaves membranous, ovate or oblong crenulate or toothed. Flowers in axillary panicles or fascicled, small, white

(or pink) 4- to 5-merous. Calyx campanulate or urceolate truncate or lobed. Petals obovate. Stamens equal, double the number of the petals; anthers linear elongate. Berry small, globose. Species about 100, S. American. One species thoroughly established in the Malay Peninsula.

(1) *C. hirta* Don. *Mem. Wern. Soc.* iv. 309; *Cogniaux DC. Mon. Phan.* vii. 986; *Bot. Mag. t.* 1971.

A shrubby weed about 2 to 6 ft. tall, very hairy. Leaves thin ovate-acuminate, denticulate; nerves 5 and transverse nervules prominent, 3.5 in. long, 2.5 in. wide; petioles .5 in. long. Cymes spreading 1 in. long. Calyx very hairy with subulate lobes. Petals small, white. Fruit .2 in. long, globose, black, pulpy. *Hab.* Abundant on roadsides, Singapore near town and in Reservoir woods. Negri Sembilan, Seremban. *Distrib.* S. America and an alien in Java and Fiji.

23. ASTRONIA, Bl.

Trees or shrubs. Leaves opposite, ovate or oblong. Flowers small, white (or purple) in terminal panicles. Calyx campanulate, truncate or lobed. Petals 4 or 5. Stamens 8, 10 or 12. Anthers short, dehiscent by slits down front; connective spurred or not. Ovary 2- to 5-celled; style short. Stigma capitellate. Capsule dehiscent irregularly. Seeds minute, copious, linear. Species 24, Malayan, Polynesian.

(1) *A. smilacifolia* Triana, *Trans. Linn. Soc.* xxviii. 152; *King, l.c.* 67.

Bushy tree about 30 ft. tall. Branches, petiole, underside of leaves red-scaly. Leaves oblong tapering to each end; nervules transverse, 3 to 5.5 in. long, 1.5 to 2.5 in. wide; petioles .1 in. long. Panicles 1 to 2 in. long, dense. Flowers white, .1 in. long. Fruit rufous-scaly globose, truncate, .2 in. through. *Hab.* Mountain forests. Perak, Taiping Hills. Penang Hill, on West Hill at 3000 ft. altitude. *Distrib.* Borneo.

24. PTERNANDRA, Jack.

Trees. Leaves sub-coriaceous or coriaceous sub-sessile, 3- to 5-nerved. Flowers solitary in short clustered cymes, small or moderate size, occasionally terminal paniced. Calyx-tube campanulate or hemispheric tessellate, warty or covered with appressed triangular processes; mouth truncate or 4-toothed. Petals 4, ovate or oblong, blue or white. Stamens 8, equal, but some anthers often imperfect; anthers broad, blunt, spurred behind dehiscent by slits; filaments short, thick often geniculate. Ovary 4-celled; style filiform. Stigma clubbed. Berry sub-globose, scaly or smooth. Seeds obovoid angled. Species about 12, Malayan.

- i. **EUPTERNANDRA.** Calyx tessellate; flowers blue, small axillary.
 Leaves 5 to 6 in. long, 4 in. wide (1) **P. capitellata**
 Leaves 2 to 4 in. long, 2 in. wide.
 Flowers in axillary and terminal cymes 1 to 2 in.
 long (2) **P. cœrulescens**
 Flowers in axillary fascicles; leaves elliptic,
 thick (3) **P. Jackiana**
 Flowers in axillary fascicles; leaves ovate,
 thin (4) **P. galeata**
- ii. **KIBESSIA.** Calyx covered with flat triangular processes.
 Flowers larger, bluish white axillary (5) **P. echinata**
 Flowers in a terminal panicle small (6) **P. paniculata**

(1) **P. capitellata** Jack, *Mal. Misc.* ii. 61; *King, l.c.* 68.

Bushy tree about 60 ft. tall. Leaves coriaceous, dark shining green, ovate, elliptic or nearly lanceolate, narrowed at both ends, glabrous, strongly 3-nerved, 5 to 6 in. long, 3·5 to 4 in. wide; petioles ·2 in. long. Cymes sessile axillary of 8 to 10 flowers, ·3 in. long. Calyx cylindric-campanulate, ·1 in. long, tessellate. Petals ·05 in. long, blue, acute. Fruit dark blue. *Hab.* Woods, Perak (Scortechini); Gunong Keledang. Dindings, Lumut. Penang, foot of hill (Wallich, Curtis). *Distrib.* Tenasserim. *Native name* : Kulit Nipis.

(2) **P. cœrulescens** Jack, *Mal. Misc.* ii. 61; *King, l.c.* 68.

A tree 15 to 30 ft. tall. Leaves elliptic shortly acuminate, base round, or narrowed, smooth dark green, coriaceous 2·5 to 4 in. long, 1·25 to 2·5 in. wide; petioles ·2 in. long. Flowers ·2 in. long in axillary cymes, 1·5 in. long and terminal ones 2·5 in. long. Calyx cup-shaped, tessellate. Petals oblong-ovate small, bright blue. *Hab.* Common in low country woods. Singapore, Changi; Chan Chu Kang. Johor, Kota Tinggi; road to Gunong Pulai. Pahang, Pekan. Malacca, Chabau (Cantley). Selangor, Batu Tiga; Rawang, Perak, Blanda Mabok (Wray); Goping (Kunstler). Province Wellesley, Nibong Tebal (Curtis). Penang, Telok Bahang (Curtis). Lankawi islands (Haniff). *Native names* : Sial Munahon; Benut Paya; Bunyut Paya; Kelat Biru; Nipis Kulit.

Ewyckia cyanea Bl. of Borneo and Amboina is very near this, but its calyx is not tessellate.

(3) **P. Jackiana** Ridl. *P. cœrulescens* var *Jackiana* Clarke, in *Hook. fil. F.B.I.* ii. 551.

Tree about 30 ft. tall. Leaves stiffly coriaceous elliptic acuminate blunt, base narrowed, 2 to 4 in. long, 1·75 to 2·25 in. long; petioles ·2 in. long. Flowers 4 to 7 in axillary fascicles; pedicels ·05 in. long. Calyx tessellate, short, cup-shaped, ·1 in. long. Petals light blue. *Hab.* Woods apparently rather scarce. Singapore (Kunstler). Malacca, Bukit China (Maingay).

(4) **P. galeata** Ridl. *Kibessia galeata* Cogn. *Mon. Phan. l.c.* 110. *Ewyckia galeata* Korth. *l.c.* 254, t. 67.

A tree about 25 to 30 ft. tall. Leaves ovate acuminate, base

acute, glabrous, 3·5 in. long, 1·5 in. wide; petioles ·2 in. long. Flowers ·25 in. long, axillary, in fascicles of 3 or 4. Calyx urceolate tessellate, lobes sub-triangular, blunt in bud. Petals small oblong, blue. *Hab.* Lowland woods. Johor, Kwala Sembrong (Kelsall). Selangor, Batu Tiga. *Distrib.* Borneo. *Native name:* Lagis Pukan hutan.

(5) *P. echinata* Jack, *Mal. Misc.* ii. 9; *King, l.c.* 69.

A bushy tree about 40 ft. tall, more or less pubescent. Leaves sub-coriaceous, lanceolate or oblong-lanceolate, glabrous above, pubescent beneath, 2·5 to 4·5 in. long, 1 to 1·75 in. wide; petioles ·2 in. long. Flowers axillary solitary or in terminal cymes about 2 in. long and ·75 in. across. Calyx campanulate, covered with pubescent acuminate triangular scales, ·3 in. long. Petals ovate quadrate, white more or less deeply tinted with light blue or lilac; anthers oblong, blunt, orange. Fruit hemispheric echinate, green, ·35 in. through. *Hab.* A very common tree in secondary jungle, hedges and such places in the low country. Singapore, Changi; Bukit Timah. Johor, Castlewood; Batu Pahat. Pahang, Kuantan (Foxworthy). Malacca, Bukit Bruang; Batang Malacca (Good-enough). Selangor, Semangkok; Kwala Lumpur; Bukit Kutu. Perak, Larut (Kunstler). Penang Hill. Kelantan, Chaning.

var. *pubescens* King, *l.c.* 70.

Leaves more pubescent beneath; branches and flowers pubescent. *Hab.* Malacca, Ayer Panas (Griffith). Selangor, Rawang (Kloss). Perak, Larut (Kunstler). Kelantan, Kwala Lebir. Penang Hill (Curtis).

var. *bracteata* Ridl. With large ovate-lanceolate persistent bracts. *Hab.* Singapore, Bukit Panjang (Ridley). *Distrib.* Java, Sumatra. *Native name:* Serai Manaun.

(6) *P. paniculata* Benth. *Wall. Cat.* 4080; *Clarke, l.c.* ii. 551. *P. Griffithii* King, *l.c.* 70.

A tree about 40 ft. tall. Leaves sub-coriaceous lanceolate or elliptic, shortly acuminate, base blunt, 4 in. long, 1·5 in. wide, and flowers also in short axillary cymes. Calyx ·15 in. long, pubescent with short triangular processes. Petals orbicular-ovate, white; anthers short, thick. Fruit globular-ovate, green covered with scales. *Hab.* Lowland woods, not rare. Singapore, Chan Chu Kang. Malacca (Griffith). Dindings, Pangkor; Bruas. Perak, Ayer Larut (Wray). Penang (Porter); Penara Bukit (Curtis). Province Wellesley, Nibong Tebal. Kedah Peak. Lankawi islands (Haniff). *Distrib.* Borneo.

Bentham's *P. paniculata* seems to me the panicked form of King's *Griffithii*, in which the panicle is aborted or converted into a mass of small leaves, with a few abnormal flowers intermixed. This is the commonest state of the tree, and indeed good specimens with well-developed flowers are comparatively rare to find. In many trees the flowers are also axillary, and some of these specimens with the large, occasionally nearly cordate leaves form King's var. *cordata*.

25. MEMECYLON, Linn.

Shrubs or small to moderate trees. Leaves opposite; petiole short coriaceous, pinnate-nerved (rarely 3-nerved). Flowers small in axillary simple or panicked cymes or umbels, rose or white or often blue. Calyx campanulate, limb dilate, truncate or 4-toothed. Petals 4. Stamens 8, equal; anthers opening in slits in front, connective with a horn behind. Ovary 1-celled with a depressed or convex disc on the top with 8 radiating grooves; ovules 6 to 12. Drupe globose or ellipsoid, pulpy, 1-seeded. Species about 100, Africa, tropical Asia and Australia.

- Leaves triplinerved from base (1) **M. oligoneuron**
 Leaves pinnate-nerved more or less conspicuously.
 Cymes few-flowered on long slender peduncles (2) **M. gracilipes**
 Cymes many- or few-flowered, dense short.
 Branchlets winged or conspicuously angled.
 Branchlets stout strongly winged; leaves coriaceous oblong lanceolate (3) **M. epiphyticum**
 Branchlets slender winged; leaves very thin, lanceolate (4) **M. tenuifolium**
 Branchlets angled; cymes peduncled 1 in. long (5) **M. fruticosum**
 Branchlets angled; cymes sessile; flowers 3 or 4 (6) **M. dichotomum**
 Branchlets not winged nor angled.
 Leaves 6 to 8 in. long; nerves conspicuous inarching, sessile or nearly so.
 Cymes on stout peduncles (7) **M. caloneuron**
 Peduncles slender with terminal umbel. (8) **M. Hullettii**
 Cymes sessile or very shortly peduncled.
 Leaves cordate; flowers 2 in. wide (9) **M. Maingayi**
 Leaves cordate; flowers 1 in. wide (10) **M. Wallichii**
 Leaves ovate, base narrowed not cordate (11) **M. heteropleurum**
 Leaves oblong-lanceolate, base broad not cordate (12) **M. longifolium**
 Leaves 4 in. long or less, petiolate.
 Nerves slender visible; cymes peduncled elongate compound.
 Cymes pubescent (13) **M. pubescens**
 Cymes glabrous.
 Nerves conspicuous (14) **M. Kunstleri**
 Nerves obscure; cymes compound.
 Leaf-base acuminate (15) **M. oleæfolium**
 Leaf-base round (16) **M. laxiflorum**
 Nerves invisible.
 Leaves large over 4 in. long.
 Leaves cordate amplexicaule; flowers small white (17) **M. amplexicaule**
 Leaves not cordate; flowers large blue (18) **M. cæruleum**
 Leaves small, 2 in. long.
 Leaves ovate sessile (19) **M. malaccense**
 Leaves rhomboid petioled (20) **M. pauciflorum**

- Leaves narrow lanceolate . . . (21) **M. floridum**
 Leaves ovate lanceolate; cymes
 short dense.
 Calyx 4-toothed.
 Teeth long (22) **M. myrsinoides**
 Teeth short; calyx campanu-
 late (23) **M. lævigatum**
 Calyx mouth undulate; teeth
 minute (24) **M. cinereum**
 Calyx very short, edge undu-
 late, no teeth (25) **M. acuminatum**
 Calyx mouth entire.
 Flowers small in sub-sessile
 cymes (26) **M. minutiflorum**
 Flowers 1 in. wide; peduncle
 short stout (27) **M. garcinioides**
 Flowers 2 in. wide; peduncle
 short (28) **M. Cantleyi**
 Flowers fascicled (29) **M. campanulatum**
 Cymes longer than petiole
 solitary; leaves thin
 coriaceous (30) **M. intermedium**
 Cymes longer than petiole
 several; leaves stiff
 coriaceous (31) **M. edule**

(1) **M. oligoneuron** *Bl. Ann. Mus. Bot. Lugd. Bat.* i. 354;
King, l.c. 73.

Small tree about 25 to 50 ft. tall. Leaves ovate, abruptly blunt acuminate, base long narrowed; nerves 3 from base; nervules invisible, 2 to 4 in. long, .05 to .15 in. wide; petioles .05 to .1 in. long. Flowers white, .05 in. wide in dense axillary clusters .2 in. long. Calyx-tube cupular, teeth broad. Fruit globose or ovoid, .1 in. long on slender pedicel as long. *Hab.* Not common in forests, low country. Johor, Pulau Tioman (Burkill). Malacca, Ayer Keroh. Pahang, Sungei Cheka, Kwala Lipis (Foxworthy). Perak, Larut Hills and Ulu Bubong (Kunstler). Penang, Waterfall; Ayer Hitam (Curtis). *Distrib.* Java, Borneo.

(2) **M. gracilipes** *Ridl. Journ. Roy. As. Soc. S. Br.* 79,
 p. 72.

Small tree. Leaves thinly coriaceous, sub-sessile, ovate cuspidate, base round; nerves 4 to 5 pairs, conspicuously elevate beneath, depressed above, inarching .25 in. from edge, 2.5 to 3 in. long, 1.5 in. wide. Cymes very slender, 1 to 1.5 in. long, little or not branched; pedicels very slender. Flowers umbelled in threes. Calyx pink, .1 in. long, base sub-globose, limb wide, saucer-shaped, .2 in. across. Petals ovate acute, white, .1 in. long. Fruit globose .5 in. through on a pedicel .45 in. long. *Hab.* Very rare, woods at 1000 ft. altitude. Perak, Waterloo (Curtis).

(3) **M. epiphyticum** *King, l.c.* 74.

Epiphytic shrubs 3 to 4 ft. tall. Branches winged with auricles beneath the nodes. Leaves oblong-lanceolate, light green, acute

or acuminate, base narrowed, rounded; nerves 9 to 10 pairs invisible above, 1.75 to 3 in. long, .6 to 1 in. wide; petioles .05 in. long. Cymes 3- to 4-flowered on pedicels .1 in. long. Calyx cupular, base round, mouth .05 in. across. Petals tinted blue. Fruit globular .25 in. long, green flushed red. *Hab.* Mountain forests. Perak, Larut Hills 800 to 1000 ft. altitude (Kunstler). Sungei Larut (Wray).

(4) ***M. tenuifolium* Ridl. n.sp.**

Branches slender, winged. Leaves thin, lanceolate-acuminate, base rounded, very shortly narrowed at the base; nerves 8 to 10 pairs, very slender and faint, 3 in. long, .6 in. wide; petioles under .1 in. long. Flowers small in short axillary cymes of 6; pedicels slender longer than calyx. Calyx saucer-shaped, ribbed inside, lobes round. Petals short, lanceolate. Stamens 8; filaments long, slender; anthers semi-lunar. Style slender, nearly as long as filaments. *Hab.* Pahang, Telok Mengkuang, Temerloh (Foxworthy).

(5) ***M. fruticosum* King, l.c. 74.**

Shrub 6 to 8 ft. tall. Branchlets winged and eared. Leaves chartaceous, ovate-lanceolate acuminate base round; nerves 7 to 9 pairs inarching within margin, conspicuous beneath, 3 to 4 in. long, 1.35 to 1.85 in. wide; petioles .05 in. long. Cymes paired, 8- to 10-flowered, .5 in. long. Calyx hemispheric .1 in. long, mouth .075 in. across. Petals bluish white. Fruit globose-ovoid, constricted below. Calyx-limb .35 in. long, .25 in. through. *Hab.* Open jungle, rare. Perak, Larut at 200 to 500 ft. altitude (Kunstler).

(6) ***M. dichotomum* Clarke, in King, l.c. 75.** *M. elegans* var. *dichotomum* Clarke, in Hook. fil. *F.B.I.* ii. 554.

A slender shrub 6 to 10 ft. tall. Branchlets angled. Leaves thin coriaceous, nearly sessile, lanceolate or ovate-acuminate caudate, base round; nerves 6 to 8 pairs, 2.5 to 4 in. long, 1 to 2 in. wide. Cymes 2- to 5-flowered, solitary, axillary; pedicels short. Calyx pyriform, narrowed to base; lobes 4, broad short when young, campanulate when adult, truncate, pink. Stamens white, spurs deep blue. Fruit globular, .5 in. through, yellow, flushed red. *Hab.* Hill forests, Malacca, Mt. Ophir (Maingay). Pahang, Tahan River woods. Selangor, Dusun Tua. Perak, Ulu Kal (Kunstler).

var. *eugeniiflorum* Ridl. *M. eugeniiflorum* Ridl. *Journ. Roy. As. Soc. S. Br.* 57, p. 48.

Leaves coriaceous lanceolate cuspidate. Flowers entirely deep rose. *Hab.* Selangor, Klang Gates; Sempang mines. Semangkok, Perak, Temengoh (Ridley).

(7) ***M. caloneuron* Miq. Fl. Ind. Bat. Supp. 321; King, l.c. 76.**

Tree 40 to 50 ft. tall, 10 to 15 in. through. Leaves coriaceous, 4 to 9 in. long, 1.5 to 3.5 in. wide; nerves 14 pairs, prominent,

inarching into a nearly straight intramarginal line; petioles .1 in. long. Flowers pale yellow, crowded in heads on the tips of the branches of the cyme, which is peduncled and 1 to 2 in. long; branches several angled. Calyx short, cup-shaped. Fruit .5 in. through, globular, deep blue, on a stout panicle 3 in. long with a winged peduncle. *Hab.* Not common. Rocky woods to 3500 ft. altitude, Johor, Kota Tinggi. Dindings, Bruas (Burn-Murdoch). Perak, Thaiping 800 to 1000 ft. altitude (Kunstler). Lankawi, Gunong Raya (Curtis). *Distrib.* Java, Sumatra, Borneo. *Native names:* Kayu Kapas; Api-Api Bukit.

(8) **M. Hullettii** King, *l.c.* 76.

Shrub about 10 ft. tall. Leaves sessile chartaceous oblong, narrowed to tip, base broad cordate; nerves 15 pairs, horizontal, 6 to 8 in. long, 2.25 to 3 in. wide. Peduncle solitary, 2 in. long, slender, pendulous ending in a compound or simple umbel of few white flowers. Calyx campanulate, mouth truncate. Fruit globular, .25 in. through. *Hab.* Local in woods in the south. Johor, Gunong Pulai; Sedenah (Hullett, Kelsall). *Native name:* Jambu Kalada.

(9) **M. Maingayi** Clarke, in Hook. fil. *F.B.I.* ii. 557.

A tree 20 to 40 ft. tall. Leaves coriaceous nearly sessile elliptic-oblong sub-acute or obtuse, base rounded, 6 to 9 in. long, 2.5 to 4.25 in. wide; nerves strong elevate beneath, 10 to 15 pairs inarching within margin. Flowers in short fascicles below the leaves; peduncles .2 in. long, 3-flowered. Calyx wide, cupular, .15 in. long, truncate, white. Petals broad, blunt, .2 in. long, bright blue. *Hab.* Malacca (Maingay). Perak, Goping (Kunstler).

This has the largest and most coriaceous flowers in the genus here.

(10) **M. Wallichii** Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 74.

Small tree or shrub about 12 ft. tall. Branchlets angled. Leaves coriaceous, oblong-lanceolate rather narrow, acuminate, base minutely cordate, or ovate acuminate, nearly sessile; petioles minute; nerves 14 to 15 pairs, prominent, inarching .1 in. from edge, 7 to 8 in. long, 2.75 to 3 in. wide. Cymes globose, or dense of numerous flowers. Peduncle very short. Calyx cup-shaped, base blunt, truncate, .1 in. long. Petals short, broad, ovate, blunt, pinkish white. Fruit globose, black .2 in. through. *Hab.* Forests, usually at about 1000 ft. altitude in the north, Perak, Larut (Kunstler); Waterloo (Curtis). Penang Hill (Wallich 4101 c). Experimental Nursery (Curtis); Moniot's Road.

(11) **M. heteropleurum** Bl. *Ann. Mus. Bot. Lugd. Bat.* i. 362.

Shrub or small tree, about 12 ft. tall. Leaves coriaceous oblong or elliptic, short blunt acuminate, base narrowed blunt; nerves 18 to 20 pairs, 5 to 7 in. long, 2 to 3.5 in. wide; petioles .1 in. long. Flowers .25 in. across in dense cymes about half an inch across. Calyx wide, short, cupular, truncate, base narrowed. Petals acute

white. Fruit ellipsoid .5 in. through, deep purple. *Hab.* Common in woods. Singapore, Garden Jungle; Bukit Timah. Johor, Sedenah. Malacca (Griffith, Maingay). Pahang, Tahan River; Temerloh (Foxworthy). Selangor, Kwala Lumpur. Perak, Gunong Batu Putih (Wray); Larut. var. *olivacea*, a form with broad round-based leaves. *Distrib.* Sumatra, Borneo. *Native names:* Jambu Baniang; Kuku Baniang.

(12) **M. longifolium** *Ridl. Journ. Roy. As. Soc. S. Br.* 79, p. 72.

Tree. Leaves elliptic-lanceolate, long, blunt, cuspidate base round, not cordate; nerves 20 pairs, slender, conspicuous, thinly coriaceous, light green, 7 to 8 in. long, 2 to 2.25 in. wide; petioles very short, .05 in. long or less. Flowers in very short sessile fascicles, about 10 in a fascicle, pink and white. Calyx campanulate, truncate .1 in. long, pink. Petals pink or white, ovate-triangular sub-obtuse. *Hab.* Dindings at Lumut (Ridley).

(13) **M. pubescens** *King, l.c.* 74.

Tree about 30 ft. tall. Branchlets nearly terete. Leaves coriaceous elliptic, obtuse or acuminate, base round; nerves 7 to 10 pairs distinct beneath, 4 to 4.5 in. long, 3 in. wide; petioles .25 in. long. Cymes branched, umbellate, rusty-pubescent, 1.5 to 2.5 in. long; branches 4-angled. Flowers crowded at tips, cream colour. Calyx campanulate, base narrow, mouth .05 in. wide with 4 sharp teeth. Fruit globular, .15 in. wide. *Hab.* Forests, rare in collections, Singapore, Tanglin. Malacca (Griffith). Perak, Goping (Kunstler).

(14) **M. Kunstleri** *King, l.c.* 76.

Tree 40 to 60 ft. tall, 6 to 18 in. through. Leaves chartaceous elliptic-oblong blunt or acute acuminate, base round; nerves 7 to 8 pairs with secondary nerves visible as many, 2.75 to 4.5 in. long, 1 to 2 in. wide; petioles .05 to 1 in. long. Cymes from axils of fallen leaves, .35 to .6 in. long, umbellately paniced, 4 to 6 flowers in umbel, white; stamens brown. Calyx cup-shaped, shallow, .05 in. long. Fruit ellipsoid, .3 in. long. *Hab.* Not common. Dense jungle. Selangor, Labu woods. Perak, Ulu Bubong and on limestone hills, Gunong Dipang (Kunstler); Changkat Serdang (Wray).

(15) **M. oleæfolium** *Bl. Ann. Mus. Bot. Lugd. Bat.* i. 359; *King, l.c.* 82.

Slender tree 20 to 30 ft. tall. Leaves coriaceous elliptic blunt caudate-acuminate, base cuneate; nerves 8 to 10 very faint, 2.5 to 4.75 in. long, 1 to 2.25 in. wide; petioles .15 to .3 in. long. Cymes 1 to 3 in each axil, 1 in. long, compound with many cymules umbellate at the branch ends. Flowers numerous, blue. Calyx-tube small hemispheric, limb broad, longer, truncate. Petals ovate, small, sub-acute. Fruit ovoid-elliptic .4 in. long. *Hab.* In woods up to 1000 ft. altitude. A beautiful plant. Singapore, Garden

Jungle. Perak, Ulu Kerling; Goping (Kunstler); Penang Hill at 1000 ft. altitude. *Distrib.* Banka, Sumatra. *Native name*: Dulek or Dalek putih.

(16) **M. laxiflorum** Wall. *Cat.* 4472.

Large shrub. Leaves stiffly coriaceous ovate obtuse, base round; nerves very faint about 8 pairs, very slender, 4 to 4.5 in. long, 2 to 3 in. across; petioles .4 to .5 in. long, stout. Cymes 1 to 4 below the leaves; peduncles .3 in. long, bearing an umbel of cymules on short peduncles with longer, slender pedicels. Calyx



FIG. 65.—*Memecylon amplexicaule*.

campanulate, tube very small hemispheric, limb larger truncate. Petals short, sub-acute, blue. Fruit globose with very small trace of the limb, .25 in. through. *Hab.* Open country near sea, local. Singapore (Wallich 4472). Johor, Minyak Buku and Pinerong (Ridley).

(17) **M. amplexicaule** Roxb. *Fl. Ind.* ii. 260. *M. microstomum* Clarke, in Hook fil. *F.B.I.* ii. 557; King, *l.c.* 79.

Small tree about 40 ft. tall. Leaves very coriaceous, sessile, broadly elliptic blunt shortly cordate; nerves very indistinct, 3.25 to 5 in. long, 1.3 to 2 in. wide. Flowers small, under .1 in.

long, numerous, pure white in dense glomeruli .75 in. across. Calyx funnel-shaped, narrowed below the wide margin. Petals short ovate. Fruit globular, .6 in. through. *Hab.* In dense forests up to 2000 ft. altitude. Singapore, Bukit Timah. Malacca (Griffith). Perak, Ulu Bubong (Kunstler). Penang Hill to 2000 ft. altitude (Curtis).

(18) **M. cœruleum** Jack, *Mal. Misc.* i. 26; *King, l.c.* 80.

Shrub 4 to 15 ft. tall. Leaves sessile stiff coriaceous dark green, ovate to oblong sub-acute, base round cordate, 4 to 5 in. long, 1.75 to 2.5 in. wide. Flowers in dense axillary clusters, rather numerous. Calyx campanulate, pink. Petals ovate acute, blue. Stamens lavender colour. Fruit ellipsoid narrow, .4 in. long, .25 in. wide, black. *Hab.* Sandy open spots, edges of woods. Common. Johor, Hulu Sedili (Kelsall). Malacca, Bukit China (Derry); Tanjong Kling; Nyalas (Holmberg). Negri Sembilan, Bukit Danan (Cantley). Province Wellesley, Bukit Juru. Penang, Pulau Jerajah (Kunstler); Tanjong Bunga (Curtis). Kedah, Alor Sta; Yan. Adang islands, Pulau Rawei. Singora. *Distrib.* Philip-pines. *Native names:* Api-API hutan; Dalek jambu; Pantat ulat; Sinonia. *Use:* Fruit eaten.

(19) **M. malaccense** Clarke, *MSS. Ridl. Roy. As. Soc. S. Br.* 79, p. 73. *M. amabile* Bedd. var. *malaccense*, Clarke, in *Hook. fl. F.B.I.* ii. 555.

Probably a shrub. Leaves ovate-lanceolate, base rounded, tip acuminate blunt, fleshy coriaceous, opaque; nerves invisible, 2 to 2.75 in. long, 1 to 1.25 in. wide, sessile or minutely petioled. Cymes very short, .3 in. long. Flowers 4 to 5 umbelled on the top of the peduncle. Calyx cup-shaped truncate, fleshy, base broad. Petals forming a blunt cone in bud, ovate. *Hab.* Malacca (Maingay). Never collected again and very little known.

(20) **M. pauciflorum** Bl. *Ann. Mus. Bot. Lugd. Bat.* i. 356; *King, l.c.* 83. *M. pulchellum* Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 52.

A bush 3 to 10 ft. tall, very floriferous. Leaves coriaceous rhomboid, tip blunt, base acute; nerves nearly invisible 6 to 7 pairs, 1 to 1.5 in. long, .35 to 1 in. wide; petioles under .1 in. long. Cymes of several bright azure flowers on a very short peduncle and longer pedicels, axillary. Calyx wide campanulate with 4 distinct short teeth. Petals ovate cuspidate, larger than calyx. Fruit globular, .2 in. long, crowned with the calyx-limb. *Hab.* Sea coasts in open ground. Penang (Kunstler). Kedah, Lankawi islands. Pulau Adang group, Rawei; Sarang. Terutau (Haniff). *Distrib.* Andamans, Tenasserim, Chittagong.

(21) **M. floridum** Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 73.

Tree 40 to 50 ft. tall. Leaves thinly coriaceous, lanceolate acuminate nearly equally at both ends; nerves very faint about 7, with a faint intramarginal one on each side close to edge, 3 to 4 in. long, 1.25 in. wide; petioles .3 in. long. Cymes 1 to 3 in each

leaf axil; peduncle thick, 3 in. long, with an umbel of three or more flowers. Calyx tube cylindric, obconic; limb broad, 1 in. across. Petals ovate in bud conic blunt. *Hab.* Perak, Larut at 500 to 1000 ft. altitude (Kunstler).

(22) **M. myrsinoides** *Bl. Ann. Mus. Bot. Lugd. Bat.* i. 356; *King, l.c.* 81, and *var. lilacina King, l.c.*

A shrub or tree up to about 30 ft. tall. Leaves thin coriaceous, elliptic to ovate-lanceolate acuminate often caudate, much narrowed to base; nerves invisible, 1.5 to 2.5 in. long, .9 to 1.25 in. wide; petioles .1 to .25 in. long. Flowers numerous in dense compound cymes about 2 in. through and as long, blue or rose pink. Calyx campanulate, tube narrowed, teeth 4, triangular acute, as long as tube. Petals acute, long. Style long and persistent. Fruit globular, .2 in. long. *Hab.* Common; especially near the sea, in woods and thickets. Singapore, Bajau. Johor, Tana Runto. Malacca, Jelutong (Goodenough). Selangor, Kwala Lumpur. Perak, Ulu Bubong and Ulu Kerling (Kunstler). Penang Hill (Curtis). *Distrib.* Borneo, Sumatra. *Native names:* Bala; Dalek putih; Kuku Baning; Nipis Kulit.

(23) **M. lævigatum** *Bl. Ann. Mus. Bot. Lugd. Bat.* i. 358; *King, l.c.* 82.

Large shrub or small tree with pale bark. Leaves thin, coriaceous, ovate or elliptic, caudate or acuminate or short acuminate; nerves invisible, 2 to 2.5 in. long, 1 to 1.75 in. wide; petioles .1 to .15 in. long. Cymes below the leaves, few-flowered; peduncles .1 in. long. Flowers small. Calyx campanulate, narrowed to base, teeth distinct acute. Fruit globular .3 in. long. *Hab.* Woods. Singapore, common, Kranji. Johor, Tana Runto; Tebrau. Malacca (Griffith). Selangor, Weld's Hill (Burn-Murdoch); Bukit Kutu. Perak, Larut (Kunstler). *Distrib.* Burma, Banka, Java, Borneo. *Native name:* Dalek Tembaga.

(24) **M. cinereum** *King, l.c.* 82.

Shrub 6 to 8 ft. tall. Leaves thin coriaceous, drying blackish brown, lanceolate or ovate lanceolate, long acuminate, base cuneate or rarely rounded; nerves invisible, 2.8 to 5.5 in. long, 1 to 2.2 in. wide; petioles .15 to .3 in. long. Peduncles very short. Cymes 2 in. long, of about 12 flowers. Calyx cupular, base round, mouth wide, .1 in. wide, undulate, teeth minute. Style long persistent. Fruit globular .25 in. through. *Hab.* Selangor, Weld's Hill, Kwala Lumpur (Cubitt). Perak, Selama (Kunstler, Scortechini) at 300 to 400 ft. altitude.

(25) **M. acuminatum** *Sm. in Rees' Cyclop.* xxiii. 4; *King, l.c.* 84.

Tree about 30 to 50 ft. tall with slender branches. Leaves coriaceous ovate, long caudate, blunt, base cuneate; nerves invisible, 1.5 to 4 in. long, .75 to 1.5 in. wide; petioles .2 in. long. Cymes 1 or 2 axillary, short, peduncled of 8 or 10 flowers; peduncle

under '1 in. long. Calyx-tube very short, cup-shaped, limb broad, undulate. Petals ovate blunt. Fruit globular '25 in. through. *Hab.* Forests up to 3000 ft. altitude. Johor, Tana Runto; Kwala Tebing Tinggi. Malacca (Maingay). Selangor, Bukit Kutu at 3000 ft. altitude. Sempang Mines, Semangkok. Perak (Kunstler). *Native name*: Mangas.

(26) **M. minutiflorum** *Miq. Fl. Ind. Bat. Supp.* 323; *King, l.c.* 81. *M. acuminatum* *var. flavescens* *Clarke, l.c.* ii. 562.

A tree 30 to 70 ft. tall. Stem 10 to 15 in. through. Leaves thinly coriaceous, elliptic caudate-acuminate, base sharply narrowed acute; nerves very faint, 3'25 to 3'5 in. long, 1 in. wide; petioles 2 in. long. Cymes several branched on a peduncle, '1 in. long, whole inflorescence '4 in. long. Flowers numerous, crowded, very small. Calyx very short wide campanulate, glandular hairy when young. Petals blunt, dark blue. Fruit globose, '35 in. long, yellow. *Hab.* Dense, rocky jungle. Malacca (Griffith). Perak, Larut 2500 to 3000 ft. altitude, and Goping 300 to 800 ft. altitude (Kunstler). Penang at 1000 ft. altitude on the hill (Curtis); Lankawi, Sungei Batu Asap (Haniff).

(27) **M. garcinioides** *Bl. Ann. Mus. Bot. Lugd. Bat.* i. 358; *King, l.c.* 85.

Small tree up to about 40 ft. tall. Leaves thinly coriaceous, oblong-ovate or elliptic acuminate or cuspidate, blunt, base cuneate; nerves invisible, 3 to 5'5 in. long, 1'2 to 2'2 in. wide; petioles '05 to '1 in. long. Cymes short; peduncle thick, '2 in. long. Cymules umbelled at top. Flowers small, greenish white. Calyx campanulate, mouth truncate, teeth short or none, '05 in. across. Petals small ovate. Fruit globular, smooth '2 in. long, dark blue. *Hab.* Not rare in lowland woods. Singapore, Selitar, Bukit Timah. Johor, Tebrau River; Kukub. Malacca (Maingay); Selangor, Rawang. Perak, base of Gunong Malacca (Kunstler). Pulau Adang. *Distrib.* Sumatra, Borneo. *Native names*: Bangas; Jenitan; Bangas Merah.

(28) **M. Cantleyi** *Ridl. Journ. Roy. As. Soc. S. Br.* 79, p. 72.

Large shrub. Leaves thinly coriaceous, elliptic acuminate to both ends; nerves 5 pairs, very faint, 3'5 to 4'5 in. long, '2 in. wide; petioles '4 in. long. Flowers few in simple cymes '5 in. long; peduncles '15 in. long, rather thick. Calyx wide-cupped, narrowed at base truncate, '1 in. long and '2 in. wide, white, tinted violet. Petals sub-quadrate apiculate, pale blue. Stamens deep violet. *Hab.* Forests, rare. Singapore, Garden Jungle. Malacca (Maingay).

(29) **M. campanulatum** *Clarke, l.c.* ii. 563; *King, l.c.* 80.

Tree. Leaves coriaceous elliptic acuminate, often caudate-acuminate, base narrowed to base of petiole; nerves invisible, 3 to 4'5 in. long, 1'25 to 2'2 in. wide; petioles winged, '1 in. long. Flowers on very short branched peduncles, '1 in. long; pedicels

slender, longer. Calyx sub-globose campanulate, narrowed at top, limb rather large. Petals ovate acute, short and broad. *Hab.* Rare in hill forests. Malacca (Griffith). Selangor, Rawang, forest reserve (Kloss); Ginting Bidai (Ridley).

(30) **M. intermedium** *Bl. Ann. Mus. Bot. Lugd. Bat.* i. 358; *King, l.c.* 86.

Tree 20 to 40 ft. tall. Leaves thinly coriaceous, lanceolate to elliptic cuspidate (ovate *fide* King), base cuneate, 1·5 to 3·5 in. long, 1·25 to 2 in. wide; petioles ·25 to ·35 in. long. Cymes compound; peduncles slender, 1·5 in. long, secondary peduncles umbelled 1 in. long. Flowers numerous 1 in. long. Calyx broad, campanulate with minute teeth. Petals ovate, nearly blunt. Fruit globose. *Hab.* Perak. No locality (Scortechini). Very rare. I have seen no specimen from the Malay Peninsula, and have had to describe it from a Javanese specimen. *Distrib.* Java.

(31) **M. edule** *Roxb. Corom. Pl. i. t.* 82; *King, l.c.* 86.

Large shrub or small tree. Leaves coriaceous, elliptic or ovate, blunt acuminate, base narrowed or round (var. *ovata*); nerves very faint, 5 to 8 pairs, 2 to 4 in. long, 1 to 2·25 in. wide; petioles ·1 to ·35 in. long. Panicles sub-globose 1 or more in axils below leaves, 1 in. long and as wide or less. Flowers numerous, bright blue or lilac; peduncles stout. Calyx cupular, narrowed to base, limb truncate. Petals triangular, ovate broad. Style long exsert. Fruit olivaceous globose, ·25 in. through. *Hab.* Near the sea, rather dry spots, in thickets and on sandy open heaths. A very handsome shrub. Singapore, Pulau Ubin (Hullett); Changi; Pulau Brani. Johor, near Pinerong; Minyak Buku, Batu Pahat. Pahang, Pekan heaths, abundant; Gunong Tahan at 3300 ft. altitude (Robinson). Malacca, Sungei Hudang (Derry). Dindings, Pangkor (Foxworthy). Perak, Larut near the sea (Kunstler). Penang, Batu Feringhi; Muka Head (Curtis). Lankawi, Kesap (Curtis); Terutau (Haniff); Pulau Adang. *Distrib.* Indo-Malaya. The form *ovata* of Clarke with rounded ovate leaves occurs with the narrow elliptic lanceolate form. *Native names*: Dalek Ayer; Dalek putih.

ORDER LX. LYTHRACEÆ.

Trees, shrubs and herbs. Leaves entire opposite (or alternate). Flowers bisexual (except *Crypteronia*). Calyx-tube free, persistent; lobes 3 to 6. Petals as many or absent, insert near mouth of the calyx-tube. Stamens numerous or definite, insert on tube. Ovary free in tube, rarely inferior, 2- to 6-celled; ovules numerous; style long. Stigma capitate. Fruit capsular (baccate in *Sonneratia*), free or adnate to calyx-tube at base, 2- to 6-celled. Seeds

numerous. Species 275, in the tropics chiefly in South America, and in temperate regions. (*King, Journ. As. Soc. Beng.* lxxvii. 1.)

The Pomegranate (*Punica granatum* L.) Delima of the Malays, often cultivated by the Chinese, belongs to this Order.

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|--------------------------------------------------------------------------------------|-----------------|
| Herbs in wet spots with minute axillary flowers | 1. AMMANNIA |
| Trees or shrubs; flowers moderate or large (minute in <i>Crypteronia</i>). | |
| Stamens not more than 12. | |
| Shrub; calyx 6-toothed; petals 6; stamens 12 | 2. PEMPHIS |
| Tree; calyx 5-toothed; petals 0; stamens 4 or 5; flowers minute, unisexual | 3. CRYPTERONIA |
| Stamens indefinite; trees. | |
| Stamens in 2 or more rows; capsule 3- to 6-celled; seed winged | 4. LAGERSTRÆMIA |
| Stamens in 1 row; capsule 4- to 8-celled; seeds minute | 5. DUABANGA |
| Fruit baccate, 10- to 15-celled; sea trees | 6. SONNERATIA |
| Ovary quite inferior; stamens 10; flowers small. | 7. AXINANDRA |

1. AMMANNIA, Linn.

Annual glabrous herbs in wet spots. Leaves opposite or alternate, entire. Flowers very small axillary and sub-sessile or in small trichotomous cymes. Calyx campanulate, 3- to 5-toothed. Petals 3 to 5 or often none. Stamens 2 to 8 on the calyx-tube. Ovary enclosed in the tube, 1- to 5-celled. Capsule membranous, globose or ellipsoid, 2- to 3-valved, irregularly breaking up or circumscissile. Seeds many, minute. (Koehne, in *Pflanzenreich*, separates these two species into two genera *Rotala* and *Ammannia*, on what appears to be somewhat insufficient grounds.) Species 30, whole of the warmer parts of the world.

- | | |
|---------------------------------------------------------------------|-------------------------|
| Flowers sessile; capsule ellipsoid; seed narrow, oblong | (1) A. peploides |
| Flowers pedicelled; capsule hemispheric; seed hemispheric | (2) A. baccifera |

(1) **A. peploides** Spreng. *Syst.* i. 444; *Clarke, in Hook. fil. F.B.I.* ii. 566; *King, Journ. As. Soc. Beng.* lxxvii. (2), 3. *Rotala indica*, *Koehne, Pflanzenreich* 40.

Erect or decumbent, 4 to 14 in. tall. Leaves 4 in. long, oblanceolate obtuse, narrowed to base. Flowers very small sessile, solitary in axils of reduced leaves. Bracts in pairs, filiform. Calyx 2-valved, ellipsoid. Seeds narrow oblong, sub-falcate, pink, angled. *Hab.* Damp spots, rice-fields and marshes in the north. Perlis, Ginting Kabok. Lankawi, Kwah in marshes. Kelantan, Kota Bharu, rice-fields (Ridley). *Distrib.* India, Java, China, Persia.

(2) **A. baccifera** Linn. *Sp. Pl.* 120; *Clarke, l.c.* ii. 569; *King, l.c.* 3.

A dull red herb. Stem erect 8 to 12 in. or more tall branched. Leaves opposite, linear-oblong sub-acute or blunt, narrowed at base 2 to 5 in. long, 2 in. or less wide, upper ones small. Flowers

in dense axillary clusters, .1 in. long, pedicelled. Calyx-tube wide campanulate, short, teeth 4, broad, triangular acute. Petals none. Capsule depressed, globose imperfectly circumscissile. Seeds hemispheric, black. *Hab.* In damp swampy spots, not common. Perak, Tambun near Ipoh. Kedah, Gunong Geriang (Ridley). *Distrib.* Africa, Indo-Malaya, Australia.

2. PEMPHIS, Forst.

A sea-shore shrub. Leaves opposite, oblong, thick fleshy. Flowers solitary axillary; peduncles bibracteate. Calyx-tube campanulate, 12 or more ribbed, teeth 6 long, 6 short. Petals 6, white, inserted at the mouth of calyx-tube, obovate. Stamens 12 in 2 rows from the middle of the calyx-tube. Ovary free; ovules many; style long. Stigma capitate. Capsule coriaceous obovoid to globose enclosed in or half exserted from calyx-tube, circumscissile, 1-celled. Seeds many-angled obovoid. Species 1, Indo-Malaya, Polynesia.

(1) *P. acidula* Forst, *Gen. t.* 34; *King, l.c.* 4.

Shrub 5 ft. to a tree about 20 ft. tall. Young parts grey-silky. Leaves .5 to 1.5 in. long. Flowers .5 in. across. Capsule 4 in. long, 2 in. wide. *Hab.* Sea-shores, curiously rare in the Malay Peninsula. Singapore, mouth of Changi River.

3. CRYPTERONIA, Bl.

Trees. Leaves opposite, ovate or lanceolate. Racemes long, many-flowered, paniced. Flowers very small, greenish or white. Bracts short, linear. Calyx-tube short, saucer-shaped or half hemispheric; teeth 5 (or 4). Petals 0. Stamens as many as calyx-lobes insert in calyx mouth between them. Ovary free, 2-celled; ovules numerous axile; style long, filiform. Stigma capitate 3-lobed. Capsule globose, pubescent, 2-celled dehiscing through the style. Seeds many ellipsoid, winged on one side. Species 5, N. India to Philippines.

Leaves membranous, base narrowed; calyx less than

.1 in. across .

(1) *C. paniculata*

Leaves coriaceous, base cordate; calyx more than

.1 in. across .

(2) *C. Griffithii*

(1) *C. paniculata* Bl. *Bijdr.* 1151; *King, l.c.* 5. *C. pubescens* Bl. *Mus. Bot. Lugd. Bat.* ii. 123. *C. glabra* Bl. *l.c.*

Tree 20 to 50 ft. tall. Leaves membranous to sub-coriaceous, oblong to oblong-lanceolate, blunt acuminate, base narrowed, glabrous, or pubescent beneath; nerves 5 to 6 pairs, 3 to 6 in. long, 1.25 to 2.5 in. wide. Racemes pubescent or glabrous, 5 in a panicle on a peduncle, .3 to .5 in. long. Flowers very numerous, greenish white. Calyx less than 1 in. across. Capsule globose-conic puberulous. *Hab.* Forests in the north chiefly. Negri Sembilan, Bukit

Kupayiang (Cantley). Penang Hill. Common up to 2500 ft. altitude (all collectors). Lankawi, Kesap (Haniff). Perlis, Kanga. Kedah, Alor Sta. *Distrib.* Himalaya to Burma, Malay isles to the Philippines. *Native names* : Rupal; Bekoi.

I cannot separate the hairy-leaved specimens from the glabrous ones. Both grow together on Penang Hill.



FIG. 66.—*Crypteronia paniculata*.

(2) **C. Griffithii** Clarke, *l.c.* ii. 574; King, *l.c.* 6.

Tree 40 to 60 ft. tall, glabrous. Leaves stiffly coriaceous, broad elliptic acute, base cordate; nerves 7 to 8 pairs, elevate beneath, 4 to 8 in. long, 2.25 to 3.5 in. wide. Racemes about 8 in. a panicle, 9 in. long, pubescent. Flowers numerous, nearly sessile, greenish yellow. Calyx more than .1 in. across. Stamens exsert. Capsule less than .1 in. across. *Hab.* Open jungle. Pahang, Kwala Lipis (P. Philips). Malacca, Bukit Bruang (Derry); Merlimau (Cantley). Selangor, Sungei Buluh (Foxworthy). Perak, Larut (Kunstler). Penang Hill, Moniot's Road (Curtis). *Native name* : Kelat Tampoi.

4. **LAGERSTRÆMIA**, Linn.

Trees or shrubs. Leaves opposite, distichous, oblong or ovate, coriaceous or membranous, caducous. Panicles axillary, terminal;

branchlets cymose, many-flowered. Flowers medium to large, showy. Calyx tube funnel-shaped, ridged or smooth; lobes 5 (to 9) ovate acute. Petals 6 (or 7 to 9) on the summit of calyx-tube, clawed, edge crisped or fimbriate. Stamens very many insert in several rows in tube; filaments exsert. Ovary at bottom of tube 3- to 6-celled; style long. Stigma capitate. Capsule adnate to calyx protruding, ellipsoid, 3- to 6-ovuled. Seeds many elongate.

Calyx red tomentose (1) **L. floribunda**

Calyx ashy-velvety.

Calyx 8- to 10-ribbed; leaves 2 to 3·25 in. long . . . (2) **L. ovalifolia**

Calyx 12- to 14-ribbed; leaves 3·5 to 8 in. long . . . (3) **L. flos-reginæ**

Calyx hardly ribbed at all; leaves large oblong round, stiff (4) **L. macrocarpa**

(1) **L. floribunda** Jack, *Mal. Misc.* i. 38; *Clarke, in Hook. fil. F.B.I.* ii. 577; *King, l.c.* 7. **L. turbinata** Koehne, *Engl. Jahrb.* iv. 34.

Tree 30 to 60 ft. tall. Leaves ovate-oblong, sub-acute, base round sub-sessile; young tomentose, adult pubescent on nerves beneath, finally glabrous; nerves raised 8 to 12 pairs, 5 to 7 in. long, 2 to 2·7 in. wide. Panicles erect, woolly pubescent. Flowers 1 in. wide. Calyx turbinate 12-ribbed; teeth triangular, 6. Petals sub-obicular, rose pink to violet. Capsule 5 in. long, elliptic, half covered by calyx. *Hab.* Open country and river-banks. Pahang, common on the banks of Pahang River; Kwantan (Burn-Murdoch); Kwala Lipis (Machado). Perak, Kwala Kangsa; Temengoh. Penang (Jack, Curtis). Lankawi (Curtis). Perlis, Kanga. Naung Chik, Bukit Besar (Gwynne Vaughan). *Distrib.* Burma, Siam. *Native names* : Bungor; Antoi Gajah.

I am quite unable to separate Koehne's *turbinata* from this species.

(2) **L. ovalifolia** *Teysm. and Binn. Nat. Tijds. Ned. Ind.* ii. 306; *King, l.c.* 3. **L. hexaptera** *Miq. Fl. Ind. Bat.* i. 623; *Clarke, l.c.* ii. 577.

Big tree. Leaves oblong or oblong-ovate acute, base narrowed, glabrous except minutely pubescent nerves, 2 to 3·25 in. long, 1·35 to 2 in. wide; petioles ·25 in. long. Panicles puberulous 4 to 6 in. long. Flowers 1 in. across. Calyx turbinate, minutely velvety-grey, ridges stout 8 to 9, not passing into calyx-teeth, which are 8 to 9 acute triangular. Petals pale rose, ·75 in. long. Capsule elliptic-ovoid blunt minutely velvety, ·75 in. long. *Hab.* River-banks, open country, local. Malacca (Maingay); Brisu (Derry). Negri Sembilan, Linggi, coast (Foxworthy). Pahang, Kwala Tahan; Kwala Lipis (Foxworthy). Perak, Ulu Bubong (Kunstler). *Distrib.* Malay isles. *Native name* : Bunga Malukut.

(3) **L. flos-reginæ** *Retz, Obs.* v. 25; *King, l.c.* 8.

Tree 30 to 60 ft. tall, glabrous except inflorescence. Leaves oblong to elliptic-oblong, narrowed or blunt at base; nerves 10 to 12 pairs, 3·5 to 8 in. long, 1·75 to 3 in. wide; petioles ·25 to

·4 in. long. Panicles long. Flowers 2 to 3 in. wide; pedicels grey. Calyx turbinate, ridges 12 to 14, prominent blunt; teeth 6 to 7, acute. Petals oblong-orbicular clawed undulate. Capsule oblong, ·8 to 1·25 in. long. *Hab.* Open country and river-banks. Pahang, Temerloh (Foxworthy). Perak, Changkat Mentri (Kloss). Kedah, Alor Sta. Kelantan, Chaning River banks. *Distrib.* India, Java, often cultivated in gardens.

(4) *L. macrocarpa* Wall. 2114A.

Leaves stiff coriaceous, oblong, base broad, tip round; nerves prominent 9 pairs inarching near the edge 8 in. long, 3 in. wide; petioles thick, ·25 in. long. Panicles rather large, about 12 in. long. Calyx hardly ribbed in flower, and not at all or very inconspicuously at the base in fruit. Petals pink, obovate clawed, ·5 in. long or more. Fruit oblong ovoid ·6 to 1 in. long; sepals acute recurved. *Hab.* Cultivated in gardens. Pahang, Kampang Tengah, Temerloh (Foxworthy). Negri Sembilan, Kwala Pilah and Selangor, Klang (Foxworthy).

This species has been reduced to *L. speciosa* (*L. flos-reginæ*) by Koehne in his monograph. It is very distinct, however, from the true *flos-reginæ* in its larger, oblong-rounded stiffer leaves and unribbed calyx. The typical *L. macrocarpa* has very large fruits and flowers and may be seen in gardens. The specimens quoted above closely resemble Burmese forms, rather smaller in all parts. The first quoted may be wild, the other two, doubtless, planted.

5. DUABANGA, Ham.

Large trees. Branches pendent, 4-angled. Leaves opposite distichous elongate acute, base cordate or rounded. Panicles large terminal. Flowers large, white. Calyx-tube wide adnate to base of ovary; lobes 4 to 7, valvate. Petals 4 to 7, obovate clawed crisped. Stamens numerous on a perigynous ring. Ovary conic, 4-celled; style long. Stigma capitate, 4- to 8-lobed. Capsule sub-globose with spreading calyx-lobes at base, coriaceous 4- to 8-valved. Seeds very numerous, minute, tailed. Species 2, Indo-Malayan.

(1) *D. sonneratioides* Ham. in *Trans. Linn. Soc.* xvii. 178; *Hook. fil. Ill. Him. Pl. t.* 11; *Clarke, in Hook. fil. F.B.I.* ii. 579; *King, l.c.* 10.

Tree 60 to 100 ft. tall. Leaves coriaceous, 7 to 12 in. long, 2·5 to 4 in. wide, glaucous beneath. Flowers 2 to 2·5 in. wide, few on a panicle 6 in. long and as wide. Petals 1 in. long, ·5 in. wide. Capsule ovoid-globose, 1 to 1·5 in. across. *Hab.* In forests. Perak, base of Hermitage Hill; Batang Padang valley to Telom. Penang, Balik Pulau (Curtis); Setul. *Distrib.* India, Burma. *Native names:* Kandada; Berombong Hutan.

6. SONNERATIA, Linn. fil.

Big trees or shrubs growing near or in the sea, glabrous. Leaves fleshy-coriaceous opposite petioled. Flowers in cymes of 3, terminal large (occasionally solitary axillary). Calyx coriaceous; lobes 4 to 8 lanceolate. Petals linear-oblong 4 to 8 or none. Stamens numerous inserted in a band in tube. Ovary free or adnate at base of tube; style long. Stigma capitate. Berry sub-globose, 10- to 15-celled. Seeds many, curved, imbedded in pulp. Species 4 or 5, Indo-Malaya.

Leaves narrow oblong; petals present and with stamens

pink (1) **S. acida**

Leaves obovate; petals 0; stamens white.

Leaves obovate narrowed to base (2) **S. Griffithii**

Leaves oblong orbicular (3) **S. alba**

(1) **S. acida** Linn. fil. *Supp.* 252; *Griff. Notulæ* iv. 652; *Clarke, in Hook. fil. F.B.I.* ii. 580.

Usually a shrub or small tree 10 to 35 ft. tall. Branches 4-angled. Leaves oblong-lanceolate to oblong obovate acuminate narrowed to petiole blunt, 2 to 3 in. long, 1.25 in. wide. Buds solitary, ellipsoid. Calyx-tube not angled; lobes 6 to 8 triangular. Petals linear dilated upwards, pink. Stamens pink. Capsule depressed globose, 2 in. through. *Hab.* Tidal rivers. Singapore, Balestier Plain. Johor, Batu Pahat River. Pahang, Kwala Pahang. Perak, Matang (Wray). Penang, Batu Feringhi (Curtis). *Distrib.* India, Burma, Malaya. *Native names:* Bedat; Bedata.

Very distinct in its thin willow-like leaves and pink stamens. The Indian and Bornean plants have blunt tips to the leaves, ours and the Siamese forms are acuminate.

(2) **S. Griffithii** Kurz, *Pegu Report, App. B.* 54; *Clarke, in Hook. fil. F.B.I.* ii. 580. *S. acida* var. *Griffithii* King, *l.c.* 11. *S. alba* Griff. (not Smith) *Notulæ* iv. 652.

Tree growing in sea, large with very stout stem. Leaves obovate petioled, blunt, narrowed to base, 3.5 in. long, 2 in. wide; petioles .5 in. long. Calyx-tube obconic, .5 in. long; lobes 5, triangular acute, .5 in. long. Petals 0. Stamens .75 in. long, white. Style longer. *Hab.* In muddy bays in the sea. Singapore, Gelang; Freshwater Island; Toas; Changi. Malacca, Pulau Jawa (Griffith); Selangor, Jugra and Pasir Panjang (Foxworthy) Perak, Sungei Limau (Foxworthy). *Native names:* Bedada; Pedada; Gadabu; Perepat.

(3) **S. alba** Smith in *Rees Cyclop.* xxxiii. No. 2; *Clarke, l.c.* ii. 580; *King, l.c.* 11.

Tree, large with many aerial roots. Leaves obovate to reniform decurrent on petiole blunt, 2 to 4 in. long and as broad; petioles .25 in. long. Flower-buds narrow, ellipsoid tapering to both ends.

Calyx-tube obconic, angled, .4 in. long; lobes 6 to 8 oblong-lanceolate acute. Petals 0. Stamens white. Style long. Capsule obconic, ribbed 1 in. or more through. *Hab.* Marine, usually growing quite in the sea. Singapore, Sungei Jurong; Galang; Pulau Brani. Johor, Tanjong Kupang. Negri Sembilan, Sungei Menyala (Foxworthy). *Distrib.* Burma, Malay isles. *Native name*: Berombong. *Use*: Timber for knees of boats.

7. AXINANDRA Thw.

Trees glabrous. Leaves coriaceous. Racemes axillary and terminal paniced. Flowers small. Calyx superior, 5-lobed. Petals 5, small triangular; stamens 10. Ovary 5- to 6-celled, inferior; ovules 1 to 2 in cell; style straight. Capsule half-superior, woody, ellipsoid below adnate to calyx-tube, loculicidally 3- to 6-valved. Seeds winged. Species 4 to 5, Ceylon and Borneo.

(1) **A. Maingayi** *Clarke, in Hook. fil. F.B.I. ii. 581.*

Leaves elliptic acuminate, base short, narrowed, 3 in. long, 1.75 in. wide; petioles short, .15 to .25 in. long. Racemes 3 in. long; flowers remote, .1 in. long; pedicels as long. Calyx broad cupular, 10-ribbed. Petals caducous. Style long. *Hab.* Malacca (Maingay). Very rare, never met with again.

ORDER LXI. ONAGRACEÆ

Herbs usually found in damp spots. Leaves opposite or alternate. Flowers usually axillary solitary, yellow, white (or pink). Calyx tube wholly adnate to ovary, lobes 3 to 6. Petals epigynous as many. Stamens as many or twice as many. Ovary inferior, 4- or 5-celled; style 1. Stigma capitate or lobed. Fruit usually dehiscent, 1- to many-seeded. Species 3000, chiefly in temperate regions.

Stamens twice the number of sepals	.	.	.	.	1. JUSSIÆA
Stamens as many as sepals	.	.	.	.	2. LUDWIGIA

1. JUSSIÆA, Linn.

Water or ditch herbs. Leaves alternate. Flowers yellow or white, solitary axillary. Calyx-tube narrow or obconic, teeth 4 to 6, acute persistent. Petals 4 to 6, usually yellow, caducous. Stamens short, twice as many. Ovary 4- or 5-celled; ovules numerous axile; style simple, short. Stigma 4-lobed. Capsule narrow, cylindric or angled or obconic, 4- or 5-celled. Seeds very numerous minute. Species 30, tropics generally.

- Aquatic floating plant; flowers white, centre yellow . (1) **J. repens**
 Terrestrial erect herbs; flowers yellow.
 Petals much shorter than sepals, small, rhomboid . (2) **J. suffruticosa**
 Petals large obovate clawed.
 Plant nearly glabrous; corolla 1·25 in. wide;
 fruit narrow, cylindric (3) **J. erecta**
 Plant hairy.
 Corolla ·75 in. wide; fruit thick cylindric . . (4) **J. villosa**
 Corolla 3 in. wide; fruit obconic, woolly . . (5) **J. speciosa**

(1) **J. repens** Linn. *Fl. Zeyl.* 169; *Sp. Pl.* 555; Clarke, in Hook. *fil. F.B.I.* ii. 587; Hook. *Bot. Misc.* iii. 200, t. 40.

A creeping or floating plant. Leaves obovate or oblanceolate, narrowed to the petiole 1·5 to 3 in. long, ·2 to ·5 in. wide, glabrous. Pedicels ·5 to 1 in. long. Ovary as long. Flower 1 in. across. Petals white yellow at base, very caducous. Capsule ·5 to 1·5 in. long, linear cylindric. Seeds quadrate, raphe corky. *Hab.* Ponds and ditches. Common. Singapore, Tanglin; Serangoon Road, Pahang, Pekan. Province Wellesley, Permatang Bertam. Penang. Bagian Jemmal (Curtis); Patalung (Gwynne-Vaughan). Kelantan, Kota Bharu. *Distrib.* Whole tropics.

(2) **J. suffruticosa** Linn. *Sp. Pl.* 555 (not of other botanists). *J. fissendocarpa* Haines, *Journ. As. Soc. Beng.* xv. 1919, p. 313.

Erect branched glabrous herb, 1 to 2 ft. tall. Branches slender winged. Leaves lanceolate acuminate at both ends, thin membranous, ·5 to 3 in. long, ·25 to ·5 in. wide; petioles slender winged nearly to base. Pedicel and ovary ·5 in. long. Sepals 4, very narrow lanceolate acuminate ·1 in. long. Petals shorter, ·1 in. long or less, rhomboid, base narrowed. Fruit cylindric, ·75 in. long, ·1 in. through. Seeds in upper part ellipsoid, smooth, pale, in middle larger slightly corky, at base oblong, corky with a groove on one side, much larger. *Hab.* Damp spots by runnels and ditches. Singapore, Tanglin, etc., very common, to Kelantan, Channing. Penang (Curtis). *Distrib.* India, Siam, Christmas Islands, Philippines.

(3) **J. erecta** Linn. *Fl. Zeyl.* 170; *Sp. Pl.* 556 (excluding the *S. American plants*). *J. angustifolia* Lam. *Dict.* iii. 331; *Ill. t.* 280, fig. 3. *J. Blumeana* DC. *Prodr.* iii. 55. *J. Junghuhnii* Miq. *Fl. Ind. Bat.* i. (1), 627. *J. suffruticosa* of Clarke and other botanists, not of Linnaeus.

Herb 1 to 3 ft. tall, glabrous or sparsely hairy especially on the young parts, fairly stout. Stem angled or slightly winged, simply branched. Leaves lanceolate-acuminate, long, narrowed to the base; nerves ascending, 14 pairs slightly elevate beneath and usually sparsely hairy 2 to 4 in. long, ·25 to 1 in. wide. Ovary and pedicel ·5 in. long. Sepals 4, ovate acuminate ·12 to ·2 in. long and increasing to ·3 in fruit; nerves prominent, 3, hairy. Corolla 1 in. across; petals obovate slightly emarginate clawed. Fruit oblong, obcuneate glabrous, broadest above, narrowed to base, ·75

to 1 in. long, .25 in. through at top. Seeds ellipsoid polished, mahogany brown. *Hab.* Wet spots, ditches, etc. Common. Singapore, Tanglin, Tanjong Katong, Malacca (Griffith); Pulau Besar (Maingay) to Kelantan, Chaning; Kota Bharu. Penang (Wallich). *Distrib.* India, Java, Borneo, Timor, Philippines, Papua, Australia, China. *Native names*: Bujong Samalam; Pujong Malam; Lakom Ayer. *Use*: As a poultice for headache.

J. exaltata Roxb. *Fl. Ind.* ii. 401, is a form with leaves sparsely hairy above. It is common in India, and forms approaching it occur here.

(4) ***J. villosa* Lam. *Encycl.* iii. 331.**

A tall densely hairy plant. Leaves lanceolate, narrowed at both ends, sessile hairy all over, 3 in. long, 1 in. wide. Ovary cylindric hairy. Sepals ovate acute .3 in. long, .1 in. wide at base, hairy outside. Corolla .75 in. across; petals oblong oblanceolate retuse, .25 in. across. Fruit thickly cylindric, base narrowed, hairy, 1.25 in. long, .25 in. through. Seeds dark red ellipsoid, grooved. *Hab.* Wet spots, Singapore, Alexandra Road. *Distrib.* S. India, Cambodia, Borneo, Timor, Philippines, Australia.

(5) ***J. speciosa* Ridl. *Journ. Bot.* 1921, p. 259.**

A plant 4 to 6 ft. tall, densely softly tomentose-hairy all over. Leaves lanceolate broad, narrowed to both ends 4 in. long, 1 in. wide; nerves over 20 pairs; petioles short, distinct, .25 in. long. Sepals triangular acuminate, cuspidate, densely hairy outside .5 in. long, .25 in. wide at base. Corolla 3 in. across; petals .25 in. across, obovate. Capsule obconic, densely softly hairy and crowned by the large sepals now .9 in. long. Seeds ellipsoid not grooved, red. *Hab.* Ditches and swamps, local and not common. Singapore, Balestier Plain, Serangoon Road. *Distrib.* South India, Ceylon.

2. LUDWIGIA, Linn.

Erect or decumbent herbs. Leaves alternate. Flowers axillary, sessile or nearly so. Calyx-tube slender, cylindric, lobes 3 to 5, persistent acute. Petals 3 to 5, epigynous, yellow, very small. Stamens as many. Ovary inferior 4- or 5-celled; ovules many in two or more rows; style simple. Stigma capitate. Capsule linear or oblong 4- to 5-celled breaking up irregularly. Seeds numerous, obovoid smooth not corky. Species 20. Temperate or tropical regions. Differs from *Jussiaea* simply in the smaller number of the stamens.

Capsule oblong, thick; seeds in several rows . . . (1) ***L. parviflora***
Capsule very slender, cylindric; seeds in 1 row . . . (2) ***L. prostrata***

(1) ***L. parviflora* Roxb. *Hort. Beng.* 11; *Clarke, l.c.* ii. 588; *King, l.c.* 13.**

Erect glabrous herb 6 to 12 in. tall. Leaves lanceolate to linear-oblong narrowed to both ends 1 to 3 in. long, .25 to .5 in.

wide. Sepals 4, lanceolate. Petals very small, yellow elliptic. Stamens 4. Capsule short, pedicelled, cylindric, narrowed at the base, .25 in. long, .1 in. wide. Seeds in many rows in the cells, ellipsoid, polished light brown. *Hab.* Ditches, Selangor, Ginting Bidai. Perak, Matang (Wray); Terutau (Robinson). *Distrib.* Tropical Asia to Australia.

(2) **L. prostrata** Roxb. *Hort. Beng.* 11; *Fl. Ind.* i. 420; *Clarke, l.c.* ii. 588; *King, l.c.* 13.

Glabrous herb, erect branched (occasionally decumbent) 8 to 20 in. long. Leaves lanceolate, narrowed to both ends, thin 1 to 4 in. long, .25 to .5 in. wide. Flowers sessile, several together in leaf axils. Sepals 4, lanceolate. Petals very small, lanceolate acute. Capsule very slender cylindric, nearly sessile .5 in. long, .05 in. through. Seeds dark red in one row in a cell. *Hab.* Common in ditches, Singapore, Tanglin. Johor, Scudai River. Pahang, Kwantan (Foxworthy); Pekan. Selangor, Batu Tiga (Goodenough); Perak, Tanjong Rambutan (Curtis); Tanjong Malim. Penang, Batu Feringhi (Curtis). Tringganu, Bundi (Rostado). Kelantan, Kota Bharu. *Distrib.* Indo-Malaya, Japan.

This at first sight closely resembles *Jussiaea suffruticosa* Linn., but it has more than one flower in the axil, more slender fruit and only 4 stamens. *Ludwigia perennis* Linn., is either this plant or his *Jussiaea suffruticosa*. It does not seem possible to say which.

ORDER LXII. SAMYDACEÆ.

Shrubs or small trees. Leaves alternate, sometimes serrate. Flowers rather small in clusters or racemes. Calyx inferior. Petals 5 to 10 or 0. Stamens 1 to 7 with alternating staminodes or glands. Ovary inferior, free or half superior 1-celled, many ovuled. Fruit fleshy or coriaceous, 2- to 5-valved. Species about 300, all tropics.

Petals 0.

Style 1; stamens 8 to 10 alternating with staminodes . 1. CASEARIA

Style 3; stamens 8 to 10 alternating with hairy scales . 2. OSMELIA

Petals 5 to 10; stamens 1 to 7 alternating with glands . 3. HOMALIUM

1. CASEARIA, Jacq.

Shrubs or small trees. Leaves alternate distichous, occasionally serrate. Flowers small in axillary clusters, greenish yellow; pedicels short surrounded by small scales. Calyx inferior, 4- to 5-lobed, lobes imbricate. Petals 0. Stamens twice the number of calyx-lobes, united in a tube with alternating staminodes, hypogynous (sometimes nearly free). Ovary free, ovoid, 1-celled; ovules many; style simple. Stigma capitate or trifid. Fruit globose or ellipsoid, yellow, 3- or 2-valved. Seeds many, angular

or ovoid with a scarlet aril. Species 140, all tropics (King, *Journ. As. Soc. Beng.* lxvii. (2), p. 14).

Leaves pubescent beneath.

Leaves thin, base cuneate or blunt, 3 in. long;
fruit under 1 in. long

(1) **C. Lobbiana**

Leaves rather thick, base cordate, 6 in. long; fruit
1 in. long

(2) **C. grewiae**folia

Leaves broad elliptic, base cuneate, 6 by 4 in.;
fruit 1 in. long

(3) **C. velutinosa**

Leaves quite glabrous.

Fruit under 1 in. long.

Leaves large ovate elliptic

(4) **C. latifolia**

Racemes not elongating, sub-crenulate.

Leaves oblong-lanceolate 4 by 2 in.; fruit
short, ovoid

(5) **C. esculenta**

Leaves oblong 4 to 6 in. long, 2·5 to 3 in.
wide

(6) **C. leucolepis**

Leaves lanceolate, thin coriaceous, 4 by 1·5
in.; fruit oblong

(7) **C. coriacea**

Leaves lanceolate, 3 by 1 in.; fruit ellipsoid.

(8) **C. flexula**

Racemes elongating; leaves thinly ridged
coriaceous

(9) **C. albicans**

Fruit 1·5 to 2 in. long.

Leaves lanceolate 6 in. long; flowers crowded,
several.

(10) **C. Clarkei**

Leaves lanceolate, short, 4 to 5 in. long; flowers
in ones and twos

(11) **C. macrocarpa**

(1) **C. Lobbiana** Turcz, *Bull. Soc. Nat. Mosc.* xxx. (1), 463; *Clarke, in Hook. fil. F.B.I.* ii. 594; *King, l.c.* 15.

Small shrub or small treelet, 4 to 15 ft. tall, pubescent. Leaves oblong or oblong-lanceolate short acuminate, membranous, glabrous above, except midrib and nerves beneath, softly pubescent; nerves 8 to 10 pairs, 2 to 5 in. long, .75 to 2·25 in. wide; petioles .2 to .3 in. long tomentose. Flowers few, axillary, green. Calyx teeth triangular, acute, .5 in. long, .4 in. wide. Fruit subglobose orange .5 in. long, .4 in. wide. Seed with crimson aril. *Hab.* Lowland woods. Singapore, Garden Jungle, Johor, Tanjong Kupang. Malacca, Alor Gajah (Griffith). Selangor, Bukit Hitam (Kelsall). Perak, Larut (Kunstler); Gunong Keledang. Penang, Waterfall (Curtis).

(2) **C. grewiae**folia Vent. *Choix. des Plantes* 48; *Clarke, l.c.* ii. 594; *King, l.c.* 16. *C. variabilis* Bl. *Ann. Mus. Bot. Lugd. Bat.* i. 252.

Small tree. Branchlets 4-angled, tomentose. Leaves oblong acute, base sub-truncate cordate, edges crenulate or not, above glabrous, beneath tomentose on midrib and nerves 10 to 14 pairs, 4·25 to 6 in. long, 1·25 to 3·25 in. wide; petioles .2 in. long. Heads many-flowered; pedicels slender. Buds .15 in. long; sepals pubescent. Stamens 8, glabrous; staminodes 8, pubescent. Ovary pyramidal hairy at top. Fruit nearly 1 in. long, glabrous. *Hab.* Forests. Not common. Malacca (Maingay). Dindings, Lumut;

Bruas. Perak (Scortechini) : Gunong Keledang (Ridley). *Distrib.* Cambodia, Malay islands.

(3) **C. velutinosa** *Ridl. Journ. Roy. As. Soc. S. Br.* 75, p. 34.

Shrub. Branches velvety flexuous. Leaves thinly coriaceous, oblong to ovate acuminate, base rounded or shortly narrowed; nerves 12, prominent beneath, depressed above; glabrous above, softly tomentose beneath, 6 to 10 in. long, 3 to 4.5 in. wide; petioles tomentose, .2 in. long. Heads .15 in. across. Flowers .1 in. across. Sepals imbricate, pubescent, 5 sub-orbicular, oblong hairy outside. Petals 0. Stamens 10, glabrous; anthers small introrse. Staminodes forming a tube with them, sub-spathulate hairy. Ovary conic. Stigma large capitate. Capsule .5 in. long, dehiscing into 3 narrow boat-shaped valves. *Hab.* Forests, local. Perak, Gunong Keledang. Dindings, Lumut; Bruas (Ridley).

(4) **C. latifolia** *Ridl. Journ. Roy. As. Soc. S. Br.* 75, p. 34.

C. albicans *King, l.c., not of Wallich nor of Clarke.*

A big shrub or tree (Wallich), about 10 ft. tall with flexuous white slender branches, quite glabrous. Leaves thinly coriaceous dark green, elliptic-ovate long-acuminate, base rounded; nerves fine, 8 pairs, slightly raised beneath, reticulations fine conspicuous, 8 in. long, 4 in. wide; petioles .2 in. long. Heads small, axillary usually many-flowered. Bracts short, ovate. Buds globose, glabrous pedicelled. Fruit oblong-ellipsoid, yellow, .5 in. long. *Hab.* Hill forests. Perak, Ulu Bubong (Kunstler 10869), Penang (Wallich 7197 (1), 7432) halfway up Western Hill; Pulau Betong (Curtis).

(5) **C. esculenta** *Roxb. Fl. Ind.* ii. 422; *Clarke, l.c.* ii. 592; *King, l.c.* 17.

Shrub or treelet up to 20 to 30 ft. tall, glabrous. Branches white, flexuous. Leaves thinly coriaceous, elliptic-oblong acute, base cuneate or round, edge obscurely undulate (or not); nerves 6 to 8 pairs, 3 to 4 in. long, 1.5 to 2.25 in. wide. Heads many-flowered; pedicels .2 in. long, all glabrous. Calyx teeth 4 ovate. Fruit oblong-ovoid, 1 in. long, valves broad, ovate. *Hab.* Malacca (Griffith, Maingay), rare. *Distrib.* India.

Griffith's Malacca specimens are identical with another one collected by him in Khasia in Kew Herbarium, and I should conclude it was an error of localisation to refer them to the peninsula were it not for Maingay's specimens.

(6) **C. leucolepis** *Turcz, Bull. Soc. Nat. Mosc.* i. 463.

Glabrous plant with stout branches. Leaves distant, thinly coriaceous or membranous, oblong blunt or bluntly acuminate, base inæquilateral rounded or sub-cordate, edge minutely crenulate; nerves slender, 10 pairs, 4 to 6 in. long, 2.5 to 3 in. wide; petioles .2 in. long. Flowers several in short heads of woolly bracts. Pedicels slender, .15 in. long. Sepals 4, oblong blunt inside pubescent. Stamens 8, shorter; anthers ovate acute. Staminodes

much shorter, clubbed, woolly hairy. Pistil conic, pubescent; style stout. Stigma large, capitate. *Hab.* Johor, Pulau Tinggi (Burkill). *Distrib.* Borneo, Philippines.

(7) *C. coriacea* Vent. *Choix des Plantes*, 45; *Koorders Boomsorten Java*, 345.

Small tree 20 to 25 ft. tall, 2 to 3 in. through. Branches flexuous. Leaves thinly coriaceous, oblong or elliptic-acuminate, base narrowed shortly; nerves 5 to 6 pairs, slender, reticulations rather conspicuous when dry, 5 to 6 in. long, 2 to 2·75 in. wide;



FIG. 67.—*Casearia flexula*.

petioles 3 in. long. Heads small, not lengthening. Bracts ovate acute. Flowers white, 15 in. across. Petals ovate sub-acute. Staminodes shorter than filaments, hairy at tip. Fruit oblong, 1·5 in. long, reddish yellow. *Hab.* Forests chiefly in the hills; rare. Singapore (Wallich 7197, 2). Perak, Thaiping Hills 4000 to 4600 ft. altitude (Kunstler); Bujong Malacca. *Distrib.* Java.

(8) *C. flexula* Ridl. *C. flexuosa* Ridl. *Journ. F.M.S. Mus.* vii. 41 (not of Craib).

Branches flexuous with pale bark. Leaves thinly coriaceous lanceolate, narrowed at both ends, acute; nerves 4 pairs, 3 to 3·5 in. long, 1 to 1·25 in. wide; petioles 2 in. long. Heads dense;

flowers about 20; rachis finally elongating. Bracts acute, ciliate. Flowers .1 in. long. Sepals oblong, glabrous, inner ones obovate-orbicular, edge ciliate. Stamens nearly as long, glabrous. Scales oblong-linear, tips villous. Fruit ellipsoid, .75 in. long, apricot-coloured. *Hab.* Mountains, Kedah Peak (Robinson and Kloss).

(9) **C. albicans** Wall. Cat. 7197 (3), *not of King or Clarke*.

Small tree. Leaves thinly stiff coriaceous shining, lanceolate acuminate, base narrowed; nerves 8 pairs fine, reticulations conspicuous on both sides, 4 in. long, 1.75 in. wide; petioles .24 in. long. Heads small, the racemes lengthening to 2 in. long with numerous ovate acute bracts. Flowers .1 in. wide. Sepals ovate rounded, edges ciliate. Stamens 8; staminodes hairy at tip as long as the filaments. Fruit oblong, .5 in. long (not ripe) orange. *Hab.* Penang, top of the hill (Wallich, Curtis).

Near *C. flexula*, but with more rigid leaves and racemes elongating.

(10) **C. Clarkei** King, l.c. 18. *C. albicans* Clarke, in Hook. fil. F.B.I. ii., *not of Wallich or King*.

Tree 30 to 40 ft. tall with stout branches, glabrous. Leaves coriaceous, narrowly oblong acute, base shortly narrowed; nerves 5 to 7 pairs prominent beneath, reticulations fine, conspicuous, 8 to 9 in. long, 3 in. wide; petioles .5 in. long. Heads condensed; pedicels .25 in. long. Buds very small. Fruit ellipsoid 2.5 in. long, yellow. *Hab.* Forests up to about 3000 ft. altitude. Singapore, Chua Chu Kang. Malacca (Maingay). Selangor, Weld's Hill, Kwala Lumpur. Perak, Larut (Kunstler). Penang, Balik Pulau.

var. *Kunstleri*. *C. Kunstleri* King, l.c. 17.

Tree 60 to 80 ft. tall. Branches and leaves as in type. Flowers much larger; pedicel .2 in. long. Fruit pear-shaped, 2.5 to 3 in. long, 2 in. through, very soft, bright yellow. *Hab.* Johor, Kwala Sembrong (Kelsall). Pahang, Telom. Perak, Larut Hills (Kunstler); Kamuning.

(11) **C. macrocarpa** Clarke, l.c. ii. 593; King, l.c. 18.

Tree about 20 ft. tall, glabrous. Leaves narrowly lanceolate acute or acuminate, base narrowed, thinly coriaceous, 4 to 6 in. long, 1 to 1.25 in. wide; petioles .3 to .4 in. long. Heads 1- or few-flowered; pedicels slender, .2 in. long. Buds globose .1 in. long. Calyx-lobes 5, oblong blunt, velvety inside. Fruit ellipsoid, compressed, 1.75 in. long, .5 in. through, red. Seeds obovoid. *Hab.* Hill forests, local. Penang Hill (Maingay); Batu Feringhi; Moniot's Road (Curtis).

2. OSMELIA, Thw.

Trees. Leaves ovate or oblong-lanceolate. Flowers small nearly sessile in long simple or paniced racemes. Calyx inferior, cleft nearly to base, lobes 4 to 5, round, imbricate. Petals none.

Stamens 8 or 10, half alternating with as many bilobed hairy scales, and half in the notches of the scales. Ovary superior, 1-celled; ovules few; styles 3, with bifid or capitate stigmas. Capsule subglobose, 3-valved. Seeds few with a red aril. Species 6, Ceylon, Malay isles.

(1) **O. Maingayi** King, *l.c.* 19.

Unisexual tree 20 to 60 ft. tall. Branchlets, underside of leaves and inflorescence tomentose. Leaves membranous, oblong short acuminate, base round; nerves 6 to 10 pairs, 4 to 6 in. long, 1.75 to 3 in. wide; petioles .75 in. long. Male panicles terminal and axillary, 3 to 8 in. long. Flowers 1 in. wide, pink and yellow, in small heads. Sepals 4, pubescent. Stamens 8 in 2 unequal rows. Female panicles axillary; flowers as in male, but stamens subequal. Ovary tomentose. Capsule .5 to .65 in. long. *Hab.* Forests, not uncommon in the lowlands. Singapore, Bukit Mandai; Bukit Timah. Pahang, Pulau Tawar. Malacca (Maingay). Selangor, Bukit Kutu; Batu Caves. Negri Sembilan, Bukit Tampin (Goodenough); Seremban (Cantley), Perak, Chanderiang and Goping (Kunstler). *Native names*: Berunai Ayer; Medang Kemantan. *Use*: For making chairs.

3. HOMALIUM, Jacq.

Shrubs or trees. Leaves alternate, crenate seldom quite entire. Flowers small, hairy, in slender axillary and terminal racemes, simple or paniced. Bracts sometimes large, caducous. Calyx funnel-shaped, adnate to base of ovary, lobes 5 to 10, narrow, persistent. Petals 5 to 10, narrow insert in throat of calyx. Disc tomentose. Stamens 1 to 2 opposite each petal alternating with glands. Ovary half superior, 1-celled; ovules many; styles 2 to 3, filiform. Capsule half superior, coriaceous, 2- to 5-valved at the tip. Species 50, tropics generally.

Flowers .3 in. wide.

Stamens 1 to each petal; leaves glabrous . . . (1) **H. longifolium**

Stamens 2 to each petal; petals 6 to 8.

Leaves glabrous, glaucous beneath, stiff coriaceous . . . (2) **H. Kunstleri**

Leaves glabrous not glaucous, broad, blunt . . . (3) **H. propinquum**

Stamens 2 to each petal; petals 10.

Leaves entire, glabrous . . . (4) **H. spathulatum**

Leaves crenate, pubescent beneath . . . (5) **H. Griffithianum**

Stamens 4 to a petal; petals 6; calyx cylindric . . . (6) **H. frutescens**

Flowers .75 in. wide.

Stamens 4 to a petal; calyx-teeth 5, small . . . (7) **H. undulatum**

Stamens 7 to 9 to a petal; calyx-teeth 7 to 9; accrescent in fruit . . . (8) **H. grandiflorum**

(1) **H. longifolium** Benth. *Journ. Linn. Soc.* iv. 35; *Clarke, in Hook. fil. F.B.I.* ii. 596; King, *l.c.* 20.

Tree 30 to 60 ft. tall, glabrous. Leaves coriaceous, oblong acuminate, base shortly cuneate; nerves 7 to 10 pairs, slender,

entire or slightly crenulate 3 to 7 in. long, 1·25 to 2 in. wide; petioles 1·5 to 3 in. long. Racemes slender, 6 to 9 in. long, axillary, solitary, minutely white tomentose. Flowers 15 in. across, pale yellow, sub-sessile, in fascicles of 3 to 4. Calyx-tube 6-fid, lobes lanceolate. Petals similar, narrower. Stamens 1 opposite each petal, alternating with yellow glands. *Hab.* Forests at 200 to 2000 ft. altitude. Malacca, Selandor (Derry); Mt. Ophir. Selangor, Batu Caves; Kwala Lumpur. Perak, Batang Padang (Kunstler). Penang, Pulau Betong; West Hill (Maingay, Phillips, Curtis). Tomoh (Machado). Tringganu, Bundi (Rostado). *Native names*: Sangkah; Petaling Gajah; Selumbar; Kemap; Mesikang.

(2) **H. Kunstleri** King, *l.c.* 20.

Tree 20 to 40 ft. tall. Leaves stiffly coriaceous, oblong-elliptic, short acuminate, base narrowed or round, edges crenate, glabrous glaucous beneath; nerves 8 or 9 pairs, 4·5 to 7 in. long, 2·25 to 2·75 in. wide; petioles 2 to 3 in. long, thick. Racemes solitary rather thick, 4 in. or more long, tomentose; flowers in remote clusters of 3 to 4, 2 in. across, greenish yellow. Calyx-tube short funnel-shaped, teeth 6, oblanceolate. Petals 6, broadly lanceolate, villous inside. Stamens 2 opposite each petal, glabrous. Ovary hairy. *Hab.* Limestone rocks. Perak, Goping (Kunstler).

(3) **H. propinquum** Clarke, *l.c.* ii. 597; King, *l.c.* 21.

Big tree 30 to over 100 ft. tall, 15 to 24 in. through. Leaves coriaceous, elliptic to obovate obtuse or shortly acuminate, base narrowed, undulate or crenate, glabrous (except midrib beneath sometimes pubescent); nerves 9 to 11 pairs, raised beneath, 4 to 7 in. long, 2·25 to 3·5 in. wide; petioles 25 to 35 in. long. Racemes 12 in. long, clustered and paniced, pale tomentose. Flowers 2 in. across in clusters on pedicels 15 in. long, pale green. Calyx-tube funnel-shaped, lobes 6 to 7, sub-spathulate. Petals shorter. Stamens 2 to each petal. *Hab.* Forests. Perak, banks of Bernam River (Kunstler). Penang, Waterfall (Curtis). *Native name*: Pantat K'lat Putih.

(4) **H. spathulatum** Ridl. *Journ. Roy. As. Soc. S. Br.* 75, p. 35.

Glabrous tree. Leaves thinly coriaceous, elliptic acuminate, blunt, base narrowed, entire or undulate; nerves about 7 pairs, very fine and rather obscure, 4 in. long, 1·5 in. wide; petioles 2 in. long. Racemes axillary, solitary, 3 in. long, slender, tomentose. Flowers numerous, not clustered, sub-sessile, 2 in. wide. Calyx-tube funnel-shaped tomentose, 1 in. long, lobes 10 very narrow linear, edged with long hairs. Petals little longer, linear-spathulate 10. Stamens glabrous, shorter, 2 to a petal; glands pubescent. Styles 3, glabrous. *Hab.* Dindings, Pangkor (Curtis).

(5) **H. Griffithianum** Kurz *Journ. As. Soc. Beng.* xl. (2), 57; Clarke, *l.c.* ii. 597; King, *l.c.* 21 (Fig. 68, p. 836).

Small tree 30 to 40 ft. tall, softly pubescent. Leaves thinly

coriaceous, obovate-oblong, shortly blunt apiculate, nearly entire or coarsely crenate, base shortly narrowed or round cordate, glabrous except nerves above and beneath (when adult); nerves 7 pairs, 2.75 to 5 in. long, 1.65 to 2.5 in. wide; petioles .2 to .4 in. long, pubescent. Racemes solitary, tomentose, 3 to 5 in. long, slender. Flowers .3 in. across, villous greenish yellow or white in small clusters. Calyx .1 in. long, conic, teeth 10, linear. Petals oblanceolate, larger. Stamens 2 opposite each petal, glabrous; styles 5. *Hab.* Rocky places in the north, Pahang, Kwala Sungei Sawa Chini,



FIG. 68.—*Homalium Griffithianum*.

Kwantan (Foxworthy). Lankawi, by the lake (Curtis); Sungei Batu Asap. Perlis, Kanga. Pulau Adang, Rawei Island. Kedah, Tanjong Sirih (Curtis). *Distrib.* Tenasserim, Indo-China, Siam. *Native name:* Telor Buaya.

(6) *H. frutescens* King, *l.c.* 22.

Small tree 15 to 30 ft. tall, glabrous. Leaves coriaceous, elliptic-oblong, shortly acuminate, narrowed to base, edge usually crenate, drying brown beneath; nerves 6 to 8 pairs, slender, secondaries conspicuous 3 to 5 in. long, 1.75 to 2.25 in. wide; petioles .1 in. long. Racemes axillary sometimes branched, fairly stout, glabrous

4 in. long. Flowers numerous not congested, .25 in. long, .15 in. wide. Calyx cylindric conic, rigid, teeth 6, lanceolate acute. Petals white, larger pubescent, oblong-lanceolate. Stamens 4 opposite each petal, glabrous, white, glands yellow, 5; styles 5 as long as stamens. *Hab.* Open wet jungle. Johor, Kota Tinggi; Serom; Kwala Sembrong (Kelsall), Pahang, Temerloh (Foxworthy). Selangor; Rantau Panjang (Kloss); Kwala Lumpur. Perak, Ulu Bubong (Kunstler). *Distrib.* Malay isles. *Native names* : Petaling Ayer; Dada Ruan.

(7) **H. undulatum** King, *l.c.* 23.

Tree 40 to 60 ft. tall, 10 to 15 in. through. Leaves coriaceous, elliptic, shortly blunt-apiculate, shortly narrowed at base, serrate crenulate, glabrous yellowish green; nerves 8 pairs, very fine, 3 to 4 in. long, 1.75 to 2 in. wide; petioles .25 in. long. Panicle terminal .6 in. long and racemes axillary, sparsely tomentose, slender. Flowers .6 to .7 in. across, greenish yellow with a silvery tinge, tomentose; pedicels slender .4 in. long. Calyx broad, funnel-shaped, teeth 5, lanceolate. Petals obovoid, clawed. Stamens much shorter, 4 to each petal, glabrous. Ovary hairy. *Hab.* Rare, limestone rocks. Perak, Kinta, Gunong Malacca (Kunstler).

(8) **H. grandiflorum** Benth. *Journ. Linn. Soc.* iv. 36; Clarke, *l.c.* 598; King, *l.c.* 23.

Tree 30 to 60 ft. tall. Leaves bright green, red when young, glabrous, thinly coriaceous shining, elliptic to oblong acute or acuminate, narrowed near petiole faintly crenulate; nerves 9 to 12 pairs, slender, 3.5 to 6.5 in. long, 1.75 to 3.25 in. wide; petioles .2 to .3 in. long. Racemes or panicles 6 in. long; branches of panicles short tomentose. Flowers numerous, scattered, with large ovate glabrous caducous bracts. Calyx-tube short, hemispheric, with pedicel 1 in. long, tomentose, teeth 7 to 9, spatulate oblong. Petals shorter, whole flower .4 in. across. Stamens 7 to 12, opposite each petal; filaments pilose; glands alternating with petals. Ovary free, 6-ridged, tomentose. *Hab.* Lowland forests, very rarely flowering, probably once in twenty-five years. Singapore, Tanglin; Garden Jungle; Kranji. Malacca (Griffith). Selangor, Ulu Gombak (Burn-Murdoch). *Distrib.* Tenasserim.

ORDER LXIII. TURNERACEÆ.

Shrubby plants or herbs usually hairy. Leaves alternate serrate. Flowers large axillary 1 or few, bisexual. Calyx tubular, 5-lobed. Petals 5, insert in calyx mouth, clawed, white or yellow. Stamens 5 in the middle or mouth of tube; filaments free. Styles 3, filiform (simple) or fimbriate; ovules many. Capsule 1-locular, 3-valved. Seeds numerous, oblong-cylindric. Upwards of 100

species, chiefly American. Two species of *Turnera* have run wild in the Straits.

TURNERA, Linn.

Description as above.

Flowers white with maroon eye (1) **T. trioniflora**
 Flowers bright yellow (2) **T. ulmifolia**

(1) **T. trioniflora** Sims *Bot. Mag.* 2106.

Shrubby herb about 18 in. tall. Leaves narrowly lanceolate acuminate, base long narrowed, serrate, 2·25 in. long, 1 in. wide, upper ones smaller, glabrous above; nerves 9 pairs, slender, hairy beneath; petiole ½ in. long, strigose. Flowers sub-sessile in terminal axils. Calyx-lobes ¾ in. long, narrow acuminate, strigose. Corolla 2 in. across, pale yellow with a black centre. Stamens black. Capsule ¾ in. long, hairy. *Hab.* Damp, open country, Singapore, Tanglin, Penang, Batu Feringhi (Curtis).

This has been reduced to a form of *T. ulmifolia*, but no two species could be more dissimilar.

(2) **T. ulmifolia** Linn. *Sp. Pl.* 387; *Bot. Mag. t.* 281 and *t.* 4137 (*T. angustifolia*).

A stiff branched herb 12 in. tall. Leaves herbaceous lanceolate or ovate lanceolate dentate serrate narrowed to base, hairy all over; nerves slender, 9 pairs, 3·5 in. long, 1 in. wide; petioles ¾ in. long. Flowers solitary in terminal axils. Calyx of 5 long lanceolate acuminate segments, 2 in. long strigose. Corolla 2 in. wide, deep yellow. Petals 5, round, clawed. Stamens yellow. *Hab.* Sandy open spots, Singapore, Tanjong Katong; Tanglin. Penang, Batu Feringhi (Curtis). *Distrib.* South America. Now established in the Mascarene Isles, India, Ceylon, Cocos and Christmas islands.

ORDER LXIV. PASSIFLORACEÆ.

Twining herbs or shrubby at base, with tendrils, more rarely trees. Leaves alternate, often lobed, stipulate. Inflorescence axillary, cymose. Flowers regular. Calyx tubular at the base, lobes imbricate 5. Petals none or as many as the calyx-lobes rising from the calyx-tube, a corona of one or more rows of filaments from the tube mouth. Stamens 5, on a gynophore. Anthers oblong. Ovary superior on the gynophore, 1-celled; styles 3, with reniform stigmas. Fruit, a berry many-seeded or a capsule. Species about 300, chiefly in the tropics of South America. The Papaya (*Carica Papaya*, L.), Malay name, Betik, is usually referred to this Order.

It is a native of South America. (King, *Journ. As. Soc. Beng.* lxxi. (2), p. 49.)

Climbing plants.

Flowers bisexual, spreading; fruit a berry	1. PASSIFLORA
Flowers unisexual; fruit a capsule	2. ADENIA
Tree, bisexual; petals and stamens 5; fruit a capsule	3. PAROPSIA

1. PASSIFLORA, Linn.

Twining herbs or half shrubby plants. Leaves simple or lobed. Stipules filiform or leafy. Flowers solitary or in cymes, peduncled often showy. Calyx-tube fleshy, 5-lobed. Petals 5 from throat of calyx-tube. Corona of one or more rows of filaments. Gynophore surrounded at base by a shallow cup. Stamens 5; anthers oblong. Ovary 1-celled; styles 3. Stigmas reniform, capitate. Fruit, a berry with numerous arillate seeds. Species about 250, chiefly South American. Only one species is native here and another thoroughly established as an alien. Several South American species are in cultivation here, and some have more or less established themselves as garden escapes.

(1) **P. Horsfieldii** Blume, *Rumphia* i. 170, t. 52; *King, l.c.* 50.

Slender climber. Leaves membranous oval or oblong ovate sub-acute, base rounded and minutely emarginate, glabrous; nerves 5 pairs, 4 to 6 in. long, 2.5 to 3.25 in. wide; petioles .6 to .9 in. long, with two oval glands near middle. Inflorescence 2 in. long, axillary 5-flowered. Flowers white 1.25 to 1.5 in. wide; pedicels .4 in. long. Fruit sub-globular, .75 in. through. *Hab.* Forests, not common. Pahang, Kwala Lipis (Machado). Perak, Gopong; Larut (Kunstler). *Distrib.* Java.

(2) **P. foetida** Linn. *Sp. Pl.* 959.

Slender climber, hairy. Leaves thin, trilobed hairy, 2.5 to 3.5 in. long, 1.5 to 3 in. wide, base cordate; petioles hairy 1 in. long. Flower solitary, axillary, 1.25 in. across, white with a fimbriate sticky involucre of 3 leaves. Fruit globose, .75 in. through, orange enclosed in the green involucre. Native of South America, now thoroughly established all over the peninsula in open country. Singapore, Selangor, Pahang, Perak. First record Malacca, Cuming 1841. The plant was extensively used at one time for killingalang grass by climbing over and smothering it. *Native names:* Lang Buluh; K'rang Kraut; Letop-Letop; Timun Dindang; Timun Padang.

OCCASIONAL ESCAPES

P. QUADRANGULARIS Linn.

A large plant with soft 4-angled stems and large entire light green leaves. Flowers 3 to 5 in. across, purple banded with white. Fruit pale green, oblong, 8 in. long. The *Granadilla*.

P. LAURIFOLIA Linn.

A long slender slightly woody climber, not 4-angled. Leaves sub-coriaceous oblong, dark green. Flowers violet 3 in. across. Fruit egg-shaped and as big as an egg, yellow with 2 persistent green leafy bracts at the base. *Native name*: Buah Susu. The best eating passion-fruit. It is cultivated and has run wild in Singapore and Malacca.

P. SUBEROSA Linn.

A very small species with lobed leaves, small, green flowers $\frac{1}{2}$ in. across and sub-globose; purple fruit, .5 in. long. Occurs as an escape in Tanglin, Singapore.

P. EDULIS Sims.

With trilobed serrate leaves, given by King, *l.c.*, as the *Grana-dilla*, and as an alien here, has often been planted in gardens, where it rarely, if ever, flowers, and has never been known by me to fruit. It cannot be counted even as an alien escape.

2. *ADENIA*, Forsk.

Long slender climbers, sometimes woody at base. Leaves entire (lobed in other countries) with circular glands on the petiole. Cymes axillary on long peduncles. Flowers tubular, green, unisexual. Male flowers, calyx tubular or campanulate, 5-lobed. Petals 5 from the tube. Corona a ring of threads from near the base of the tube or absent. Disc-glands 5, opposite the calyx-lobes, strap-shaped or capitate. Stamens 5, connate in a ring at the base of the tube; anthers linear. Females as in males with staminodes connate at base, no anthers. Ovary globose, sessile or stalked. Stigmas 3. Fruit capsular, 3-valved, red. Seeds black, pitted or warted, suspended by long white funicles. Species 40, Old World tropics.

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|------------------------------------------------------------------------|----------------------------|
| Leaves lanceolate acuminate, minutely peltate | (1) <i>A. nicobarica</i> |
| Leaves ovate, base cordate | (2) <i>A. populifolia</i> |
| Leaves shortly narrowed at base, not cordate oblong. | |
| Leaves thin; peduncles 2 to 4 in. long | (3) <i>A. acuminata</i> |
| Leaves rigid, pale beneath | (4) <i>A. singaporeana</i> |
| Leaves 4 to 6 in. long, sub-coriaceous; panicle 1.5 in. long | (5) <i>A. grandifolia</i> |

(1) *A. nicobarica* King, *l.c.* 52. *Modecca nicobarica* Kurz, *Journ. Bot.* 1875, p. 327; *Masters, in Hook. fil. F.B.I.* ii. 603.

Very slender, wiry climber. Leaves membranous, elliptic-oblong or lanceolate, base round peltate, acuminate at tip; nerves 4 pairs inarching, 2.5 to 4.5 in. long, .6 to 1.8 in. wide; petioles .4 to .8 in. long; peduncles 1.5 in. long with a tendril and 1 to 2 flowers. Flowers .4 in. long, green. Males, calyx campanulate, deeply 5-lobed; lobes linear acute. Petals shorter oblanceolate truncate; anthers as large, oblong, blunt cordate, tube of filaments

wide. Capsule elliptic-oblong, acute, 2·3 in. long, ·75 in. wide, red. Seeds sub-orbicular with radiating grooves from centre. *Hab.* Thickets, Johor, Tebing Tinggi. Selangor, Kwala Lumpur. Perak, Waterfall, Thaiping (Wray); Tanjong Hantu. Dindings, Lumut. Penang Hill at 2500 ft. altitude (Maingay, Curtis); Telok Bahang (Curtis); Lankawi (Curtis); Setul Heath, a very narrow-leaved form. *Distrib.* Andamans and Nicobars.

(2) **A. populifolia** *Engl. Jahrb.* xiv. 376; var. *pentamera* King, *l.c.* 54.

Slender climber. Leaves membranous oblong-ovate acuminate, acute, base cordate; nerves 5 to 7 pairs, faint, 3 to 5 in. long, 1·75 to 2·5 in. wide; petioles ·75 to 1·25 in. wide with two large cup-shaped glands at top. Peduncles 1 in. long with two branches and a tendril. Flowers few, on pedicels ·4 in. long. Male flowers ·2 in. long, green, fusiform. Calyx-lobes 5, oblong blunt. Petals just below lobes; anthers 5, sagittate, linear; filaments in a tube. Female flowers ·15 in. long. Fruit fusiform red, 2·5 to 3 in. long, ·75 in. through. Seeds oblong foveolate. *Hab.* Edges of woods. Selangor, Sungei Buluh; Petaling. Sungei Ujong, Pantai (Cantley); Perak, Goping and Gunong Bubu (Kunstler); Ipoh (Curtis). *Distrib.* Borneo, Timor.

(3) **A. acuminata** King, *l.c.* 55.

Stem slender. Leaves thin, coriaceous, ovate-oblong or ovate sub-cordate or round, short acuminate; nerves 2 (or 3) pairs, 4 to 6 in. long, 2 to 4 in. wide; petioles ·75 to 1·35 in. long. Peduncles 2·5 to 4·5 in. long with 2 or more branches 1 in. long and a tendril. Male flower narrow ovoid green ·25 to ·3 in. long. Calyx leathery, lobes ovate lanceolate. Petals oblong acute. Females larger ·4 in. long, tubular, swollen at base. Ovary fusiform. Fruit fusiform, red, 2 in. long, ·75 in. through. Seeds pitted in centre with radiating grooves to edge. *Hab.* Common on edges of woods. Pahang River, Tahan River. Malacca, Merlimau (Cantley); Bukit Bruang (Derry). Selangor, Batang Berjuntai. Negri Sembilan, Bukit Kapayung (Cantley). Perak, Padang Rengas (Curtis); Larut (Kunstler); Tapah (Wray); Ulu Bubong (Kunstler); Dindings, Lumut. *Distrib.* Java, Sumatra. *Native names:* Akar Lempedu Gajah; Akar Gelompong; Akar Lupok; Akar Merapoh; Kulipunang.

(4) **A. singaporeana** *Engl. Jahrb.* xiv. 376; King, *l.c.* 56. *Modecca singaporeana* Masters, in Hook. *fl. F.B.I.* ii. 601.

Lofty climber. Stem rather thick, woody. Leaves coriaceous, oblong, base cuneate, glands 2, sub-acute, underside pale, reticulations obscure; nerves 3 pairs, 3·5 to 4·5 in. long, 1·75 to 2·25 in. wide; petioles ·5 to 1·5 in. long. Male flowers ·25 in. long, pale green, elongate, fusiform. Fruit fusiform, base rounded 2 in. long, red. Seeds compressed, ellipsoid, ·3 in. across, strongly tubercled. *Hab.* Woods in the south, not common. Singapore, Garden

Jungle; Chan Chu Kang; Pulau Tekong. Johor, Bukit Soga; Jaffaria (King).

(5) **A. grandifolia** Ridl. *Journ. F.M.S. Mus.* x. 136.

Glabrous climber. Leaves membranous to thinly coriaceous, broad ovate-elliptic, shortly, abruptly acuminate, base decurrent on petiole with 2 glands, 4 to 6 in. long, 2·5 to 4·5 in. wide; petioles 1 to 1·5 in. long. Panicles short, thick, 1·5 in. long, many-flowered. Bracts lanceolate acuminate, 1·5 in. long. Male flowers flask-shaped, coriaceous 1·45 in. long. Calyx-lobes recurved, linear acuminate. Petals from mouth of the tube linear acuminate as long. No corona. Stamens much shorter than tube. Anthers apiculate. Fruit globose 1·5 in. through. Seeds oblong oblique ovoid pitted. *Hab.* Pahang, Kwala Tekam and Kota Tongkat (Evans). Negri Sembilan. Bukit Tangga Pass (Ridley). *Distrib.* Sumatra.

3. PAROPSIA, Noronha.

Erect shrubs. Leaves simple. Flowers in dense axillary cymes. Calyx-tube short, 5-lobed. Petals 5, from base of calyx-tube. Corona of fine threads from calyx-tube, in 5 phalanges. Gynophore very short. Ovary sub-globose; style of 3 branches. Stigmas reniform, capitate. Fruit capsular. Species 4 or 5, Africa, Malaya.

(1) **P. vareciformis** Masters, in *Trans. Linn. Soc.* xxvii. 639; *King, l.c.* 49.

Shrub or small tree. Leaves sub-coriaceous, oblong or oblong-lanceolate acute or acuminate, base cuneate, edges entire or serrate, glabrous except midrib and 6 to 7 pairs of nerves, 2·5 to 5·25 in. long, 1 to 1·75 in. wide; petioles 1 to 2 in. long. Flowers 5 in. across; pedicels 1·5 in. long, tomentose. Calyx campanulate, villous, lobes oblong acute. Petals smaller oblanceolate. Corona single woolly. Stamens 5. Ovary villous. Fruit ovoid 5 to 7 in. long. Seed flat scrobiculate. *Hab.* Forests. Malacca (Main-gay, etc.). Bukit Bruang. Selangor; Ulu Gombak (Burn-Murdoch); Weld's Hill, Kwala Lumpur (Foxworthy). Perak (Kunstler and Scortechini).

ORDER LXV. CUCURBITACEÆ.

Climbing herbs, with tendrils. Leaves alternate often cordate, lobed. Flowers unisexual (rarely bisexual) yellow or white, racemed or solitary. Calyx-tube quite adnate to ovary; limb rotate or campanulate; lobes 5. Petals 5, insert on calyx-limb, often fimbriate at edge. Stamens usually 3, insert on mouth or lower down; anthers free or united; cells straight or flexuous. Ovary inferior; carpels 3; style 1. Stigmas 3 (rarely with 2, 3 or 4 styles). Fruit a large or small berry, occasionally a capsule. Seeds

often compressed and corrugate on edge, many; in capsular fruits, winged. Species 600, whole world. (*King, Journ. As. Soc. Beng.* lxvii. (2), p. 24.)

Female flowers solitary, fruit baccate.

Anther-cells conduplicate or sigmoid.

Petals cirriferous.

Seeds 6, woody, large; testa fibrous . . . 1. HODGSONIA
Seeds numerous, small; testa not fibrous . . . 2. TRICHOSANTHES

Petals entire, divided nearly at base.

Calyx-tube elongate in male; anthers included . . . 3. GYMNETALUM

Calyx-tube short; anthers more or less exsert.

Stamens insert below the corolla mouth.

Flowers yellow . . . 4. MOMORDICA

Corolla campanulate, divided half-way.

Flowers white . . . 5. CEPHALANDRA

Anther-cells straight; connective produced.

Flowers very small, solitary . . . 6. MELOTHRIA

Flowers, males corymbose . . . 7. ZEHNERIA

Female flowers in panicles; anther-cells straight.

Fruit a berry . . . 8. GYNOSTEMMA

Fruit a cylindric or campanulate capsule opening by a lid; seeds thin winged.

Calyx-lobes 3; seeds winged all round . . . 9. ZANONIA

Calyx-lobes 5; seeds winged at top only . . . 10. ALSOMITRA

1. HODGSONIA, Hook. fil.

Large climbers. Leaves thin or coriaceous, 3- to 5-lobed, tendrils 2- to 3-fid. Flowers usually large; males in long racemes; bracts oblong, entire. Females solitary. Male calyx-tube long, mouth campanulate, teeth short, 5. Petals 5, fimbriate. Stamens 3; anthers exsert linear. Females, ovary globose, 1-celled; style long. Stigmas 3, bifid. Fruit large. Seeds 6, large, flat, ellipsoid with sunk veins. Species 2.

(1) *H. capniocarpa* Ridl. *Journ. F.M.S. Mus.* x. 135. *H. heteroclita* King, l.c. 25 partly, not of Hooker.

Long climber. Leaves coriaceous, palmate, base cordate; lobes entire, acute; nerves beneath hairy, 6 in. long, 7 in. wide; petioles 1 in. long. Male raceme woody, 6 in. long, scurfy with thick ovate bracts. Calyx-tube .5 in. long; lobes very short. Corolla-tube 2.5 in. long, scurfy-pubescent, .2 in. wide when open. Fruit 6 in. across, depressed globular grey-tomentose; pericarp woody. Seeds 2 in. long embedded in an oily pulp. *Hab.* Riverbanks. Pahang River. Malacca (Maingay). Penang (Phillips, Porter, Wallich). *Distrib.* Sumatra.

2. TRICHOSANTHES, Linn.

Climbers. Leaves entire or 3- to 9-lobed, toothed, tendrils usually 2- to 5-fid. Flowers unisexual, white, nocturnal. Males, peduncles usually in axillary pairs, one 1-flowered, the other

racemose, gradually lengthening. Bracts often large laciniate, or small or 0. Female flower solitary. Male calyx long tubular; lobes 5, lanceolate, entire or serrate. Corolla 5-lobed, lobes fimbriate, Stamens 3; anthers linear conduplicate, one 1-celled, two 2-celled. Female as in male; stamens 0. Ovary inferior 1-celled; style filiform, 3- to 6-fid at top. Fruit oblong or globose, red. Seeds many in greenish black pulp, ellipsoid. Species 38, Indo-Malaya, China, Japan, Australia.

Usually lofty climbers; flowers opening at 12 o'clock at night, fragrant, falling by morning. Fruits very showy, scarlet, usually egg-shaped, and commonly called "Easter eggs." The plant often dies down after flowering, when the fruit is ripe, so that the brilliant fruits are very conspicuous on the dead stems.

Leaves lobed, not trifoliolate.

Male inflorescence ebracteate (1) **T. cucumerina**

Male inflorescence bracteate.

Bracts distant, ovate, slightly toothed . . . (2) **T. tricuspidata**

Bracts crowded, long, laciniate.

Leaves broad-lobed; fruit globular; sepals laciniate. (3) **T. palmata**

Leaves long, narrow-lobed; fruit ellipsoid . . . (4) **T. Wallichiana**

Leaves adult trifoliolate.

Leaves membranous (5) **T. Wawraei**

Leaves coriaceous (6) **T. celebica**

(1) **T. cucumerina** *Linn. Sp. Pl.* 1008; *King, l.c.* 27.

Leaves membranous orbicular-reniform to broad ovate, edges denticulate, often 3- to 7-lobed; lobes broad acute, base cordate, above sparse pubescent, beneath pubescent, later scabrid, 2 to 4 in. long and wide; petioles 1 to 2 in. long, pubescent. Male peduncles pubescent, ebracteate. Flowers .5 to 1 in. across, tube .9 to .3 in. long. Female peduncle .5 in. long. Fruit 1 to 3 in. long, ovoid, apex conic, red. Seed elliptic corrugate. *Hab.* Perak (Kunstler). Perhaps only cultivated or an escape. I have seen no specimen, but King says it has larger flowers than the Indian plant and is doubtful about its identity. *Distrib.* India.

(2) **T. tricuspidata** *Lour. Flor. Cochinchine*, ii. 723; *King, l.c.* 28.

Slender climber. Leaves membranous, ovate-subtriangular; lobes 3 to 5, triangular, base cordate, acute or acuminate or sub-entire, glabrous, 3 to 5 in. long and as wide; petioles slender, 1 to 1.5 in. long. Male peduncles floriferous for half the length, stout, 6 in. or more long. Bracts ovate, lanceolate caudate, entire or toothed. Calyx-tube shortly dense tomentose; lobes caudate toothed. Corolla 1.5 in. wide. Female flower, from same axil as male peduncle, tube 1.5 in. long. Fruit sub-globose, 2 in. through, red. Seeds ovate, .5 in. long. *Hab.* Thickets. Pahang, Pulau Chengai, Pahang River. Perak, Larut (Kunstler); Tambun, Ipoh. Penang (Curtis); Pulau Betong. *Distrib.* Siam, Cochinchina. *Native name*: Akar Katominon.

var. *penangensis* Ridl.

Leaves quite similar to type, but bracts large, strongly toothed as in *T. palmata*, and calyx-lobes only slightly denticulate. Probably a distinct species, but specimens few and incomplete. *Hab.* Penang (Curtis).

(3) **T. palmata** Roxb. *Hort. Beng.* 70; *Fl. Ind.* ii. 704.

Leaves thick membranous, ovate or orbicular, cut down to 3 to 7 lobes; lobes acute or acuminate, edges sub-entire, base deeply narrowed cordate, scabrous above, glabrous or pubescent beneath, 2 to 6 in. long, 1 to 3 in. wide. Male racemes few-flowered, sometimes paired, 8 in. long. Bracts large, ovate to sub-orbicular deeply cut or serrate, glabrous or hairy. Calyx-tube 1.5 in. long; teeth lanceolate, edges deeply laciniate. Female flower solitary; peduncle under 1 in. long. Fruit ovoid acute, globular when ripe 1.5 in. long. *Hab.* Perak, Ulu Bubong (Kunstler). *Distrib.* India.

(4) **T. Wallichiana** Wight, *Ann. Mag. Nat. Hist.* vii. 70. *T. multiloba* Clarke, in *Hook. fil. F.B.I.* ii. 607 (not of Miquel).

Leaves membranous sub-orbicular divided half-way down into 3 to 5 oblong or triangular acute lobes sparsely-toothed, base cordate, glabrous, 3 to 7 in. long and wide. Male peduncles stout lengthening to 8 in. Bracts oblong-ovate, edges laciniate. Calyx-tube glabrous, teeth entire lanceolate-acuminate. Petals obovate laciniate. Female flowers solitary. Fruit ellipsoid obtuse, red, 2 to 4 in. long. *Hab.* Forests. Singapore Gardens; Bukit Timah; Pulau Ubin, very common. Johor, Kukub. Selangor, Rantau Panjang (Kloss); Bukit Bintang (Goodenough). Sungei Ujong, Bukit Sulu (Cantley). Province Wellesley, Ara Kudah. Penang (Curtis). *Distrib.* India. *Native names*: Akar Timun Gagak (crow's pumpkin); Akar Balistur. The jungle crows often come from the forest to eat these fruits.

(5) **T. Wawraei** Cogn. *Dec. Mon. Phan.* iii. 384; *King, l.c.* 30.

Leaves membranous trifoliate (or simple); leaflets unequal acuminate, median one oblanceolate 4 in. long, 1.5 in. wide, petiolule .3 in. long, laterals inæquilateral lobulate at base on outside shorter and broader; petiolules shorter than median one, glabrous, reticulate when dry; petioles 1.25 in. long. Male peduncles long, stout sulcate. Bracts small, oblong, teeth few, short. Calyx .5 in. long, narrow, campanulate, suddenly contracted into tube, teeth lanceolate-acuminate. Female, flower tube slightly ciliate at tip. Petals white, oblong, long fimbriate. Fruit oblong, red. *Hab.* Forests. Singapore, Selitar; Pandan Kechil. Johor, Pengerang; Gunong Pulai. Malacca, Selandor (Cantley). Pahang, Kwantan (Durnford). Perak, Larut (Kunstler); Goping. Penang. *Native name*: Akar Tiga Chabang.

(6) **T. celebica** Cogn. *Dec. Mon. Phan.* iii. 385; *King, l.c.* 30.

Leaves coriaceous trifoliate. Leaflets unequal, mid-one largest ovate oblong acuminate, base slightly narrowed entire, laterals

broadly unequal round at base, 3 to 4·5 in. long, 1·5 to 2·5 in. wide; petioles 1 to 1·5 in. long; petiolules ·2 in. long or less. Male inflorescence long stout sulcate. Bracts deltoid pectinate glandular tomentose. Calyx-tube narrow, funnel-shaped, pubescent, teeth lanceolate, entire. Fruit oblong ovate, red, 4 to 5 or nearly 6 in. long, 3 in. through. Seeds in greenish black pulp, brown, edge thick. Singapore, Orchard Road; Chan Chu Kang; Tanglin. *Hab.* Johor, Bukit Murdom (Kelsall). Malacca, Alor Gajah (Griffith). Dindings, Lumut. *Distrib.* Celebes. *Native names*: Akar Tiga Chabang; Timun Dandang Lunjung.

CULTIVATED SPECIES.

T. ANGUINA *Linn. Sp. Pl.* 1008.

"Serpent Gourd," "Ketola Ular," easily recognised by its long snake-like fruit, dark green with lighter patches when young, red when ripe, very slender racemes and small flowers. It is often cultivated in vegetable gardens.

3. GYMNOPETALUM, Arn.

Usually creeping herbs, slender. Leaves entire or deeply 3- to 5-lobed. Flowers white, rather large. Male peduncles 2 from each axil, one 1-flowered, the other racemose. Bracts on racemes large, lanceolate incised or small. Females 1-flowered. Male, calyx-tube long, lobes 5, lanceolate. Petals 5 not fimbriate. Stamens 3, anthers conduplicate. Female, ovary oblong; style long. Stigmas 3. Fruit ovate, oblong, acute at both ends. Seeds ellipsoid, margined. Species 6, Indo-China, Malaya.

Leaves not lobed (1) *G. integrifolium*

Leaves deeply 3- to 5-lobed.

Lobes triangular, acute (2) *G. cochinchinense*

Lobes lobulate sinuate (3) *G. quinquelobum*

(1) *G. integrifolium* *Kurz, Journ. As. Soc. Beng.* xl. 58; *King, l.c.* 31.

A creeping plant in grass, scabrid. Leaves reniform, blunt, edge undulate or toothed, above scabrid, beneath tomentose, 1·75 in. long, ·8 to 2·25 in. wide; petioles ·45 to ·65 in. long. Flowers solitary. Male peduncles 1·5 in. long. Females ·25 in. long. Calyx-tube hairy, teeth lanceolate. Corolla white, 1·35 in. wide, lobes obovate, pubescent. Fruit ·75 in. long, globular, orange colour. *Hab.* Open grassy spots. Perak, Batu Togoh (Wray); Dindings, Lumut. Kelantan, Channing Estate. *Distrib.* Cambodia, Java.

(2) *G. cochinchinense* *Kurz, Journ. As. Soc. Beng.* xli. (2), 57; *King, l.c.* 32. *Trichosanthes laciniata* *Ridl. Journ. Roy. As. Soc. S. Br.* 59, p. 107.

Stem scabrid, hairy. Leaves reniform to triangular, 5-angled or lobed half-way, lobes triangular acute, edges crenate dentate,

base deep cordate, scabrid, 2 to 4 in. long, 2 to 3·5 in. wide; petioles scabrid pubescent, 1 to 1·5 in. long. Male peduncles 3 in. long. Flowers racemose. Bracts large incised serrate, ·75 in. long. Calyx-tube sub-cylindric, villous, mouth with deflexed hairs. Petals ovate oblong, ·5 in. long. Female peduncles short. Fruit 2 in. long, ·75 in. through, 10-ribbed, beaked, orange. *Hab.* Grassy open spots. Pahang, Pekan. Malacca, on the hill by the ruins; Kelantan, Kota Bharu. Lankawi, Kwah (Curtis). *Distrib.* Indo-Malaya, China. *Native name* : Sipam.



FIG. 69.—*Gymnopetalum cochinchinense*.

(3) ***G. quinquelobum*** *Miq. Fl. Ind. Bat. i. (1), 681; King, l.c. 32.*

Slender creeper. Leaves orbicular or triangular deeply 5-lobed, lobes 2- to 3-lobulate, sparsely hairy with thick hairs, 1·5 to 2·25 in. long, 1·75 to 3 in. wide; petioles ·75 to 1 in. long. Male flowers solitary (rarely racemose) pilose. Bracts oblong, serrate ·5 in. long. Calyx-teeth entire or toothed. Petals oblong acute puberulous outside. Female peduncles ·5 to 1 in. long. Fruit oblong, fusiform, ribbed, pubescent, scarlet 1·5 to 2 in. long. *Hab.* Not common. Singapore (Thomson); Malacca (Griffith), Perak, Plus River (Wray). Penang (Porter, seeds collected here and

cultivated in Europe). *Distrib.* Andamans and Nicobars, Borneo, Java.

Motley, who collected it in Borneo, 1857 to 1858, says it is called *Petola Bruang*, and that it is common on dry ground after burning and fruit eatable, cultivated much in Singapore and Penang; but it seems to have disappeared of late years.

4. **MOMORDICA**, Linn.

Climbers. Tendrils simple. Leaves cordate, entire. Flowers yellow or creamy. Males, solitary racemed, bracteate or not. Calyx-tube short, campanulate, 2 to 3 basal oblong incurved scales, lobes 5. Corolla, petals 5, free nearly to base. Stamens 3, conduplicate. Female, ovary oblong; style long. Stigmas 3. Fruit oblong or spherical, sometimes prickly, sometimes 3-valved. Seed obovate. Species 25, Africa, Asia, America.

Momordica charantia Linn. with small 5-lobed leaves, small yellow flowers and fusiform fruit acuminate at both ends, yellow, softly prickly, dehiscing into 3 valves, with the seeds in a crimson aril, is often cultivated and is known as "Peria Laut."

Leaves entire, thin; flowers 1 in. wide or less.

Flowers .75 in. wide on long slender pedicels . . . (1) **M. Clarkeana**

Flowers 1 in. wide with large bract . . . (2) **M. subangulata**

Leaves trilobed; flowers 3 in. wide, cream yellow, black centre; fruit large spiny . . . (3) **M. cochinchinensis**

(1) **M. Clarkeana** King, *l.c.* 35.

Stem 4-angled. Leaves thin membranous, ovate cordate acute, glabrous 3 to 5 in. long and nearly as wide; petioles 1.5 to 2 in. long. Male flowers .75 in. across; pedicels slender, several from one axil or in lax racemes. Calyx-lobes puberulous, broad, obtuse, edge glabrous. Corolla of 5 broad lobes, puberulous. Fruit sub-globular, apiculate, red, 1 to 2.5 in. through. *Hab.* Forests. Perak, Gunong Bubu (Kunstler); Kamuning (Ridley).

(2) **M. subangulata** Bl. *Bijdr.* 928; King, *l.c.* 36.

Stem angled. Leaves broad ovate deep, cordate with remote teeth, glabrous above, sparse hairy beneath, 1.75 to 2.25 in. long, 1.25 to 1.65 in. wide; petioles 1 in. long. Male peduncles 1 in. long, pubescent. Flower-bracts broad, cordate, blunt, minutely pubescent. Flower 1 in. across. Calyx deep purple, lobes oblong blunt, .2 in. long. Corolla yellow; petals oblong with black spot at base. Fruit ellipsoid 2 to 3 in. long, ribbed. *Hab.* Limestone rocks and river-banks. Perak, Ipoh (Curtis); Kamuning. Kelantan, Chaning, river-banks. *Distrib.* India, Java.

(3) **M. cochinchinensis** Spreng, *Syst. Veg.* iii. 14; *Bot. Mag.* t. 5145; King, *l.c.* 36. *M. mixta* Roxb. *Hort. Beng.* 70.

A big climber. Leaves broadly ovate-cordate trilobed, glabrous, 4 to 7 in. long and as wide; petioles 2 to 3 in. long. Male peduncles 2 to 6 in. long. Bract orbicular reniform cucullate. Calyx-lobes coriaceous, hairy. Corolla 3 in. across, cream white, base of petals

black. Female peduncles 1 to 2 in. long. Fruit ovate or globose, red with conical spikes all over it, 4 to 5 in. through. Seed black ovate, edges lobulate. *Hab.* River-banks. Pahang, Tembeling; Tahan River. Selangor, Batu Caves; Semangkok Pass. Perak, Temengoh. Penang, Penara Bukit (Curtis). Kelantan, Kwala Aring (Yapp). *Distrib.* India, China, Malaya.

5. CEPHALANDRA, Schrader.

Leaves 5-angled or lobed toothed. Flowers rather large, white. Male calyx campanulate, short, 5-lobed. Corolla campanulate, short, 5-lobed. Stamens 3; anthers exsert conduplicate. Females as male. Ovary oblong; style long. Stigmas 3 bifid. Fruit cylindric. Species 12, all African but one.

(1) *C. indica* Naud. *Ann. Sc. Nat. ser. 5*, v. 16; Clarke, in *Hook. fl. F.B.I.* ii. 621.

Leaves 2 to 4 in. long, 5-angled, scabrid; petioles 1 in. long. Male peduncles 1 in. long. Calyx-lobes linear-oblong. Corolla 1 in. wide, pure white. Female peduncles .25 in. long. Fruit 1 to 2 in. long, .5 to 1 in. through, scarlet. *Hab.* Cultivated by Javanese and believed to be introduced from Java. Singapore. Johor, Kukub. *Distrib.* Malay isles. *Native name*: Pepasan.

6. MELOTHRIA, Linn.

Small climbing herbs. Leaves deltoid or ovate, truncate or cordate, entire or 3-lobed. Flowers very small, yellow or white. Males and females often from the same axil. Male pedicels long, clustered on long peduncles. Female long-pedicelled. Male calyx-tube short, teeth 5. Corolla 5-lobed. Stamens 3, in the middle of calyx-tube; anthers free, straight, connective prolonged. Female ovary oblong; style long. Stigmas 3, sub-globose. Fruit globose or fusiform. Seeds oblong compressed margined. Species 55, tropics.

Fruit not beaked.

Fruit globose, red; leaves ovate-cordate . . . (1) *M. affinis*

Fruit oblong, white; leaves triangular . . . (2) *M. indica*

Leaves widely 3-lobed, sagittate . . . (3) *M. odorata*
var. *triloba*

Fruit beaked, fusiform . . . (4) *M. marginata*

(1) *M. affinis* King, *l.c.* 38.

Climbing 4-angled. Tendrils bifid. Leaves ovate-cordate to triangular often 5-lobed, denticulate, scabrid-hispid on both sides, 1.35 to 4.25 in. long, 1.5 to 3.25 in. wide; petioles .5 to 1 in. long. Male and female flowers from same axil. Males in many-flowered umbels on pedicels 1 to 2 in. long; pedicels 20, glabrous, .35 in. long. Flower .1 in. across, globose pubescent. Calyx-teeth subulate 5. Fruit globose red, .4 to .5 in. through. Seeds obovoid, pitted. *Hab.* Johor, Batu Pahat. Pahang, Pekan. Selangor,

Batu Caves. Sungei Ujong, Bukit Sulu (Cantley). Perak, Kwala Kangsa; Larut (Kunstler). Dindings, Bruas. Kelantan, Chaning. *Distrib.* Borneo. *Native name*: Akar Kundur Tikus.

(2) **M. indica** Lour. *Flor. Cochinchine*, 35; *King, l.c.* 38.

Stem slender rooting at nodes, tendrils simple. Leaves triangular-cordate acute entire or 3-lobed, glabrous except the hairy nerves, lobes denticulate or lobulate, 1·25 to 2 in. long and as wide; petioles ·6 to 1 in. long. Male pedicels solitary or racemose, 2 to 3 on a 1 in. peduncle. Calyx-tube broad, campanulate, teeth subulate. Corolla white, puberulous, 1 in. wide; petals ovate-oblong. Anthers connective much produced. Peduncle of female flowers solitary. Fruit oblong, white, ·5 to ·75 in. long. *Hab.* Open country. Malacca, Chabau. Selangor (Kunstler). Province Wellesley, Bukit Mertajam (Burkill). *Distrib.* Indo-Malaya.

(3) **M. odorata** Clarke, in *Hook. fil. F.B.I.* ii. 626; var. *triloba*, Clarke, *l.c.*

A slender climber. Leaves widely 3-lobed, sagittate, lobes lanceolate glabrous, 2·5 to 3 in. long, ·2 to ·5 in. wide. Flowers small white. Calyx narrow, campanulate. Stamens very short. Fruit as big as a pea. *Hab.* Open country. Malacca, Ayer Panas (Griffith). Pahang, Labong, Endau (Evans). *Distrib.* Indo-Malaya.

(4) **M. marginata** Cogn. *Mon. Phan.* iii. 593; *King, l.c.* 39.

Stems creeping rooting angular. Tendrils simple, puberulous. Leaves ovate-cordate or more or less 3-lobed, acute edge minutely denticulate, coarsely strigose both sides; nerves pubescent, 1 to 1·25 in. long and about as broad; petioles ·75 to 1 in. long, tomentose. Males umbellate on a filiform peduncle, glabrous short; pedicels ·2 to ·3 in. long. Calyx campanulate, pubescent. Petals villous, yellow. Female flowers solitary; peduncle ·5 in. long. Fruit narrow, cylindric, beaked velvety, ·75 in. long. Seeds 6 to 8 foveolate. *Hab.* Thickets, waste ground, Pahang, Pekan. Malacca (Maingay). Sungei Ujong (Cantley). Selangor; Batu Caves.

var. *heterophylla* Cogn. *l.c.* 594.

Leaves entire, ovate cordate almost smooth except nerves. *Hab.* Pahang, Pahang River, Perak, Kwala Temengoh. Penang (Wallich 6704); Pulau Betong (Curtis). *Distrib.* Java, Sumatra. *Native name*: Timun Tikus.

7. ZEHNERIA, Endl.

Climbing herbs. Tendrils simple. Leaves entire or lobed. Flowers small. Males in a short corymb. Females solitary or sub-corymbose. Bracts 0 or very small. Male calyx tubular, campanulate, teeth 5. Corolla divided nearly to base into 5 triangular segments. Stamens 3, anthers 2- or 1-celled, curved

or sigmoid. Female, style cylindric, 3-lobed. Fruit globose or cylindric. Seeds obovoid. Species 10, all tropics.

(1) **Z. umbellata** Thw. *Enum.* 125; *Hook. fil. F.B.I.* ii. 625.

Usually glabrous. Leaves ovate-deltoid cordate to hastate (or 3- to 5-partite to near base), mucronulate, 3·5 in. long, 2 in. wide at base; petioles ½ in. long. Male corymb sub-sessile, ½ in. long. Flowers numerous crowded very small. Females solitary; peduncle very short. Fruit short, cylindric. Seeds few, obovoid, slight-compressed, quite smooth. *Hab.* Open sandy country. Perak, Kwala Temengoh (Ridley). *Distrib.* Indo-Malaya, China, Australia.

8. GYNOSTEMMA, Bl.

Climbing shrubs, tendrils simple. Leaves pedate; leaflets 3 to 5, ovate, lanceolate serrate membranous. Flowers very small in diffuse axillary panicles. Male calyx short, bilobed. Corolla rotate, 5-partite lobes lanceolate. Stamens 5; anthers 2-celled, straight. Females as in male, but ovary round; styles 2 to 3 united below, bifid at tip. Fruit globose umbonate 1- to 3-seeded. Seeds warty. Species 4, Indo-Malayan.

(1) **G. pedata** Bl. *Bijdr.* 23; *King, l.c.* 40.

Leaves, petioles 1·5 in. long; leaflets 3 to 7 acute, base narrowed, crenulate, ¾ to 2·5 in. long, ¼ to 1 in. wide; petiolules ½ in. long. Panicles 3 to 6 in. long, pubescent. Corolla yellowish. Fruit 1·5 in. across. *Hab.* Edges of forests, rare. Perak, road to Jor from Tapah. *Distrib.* Indo-Malaya.

9. ZANONIA, Linn.

Leaves ovate or oblong, simple. Flowers small in large compound racemes. Males pedicelled. Females sessile. Males, sepals 3, oblong or orbicular. Corolla rotate 5-lobed. Stamens 5, free on a fleshy disc; anthers 1-celled. Females as male, but ovary sub-clavate. Styles 3-bifid at tip. Capsule elongate, cylindric top truncate, 3-valved. Seeds surrounded by a large wing. Species 3, Indo-Malayan.

Leaves ovate oblong; fruit 2·5 in. long (1) **Z. indica**
 Leaves ovate round; fruit 5 to 8 in. long (2) **Z. Clarkei**

(1) **Z. indica** Linn. *Sp. Pl.* 1028; *Clarke, in Hook. fil. F.B.I.* ii. 633; *King, l.c.* 41.

Slender climber 30 to 50 ft. long, glabrous. Leaves coriaceous, ovate-oblong acute, base rounded retuse; nerves 6 to 8 pairs, 2 to 3·5 in. long, 2 to 3·5 in. wide; petioles ⅞ to 1 in. long. Panicles large about 18 in. long with very many slender branches, on the lower part of the stem. Flowers light yellow about ⅓ in. wide, very shortly pedicelled. Fruit cylindric, campanulate, 3 in. long, dark green, truncate at top. Seeds flat thin, nucleus ⅙ in. long;

wings 1.75 in. across. *Hab.* Damp jungle climbing on trees or shrubs. Rare. Perak, Gunong Bubu and Batang Padang River (Kunstler). *Distrib.* India, Ceylon.

(2) **Z. Clarkei** King, *l.c.* 41.

A lofty climber 60 to 80 ft. long. Leaves coriaceous ovate round acute, base broad emarginate; nerves 5 to 7 radiating from base, 2.5 to 3.5 in. long, 2.5 to 3 in. wide; petioles .75 in. long. Flowers unknown. Fruit cone-shaped, ovoid cylindric, dark green mottled lighter, 5 to 8 in. long. Seed star-shaped with 7 or 8 projecting processes .1 in. thick, brown and pustulate on the faces 1 in. long; wings thin 1 in. wide. *Hab.* Rare. Hanging from lofty trees. Selangor, Batu Caves. Perak, Kinta (Kunstler).

10. **ALSOMITRA**, Benth. and Hook. fil.

Large climbers. Leaves with 3 oblong leaflets. Flowers small, unisexual, white in panicles with filiform branchlets. Males calyx rotate, 5-lobed, segments oblong acute. Corolla rotate, 5-lobed, lobes blunt. Stamens 5; anthers oblong, straight 1-celled. Female ovary elongate, clavate 1-celled. Styles conic 3 to 4. Stigmas semilunar. Capsule elongate, clavate, truncate, apex 3-valved. Seeds in 6 rows, corrugate incised on margin with a terminal membranous wing. Species 9, Indo-Malaya, Australia, America.

(1) **A. clavigera** Roem. *Syn. Fasc.* ii. 118; *Hook. fil. Bot. Mag. t.* 6017; *King, l.c.* 42. *Zanonia sarcophylla* Wall. *Pl. As. Rar.* ii. 28, *t.* 133.

Slender climber. Leaflets fleshy, blunt, base narrowed, sessile 1.5 to 2.3 in. long, .65 by 1 in. wide. Panicles 6 to 12 in. long, lax. Flowers .1 in. across. Capsule 1.5 in. long, .4 in. through. Seeds muricate. *Hab.* In rocky spots. Kedah, Tanjong Sirih. Lankawi, Pulau Langon (Curtis); near Kwah. *Distrib.* India, Tenasserim.

CULTIVATED PLANTS

Luffa ægyptiaca Mill. *Gard. Dict.* viii; *King, l.c.* 33. *Native names* : Petola Manis; Ketola Manis. The Loofar. Slender long climber with lobed leaves, 4 to 6 in. across, long tendrils. Flowers light yellow expanding at dusk, 2 in. across; petals rounded, tube short. Fruit oblong cylindric smooth, very fibrous, 2 to 6 in. or more long.

L. acutangula Roxb. *Native name* : Petola Sanding. Chiefly differs from the last in its 10-angled fruit, but these cultivated Loofars require, as King points out, careful study from the life.

Benincasa cerifera Savi *Bibl. Ital.* ix. 15. *Native names* : Kundur; Kundur China. The Wax Gourd. A large gourd with round lobed leaves and yellow flowers 2 in. wide. Fruit oblong, sub-cylindric 12 to 18 in. long, 8 to 10 in. through, hairy when

young, covered with a white bloom when adult. Commonly cultivated by the Chinese and Malays.

Cucumis sativus L. *Native name*: Timun China. Cucumber.

Cucurbita Pepo L. *Native names*: Labu Ayer; Labu Manis; Labu Pringgi. The pumpkin.

Cucurbita maxima Duch. *Native name*: Labu. Gourd.

Lagenaria vulgaris Ser. *Native names*: Labu Jantong; Labu Ayer Putih; Labu Kendi. The bottle gourd.

Citrullus vulgaris L. The water melon. *Native name*: Mendikai.

ORDER LXVI. BEGONIACEÆ.

Succulent herbs. Stem rhizomatous or creeping, rarely tuberous, often simple or erect. Leaves alternate, usually unequally bilobed at base, sometimes equal-sided, entire, toothed or lobed. Stipules 2. Peduncles axillary dichotomously cymose. Flowers white or pink, unisexual. Males above, females below on the cymes. Males, sepals 2, petaloid. Petals 2, similar but smaller, occasionally absent. Stamens indefinite free or with the filaments connate into a column; anthers narrow linear or clubbed. Female perianth as in male, or with one extra petal. Ovary 2-, 3-, or 4-celled, triquetrous; ovules many; styles 2 to 4 free or connate at the base. Stigmas branched or twisted. Fruit capsular, rarely succulent, triquetrous, or 3-winged; wings equal or one larger than the other. Seeds very minute. Species 400, of 4 genera. Most belong to the genus *Begonia*. *Distrib.* All warm, wet tropical countries.

BEGONIA, Linn.

CHARACTERS OF THE ORDER.

(King, *Journ. As. Soc. Beng.* lxxi. (2), p. 56.)

- i. CASPARYA. Fruit fleshy 3-angled, not winged (1) *B. tricornis*
- ii. KNIESBECKIA. Capsule with 3 nearly equal narrow vertically oblong wings, 3-celled.
 - Small herb; leaves round ovate, slightly oblique (2) *B. Forbesii*
 - Short stout plant; leaves broad round oblique bullate (3) *B. Rajah*
 - Tall herbs 2 to 3 ft.; leaves very unequal at base, glabrous.
 - Male flowers 2 to 3 in. wide (4) *B. isoptera*
 - Male flowers 1.5 in. wide (5) *B. isopteroidea*
 - Hairy herb 1 ft. tall; leaves oblique lanceolate, base narrow (6) *B. barbellata*
- iii. PLATYCENTRUM. Capsule 2-celled; wings sub-equal, one larger but thin; small plants; flowers usually small.
 - Leaves glabrous; plant tuberous (7) *B. Curtisii*
 - Leaves hairy, no tubers.
 - Leaves acute toothed, one or two (8) *B. sinuata*

- Leaves round, blunt (9) **B. clivalis**
 Leaves peltate from over-lapping lobes (10) **B. thaipingensis**
 Leaves ovate entire distinctly unequally
 cordate lobed.
 Petiole glabrous; leaves hairy on nerves
 only; flowers rather large (11) **B. carnosula**
 Petiole hairy; leaves hairy all over
 beneath (12) **B. leucantha**
 Leaves glabrous.
 Leaves oblique, cordate 3 in. long; flowers
 small (13) **B. debilis**
 Leaves oblique cordate 5 in. long; flowers
 5 in. wide. (14) **B. guttata**
 Leaves lanceolate acute, base oblique. (15) **B. variabilis**
 Leaves oblong ovate cordate 3 in. long;
 flowers 25 in. wide (16) **B. phoeniogramma**
 Leaves orbicular crenate not oblique 5 in.
 wide (17) **B. sibthorpioides**
- iv. MONOPTERA. Capsule, with 2 short and one much larger wing usually
 thick, dehiscing on the faces between the wings.
- Leaves peltate.
 Petioles slender, glabrous (18) **B. Hasskarli**
 Petioles thick, woody (19) **B. eiromischa**
 Leaves lanceolate not cordate or oblique.
 Leaves hairy, base long, narrowed (20) **B. Scortechinii**
 Leaves glabrous, lanceolate.
 Leaves narrowed to base, distant serrulate (21) **B. rhoephila**
 Leaves broad at base, toothed (22) **B. perakensis**
 Leaves broad at base, ovate, long acuminate,
 edge sinuate (23) **B. Klossii**
 Leaves large 9 in. long, ovate acute, fleshy (24) **B. Herveyana**
 Leaves ovate acuminate dentate (25) **B. monticola**
 Leaves ovate oblique, cordate, broad and
 round, not acuminate, completely
 glabrous.
 Flowers 1.5 in. wide; stems short (26) **B. venusta**
 Flowers 1.5 in. wide; stems tall with large
 stipules (27) **B. longicaulis**
 Flowers under 1 in. wide.
 Leaves undulate, acutely acuminate (28) **B. paupercula**
 Leaves rounded not undulate.
 Bracts ovate acute (29) **B. Robinsonii**
 Bracts linear (30) **B. pavonina**
 Leaves hairy on nerves only and on edge;
 flowers small (31) **B. Maxwelliana**
 Leaves all hairy; flowers large.
 Rhizome creeping (32) **B. decora**
 Stem tall, 3 ft., hairy (33) **B. Lowiana**
 Stem 4 to 12 in. tall; leaves thin; flowers
 small (escape) (34) **B. hirtella**

(1) **B. tricornis** *Ridl. Journ. Roy. As. Soc. S. Br.* 75, p. 35.
B. Roxburghii *Ridl. Journ. F.M.S. Mus.* iv. 20 (not of *DeCandolle*).

Stem 3 ft. tall, succulent, glabrous, dull red. Leaves lanceo-
 late long acuminate, base unequally cordate, edge toothed, 6 to
 8 in. long, 2 in. wide, light green. Flowers in clusters on short

axillary peduncles, white. Male .5 in. across. Sepals 2 ovate, obtuse. Petals 2, obovate as large. Stamens in a head; anthers linear-oblong, blunt. Female, stigmas 2, bilobed, spiral. Fruit green, pulpy, .5 in. long with 3 rounded ridges ending in points, not winged, 3-celled. *Hab.* Dense forests. Selangor, Ginting Bidai; Menuang Gasing (Kloss). Pahang, Telom (Ridley).

(2) **B. Forbesii** King, *l.c.* 58.

A dwarf plant hardly 6 in. tall, rhizome rusty villous. Leaves round ovate acuminate, slightly equally cordate, edge toothed, glabrous above, white-scaly beneath, nearly glabrous; nerves 9, 1.25 to 2.25 in. long, 1 to 2 in. wide; petioles 1.5 to 3 in. long. Stipules lanceolate, villous .3 in. long. Peduncles slender, 1 to 3.5 in. long with 1 terminal flower or branched 2 to 5 flowers. Bracts obovate oblong. Flowers pink; pedicels red. Males, sepals 2, oblong blunt, .15 in. long. Petals 2, smaller. Anthers obovate, tips emarginate. Females, sepals round ovate. Petals oblong. Styles 3. Capsule 3-celled opening on each face; wings sub-equal triangular blunt. *Hab.* Perak, Sungei Larut (Wray), rare.

(3) **B. Rajah** Ridl. *Gard. Chron.* xvi. 213, fig. 31; *Kew Bulletin*, 1895, *App.* ii. 34; 1914, p. 329.

Dwarf plant. Leaves radical oblique cordate, green with red-brown blotches, edge ciliate, 3 to 4 in. long, 3 to 6 in. wide. Stipules lanceolate-oblong. Peduncles hairy, 3.5 to 7 in. long, laxly cymose at tip. Flowers small, rose pink, .7 in. across. Males, sepals 2, obovate, orbicular, blunt. Petals 2, narrow oblong. Stamens on a convex torus. Females, sepals 2, elliptic-ovate. Petals 1 to 2, narrow oblong. Capsule .5 in. across with 3 oblong rounded equal thin wings. *Hab.* Tringganu. Brought to Singapore Botanic Gardens in 1892 and cultivated there.

(4) **B. isoptera** Dryand, *Smith's Ic.* 43. *B. Wrayi* Hemsl. *Journ. Bot.* 1887, p. 203.

Caulescent, 3 ft. tall, nearly glabrous. Leaves ovate-oblong to lanceolate, base cordate, very unequal, coarsely dentate; nerves prominent, 3.5 in. long, 1.5 to 3 in. wide; petioles .5 to 2.25 in. long. Stipules .75 in. long, lanceolate or oblong. Panicles leaf-opposed, slender; females at base, males at top, 3 to 6 in. long. Males .2 to .3 in. across. Sepals 2, round, pink; anthers oblong apiculate. Female, sepals and petals 5; styles 3, bifid. Capsule 3-celled, .8 in. long and as broad, oblong, base usually broad and top broad retuse; wings 3 equal narrow, .25 in. wide. *Hab.* Common in lowland woods in damp spots. Pahang, Tahan River. Malacca, Sungei Hudang (Goodenough). Selangor, Ulu Gombak; Ginting Simpai; Semangkok. Negri Sembilan, Perhentian Tinggi. Perak, Ulu Kerling; Goping (Kunstler); Ulu Kenering (Wray). Penang, Penara Bukit; Batu Hitam (Curtis). Legoh (Gwynne-Vaughan). *Distrib.* Sumatra, Java.

(5) **B. isopteroidea** *King, l.c.* 59.

About 3 ft. tall. Leaves very oblique ovate-lanceolate acuminate, base rounded broad or the narrow side shortly acute, lobulate dentate, white, scaly beneath; nerves 7, 3·5 to 4·5 in. long, 1·2 to 1·5 in. wide, green; petioles 2 to 3·5 in. long, red. Stipules lanceolate acute, ·75 in. long. Peduncles 1 in. long with 2 pedicellate and 1 sub-sessile, pale apple-pink flowers. Males, sepals 2, round oblong ·75 in. long. Petals 2, ·5 in. long. Stamens on an elongate column; anthers quadrate short truncate. Females, nearly as large; style short, branches 3, spiral. Capsule ·75 in. long and wide, 3-celled, narrowed at base, wings oblong, narrow, unequal. *Hab.* Perak, Gunong Brumber Pahang, at 5000 ft. altitude (Wray).

(6) **B. barbellata** *Ridl. Journ. F.M.S. Mus.* x. 135.

Plant 14 in. tall or less. Stem firm glandular-hairy. Leaves membranous, obliquely lanceolate-acuminate crenate serrate, base narrowed to a blunt rounded tip, with a few scattered hairs on the upper surface and the nervules hairy beneath, 5 in. long, 1·75 in. wide; petioles ·1 to ·25 in. long. Male flowers white, ·5 in. wide in cymes of 2 or 3, from lanceolate acuminate hairy bracts. Sepals oblong. Females slightly larger; ovary hairy from lower axils. Capsule oblong, base slightly narrowed of three equal narrow wings, ·4 in. long, ·25 in. wide. *Hab.* Sandy woods. Kelantan, Channing Woods; very local in sandy spots (Ridley).

(7) **B. Curtisii** *Ridl. Journ. Roy. As. Soc. S. Br.* 59, p. 106. *B. Haniffii*, *Burkill, l.c.* 79, p. 103.

Tuberous; stem erect, red 2 to 8 in. tall, glabrous. Leaves ovate, unequally cordate or ovate-lanceolate, 2 to 6 in. long, 2 in. wide, green to brown spotted silver; petioles 1 to 2·25 in. long. Cymes terminal or axillary. Bracts ovate, white veined red. Male flowers ·75 in. wide; sepals 2, oblong or orbicular. Petals 2, oblong-linear, white or pink-tinted. Stamens in a round head. Females with 4 to 5 sepals and petals. Styles 2; ovary 2-celled. Fruit ·6 in. long, 3-winged, 1 wing longer, obtuse, triangular, ·5 in. long. *Hab.* On limestone rocks. Lankawi (Haniff). *Distrib.* Kasum (Curtis).

This charming plant dies down completely in the dry season.

(8) **B. sinuata** *Wall. Cat.* 3680; *Clarke, in Hook. fil. F.B.I.* ii. 650; *King, l.c.* 59.

Rootstock tuberous. Stem 2·5 to (rarely) 15 in. tall. Leaves reniform blunt or ovate acute, deeply cordate or entire, edges wavy or denticulate, 1·3 to 6 in. long, 1 to 8 in. wide, often purple, appressed white-hairy; nerves 7 to 11; petioles ·5 to 3 in. long pubescent. Stipules small oblong-lanceolate glabrous. Panicle slender, 3 to 8 in. long, puberulous. Flowers few, pink or white, glabrous. Bracts minute, ·05 to ·1 in. long. Males ·2 to ·25 in.

across. Sepals 2, round. Petals 2, narrower obovate. Stamens 20; anthers obovoid. Female segments 5; styles 2. Stigmas binate. Capsule .3 in. broad, posterior wing longest. *Hab.* On damp rocks in forests, chiefly in the north. Pahang, Kwala Tahan and Gunong Tahan to 1000 ft. altitude. Penang (Wallich and all collectors), common on damp rocks on the hill; Batu Hitam; Pulau Jerajah (Kunstler). Kedah Peak, Yan. Pulau Adang island. *Distrib.* Peninsular Siam.

This plant sometimes produces a bulbil in the notch of the leaf. It varies very much in size.

(9) **B. clivalis** *Ridl. Journ. Roy. As. Soc. S. Br.* 54, p. 43.

Small herb 4 to 8 in. tall with a short rhizome. Stem red-hairy, branched. Leaves orbicular or ovate-cordate, sub-æquilateral, edge undulate, sparsely toothed hairy beneath, 1 to 3 in. long, .75 to 3 in. wide; petioles 1 or 2 in. long, hairy. Cymes 3, pubescent, 2 to 4 in. long. Males, sepals 2, ovate, round, 2 in. long. Petals 2, narrower, linear-oblong. Stamen-head globose. Females, sepals red 2. Petals 2, white. Capsule .25 in. wide, 2 wings, short triangular, one longer blunt. *Hab.* Sandy banks, Selangor, Klang Gates; Semangkok Pass.

(10) **B. thaipingensis** *King, l.c.* 61.

Rhizome long, slender, creeping, villous. Leaves velvety dark green, claret-colour beneath, round reniform, edges dentate, lower lobes overlapping, scaly, especially on underside and nerves 6 to 7 tomentose, 1.25 to 2 in. long, 1.5 to 2.25 in. wide; petioles 1 to 4 in. long, tomentose. Peduncles 4 to 9 in. long villous, slender with 1 to 2 pairs of lanceolate bracts and 3 to 5 slender-pedicelled pink flowers. Males, sepals 2, rounded .15 in. long. Petals 2, smaller, oblong. Anthers obovate, tip emarginate. Female of 5 lobes. Style thick, 2 arms. Stigmas twisted. Capsule 2-celled .5 in. wide; wings sub-equal triangular. *Hab.* Shady places. Selangor, Semangkok; Kanching (Ridley). Perak, Thaiping (Scortechini, Wray, Kunstler).

(11) **B. carnosula** *Ridl. Journ. F.M.S. Mus.* iv. 20.

Succulent, acaulescent, rhizome creeping. Leaves ovate-cordate oblique, lobes sub-equal, edge entire, 4 to 5 in. long, 3 to 4 in. wide; nerves 6, red-hairy; petioles 3 to 5 in. long, glabrous; peduncle axillary, 5 to 7 in. long, glabrous; branches one or two, 1 in. long. Flowers white. Males, sepals 2, oblong ovate, .3 in. long. Petals 2, linear narrower. Stamens, anthers in a ball on a peduncle as long, spatulate blunt. Fruit .5 in. long, 3-winged, 1 wing larger rounded, .25 in. across, others narrower, 2-celled. *Hab.* Muddy banks in forest, local. Perak, Ulu Batang Padang (Ridley).

(12) **B. leucantha** *Ridl. Journ. Roy. As. Soc. S. Br.* 57, p. 49.

Rhizome under 1 in. long. Stem 4 in. tall hairy with 3 to 4 remote leaves. Leaves ovate unequally cordate, entire, succulent, 6 in. long, 4 in. wide, glabrous above, hairy beneath, especially on nerves and edge; petioles 1 to 3 in. long, hairy. Peduncle 1.5 in.

long with 1 to 2 branches, .5 in. long, glabrous. Bracts oblong truncate caudate, hairy .25 in. long. Male flowers white, .75 in. wide. Sepals oblong obtuse, .25 in. long. Petals narrow linear-oblong .12 in. long. Stamens in a globose head; anthers pyriform truncate. Females, petals oblong truncate, sub-equal. Ovary 2-celled. *Hab.* Forest banks, local. Perak, on banks at Temengoh (Ridley).

(13) ***B. debilis*** King, l.c. 60.

Slender weak herb 6 to 8 in. tall. Leaves about 3, thin, ovate reniform blunt to sub-acute deep green, base unequally rounded, nearly or quite entire, 1.5 to 3 in. wide, 3.5 to 7 in. long, glabrous; nerves 7; petioles 1 to 3 in. long. Panicle lax, slender axillary and terminal; branches few; bracts in pairs, ovate-lanceolate .1 to .15 in. long. Flowers white. Male .35 in. across. Sepals 2, oblong-ovate, blunt. Petals 2, smaller. Stamens in a globular mass; anthers obovate emarginate. Female flower of 5 segments obliquely oblong. Styles united in a column, above divided. Capsule .75 in. broad, .4 in. long, 2-celled, lateral wings triangular acute, posterior oblong twice as long. *Hab.* On rocks in forests. Negri Sembilan, Gunong Tampin (Robinson). Perak, Gunong Pondok, on limestone rocks (Kunstler).

(14) ***B. guttata*** Wall. Cat. 3671A; Clarke, in Hook. fil. F.B.I. ii. 648; King, l.c. 61.

Dwarf creeping plant. Stem succulent, red. Leaves 2, oblique reniform, glabrous, base completely cordate, apex sub-acute; nerves 5, sparsely hairy, 4 to 7 in. long, 2 to 4.5 in. wide; petioles 1.5 to 4 in. long. Peduncles 1 to 2 in. long, glabrous with a few flowers at tip. Males, sepals 2, round. Petals 2, oblong, white tinged pink. Stamens 50; anthers obovoid. Female flower segments 5. Styles 2; branches twisted 2. Capsule .4 in. long, .75 in. wide, smaller wings very narrow, posterior broad. *Hab.* Local, and not common; on damp rocks in woods. Selangor, Ginting Bidai. Penang (Wallich); Batu Hitam (Curtis).

(15) ***B. variabilis*** Ridl. Journ. Roy. As. Soc. S. Br. 57, p. 50.

Caulescent, 12 in. tall, glabrous. Leaves distant, lanceolate acuminate, base bilobed very oblique acute 4 in. long, 3 in. wide; lower lobe 2 in. long, purple, green or green with white spots; petioles 1.5 to 3 in. long. Peduncle 2 in. long. Bracts papery, lanceolate-acuminate, .5 in. long. Males in terminal cyme, .25 in. wide. Sepals orbicular ovate blunt. Petals as long narrower oblanceolate; anthers pyriform. Capsule wings 3, nearly equal. *Hab.* Banks in forests. Perak, Temengoh (Ridley).

(16) ***B. phœniogramma*** Ridl. Journ. Roy. As. Soc. S. Br. 75, p. 35. *B. paupercula* Ridl. Journ. Roy. As. Soc. S. Br. 54, p. 42 (not of King).

Small dwarf plant with creeping rhizome, 4 to 6 in. tall. Stem pink, glabrous. Leaves ovate acuminate cordate unequally, light green or dark with white spots; nerves 5 to 7; 4 in. long, 2.25 to

3 in. wide; petioles 2 to 3 in. long. Peduncle 3 in. long. Cyme few-flowered. Bracts lanceolate, white veined red. Males, sepals orbicular-ovate blunt, white veined red, .25 in. long. Petals 2, smaller, spatulate. Stamens in a globose head; anthers subglobose. Females .5 in. across. Petals 6 to 7, obovate. Styles 2, free to base. Capsule lateral wings short, posterior oblong triangular blunt, .5 in. long. *Hab.* Limestone rocks, rare. Selangor, Batu Caves (Ridley). Lankawi (Curtis).



FIG. 70.—*Begonia eiromischa*.

(17) *B. sibthorpioides* Ridl. *Journ. F.M.S. Mus.* vii. 42.

Rhizome tuberous .2 in. long, golden-hairy. Stems very slender 2 to 4 in. long red, glabrous. Leaves in distant pairs, orbicular cordate crenate, red beneath, glabrous .5 in. long and wide not oblique; petioles .2 to .8 in. long. Male flowers small 2 to 3 subterminal on 1 to 3 branches. Sepals 2, oblong, blunt. Petals 2, all white or rose pink. Anthers in a globose pedicelled head. Fruit .1 in. long, one wing large oblong .2 in. long, others very short. *Hab.* Kedah Peak at 3800 ft. altitude (Robinson).

(18) **B. Hasskarli** Zoll. and Mor. Syst. Verz. Zoll. 31 (not of Miquel); King, l.c. 62. *B. peltata* Hassk. *B. hernandiæfolia* Hook. fil. Bot. Mag. t. 4676, not of others.

Small glabrous plant, with a creeping rhizome, rather thick with 3 or 4 leaves. Leaves fleshy ovate acuminate peltate, bluish green, beneath deep red; nerves 10, 3·5 to 5·5 in. long, 2·25 to 3·75 in. wide; petioles 3 to 4 in. long. Stipules lanceolate. Peduncle from rhizome 7 to 8 in. long; panicle slender, few-branched, 2·5 in. long. Flowers small, white tipped red or all red. Males 2 in. broad. Sepals 2, reniform. Petals 2, narrow, oblong. Stamens cuneiform emarginate; filaments short, free. Females, sepals 2, reniform. Style short, thick; branches 4. Stigmas 4, lobulate. Capsule 4-celled, 6 in. long, lateral wings narrow; posterior 5 in. long, narrowed to blunt tip. *Hab.* Limestone rocks. Pahang, Gunong Senyum (Evans). Selangor, Batu Caves. Perak, Gopong (Kunstler); K'wala Dipang.

var. *hirsuta*, with young leaves and adult petioles hairy. Pahang, Kota Glanggi (Ridley). *Distrib.* Java.

(19) **B. eiromischa** Ridl. Journ. Roy. As. Soc. S. Br. 75, p. 36 (Fig. 70, p. 859).

Rhizome short, stout. Leaves fleshy obliquely reniform peltate acuminate deep green, glabrous, 3 to 3·5 in. long and wide; nerves 7; petioles 2 to 3 in. thick, densely red-hairy. Peduncle glabrous red, about 5 in. long. Flowers on 2 branches, small rose pink 5 in. across. Male, sepals 2, broad orbicular rounded. Petals very narrow, linear. Females, style trifid; branches bifid. Fruit 6 in. long, lateral wings very short, posterior rather thin, broad oblong rounded, 3 in. long and wide. *Hab.* Penang, Pulau Betong (Curtis 1028).

(20) **B. Scortechinii** King, l.c. 62.

Rhizome stout scaly. Leaves narrow lanceolate-acuminate dentate, base sub-acute (not lobed) hairy on both sides; nerves pinnate 3 to 4 pairs, 2·3 to 4 in. long, 1 in. wide; petioles 5 to 7 in. long. Peduncles from rhizome 4·5 in. long, glabrous; branches at top 2 to 3, about 2 in. long. Bracts lanceolate. Flowers white tinged pink and green. Male, sepals ovate blunt, 75 in. long. Petals 15 in. across, linear oblong. Stamens in a ball on a short column; anthers apiculate. Female, segments 5. Styles free, 2- to 4-fid. Capsule 75 in. broad, lateral wings narrow oblong, posterior larger. *Hab.* Perak (Scortechini).

var. *Kunstleriana* Ridley. *B. Kunstleriana* King, l.c. 63.

Leaves broader, base somewhat rounded ovate-lanceolate; petioles very hairy, 6 in. long, 1·5 in. wide. Perak, Bujong Malacca (Kunstler).

(21) **B. rhoephila** Ridl. Journ. Roy. As. Soc. S. Br. 75, p. 36.

Rhizome creeping, stout 1 in. long. Leaves nearly or quite glabrous, lanceolate caudate-acuminate, base decurrent on petiole, sparsely distant toothed, apex closely toothed; nerves 4 pairs,

often hairy on back, midrib always hairy (with appressed hairs), 5 to 6 in. long, 1 to 2 in. wide; petioles 1.5 to 4 in. long, glabrous or hairy. Peduncle 1 to 2 in. long in flower, 12 in. in fruit, stouter, glabrous. Flowers few, short pedicelled, white tinted pink on back or all rose pink. Male, sepals oblong-ovate .3 in. long, .3 in. wide. Petals narrower, oblong. Stamens numerous; anthers oblong apiculate as long as filaments. Females, 5-petalled. Fruit 1.1 in. across, .5 in. long, lateral wings blunt triangular, posterior .75 in. long, .3 in. wide, oblong rounded thick ribbed. *Hab.* Rocks in streams, forests. Selangor, Ulu Gombak (Ridley).

(22) **B. perakensis** King, *l.c.* 64.

Rhizome moderately stout. Leaves ovate-lanceolate acuminate caudate, base rounded, sparse and distant toothed, except apex closely denticulate, glabrous; nerves pinnate 4 to 5 pairs, 3.5 to 5.5 in. long; petioles 2.5 to 5 in. wide. Peduncles slender, 3 in. long, 4-angled. Flowers few, rich pink. Male, sepals round ovate .4 in. long. Petals 2, oblong, much smaller. Stamens linear, apiculate; filaments short. Female segments 5. Capsule 1.2 in. broad, .5 in. long, 2-celled, lateral wings narrow, posterior oblong, blunt, thick, .35 in. broad. *Hab.* Rocks in streams 500 to 3000 ft. altitude. Selangor, Bukit Hitam; Ginting Bidai; Semangkok Pass. Perak, Kal (Kunstler).

(23) **B. klossii** Ridl. *Journ. Linn. Soc.* xli. 290.

Rhizome long creeping. Leaves ovate base rounded acuminate entire, glabrous, but scurfy on the back; nerves 5, 4.5 in. long, 2.5 in. wide; petioles 7.5 in. long. Peduncles red, 6 in. long. Male flowers 3 to 4 on slender pedicels, .75 in. long. Bracts 2, lanceolate, persistent, .4 in. long. Sepals oblong sub-spathulate rounded, .5 in. long. Petals narrower and shorter. Stamen-head sessile; anthers linear not apiculate. Capsule 3-winged, laterals obtusely triangular, posterior oblong obliquely rounded, .75 in. long, .5 in. wide. *Hab.* Mountains 3000 to 4000 ft. altitude. Selangor, Menuang Gasing (Kloss).

(24) **B. herveyana** King, *l.c.* 63.

Big glabrous plant, rhizome rather stout, creeping. Leaves broad elliptic-ovate, short acuminate, base round or slightly narrowed, obscurely serrate; nerves 6 pairs, 5 to 9 in. long, 3 to 4.5 in. wide; petioles 6 to 8 in. long. Stipules lanceolate. Peduncles 5 to 10 in. long fleshy with 2 or 3 branches at tip with few pink flowers. Males, sepals ovate round. Petals 2, much smaller oblong, blunt. Stamens in a cone linear apiculate. Female, petals 5, round. Capsule 1 in. broad, .5 in. long, lateral wings narrow oblong, posterior ovate, blunt, .65 in. long. *Hab.* Forests. Johor, Pulau Tinggi (Feilding). Malacca, Ulu Bumban (Derry); Jeram Nyalas (Derry). Negri Sembilan, Bukit Sulu (Cantley).

var. *robusta*. Rhizome very stout. Leaves ovate acuminate, denticulate on tip, base narrowed cuneate; nerves 4 pairs, 9.5 in. long, 5.5 in. wide; petioles 9 in. long. Peduncles stout

18 in. tall; branches 3 in. long. Flowers numerous, white. Bracts purplish pink. Capsule 1.25 in. wide, .5 in. long, lateral lobes oblong, .2 in. across, posterior thick, oblong, .5 in. long, rounded at tip. *Hab.* Pahang, Gunong Tahan 500 to 1000 ft. altitude (Robinson). A much stouter plant than the Malacca one.

(25) **B. monticola** Ridl. *Journ. F.M.S. Mus.* v. 34.

Glabrous, rhizome creeping. Leaves ovate inæquilateral acuminate, base unequally bilobed, denticulate; nerves 10, 3.5 to 5 in. long, 1.75 to 2.5 in. wide; petioles 6 in. long. Peduncle red, 8 to 2 in. long in fruit. Flowers few, 1 in. across. Male, sepals 2, oblong-obovate. Petals smaller. Female, sepals and petals equal obovate round, white. Capsule 3-winged, .5 in. long, .1 in. wide, lateral wings broad, triangular, blunt, .3 in. long, posterior .7 in. long, broad oblong rounded thick. *Hab.* Mountains at 5000 ft. altitude. Selangor, Gunong Mengkuang Lebah (Robinson).

(26) **B. venusta** King, *l.c.* 65.

Rhizome rather slender. Leaves dark green, red beneath, ovate acuminate, minutely denticulate, base unequally round bilobed, glabrous; nerves 7 from base, 3 to 6 in. long, 2 to 3.5 in. wide; petioles 6 to 12 in. long. Peduncles 6 to 12 in. long with 2 to 3 large white pink-tinted flowers at top. Males, sepals 2 ovate or oblong, round blunt .75 in. long. Petals 2 larger. Stamens narrow oblong, apiculus large. Females, smaller of 5 petals; styles very short. Capsule .3 in. long, 1.15 in. broad, lateral wings more than half as long as posterior one, .7 in. long, thick. *Hab.* High mountains at about 6000 ft. altitude. Perak, Ulu Batang Padang (Wray); Gunong Kerbau (Robinson). Telom (Ridley).

B. megapteroidea King, *l.c.* 65, from Gunong Brumber Pahang (Wray), seems to me identical. The plants referred to it from Sumatra (Forbes, etc.) are hairy, and no doubt, as Koorders suggests, are *B. rubra* Bl.

(27) **B. longicaulis** Ridl. *Journ. Roy. As. Soc. S. Br.* 75, p. 35.

Stem elongate with internodes 2.5 in. long, red, glabrous. Leaves ovate cuspidate, base deeply cordate unequally 3 in. long, 2.5 in. wide; petioles 4 to 6 in. long. Stipules persistent, oblong with a terminal seta, 1 in. long, .2 in. wide. Peduncles 6 in. long with 2 terminal flowers on pedicels 1 in. long. Flowers pinkish white, 1.5 in. wide. Males, sepals broad, ovate, .75 in. long and wide. Petals oblong-lanceolate, blunt, .3 in. wide. Stamens in a globose head on short stalk. *Hab.* Mountain woods. Pahang, Gunong Tahan (Ridley). Perak, Gunong Kerbau (Robinson).

(28) **B. paupercula** King, *l.c.* 64 (not of Ridley).

Rhizome rather stout. Leaves ovate unequal sided acuminate to ovate-lanceolate, base oblique, edges sinuate denticulate, glabrous; nerves 5 to 7 radiating from base, 3.5 to 5 in. long, 1.25 to 3.5 in. wide, glossy bright green, fleshy. Flower white, tinged red. Males, sepals 2 elliptic-oblong, .4 in. long. Petals 0. Stamens linear-oblong, apiculate. Females, petals 5, unequal. Capsule

·6 in. long, 1 in. wide, lateral wings sub-elliptic, oblique, ·3 in. broad, posterior oblong, blunt, thick, 6 to 7 in. long, ·35 in. wide. *Hab.* Forests on rocks. Perak, Goping (Kunstler).

(29) **B. Robinsonii** *Ridl. Journ. F.M.S. Mus.* iv. 22.

Rhizome stout fleshy, ·5 in. through; sheaths ovate. Leaves ovate sub-acute unequal-lobed, fleshy, glabrous green polished entire, 3 in. long, 2 in. wide; nerves 5 to 7; petioles 2 in. long. Peduncle 1·5 in. long, axillary. Bracts 2 below flowers ovate acute green, ·5 in. wide. Males, white; pedicel ·25 in. long. Sepals 2, ovate blunt, ·4 in. long, ·25 in. wide. Petals 2, oblong blunt, a little smaller. Stamens capitate on a short column; anthers short, oblong. *Hab.* Dense forests at 4000 ft. altitude, occasionally creeping up trees a short way. Pahang, Telom woods (Ridley).

(30) **B. pavonina** *Ridl. Journ. F.M.S. Mus.* iv. 22.

Rhizome short, red. Leaves ovate-cordate acuminate or acute, base unequally lobed, entire, glabrous (except when young); nerves 9, satiny green when young, deep green shot peacock-blue above (when adult), red beneath, 5 in. long, 4 in. wide; petioles 7 in. long, red. Peduncles 6 in. long. Flowers few. Bracts linear-oblong. Males, sepals 2, ovate obtuse, ·5 in. long, ·75 in. wide. Petals narrower, linear-oblong, ·2 in. wide. Stamens in a sessile or short-stalked head; filaments separate; anthers oblong. Females, sepals 2, ovate. Petals 2 (or 3). Styles 2, connate half-way; arms 2, spiral. Capsule wings 2 small, one large elliptic. *Hab.* Dense forests in mountains at 4000 ft. altitude. Pahang, Telom woods (Ridley).

(31) **B. Maxwelliana** *King, l.c.* 66.

Rhizome stout. Leaves ovate to round acuminate, base very unequally lobed, edges ciliate denticulate more or less hairy green; nerves 7 to 9, radiating 5 to 6 in. long, 4 to 7 in. wide; petioles 4 to 10 in. long, hairy. Peduncles 8 to 12 in. tall, hairy, above dichotomously branched. Bracts short broad. Males clustered, sepals 2, oblong ovate, blunt, ·4 in. long. Petals 2, smaller. Stamens numerous in a sessile head. Females of 5 petals. Styles 2, much lobulate. Capsule 1·4 in. broad, 1·6 in. long, lateral wings sub-quadrate, blunt, posterior oblong, narrowed at tip, blunt, ·8 in. long, ·5 in. wide, ribbed thick. *Hab.* Banks in mountain forests. Perak, Thaipung Hills, 2500 to 3000 ft. or more altitude (all collectors); Bujong Malacca. Penang, Government Hill (Foxworthy).

(32) **B. decora** *Stapf, Kew Bulletin* 1893, p. 29. *B. præclara* *King, l.c.* 66.

Rhizome creeping, scaly. Leaves oblique ovate acuminate, base unequally rounded, minutely dentate, dark green or red above with lighter colour along the nerves, with conical papillæ, each bearing a coarse hair, deep red or more or less hairy beneath; nerves 7, prominent beneath, 3·5 to 5·5 in. long, 2·5 to 3·5 in. wide; petioles 3 to 6 in. long, hairy. Peduncles taller, glabrous 1- to

3-flowered. Flowers white or red. Male, sepals $\cdot 75$ to 1 in. long, oblong-ovate. Petals 2, narrow oblong, $\cdot 5$ in. long. Stamens spathulate blunt. Female, styles 2 bifid, branches divided into twisted lobes. Capsule $\cdot 5$ in. long, 1.5 in. wide, lateral wings quadrate ovate, $\cdot 4$ in. long, posterior oblong blunt, 1 in. long. *Hab.* Mountains, 4000 to 4200 ft. altitude. Perak (Kunstler); Gunong Kerbau (Robinson). Pahang, Telom woods abundant. Lankawi (Curtis).

(33) **B. Lowiana** King, *l.c.* 67.

A caulescent herb. Stem about 3 ft. tall, hairy. Leaves very oblique reniform (some ovate acute), basal sinus deep, dentate serrate, hairy all over; nerves 7, pale green, 3 to 4.5 in. long, 4 to 7 in. wide; petioles $\cdot 4$ (above) to 4 in. long, below, hairy. Cymes few-flowered, terminal 2 to 3 in. long; pedicels slender, red. Bracts ovate lanceolate, ciliate. Males, $\cdot 75$ in. across, white. Sepals 2, ovate-oblong. Petals 2, oblong, smaller. Stamens oblong not apiculate. Female, petals 5. Styles 2, bifid, spiral. Capsule $\cdot 65$ in. long and 1.2 in. wide, lateral wings very narrow, $\cdot 15$ in. broad, posterior broad ovate, blunt, $\cdot 9$ in. long, $\cdot 8$ in. wide. *Hab.* Mountains 6000 to 6700 ft. altitude. Perak, Gunong Brumber Pahang and Gunong Batu Putih (Wray).

(34) **B. hirtella** Link. *Enum. Hort. Berol.* ii. 296.

A dwarf caulescent hairy herb 4 to 12 in. tall. Leaves thin very oblique reniform, hardly cordate, 1 to 3 in. wide, small white flowers and thin fruit 1 in. across with two short rounded lobes and one ovate oblong much bigger. *Hab.* Occurs on banks in Singapore and Penang Hill near the Crag Hotel. *Distrib.* Native of Peru and Brazil. A garden escape.

ORDER LXVII. DATISCACEÆ.

Trees (or herbs). Leaves simple (or pinnate). Flowers small bisexual, paniced or racemed. Males, calyx-tube short, teeth 4, (to 9). Petals 0. Stamens 4 (to 25). Female calyx adnate to ovary, lobes 4 (to 8). Petals 0. Ovary 1-celled; styles 4 (or 3); ovules many. Capsule coriaceous opening between the styles. Seeds many. Species 4, Europe, temperate Asia to Java and N.W. America.

TETrameLES, R. Br.

A gigantic tree. Leaves ovate pubescent. Flowers diœcious appearing before the leaves. Males paniced, small. Females in elongate racemes from ends of branches. Male calyx-tube short, teeth 4 ovate. Petals 0. Stamens 4, opposite calyx teeth inserted round a disc. Female, calyx-tube ovoid, teeth 4, short; styles 4.

Stigmas clubbed. Capsule ovoid, membranous opening between the styles. Seeds minute, ellipsoid, testa prolonged into a membrane. Species 1, India, Burma, Java.

(1) *T. nudiflora* R. Br. *Benn. Pl. Jav. Rar.* 99, t. 17; *Clarke, in Hook. fil. F.B.I.* ii. 657.

A gigantic tree over 100 ft. tall. Leaves 6 in. long, 4.5 in. wide, toothed acute, base retuse, softly downy; petioles 3 in. long. Male panicles numerous 6 in. long, 1 in. across. Flowers about



FIG. 71.—*Tetrameles nudiflora*.

·2 in. across. Female racemes 15 in. long. Fruit ·25 in. long, ·15 in. through. *Hab.* Kedah, Gunong Geriang (Ridley), in fruit and leafless in February.

ORDER LXVIII. CACTACEÆ.

Succulent spiny leafless jointed shrubs. Flowers large, showy, white, yellow or red, solitary sessile. Petals and stamens indefinite, superior. Ovary inferior with numerous placentæ and ovules; style elongate. Stigma 2- to many-radiated. Fruit a berry.

Species over 1000, nearly all South American. One species introduced here and more or less established in sandy spots.

OPUNTIA, Mill.

Stem elongate, lobes flat with tomentose tubercles bearing long spines. Flowers lateral yellow (or red). Calyx-tube not prolonged beyond the ovary. Sepals numerous. Petals numerous connate. Stamens in many series, shorter than petals. Berry pear-shaped.

(1) *O. monacantha* Haw. *Suppl. Pl. Succ.* 81; *Burkill, Gardens Bulletin* i. 320.

Plant usually about 6 ft. tall, often more; lobes spatulate, 8 to 10 in. long, 4.5 in. wide, spines long, white single or in pairs. Calyx 2 to 3 in. long, sepals green tipped red. Corolla 3 in. wide, yellow, reddish on the back. Stamens shorter. Stigmas 6. Style short thick. Fruit pear-shaped 4 in. long. *Hab.* Sandy spots near the coast. Singapore, Galang; Balestier. Malacca. Introduced many years ago and more or less established.

ORDER LXIX. FICOIDEÆ.

Herbs often succulent. Leaves often fleshy opposed or whorled. Flowers in cymes or clusters rarely solitary, bisexual. Calyx of 4 or 5 sepals connate into a tube or nearly free, free from ovary. Petals usually 0. Stamens perigynous or hypogynous, definite or indefinite. Ovary free, 2- to 5-celled, syncarpous (in Malay species); styles as many. Fruit capsular, splitting dorsally or circumsciss. Seeds many (or 1) reniform. Species 450, mostly African.

Succulent seashore herb; flowers conspicuous, pink . . . 1. SESUVIUM

Slender erect much-branched herbs; flowers very small.

Seeds with a bristle appendage 2. GLINUS

Seeds with no appendage 3. MOLLUGO

1. SESUVIUM, Linn.

Succulent prostrate herb. Leaves opposite, linear, spatulate, sub-cylindric, fleshy. Flowers axillary sessile or pedicelled, solitary. Calyx-tube short; lobes 5, coloured inside. Petals 0. Stamens many, insert round mouth of calyx-tube. Ovary free 3- to 5-celled; styles 3 to 5. Capsule ovate-oblong membranous, circumsciss. Seeds many reniform. Species 4 or 5, littoral, warm countries.

(1) *S. Portulacastrum* Linn. *Syst. ed.* 10, p. 1058; *Clarke, in Hook. fil. F.B.I.* ii. 659; *King, l.c.* 68.

A fleshy creeping plant with light green leaves about 1 in. long.

Flowers solitary, pedicelled, 1 in. across, rose pink inside. Stamens 15 to 40, free or nearly so. Capsule .2 in. across. *Hab.* In tidal mud and sand on sea-coasts. Common. Singapore, Changi (Hullett). Johor, Pengarang; Jambu Larang (Feilding). Pahang, Sungei Meang. Dindings, Pangkor; Lumut. Tringganu, Cherating River. *Distrib.* Indo-Malaya. *Native names:* Sepit; Sesipit; Gelang Laut. *Use:* An excellent pot-herb, but requires long soaking in fresh water to free it from salt.

2. GLINUS, Linn.

Herbs tomentose or glabrous erect branched. Leaves alternate or falsely whorled, linear to spathulate. Flowers axillary in cymes, umbellate, small. Sepals 5. Petals 0. Stamens 5 or more; filaments filiform. Ovary ovoid or sub-globose. Seeds very numerous with an appendage of a short bristle. Species of about 6, Eastern and Western tropics.

(1) *G. mollugo* Fenzl. *Ann. Wien. Mus.* i. 350. *Mollugo* spergula DC. *Prodr.* i. 391; *Clarke, in Hook. fil. F.B.I.* ii. 662.

A much-branched glabrous herb up to 18 in. tall. Leaves spathulate lanceolate or elliptic, .5 to 1 in. long; petioles .12 in. long or often absent. Pedicels slender, .5 in. long. Flowers .12 in. wide. Sepals ovate acute yellowish white. Stamens 8 to 10. Stigmas 3. Capsule ellipsoid shorter than the sepals. Seeds tubercled, with short bristles at the top. *Hab.* Sandy places on the east coast. Pahang at Kalambalai, Pahang River. Kelantan, Kamposa (Ridley). *Distrib.* India, Africa, Australia.

3. MOLLUGO, Linn.

Herbs branched dichotomously. Leaves alternate or falsely whorled or radical, linear to obovate. Flowers axillary, sessile or pedicelled in panicles or racemes, small. Sepals 5, persistent. Petals 0. Stamens 5 to 3. Ovary free, globose or ellipsoid, 3- to 5-celled; styles 3 to 5. Capsule membranous, 3- to 5-celled. Seeds many with no bristles at the top. Species 12, tropics and sub-tropics.

(1) *M. pentaphylla* Linn. *Sp. Pl.* 89; *King, l.c.* 69. *M. stricta* Linn. *Sp. Pl. ed.* ii. 131; *Clarke, in Hook. fil. F.B.I.* ii. 663.

A slender glabrous much-branched herb often red, 3 to 6 or 12 in. tall. Leaves .75 in. long, 1.5 in. wide, lanceolate acute or ovate blunt, narrowed to base, sub-sessile or sessile. Cymes lax on slender peduncles, spreading .5 to .2 in. long. Sepals .05 in. long, elliptic or round. Stamens 3 to 5. Styles 3, linear. Capsule globose. Seeds brown, tubercled. *Hab.* Waste ground and sandy spots. Common. Singapore, Tanglin; Changi. Johor, Pengarang; Batu Pahat. Pahang, Pahang River to Tembeling. Malacca,

Merlimau; Alor Gajah. Selangor, Kwala Lumpur. Negri Sembilan, Port Dickson. Perak, Temengoh. Province Wellesley, Kubang Ulu (Curtis). Kelantan, Kamposa. Setul Heath. *Distrib.* Indo-Malaya, China, Polynesia. *Native names:* Tapak Burong; Rumput Belangkas.



FIG. 72.—*Mollugo pentaphylla*.

ORDER LXX. UMBELLIFERÆ.

Herbs. Leaves alternate usually more or less lobed or divided; petiole usually sheathing. Styles none. Flowers bisexual (rarely unisexual) in compound umbels (simple in *Hydrocotyle* and *Eryngium*), involucrate. Flowers small. Calyx adnate to ovary with a 5-toothed limb, often absent. Petals 5, epigynous. Stamens 5, epigynous. Ovary inferior 2-celled, 1 ovule in each cell; styles 2. Stigmas capitellate. Fruit of 2 compressed indehiscent carpels attached to and pendulous from a carpophore with 5 primary ridges

and often 4 secondary ones between. Seeds 1 in each carpel. Species about 1500, chiefly in northern temperate regions, very few in the tropics.

Creeping herbs	1. HYDROCOTYLE
Erect herbs.	
Leaves spiny; flowers in a dense head	2. ERYNGIUM
Unarmed herbs; flowers distinctly umbelled.	
Umbels irregularly compound, rays few	3. SANICULA
Umbels distinctly rayed	4. CENANTHE

1. HYDROCOTYLE, Linn.

Long-creeping herbs. Leaves cordate rounded or reniform lobed or crenate, long petioled. Umbels simple small dense. Flowers very small. Calyx-teeth minute or 0. Petals entire. Fruit ellipsoid, flat nearly or quite sessile in small heads. Species 70, tropics and temperate regions.

Stem branches ascending a foot or more; umbels clustered on long pendulous peduncles; leaves lobed (1) *H. javanica*

No ascending branches; umbel peduncles very short; leaves reniform crenulate.

Leaves .5 to 2 in. wide, crenate (2) *H. asiatica*

Leaves .25 in. wide, lobed (3) *H. rotundifolia*

(1) *H. javanica* Thunb. *Dissert. Hydrocotyl. n.* 17, t. 2; Clarke, in *Hook. fil. F.B.I.* ii. 667; King, *l.c.* 70.

Stem creeping and throwing up branches a foot tall. Leaves rounded or reniform cordate with 5 or 6 lobes more or less crenulate, 2 in. wide and a little shorter; petioles 1 to 4 in. long, pubescent. Peduncles numerous terminal, hairy, .5 in. long with numerous bracts at the base, each bearing a compact umbel or head of many small white flowers, occasionally branched. Fruit numerous crowded, broadly obovoid, compressed, .1 in. long. *Hab.* Damp spots in woods usually high up on mountains. Pahang, Telom. Perak, Thaiping Hills 200 to 500 ft. altitude (Kunstler); near the Cottage, 4000 ft. altitude; Temengoh. *Distrib.* India, Malay isles, Australia.

(2) *H. asiatica* Linn. *Sp. Pl.* 234; Clarke, *l.c.* ii. 669; King, *l.c.* 71.

Slender creeping plant with no ascending stems. Leaves in tufts of 2 or 3 at the nodes, reniform crenate, glabrous, .5 to 2 in. wide; petioles 1 to 3 in. long. Flowers crowded in the leaf-axils with numerous bracts. Umbels compact on very short .1 to .2 in. long peduncles. Fruit .1 in. long, strongly ribbed. *Hab.* Very common in grass and waste places all over the peninsula. *Distrib.* tropics and sub-tropics of Old World. *Native name:* Pegaga. *Use:* A drug for liver-troubles and leprosy, much valued and largely collected and sold by the herb-women in the markets.

(3) **H. rotundifolia** Roxb. *Hort. Beng.* 21; *Fl. Ind.* ii. 28; *Clarke, l.c.* ii. 668.

A very slender little creeper. Leaves orbicular cordate shortly lobed and crenulate, .25 in. across, shining light green; petioles .2 to 1 in. long. Flowers in very small heads, sessile or on a solitary axillary peduncle, .1 to .2 in. long, very slender. Fruit very small, strongly ribbed. *Hab.* Singapore, Tanglin. A weed in paths. *Distrib.* Indo-Malaya. *Native name:* Kara-Kara.



FIG. 73.—*Hydrocotyle javanica*.

2. ERYNGIUM, Linn.

Spiny, glabrous, erect herbs. Leaves spiny toothed, entire lobed or dissect. Flowers in simple heads, bracteate. Bracts whorled, spiny. Calyx-tube covered with ascending scales; teeth rigid, acute. Petals whitish, narrow, emarginate. Fruit nearly cylindric; carpels sub-compressed, ridges obtuse not prominent. Species 100, temperate and tropical, whole world.

(1) **E. foetidum** Linn. *Sp. Pl.* 232.

About a foot tall. Stem branched above. Leaves radical, oblong-ob lanceolate, serrate, 4 to 9 in. long, .1 in. wide. Bracts, lower deeply lobed, upper smaller, 1 in. long, entire, whorled, all spiny. Spikes cylindric, green, under 1 in. long. *Hab.* Waste

ground near houses, common. A very foetid plant when bruised, said to have been introduced by Chinese, who cultivate it as a drug. Singapore, Bajau; Chan Chu Kang; Kandang Kerbau; Bukit Timah (Kunstler). Negri Sembilan, Bukit Tumiang (Cantley). Pahang, Raub (Machado). Selangor, Semangkok Pass (Machado). Penang (Curtis). Kelantan, Kota Bharu (Yapp). *Native name*: Kulubar. *Use*: As a pot-herb and drug.

3. SANICULA, Linn.

Erect herbs. Leaves palmate 3- to 5-partite; lobes toothed or dissected; umbels irregularly compound, rays few. Bracts leaf-like; umbellules small. Flowers mostly unisexual. Calyx-tube villous, spiny. Petals white, emarginate. Fruit ovoid, spiny. Carpels semi-terete, ridges obscure. Species many in the Old World temperate regions and N. America.

(1) *S. europea* Linn. *Sp. Pl.* 235; *Clarke, in Hook. fil. F.B.I.* ii. 670. *S. javanica* Bl. *Bijdr.* 882.

A herb 1 to 2 ft. tall. Leaves glabrous, palmate mucronate serrate, 2 to 4 in. across; petioles 1 to 4 in. long. Umbels wide spreading, 3 to 12 in. long, dichotomous, with few umbellules of few flowers densely crowded. Fruit 1 in. long covered with hooked bristles. *Hab.* In mountain forests at 4000 ft. altitude, rare. Pahang, Telom Valley (Ridley). *Distrib.* Europe, mountains of tropical Asia and Africa.

This is the form known as *S. javanica*. It is rather larger and of more straggling habit than the European plant, but I cannot see any really distinctive characters between this and the common one of the English woods.

4. ŒNANTHE, Linn.

Tall herbs in wet spots, erect. Leaves 1- to 3-pinnate; leaflets toothed. Umbels compound, axillary; umbellules many-flowered. Flowers small, white. Calyx-teeth small, acute. Petals emarginate. Fruit glabrous, ellipsoid (or globose). Carpels semi-terete, ridges corky. Species 25, north temperate regions and S. Africa.

(1) *O. stolonifera* Wall. *Cat.* 585; *Clarke, in Hook. fil. F.B.I.* 696. *O. javanica* and *Dasyloma laciniatum* Miq. *Fl. Ind. Bat.* i. (1), 741.

An aquatic herb 2 to 3 ft. tall, quite glabrous. Leaves thin, 9 in. long, bipinnate, segments rhomboid acute, base narrowed, strongly toothed, 5 in. long, 25 in. wide. Peduncles 1 to 3 in. long, umbel rays 5 in. or longer, 6 to about 10; pedicels 3 in. or less. Fruit 1 in. long, smooth. *Hab.* Pools and swamps. Dindings at Lumut. Perak, Temengoh woods (Ridley). *Distrib.* Indo-Malaya, China.

This is cultivated by the Javanese, and may possibly be an alien here, but in both the spots given above it was far from any houses and appeared quite wild.

ORDER LXXI. ARALIACEÆ.

Trees or shrubs, often epiphytic (very rarely herbs), often prickly. Leaves alternate, large, compound, or simple; stipules adnate to petiole, or none. Flowers in umbels, racemes or heads. Calyx-tube adnate to ovary, limb truncate or with small teeth. Petals 5 (rarely 6 or 7) valvate, often deciduous in a cap. Stamens as many (very many in *Tupidanthus*) insert round an epigynous disc. Ovary inferior, 2-celled, or as many cells as stamens, 1-celled in *Arthrophyllum*; styles as many as cells. Fruit drupaceous. Seed albuminous often ruminant. Species 340, chiefly tropics and sub-tropics, a few temperate regions (*King, Journ. As. Soc. Beng.* lxvii. 42).

- | | |
|-------------------------------------------------------------------------|--------------------|
| Petals slightly imbricate; leaves compound; styles
2 to 5 | 1. ARALIA |
| Petals valvate; stamens few up to 12. | |
| Albumen not ruminant; ovary 4- to 5-celled | 2. SCHEFFLERA |
| Fruit ridged when dry; leaves usually palmate
or digitate. | |
| Fruit fleshy not ribbed; flowers unisexual;
leaves lobed | 3. TREVESIA |
| Fruit fleshy; flowers bisexual in heads; leaves
digitate | 4. BRASSAIA |
| Fruit small obscurely ridged; leaves simple
(adults) | 5. DENDROPANAX |
| Albumen ruminant. | |
| Ovary 1-celled; ovule 1; leaves pinnate or
simple | 6. ARTHROPHYLLUM |
| Ovules 2; fruit 2-celled, 2-seeded; leaves
simple | 7. WARDENIA |
| Ovary 2-celled; leaves digitate or palmate | 8. BRASSAIOPSIS |
| Ovary 4- to 5-celled; leaves 1- to 3-foliolate
toothed | 9. HEDEROPSIS |
| Stamens over 12; ovary 8 or more celled. | |
| Ovary 8-celled; stamens 14 to 16; leaves
digitate, serrate | 10. SCHEFFLEROPSIS |
| Ovary many-celled; stamens 50 to 70;
flowers large | 11. TUPIDANTHUS |

1. ARALIA, Linn.

Shrubs, small trees (or herbs) hairy or prickly. Leaves alternate (or whorled) digitate, pinnate or compound; leaflets serrate. Umbels in panicles or racemes or solitary, rarely in compound umbels; pedicels jointed under the flower. Calyx margin truncate or 5-toothed. Petals 5, ovate, imbricate in bud. Stamens 5. Ovary 2- to 5-celled; styles 2 to 5, free or connate at base. Fruit 4- to 5-celled, 4- to 5-angled or sub-globose 2- to 3-celled albumen uniform. Species about 50, Indo-Malaya, Japan, N. America.

- | | |
|------------------------------------------------------------------|------------------------|
| Leaves entire or minutely serrate, tomentose beneath | (1) A. Thomsoni |
| Leaves coarsely serrate with a few white hairs beneath | (2) A. armata |
| Leaves almost entire, glabrous | (3) A. ferox |

(1) **A. Thomsoni** *Seem. Rev. Hed.* 91; *Clarke, in Hook. fil. F.B.I.* ii. 723; *King, l.c.* 44.

Prickly shrub 6 to 30 ft. tall, pubescent or tomentose. Leaves 2- to 3-pinnate; leaflets thick membranous 5 to 9 in a pinnule, ovate-lanceolate acuminate, base round oblique, edges serrulate, above strigose; nerves pubescent beneath tomentose, 2·5 to 3·5 in. long, 1 to 1·75 in. wide. Panicles 15 to 20 in. long; branches short. Umbels 1 in. across; pedicels in fruit ·5 in. long. Fruit ·15 in. long. *Hab.* Mountain woods, rarely in lowlands up to 1200 ft. altitude. Pahang, Pulau Chengei. Selangor, Ginting Bidai; Bukit Kutu. Negri Sembilan, Gunong Berumbun (Cantley). Perak, Batang Padang district; Ulu Kerling (Kunstler); Tapah. Penang Hill (Curtis). *Distrib.* India. *Native name:* Poko Dulang-Dulang.

(2) **A. armata** *Seem. Rev. Hed.* 91; *Clarke, l.c.* ii. 723; *King, l.c.* 45.

A prickly shrub, glabrous except the young parts. Leaves tripinnate, large; rachis puberulous; leaflets 9 to 11 in a pinnule, thin membranous, ovate-lanceolate acuminate, coarsely serrate, base round oblique and sometimes slightly cordate, sparsely hairy above with white hairs beneath on nerves, 3 to 5 in. long, 1·5 to 2 in. wide. Panicle 15 to 18 in. long, pubescent on branches; branchlets umbellate; pedicels ·3 to ·4 in. long. Fruit nearly ·2 in. long, ridges broad, flat. *Hab.* Lankawi; Kwah (Curtis). *Distrib.* India, Burma.

(3) **A. ferox** *Miq. Fl. Ind. Bat.* i. (1), 270; *King, l.c.* 45.

Stems scandent 20 to 30 ft. long, 2 in. through, thorny, thorns short recurved. Leaves bi- or tri-pinnate, pinnae 3 to 4 pairs, leaflets thin, coriaceous, 3 to 5 in a pinna, ovate acute in opposite pairs, bases round often unequal, nearly entire or serrate, glabrous, 1 to 2 in. long, ·75 to 1 in. wide; petiolules unequal, side ones ·15 to ·3 in. long. Panicle terminal 8 to 15 in. long, 6 in. wide with numerous branches and secondary branches; pedicels ·3 to ·5 in. long. Fruit ovoid globose, 5-ridged, ·1 in. long. *Hab.* Mountain woods, Pahang, Tahan River. Selangor, Semangkok Pass. Perak, Ulu Bubong (Kunstler); Maxwell's Hill. *Distrib.* Java, Borneo.

2. SCHEFFLERA, Forst.

(*Heptapleurum*, Gaertn., Clarke and King.)

Shrubs rarely tree-like, usually at first epiphytic, later terrestrial. Leaves coriaceous digitate, rarely simple, or trifoliate or bipinnate, very rarely toothed. Panicles simple in the upper axils with distant short branches, each terminated by an umbel or compound and branched, very rarely (*S. Wrayi*) with racemose branches. Flowers small. Calyx-edge usually entire short.

Petals 5- to 9-valvate. Stamens as many (very rarely double); anthers ovate. Disc convex. Ovary as many cells as there are petals. Stigma conic sessile or on a short style. Fruit sub-globose fleshy angled when dry. Seed laterally compressed. Albumen not ruminant. Species 100, Old World tropics.

Harms in "Pflanzenfamilien" has put *Heptapleurum* under the older name of *Schefflera*, a genus based on two Fiji and New Zealand plants which seem to be truly *Heptapleura*, so the later genus *Heptapleurum* is now reduced to *Schefflera*.

Flowers umbelled.

Lower leaves simple lanceolate, upper trifoliate (1) *S. lanceolata*

Leaves all trifoliate.

Panicle longer than leaves, lax (2) *S. lurida*

Panicle shorter than leaves, dense (3) *S. tristis*

Leaves 5- or more-foliate.

Flowers sessile or sub-sessile in small heads racemed.

Bracts minute or 0; leaves glabrous.

Leaflets oblong cuspidate 9 by 5 in. (4) *S. cephalotes*

Leaflets lanceolate 6 by 1 in. (5) *S. capitellata*

Leaflets elliptic narrowed at base; flowers very short pedicelled (6) *S. Klossii*

Umbel-bracts ovate scurfy.

Leaves 10 in. long, 4 in. wide, oblong; panicles long (7) *S. Scortechinii*

Leaves 5 by 2.5 in. ovate round; panicles short (8) *S. pergamacea*

Leaves thickly woolly beneath (9) *S. tomentosa*

Inflorescence of several elongate or short simple racemes of umbels; flowers stalked.

Ovary 12-celled; leaflets 12 by 4 in. thin (10) *S. singalangensis*

Ovary 9-celled; leaflets coriaceous round 3.5 in. wide (11) *S. latifolia*

Ovary 6-celled.

Leaflets coriaceous oblong, cuspidate 10 in. long; flowers white (12) *S. Hullettii*

Leaflets coriaceous, oblong-acuminate, 4 by 1 in. (13) *S. elegans*

Leaflets long acuminate 2.5 in. long; pedicels of flowers 1 in. long (14) *S. scandens*

Leaflets coriaceous, lanceolate acuminate 4 in. long; pedicels .05 in. long. (15) *S. subracemosa*

Leaflets elliptic cuspidate, 9 by 4 in.; pedicels short (16) *S. subulata*

Panicle branched.

Branches few and short; ovary 5- to 6-celled.

Leaflets lanceolate 3 by 1.25 in.; panicle 2 in. long (17) *S. nervosa*

Leaflets elliptic cuspidate 4 by 1.5 in.; panicle 6 in. long (18) *S. affinis*

Leaflets oblong elliptic 6 by 2 in. or more; panicle 6 in. long (19) *S. Ridleyi*

Leaflets thin elliptic; panicle wide spreading 9 in. long (20) *S. Roxburghii*

Leaflets coriaceous; flowers medium; panicle short, dense (21) *S. venulosa*

- Leaflets thin fleshy; panicle very slender;
 flowers minute (22) *S. micrantha*
 Lower leaves large digitately decomposed.
 Leaflets entire, oblong; umbel peduncles
 long (23) *S. heterophylla*
 Leaflets entire, linear oblong, umbel
 peduncles short (24) *S. biternata*
 Leaflets toothed; leaves bipinnate (25) *S. Curtisii*
 Flowers not umbelled in simple racemes (26) *S. Wrayi*

(1) *S. lanceolata* Ridl. *Journ. F.M.S. Mus.* x. 137. *Heptapleurum avene* King, *l.c.* 47, not of Seemann.

Slender climber. Leaves uppermost trifoliate, lower simple, coriaceous, narrow lanceolate, blunt, base narrowed 4 to 5 in. long, .75 to 1 in. wide; nerves visible when dry 8 pairs, distant; petioles slender .5 in. long. Peduncles 1.5 in. long with 4 or 5 short peduncled umbels of about 7 flowers, scurfy when young. Bracts (caducous) lanceolate broad as long as umbel-peduncles. Flowers glabrous, .15 in. long. Calyx campanulate, truncate. Petals 6 falling off in a cap. Stamens 6; no style. Fruit small, ellipsoid. *Hab.* On rocks by the sea and also epiphytic. Singapore, Sungei Morai; Kranji; Pulau Ubin; Pulau Tekong.

(2) *S. lurida* Ridl. *Heptapleurum luridum*, King, *l.c.* 48.

Epiphyte 2 to 3 ft. long. Leaves trifoliate; petioles 1 to 1.75 in. long, fleshy; leaflets very coriaceous, deep green, elliptic-oblong acute, base narrowed; nerves invisible, 2.5 to 4 in. long, .5 to .75 in. wide; petiolules thick, .4 in. long (terminal one) or shorter. Panicles 6 to 7 in. long, slender; branches 2 to 4 in. long slender, with umbels of 3 to 8 ovoid flowers, .1 in. long; pedicels .1 in. long in flower, .2 to .3 in. long in fruit. Calyx campanulate, truncate. Petals united in a cap. Stamens 6. Fruit .15 in. long, red, 6-ridged when dry. *Hab.* On big trees at 3500 to 4000 ft. altitude. Pahang, Telom. Perak, Taiping Hills (Kunstler).

(3) *S. tristis* Ridl. *Heptapleurum triste* King, *l.c.* 48. *H. coriifolium* Ridl. *Journ. F.M.S. Mus.* iv. 24.

A tree or shrub 2 to 8 ft. tall. Branches thick. Leaves trifoliate; petioles 1.5 to 2 in. long; leaflets thickly coriaceous glabrous, broadly elliptic, blunt or shortly apiculate, base round; nerves 10 to 12 pairs close together, 2.25 to 3.25 in. long, 1.5 to 2 in. wide; petiolules, lateral .5 in. long, terminal .8 in. long. Panicles terminal, 2 in. long, branching from base; branchlets .5 in. long. Flowers ovate .15 in. long, pale green; pedicels .1 in. long. Petals 5, broad, elliptic. Fruit narrow oblong, 5-ridged, .2 in. long. *Hab.* Mountains at 4900 ft. altitude. Pahang, Gunong Tahan 4000 ft. altitude. Perak, Ulu Batang Padang (Wray); Gunong Berumbun. *Distrib.* Sumatra.

(4) *S. cephalotes* Harms, *Pflanzenfamilien*, p. 36. *Heptapleurum cephalotes* Clarke, in *Hook. fil. F.B.I.* ii. 731; King, *l.c.* 49.

Tall shrub. Leaves digitate; petioles 8 to 12 in. long; leaflets

7 to 8, oblong elliptic abruptly cuspidate, base round minutely puberulous beneath when young, 12 in. long, 4 in. wide; petiolules 4 in. long. Panicles 16 in. long; rachis stout, .25 in. thick, tomentose; branches numerous .3 in. long bearing numerous globose heads .5 in. through. Flowers sessile. Fruit oblong, stellate white-tomentose, 5- to 8-ribbed. *Hab.* Often on rocks by the sea. Singapore, Bajau; Kranji; Bukit Timah; Barn Island. Malacca (Griffith).

(5) ***S. capitellata*** Ridl. *Journ. F.M.S. Mus.* x. 137.

Epiphyte. Leaves 8-foliate; leaflets lanceolate acute, narrowed to base; nerves fine, coriaceous, puberulous beneath, 3 to 5 in. long, 1 in. wide; petiolules 1 in. long; petioles .7 in. long. Racemes scurfy tomentose 18 in. long; peduncles .5 in. long, heads .4 in. through. Bracts minute or 0. Flowers puberulous truncate, 5-angled in bud, quite sessile. Petals connate in a cap. Stamens 6, purple. *Hab.* Mountain forests. Perak, Bujong Malacca. Penang Hill, 2500 ft. altitude (Curtis 837).

(6) ***S. Klossii*** Ridl. *l.c.* 137.

A large climber. Branches pale, shining; young parts and inflorescence white scurfy. Leaves, petioles stout 2.5 in. long; leaflets 5, coriaceous glabrous elliptic, abruptly short acuminate, base narrowed; nerves elevate beneath 5 pairs, 7 in. long, 3 in. wide; petiolule of middle one 1.4 in. long. Panicles 5, scurfy, 9 in. long. Umbels simple, numerous, peduncle .25 in. long. Flowers 5 in an umbel very shortly pedicelled. Calyx obconic scurfy .05 in. long, lobes very obscure. Corolla in bud pink and white, blunt ovoid .05 in. long. Petals 5, ovate blunt. Stamens 5. Styles forming truncate cone with 5 minute stigmas. *Hab.* Perak, Changkat Mentri (Kloss).

(7) ***S. Scortechinii*** Ridl. *Heptapleurum Scortechinii* King, *l.c.* 49.

Epiphyte. Leaves digitate; petioles 2.5 to 3.5 ft. long; leaflets 8 to 10, very coriaceous oblong, base round, tip apiculate, glabrous; nerves 6 to 9 pairs, elevate beneath, 9 to 13 in. long, 4 to 6 in. wide; petiolules 2.5 to 4 in. long. Panicles of several raceme-like branches, scurfy; branchlets 40 to 50, and .35 to .75 in. long, with a broad ovate convolute woolly bract at base and a globular umbel of globose flowers .1 in. long. Calyx truncate, tapering to base. Petals 6 to 7. Ovary 5-celled. *Hab.* Perak (Scortechini); Telom. Kedah, Yan.

This is very near *S. capitellata*, but has leaves with fewer prominent nerves and heads smaller and with large bracts.

(8) ***S. pergamacea*** Ridl. *Heptapleurum pergamaceum* Hassk. *Cat. Hort. Bog. A.* 165. *H. glomerulatum* Ridl. *Journ. F.M.S. Mus.* vi. 150.

Erect treelet. Leaves digitate; petioles 14 in. long; leaflets 8, thinly coriaceous, elliptic-ovate cuspidate, rounded or slightly

narrowed at the base; nerves elevate beneath, 6 in. long, 3 in. wide; petiolules 2 to 3 in. long. Panicles scurfy; branches several. Flowers sessile in small globose heads, subtended by lanceolate-acuminate bracts, edges ciliate, 12 in. long. Floral bracts similar, smaller. Calyx short turbinate. Petals ovate pubescent. Stamens 6. Stigmas connate. *Hab.* Mountains in woods on stream banks at 4500 ft. altitude. Pahang Gunong Tahan (Ridley) *Distrib.* Java.

(9) **S. tomentosa** Ridl. *Heptapleurum tomentosum* Hassk. *Cat. Hort. Bog.* 1844, p. 165.

Erect shrub about 4 to 6 ft. tall; stem 4 in. through, little branched; panicles, underside of leaf and young parts whitish woolly tomentose. Leaves digitate; petioles 9 to 12 in. long; leaflets 5 to 7, coriaceous, oblong-elliptic, caudate-acuminate, light green bullate, glabrous above, 8 to 10 in. long, 2.75 to 3.5 in. wide; petiolules 1.5 to 2.5 in. long. Panicles 2, racemose 4 to 5 in. long; branches 12, 2 to 4 in. long with a globular umbel of 8 to 10 ovoid blunt glabrous cream-coloured flowers 15 in. long; pedicels 1 in. long, pubescent. Petals white. Fruit 2 in. long, 5-ridged and 5-celled, cream colour. *Hab.* Dense wet woods, terrestrial. Not common. Lowland country. Selangor, Kwala Lumpur; Ulu Gombak; Batu Tiga. Dindings, Gunong Tungul. Perak, Thaiping Waterfall; Changkat Mentri (Kloss). *Distrib.* Sumatra.

(10) **S. singalangensis** Ridl. *Heptapleurum singalangense* Seem. *Rev. Hed.* 42; *King, l.c.* 51.

Epiphyte, scandent. Leaves digitate; petioles 12 to 15 in. long; leaflets membranous 5, elliptic short acuminate, base narrowed, with a few teeth or none, glabrous; nerves 7 to 8 pairs, 7 to 12 in. long, 3.25 to 5.25 in. wide; petiolules 1.25 to 2.25 in. long. Panicles 12 to 18 in. long, covered with deciduous pubescence, 2 in. wide; branches numerous, 5 in. long, bearing an umbel of 5 to 10 obovoid flowers 25 in. long; pedicels 2 to 3 in. long. Calyx-tube campanulate. Petals 9, connate by edges. Stamens 9. Stigmas united in a fleshy ring. Ovary 12-celled. *Hab.* Perak (Scortechini). *Distrib.* Sumatra.

(11) **S. latifoliata** Ridl. *Heptapleurum latifoliatum* King, *l.c.* 51.

Bush. Leaves digitate; petioles stout 7 to 11 in. long; leaflets 11 coriaceous thick, glabrous, round ovate blunt, base round; nerves 7 to 8 pairs, prominent beneath, 3 to 5 in. long, 1.75 to 3.5 in. wide; petiolules 1.5 in. long. Panicles terminal in pairs, 5 to 8 in. long; branches short, 4 in. long bearing an umbel of 10- to 15-pedicelled flowers. Fruit ovoid, 9-ridged, 9-celled, crowned with 9 styles, red. *Hab.* Perak, Gunong Bubu (Wray) at 5000 ft. altitude.

(12) **S. Hullettii** Ridl. *Heptapleurum Hullettii* King, *l.c.* 34.

An epiphyte or small shrub about 4 ft. tall. Leaves digitate;

petioles 10 to 24 in. long; leaflets coriaceous, dark green, 7 to 11, oblong, short abruptly acuminate, narrowed to rounded base; nerves 5 to 8 pairs, 6 to 12 in. long, 2 to 3.25 in. wide; petiolules 2 to 3.5 in. long. Panicles 9 to 12 in. long, several branches short, horizontal, .5 to 1 in. long with terminal umbels of 8 to 12 white, 6-merous flowers, .1 in. across. Fruit elliptic, 6-ridged with 6 distinct styles; pedicel .25 to .3 in. long. *Hab.* Damp woods, a very pretty plant. Singapore, Chan Chu Kang; Chua Chu Kang. Johor. Perak, Sunki (Kunstler); Waterfall, Thaiping (Wray).

(13) **S. elegans** Ridl. *Heptapleurum elegans* Ridl. *Journ. F.M.S. Mus.* iv. 24.

Tall, slender-stemmed. Leaves digitate; petioles 10 in. long; leaflets 10, elliptic coriaceous cuspidate; nerves 6 pairs indistinct; petiolules 1 in. long. Panicles erect about 5 scurfy, .12 in. long with distinct umbels, .5 in. long. Flowers about 20 in umbels. Bracts very small, lanceolate, scurfy brown; pedicels .1 in. long. Petals ovate obtuse. *Hab.* Mountain woods, local. Pahang, Gunong Tahan in small woods on the Padang 4500 ft. altitude (Ridley).

(14) **S. scandens** Ridl. *Heptapleurum scandens* Seem, *Rev. Hed.* 43; *King, l.c.* 53.

Slender creeper 3 to 5 ft. long. Leaves digitate; petioles 1 to 2.5 in. long, leaflets 3 to 5, thin coriaceous, lanceolate caudate acuminate tapering to base, glabrous 1.5 to 3.5 in. long, .5 to .8 in. wide; petiolules .2 to .25 in. long. Panicles 4 to 8 in. long, slender, lax, spreading; branches 1 in. long ending in an umbel of 8 to 9 globular flowers, on pedicels .15 to .3 in. long. Fruit elliptic, 5-ridged .1 in. long. *Hab.* Mountain jungle. Pahang, Telom. Perak, Tea Gardens, Thaiping Hills at 200 ft. altitude (Curtis). *Distrib.* Java, Sumatra, Bangka.

(15) **S. subracemosa** Ridl. *Heptapleurum subracemosum* *King, l.c.* 49.

Scrambling shrub 2 to 3 ft. long. Leaves 3- to 5-foliate; petioles 1.5 to 2.5 in. long, glabrous; leaflets coriaceous elliptic-lanceolate, caudate-acuminate, narrowed at base, finely reticulate when dry, 2.25 to 4 in. long, .75 to 1.1 in. wide; petiolules lateral .3 to .4 in. long terminal .8 to 1.25 in. long. Panicle solitary terminal, narrow sub-racemose 2-branched, 3 in. long, .65 in. across; branchlets .1 to .2 in. long, bearing an umbel of 3 to 5 oblong green flowers .15 in. long. Fruit oblong .2 in. long with 5 blunt ridges, pale green tipped blue. *Hab.* Open jungle, limestone rocks. Perak, Kwala Dipang (Kunstler).

(16) **S. subulata** Ridl. *Heptapleurum subulatum* Seem. *Rev. Hed.* 42; *King, l.c.* 51.

A scrambling epiphyte. Leaves digitate; petioles 2 to 6 in. long; leaflets 4 or 5, thinly coriaceous, oblong-elliptic cuspidate acuminate,

base shortly narrowed, glabrous, reticulate when dry; nerves 4 pairs, 2·5 to 7 in. long, 1 to 3·5 in. wide; petiolules ·2 to 2 in. long. Panicles puberulous, slender, 6 to 9 in. long in flower, longer and stouter in fruit; branches very short, ·2 in. long, with lanceolate-acuminate bracts half as long, puberulous. Umbels of 12 to 20 flowers; buds globular, ·05 in. through; pedicels ·2 in. long. Fruit broad, ovoid, 5-ridged, ·15 in. long. *Hab.* On rocks and trees, common. Singapore, Chan Chu Kang. Johor, Pulau Tioman; Sungei Tebrau. Malacca (Maingay); Selangor; Chabau (Cantley). Pahang, Kota Glanggi; Tahan River. Selangor, Batu Caves. Perak, Gunong Batu Putih (Wray), Gunong Kerbau at 2000 ft. altitude (Robinson). Penang Hill, Moniot's Road at 1000 ft. altitude. *Distrib.* Malay isles. *Native names:* Akar Pusat Badak; Kayu Mentas; Kukau. *Use:* A decoction used to calm children after a fright, and for fever (external application). The whole plant has a turpentine odour when crushed or broken.

(17) *S. nervosa* Ridl. *Heptapleurum nervosum* King, l.c. 55.

Small shrub. Leaves digitate; petioles 2 to 2·25 in. long; leaflets 6 very coriaceous, lanceolate acute, base narrowed; nerves 7 to 10 pairs impressed above, prominent beneath, 1·5 to 2·5 in. long, ·5 to ·9 in. wide; petiolules ·75 (terminal pair) to ·35 in. long in laterals. Panicles 1·5 to 2 in. long, puberulous then glabrous; branches 2 ending in an umbel of 8 to 10 glabrous flowers, ·2 in. long; pedicels ·1 to ·15 in. long. Calyx-tube cylindric, campanulate. Petals triangular. Fruit round, ovoid, 6-ridged, ·3 in. long. *Hab.* Perak, Gunong Chabong (Scortechini). Rare.

(18) *S. affinis* Ridl. *Heptapleurum affine* King, l.c. 54.

Shrub 6 to 8 ft. tall, glabrous. Leaves digitate; petioles 3·5 to 4 in. long; leaflets 5 to 6, coriaceous, ovate acuminate, base rounded, edge undulate, 2·25 to 4 in. long, 1·25 to 1·75 in. wide; petiolules ·75 to 1·5 in. long. Panicles scurfy at base when young, 2·5 to 5 in. long and as wide; branches 3 or 4; branchlets 1 in. long bearing umbels of about 12 flowers (branchlets sometimes opposite or whorled). Flowers ovate, green ·2 in. long. Petals brown. Fruit broadly ovate apiculate, 6-ridged, nearly ·25 in. long. *Hab.* Mountains at about 3500 to 4000 ft. altitude. Selangor, Gunong Mengkuang Lebah (Robinson). Perak, Larut Hills (Kunstler); Gunong Inas (Wray).

(19) *S. Ridleyi* Ridl. *Heptapleurum Ridleyi* King, l.c. 54.

Low shrub about 3 ft. tall. Leaves digitate; petioles 5 to 10 in. long; leaflets 5, coriaceous, oblong or oblanceolate-oblong acute, broad but very shortly narrowed at base, bright green; nerves 8 pairs, secondaries and wide reticulations almost as conspicuous, 4 to 6·5 in. long, 2 to 2·75 in. wide; petiolules 1 to 1·25 in. long. Panicles 5 to 6 in. long with spreading branches; branchlets ·5 in. long with umbels of 10 to 20 globular yellow flowers, ·15 in. across. Petals 5, elliptic. Fruit ovoid, succulent, faintly 6-ridged,

·25 in. long. *Hab.* Damp woods often on trees. Singapore, Sungei Morai; Sungei Buluh. Johor, Sungei Ban; Tana Runto. Pahang, Pekan (Ridley).

(20) **S. Roxburghii** Gamble, *Flora of Madras*, 570.

Small tree. Leaves, petiole 4 in. long sheathing at base; leaflets 6 elliptic, base round or shortly narrowed; nerves inconspicuous 4 in. long, 2 in. wide; petiolule ·5 in. long. Panicle lax, spreading, 9 in. long; branches 7 in. long distant about 9. Peduncles slender ·5 in. long. Umbels of 10 flowers; pedicels ·1 in. long. Buds oblong, blunt. Calyx cup-shaped. Petals oblong, rounded



FIG. 74.—*Schefflera venulosa*.

at tip. *Hab.* Penang, by the Waterfall (Porter, Wallich 4920 G.). *Distrib.* India.

(21) **S. venulosa** Harms, *Pflanzenfamilien* iii. 38. *Heptapleurum venulosum* Seem. *Rev. Hed.* 44; *King, l.c.* 52.

Epiphyte. Leaves, petioles 5 in. long; leaflets 7, stiff coriaceous, elliptic with a short blunt point, base narrowed; nerves 4 pairs ascending prominent as are the lax reticulations 5 in. long, 2 in. wide; petioles 2 in. long. Panicles 4 to 5 in. long with 3 or 4 branches, 3 in. long. Umbels of 12 flowers on peduncles ·5 in. long; pedicels ·1 in. long. Calyx short, obconic. Petals very small, oblong blunt. Stamens short. Fruit strongly 5-angled, oblong, ·15 in. long on pedicels ·5 in. long, claret colour. *Hab.* Selangor, Kwala Lumpur. Perak, Ulu Bubong (Kunstler), var. with larger

leaflets. Lankawi, Kwah (Curtis). Perlis, Kanga. Pulau Adang.
Distrib. India.

var. *Curtisii* Ridl.

Leaflets fleshy, elliptic with a broad base and acute point. Panicle as in typical *venulosum* but rather smaller flowers. Fruit more rounded on shorter pedicels strongly 5-angled. Penang, Pulau Betong (Curtis 972).

This may be specifically distinct; the venation of the leaves is approximately the same, but the texture is quite different.

(22) *S. micrantha* Ridl. *Paratropia micrantha* Miq. *Fl. Ind. Bat. Suppl.* 337.

Epiphyte. Branches ribbed. Leaves, petioles 4 to 5 in. long; leaflets thin membranous 5 ovate elliptic, shortly narrowed to the tip, base rounded; nerves 3 to 4 pairs with lax reticulations, elevate beneath, 4 in. long, 2.5 in. wide or less; petiolules 2 in. long. Panicles very slender, 6 in. long; branches 4.5 in. long or less, few. Umbels distant, few; peduncles .5 in. long. Flowers 7 to 14, very small on very slender .15 in. long pedicels. Calyx very small, semi-globose, campanulate. Fruit obovoid, narrowed to base, 5-ribbed. *Hab.* Mangrove swamps. Singapore, Kranji. Malacca (Maingay). *Distrib.* Sumatra.

(23) *S. heterophylla* Harms *Pflanzenfamilien* iii. 38. *Heptapleurum heterophyllum* Seem. *Rev. Hed.* 40.

Shrub or treelet. Lower leaves ternately decompound, upper ones smaller twice digitate; leaflets 3 to 5 on each petiolule, light green coriaceous, oblong-lanceolate to ovate-acuminate, base narrowed or rounded, edges occasionally with 1 to 2 teeth near tip, 2.5 to 7 in. long, 1 to 2.5 in. wide; petiolules .1 to .25 in. long, terminal .5 in. long. Panicles pubescent, 10 to 15 in. long, 1.5 to 2 in. wide; branches .5 to 1 in. long. Umbels of about 14 small flowers. Fruit 5-ribbed, .25 in. long, claret colour. *Hab.* Forests, terrestrial. Malacca, Pulau Undan (Cantley). Perak, Goping (Kunstler); Kwala Dipang; Temengoh River bank. Penang Hill (Wallich 4919); Balik Pulau. *Distrib.* Sumatra. *Native name:* Akar Chabang Lima.

(24) *S. biternata* Harms *l.c.* 38. *Heptapleurum biternatum* Clarke, *l.c.* ii. 735.

Small tree 3 ft. tall or more. Young parts pubescent. Leaves decompound twice pinnate; leaflets in threes at each node of rachis, coriaceous, narrow oblong-acuminate, base rounded slightly narrowed, 2 to 3.5 in. long, .5 to .75 in. wide; petioles .1 in. or less long; nerves 6 pairs, and reticulations conspicuous beneath. Panicles 8 in. long, 1.5 in. across; pedicels .2 in. long. Ovary 5-celled. *Hab.* Forests. Malacca, Hulu Rejang (Derry). Penang on blocks of stone (Maingay).

I suspect this is but a variety of *S. heterophylla*.

(25) **S. Curtisii** Ridl. *Heptapleurum Curtisii* King, *l.c.* 56.

Large shrub. Lower leaves bipinnate, upper trifoliate; petioles 8 in. long; leaflets thin, coriaceous, oblong-elliptic to obovate, coarsely serrate at top, 3 to 6 in. long, 1.5 to 2.5 in. wide. Panicles shorter than petioles with rusty stellate tomentose bracts; branches scurfy; branchlets .75 in. long. Umbels 10- to 20-flowered. Fruit oblong, 5-ribbed, disc conic. Ovary 5-celled. *Hab.* Penang, Pulau Betong (Curtis). Very rare.

(26) **S. Wrayi** Ridl. *Heptapleurum Wrayi* King, *l.c.* 55.

Small furfuraceous tree. Leaves digitate; petioles 6 to 9 in. long; leaflets 7 to 9 thinly coriaceous, glaucous beneath, elliptic abruptly cuspidate serrate, base rounded; nerves 5 to 9 pairs, 3 to 5 in. long, 1.75 to 2.25 in. wide; petiolules 1.5 to 2.5 in. long. Panicles 10 in. long pubescent; branches at base 6 in. long; branchlets 2 to 3 in. long. Flowers racemose distant on the branches, pale green, .15 in. wide on slender pedicels, .2 in. long. Calyx-tube funnel-shaped, 5-toothed. Petals 5. Fruit oblong, 5-ridged, .15 in. long, crowned by the long confluent styles. *Hab.* Mountains, at 7000 ft. altitude. Perak, Gunong Brumber Pahang (Wray).

This, with some Indian allies, is remarkable for having the flowers racemose and not umbelled, a very rare condition in the order.

3. TREVESIA, Vis.

Prickly or unarmed tree-like shrubs. Leaves palmate, the petiole united at the lower part by a wing. Flowers in dense umbels in a panicle, large. Calyx-edge entire or toothed. Petals 8- to 12-valvate cohering in a cap. Stamens and ovary-cells as many as the petals. Styles connate. Fruit ovoid fleshy. Species 6 or more, tropical Asia.

Plant nearly glabrous (1) **T. cheirantha**

Petiole and inflorescence densely covered with flat red
setæ (2) **T. rufo-setosa**

(1) **T. cheirantha** Ridl. *T. palmata* var. *cheirantha* Clarke, *in Hook. fil. F.B.I.* ii. 732.

Stem stout prickly often branched, 5 ft. or more tall, 2 in. through at the base, shoots red pubescent. Leaves sub-coriaceous, .2 to .8 in. across, lobes elliptic cuspidate; narrowed at the base, toothed, 5 to 6 in. long, 3 in. wide; petiolules united in a wing nearly or quite to the lobes; petioles 6 in. long or more. Panicles 8 to 12 in. long, red tomentose; peduncle 6 to 12 in. long. Pedicels 1 to 1.5 in. long. Flowers nearly .5 in. wide in umbels 2.5 to 3 in. through. Fruit ovoid round, .75 in. through. *Hab.* In forests. Not rare. Singapore, Bedoh. Malacca, Lubok Kedondong, Mt. Ophir. Pahang, Kwala Tembeling; Tahan River. Selangor, Batu Caves. Perak, Larut (Kunstler) and Goping; Waterfall, Thaiping (Wray). Kelantan, Kwala Aring (Yapp); Chaning.

Penang (Wallich 4925); Penara Bukit. *Distrib.* Burma, Sumatra.
Native names: Kakabu; Tapak Rimau.

(2) **T. rufo-setosa** Ridl.

A shrub with the habit of the preceding. Leaves palmate of 7 lobes cut down for 7 in., more or less elliptic shortly cuspidate, edge undulate with up-curved thorns, glabrous except nerves and centre red-hairy, covered with small raised dots; nerves 9, 2 on the lowest lobes which are dilate on the lower edge. Whole leaf 12 in. long and wide, lobes 3 to 4 in. wide; petioles stout, 2 ft. long, densely covered with red-brown flat acuminate setæ. Inflorescence entirely covered with similar setæ, 8 in. long, flexous. Flowers unisexual .25 in. across. Bracts linear acuminate caudate, .5 in. long. Calyx obconic setose, limb very short and obscure. Corolla spreading, star-like, lobes 5, triangular coriaceous, hairy beneath. Stamens 5. Style in female flowers cylindric; ovary 5-celled. Stigmas bilobed. *Hab.* Hill forests, Selangor, Semangkok Pass, 2500 ft. altitude (Ridley).

4. BRASSAIA, Endl.

Small trees about 20 ft. tall. Leaves digitate, long-petioled, coriaceous. Panicles spike-like tall with short branches bearing globose heads of sessile flowers, each surrounded by a whorl of 4 bracts as long or longer than the calyx. Calyx obconic, limb very short entire. Petals usually 10 to 12, thick valvate connate. Stamens as many; anthers ovate or oblong. Ovary usually 10- to 12-locular; styles connate in a short cone. Fruit sub-globose, pyrenes compressed. Species 4, Malaya, Australia.

Harms reduces this genus to a section of *Schefflera*, including in it *S. cephalotes*. From this latter the genus is separated by the larger number of petals and stamens and the whorl of bracts round the flower. The beautiful *B. actinophylla* of Australia is often cultivated in Singapore Gardens.

(1) **B. singaporensis** Ridl. *Journ. Roy. As. Soc. S. Br.* 75, p. 38.

Leaves digitate; petioles over 6 in. long, base widely dilate; leaflets 15, stiffly coriaceous oblong-ovate, blunt rounded at both ends, 3 to 4 in. long, 1.75 to 2.5 in. wide; petiolules 1.5 in. long. Panicles 18 in. long, stout; branches .5 in. long, thick; heads about .5 in. through of about 10 sessile flowers. Bracts ovate acuminate, longer than calyx-tube. Calyx very short, margin undulate. Corolla calyptrate rounded; petals connate 5, coriaceous. Stamens 9 to 12; filaments short; anthers oblong-linear. Stigma sessile conic. *Hab.* In forests. Rare. Singapore, Bukit Timah (Ridley).

Mr. Robinson sent from Gunong Mengkuang Lebah in Selangor a specimen of another *Brassaia*, but unfortunately too incomplete to be properly described. The petiole of the only leaf is 5 in. long,

the leaflets coriaceous, 3 in. long, narrow oblong with no visible nerves; petiolules .5 in. long; the inflorescence of 6 or more rather slender branches 9 in. long with distant heads only .15 in. through and a peduncle .25 in. long; the flowers surrounded by scurfy bracts, but petals and stamens all fallen. The small size of the heads is unique in the genus. It is to be hoped this species will be collected again in earlier flower.

5. **DENDROPANAX** Decne and Planch.

Shrubs or small trees. Leaves simple entire. Umbels solitary or in small panicles. Calyx-limb entire or 5-toothed. Petals 5, free, valvate. Stamens 5. Styles united at base, free at top. Fruit globose succulent 5-ribbed. Albumen not ruminant. About 12 species, mostly American, 1 Japanese and 1 Chinese.

Leaves ovate or lanceolate acute (1) **D. Maingayi**
 Leaves lanceolate acuminate (2) **D. lancifolium**

(1) **D. Maingayi** King, *l.c.* 58. *D. parviflorum* Clarke, in Hook. fil. *F.B.I.* ii. 733, *not of* Benth.

Low shrub 2 to 3 ft. tall. Leaves ovate or lanceolate acute, base rounded or narrowed, glabrous thin coriaceous, midrib prominent with two lateral nerves, 2 to 3.25 in. long, 1 to 1.75 in. wide; petioles .25 to 1.5 in. long. Umbel simple terminal; pedicel .35 to .5 in. long. Flowers 8 to 12, oblong, .2 in. long. Calyx campanulate cylindric, puberulous. Fruit globular succulent, .3 in. through, lead-colour. *Hab* Mountain woods, Malacca, Mt. Ophir (Maingay, Griffith, etc.). Pahang, Telom at 4000 ft. altitude (leaves very narrow lanceolate 4.5 in. long, 1 in. wide). Perak, Bujong Malacca. Kedah Peak (Ridley).

(2) **D. lancifolium** Ridl. *Arthrophyllum lancifolium* Ridl. *Journ. Roy. As. Soc. S. Br.* 75, p. 38.

A tree. Branches slender angled. Leaves coriaceous lanceolate acuminate at both ends, edges crenulate undulate; midrib winged on both sides; nerves and reticulations very fine, 3 to 2.5 in. long, 1 to 1.5 in. wide; petioles 1 to 2 in. long, the upper ones .3 in. long. Umbels 4 or 5 on peduncles .4 in. long. Flowers .05 in. wide, 10 to 13; pedicels 1 in. long. Calyx campanulate; limb undulate not toothed. Petals 5, calyptrate, oblong. Stamens 5. Ovary 1-celled. *Hab.* Mountains at 4900 ft. altitude. Rare. Perak, Ulu Batang Padang (Wray).

This is a somewhat dubious plant. It differs from typical *Dendropanax* in having the petals joined in a cap, and not spreading freely, but the leaves are all simple, and the lowest pair of nerves shows signs of running parallel to the leaf-edge. Fruit has not been collected.

6. **ARTHROPHYLLUM**, Bl.

Unarmed shrubs or small trees. Leaves glabrous or nearly, fleshy to coriaceous, the lower ones pinnate, upper or all simple;

leaflets oblong or lanceolate. Stipules forming a ligule within the petiole. Inflorescence, a number of short peduncled umbels in the upper axils or terminal. Calyx-teeth minute 5. Petals 5-valvate, green. Stamens 5. Ovary 1-celled, 1-ovuled; style short simple. Fruit pulpy ovoid. Seed sub-globose, ruminant. Species about 10, Malayan.

Trees.

Lower leaves with leaflets 6 in. long, 1·75 in. wide, oblong or ovate (1) **A. ovalifolium**

Lower leaves, leaflets about 27, linear-lanceolate 6 by ·5 in. (2) **A. angustifolium**

Shrubs.

Lower leaves; leaflets coriaceous elliptic 2·5 by 1·25 in.

Nerves sunk above; peduncles 1·75 in. long; fruit beaked (3) **A. montanum**

Leaves smooth above; peduncle ·5 in. long (4) **A. nitidum**

Leaflets about 7, 6 in. long, 2 in. wide; umbels 3 in. long; fruit not beaked (5) **A. pinnatum**

Leaflets upwards of 30, elliptic cuspidate 1 by ·5 in.; umbels 2 in. long (6) **A. alternifolium**

Leaves all simple ovate, coriaceous; nerves deep sunk above (7) **A. ovatum**

Small tree.

Inflorescence axillary.

Lower leaves 11 or more leaflets; pedicels ·1 in. long (8) **A. congestum**

(1) **A. ovalifolium** *Miq. Flor. Ind. Bat. i. (1), 768, t. xi. A. diversifolium Clarke, l.c. and King, l.c. 59, not of Blume.*

Tree about 30 ft. tall, glabrous. Leaves pinnate simple, sub-coriaceous; leaflets 13 oblong or elliptic, slightly narrowed and often oblique at base, acuminate, 5 in. long, 1·75 in. wide; petiolules ·2 in. long, uppermost leaves on the flowering branches smaller simple nearly ovate. Umbels on peduncles, ·75 in. long, in uppermost axils 1 or 2 and umbellate 6 to 9 together at the apex. Flowers green, about 10 in an umbel; pedicels slender, ·15 in. long; buds cone-shaped blunt. Calyx-margin undulate. Petals ·1 in. long. Fruit green globose, crowned by calyx and style. *Hab.* Common all over the peninsula in the low country, Singapore, Malacca. Dindings, Lumut. Pahang, near Pekan. Penang, Waterfall. *Distrib.* Andamans and Sumatra. *Native names:* Mempunai Bukit; Jolok hantu; Segan Bedahan; Apuil; Bedahan jantan.

(2) **A. angustifolium** *Ridl. Journ. F.M.S. Mus. x. 136.*

Small tree. Lower leaves pinnate over 2 ft. long; leaflets 29, coriaceous, linear-lanceolate acuminate 6 in. long, ·5 in. wide; nerves faint sunk above; petiolules ·1 in. long. Upper leaves simple broader and shorter; petioles slender 1 in. long. Inflorescences axillary and terminal; peduncles 1·5 in. long or less; pedicels ·1 in. long. Flowers very small. Calyx very short

undulate. Buds short ovoid. Petals ovate valvate, 4. Stamens 4. *Hab.* Hill tops. Rare. Perak, Gunong Keledang (Ridley).

(3) **A. montanum** *Ridl. Journ. F.M.S. Mus.* iv. 24.

A shrub about 20 ft. tall. Leaves pinnate 2 ft. long; leaflets 12 pairs, lanceolate or linear-lanceolate acuminate acute, 4 to 6 in. long, .5 to 1 in. across; nerves 3 to 4 pairs, sunk above, elevate beneath; petiolules .25 in. long. Umbels on simple peduncles, .5 in. wide, sometimes in compound umbels; peduncle 4 in. long. Flowers 9 to 20 in an umbel; pedicels .12 in. long. Fruit .25 in. long, ovoid globose, crowned with the calyx and conic style. *Hab.* Mountains at 4000 to 6000 ft. altitude. Selangor, Semangkok. Perak, Gunong Berumbun (Ridley).

(4) **A. nitidum** *Ridl. Journ. F.M.S. Mus.* vii. 42.

Small shrub. Leaves 12 in. long, pinnate; leaflets 9 to 15, coriaceous oblong to elliptic-lanceolate, base oblique 2.5 to 3.25 in. long, 1 in. wide; petiolules .25 to .4 in. long. Umbels 11 to 12 of 18 to 20 flowers; peduncles 1 to 1.25 in. long; pedicels .2 in. long. Calyx-lobes blunt, round. Buds obovoid blunt. *Hab.* Mountains, Kedah Peak (Robinson).

(5) **A. pinnatum** *Clarke, in Hook. fil. F.B.I.* ii. 734; *King, l.c.* 60.

Small shrub or treelet, glabrous. Leaves pinnate 6 in. long; leaflets 3 to 7, sub-coriaceous, elliptic to lanceolate caudate-acuminate narrowed at base, 3.5 to 4 in. long, 1 to 2.25 in. wide; petioles 3.5 in. long; petiolules .2 in. long or more, terminal one 1 in. long. Panicles spreading, 1.5 to 4 in. long, 2.5 in. wide; branchlets .5 in. or longer. Umbels of about 20 flowers, small, green. Fruit sub-ovoid globose, pulpy .2 in. long. *Hab.* Hill woods. Local but not rare. Penang Hill (Wallich, Maingay).

(6) **A. alternifolium** *Maingay MSS.* *A. pinnatum* (*in part*) *Clarke and King.*

Dwarf shrub. Stems slender. Leaves 4.5 to 8 in. long; petioles 2 in. long; leaflets coriaceous 14 or more, rhomboid ovate to lanceolate-acuminate to caudate blunt, 1.5 to 2 in. long, .2 to .5 in. wide; petioles .1 in. long. Umbels solitary on peduncles, 1 to 1.25 in. long, in upper leaf axils, several. Flowers 21 or more on pedicels .2 in. long, very small. Fruit globose, crowned with style, .2 in. long. *Hab.* Mountain tops. Local. Malacca, Mt. Ophir (Griffith, Maingay and all collectors).

(7) **A. ovatum** *Ridl. Journ. F.M.S. Mus.* vii. 42.

A woody shrub. Leaves simple ovate to elliptic, base cuneate coriaceous; nerves 3 to 5 pairs, sunk above, elevate beneath, 3.5 in. long, 1.75 in. wide; petioles 2 in. long. Umbels 2.5 in. long of 15 rays. Umbellules of 20 flowers. Pedicels .2 in. long. Buds sub-globose pointed. Calyx-lobes short, round. Petals triangular lanceolate. *Hab.* Selangor. Semangkok Pass. Kedah Peak (Robinson).

(8) **A. congestum** Ridl. *Journ. F.M.S. Mus.* x. 137.

Small tree. Leaves 10 in. or more long with 11 leaflets, fleshy coriaceous, oblong-lanceolate acuminate, base broad oblique; nerves slender, 7 pairs, very faint, 4 in. long, 1·25 in. wide; petiolules ·15 to ·2 in. long. Upper leaflets simple oblong, very oblique at base, 2·5 in. long, 1·25 in. wide; petioles slender, ·25 to ·75 in. long. Inflorescence axillary and terminal; peduncles 1·5 in. long or less; flowers crowded in a head; pedicels ·1 in. long. Calyx very short, edge undulate. Petals 4. Buds ovoid. *Hab.* Dry wooded hills. Selangor, Klang Gates. Dindings, Lumut (Ridley).

7. WARDENIA, King.

A shrub. Stem prickly at base. Leaves coriaceous, simple; petiole long, expanded into a short sheath with 2 minute stipules at base. Inflorescence a compound umbel, terminal short branched. Flowers bisexual. Calyx-tube narrow, campanulate, 5 small teeth. Petals 5, calyptrate, midribs prominent within. Stamens 5, alternate with petals. Disc large fleshy covering ovary, 5-lobed. Styles forming a column. Fruit 2-celled, 2-seeded.

(1) **W. simplex** King, *l.c.* 60.

Shrub 6 to 8 ft. tall, red-pubescent at tip. Leaves elliptic acuminate, base slightly cordate, minutely stellate-hairy all over, 8 to 15 in. long, 3·5 to 7 in. wide; petioles 5 to 10 in. long. Flower buds ·1 in. through, conical; pedicels ·6 to ·9 in. long. Umbels 10- to 20-flowered. Petals glabrous. Fruit elliptic, globose, ·2 in. long. *Hab.* Perak, near Ulu Kerling (Kunstler).

8. BRASSAIOPSIS, Decne and Planch.

Shrub or trees, sometimes armed. Leaves entire digitate or palmate. Stipules connate. Umbels in large panicles compound; young parts tomentose. Pedicels from a cluster of persistent bracteoles. Calyx 5-toothed. Petals 5-valvate. Stamens 5. Ovary 2-celled; styles 2, united. Fruit globose or turbinate 2- or 1-seeded. Albumen ruminant. Species 11, India, Java.

Leaves palmate, lobed	:	:	:	:	:	(1) B. palmata
Leaves entire or digitate	:	:	:	:	:	(2) B. elegans

(1) **B. palmata** Kurz. *Journ. As. Soc. Beng.* xxxix. (2), 77; *King, l.c.* 61.

Small tree sparingly prickly, little branched; young shoots tomentose. Leaves 9 to 15 in. across, coriaceous round cordate, palmate-lobed half-way; lobes 5 to 9, oblong acuminate, serrate, glabrous; petioles 10 to 20 in. long. Inflorescence rusty tomentose terminal paniced. Umbels many-flowered, bracteolate. Flowers ·15 in. across; pedicels ·5 to ·7 in. long. Fruit broad elliptic terete, ·3 in. long; cocci 1 or 2 with chartaceous pericarp. *Hab.*

Mountain forests. Perak, Gunong Kerbau (Robinson); Maxwell's Hill; Tapah. *Distrib.* India.

(2) **B. elegans** Ridl. *Journ. Linn. Soc.* lxi. 291.

Shrub. Young parts red-tomentose. Leaves simple or digitate; leaflets lanceolate-acuminate, base long narrowed, edges minutely toothed, 7 in. long, 2 to 2.5 in. wide; petiolules 1.5 in. long; petioles 5.5 in. long. Stipules connate, 2-toothed, teeth acuminate. Panicles long, lax; peduncles slender, 4.2 in. long; branches 1.75 to 5 in. long, tomentose. Umbels .5 in. long; flowers 13, pedicels .2 in. long. Bracts acuminate, tomentose. Calyx obconic, teeth short tomentose. Petals 5, oblong blunt. Stamens 5; styles connate. Ovary bilocular. *Hab.* Selangor, Ulu Langat (Kloss).

9. **HEDEROPSIS**, Clarke.

Tree glabrous unarmed. Leaves 1- to 3-foliate; leaflets lanceolate denticulate or nearly entire, base of petiole much dilate. Umbels paniced; pedicels jointed close under flowers. Calyx margined, 5-toothed. Petals 5, valvate. Stamens 5. Ovary 5-celled; styles connate. Fruit berried, large, sub-globose, crowned by style. Seeds 4 or 5 ruminant. Species 1.

(1) **H. Maingayi** Clarke, in *Hook. fil. F.B.I.* ii. 739; *King, l.c.* 62.

Leaflets membranous ovate-lanceolate acuminate, base narrowed; nerves faint, 3 to 5 in. long, 1.5 to 2 in. wide; petiolules .1 to .2 in. long (simple leaves 8.5 in. long, 4 in. wide), petioles 1 to 2 in. long; peduncles puberulous, 1 in. long. Calyx-tube sub-globular, puberulous. Petals ovate-lanceolate, .15 in. long. Fruit over .5 in. long. *Hab.* Malacca (Maingay). Only known from Maingay's specimen.

10. **SCHEFFLEROPSIS**, Ridl.

Leaves digitate; leaflets coriaceous, lanceolate serrate; petiolules long. Umbels paniced. Flowers rather large. Calyx cupular truncate. Petals calyptrate, blunt 5. Stamens 14 to 16. Ovary 8-celled. Stigma sessile on a cone. Species 1.

This resembles *Schefflera*, but has serrate leaflets and numerous stamens and an 8-celled ovary.

(1) **S. polyandra** Ridl. *Journ. Roy. As. Soc. S. Br.* 75, p. 37.

Leaves digitate; petioles 9 in. long; leaflets 5, oblanceolate or oblong-lanceolate, coriaceous, acuminate blunt, base narrowed, serrate, smooth above; nerves about 9 pairs, faint, reticulations faintly visible beneath when dry, 4 to 6 in. long, 1.25 to 1.75 in. wide; petiolules 1.5 in. long. Panicles .5 in. long; branchlets .5 in. long; umbels of 4 or 5 flowers; pedicels .2 in. long, stout. Calyx campanulate, edge thin truncate entire, .1 in. long. Petals 5, shorter, ovate blunt, calyptrate. Stamens 14 to 16; anther as long as filaments. Ovary 8-celled; style 0. Stigma sessile on a

cone. *Hab.* Hill-tops, very rare. Perak, Gunong Keledang (Ridley).

11. TUPIDANTHUS, Hook. fil. and Thoms.

Large glabrous shrub, eventually climbing. Leaves digitate; leaflets coriaceous. Inflorescence a compound umbel or small panicle. Calyx margin none. Petals closely connate forming a cap. Stamens very many in 2 or more series. Ovary-cells and stigmas numerous. Fruit globose, depressed, succulent.

(1) *T. calyptratus* Hook. fil. and Thoms. *Bot. Mag. t.* 4908; *King, l.c.* 63.

Leaflets 7 to 9, oblong or oblong-ovate 4 to 7 in. long, 1.75 to 3.5 in. wide; petiolules 1 to 2 in. long; petioles 6 to 15 in. long. Inflorescence umbellate 3- to 4-branched; branches short, stout. Bracts large, coriaceous. Umbels of 3 to 7 pedicelled flowers nearly 1 in. across. Stamens 50 to 70. Fruit 1.25 to 1.5 in. across. *Hab.* Mountains at 4500 ft. altitude, rare. Perak, Gunong Ulu Sungei (Wray). *Distrib.* India.

ORDER LXXII. CORNACEÆ.

Shrubs or trees (rarely herbs). Leaves opposite or alternate, coriaceous, entire rarely serrate, exstipulate. Flowers usually small in axillary or terminal cymes, panicles or heads. Calyx-tube adherent to ovary, limb truncate or toothed, persistent in fruit. Petals 4 to 5, epigynous (rarely 20 or absent). Stamens insert with the petals and equal in number, rarely 2 or 3 times as many. Ovary inferior 1- to 4-celled crowned by a large fleshy disc. Style 1; ovule 1 rarely 2. Stigma truncate or capitate. Fruit drupaceous 1 (rarely 4-celled). Species 90, chiefly in the North Temperate regions (*King, Journ. As. Soc. Beng. lxxi.* 72).

Flowers bisexual in cymes or panicles.

Flowers small in terminal compound cymes 1. MASTIXIA

Flowers medium to large in axillary cymes; petals linear 2. ALANGIUM

Flowers small, often male only, in large compound panicles 3. ARALIDIUM

Flowers unisexual in heads 4. NYSSA

1. MASTIXIA, Bl.

Trees often tall. Leaves opposite or alternate, entire. Flowers bisexual, small in terminal paniced cymes. Calyx-tube campanulate, pubescent or silky 4- to 5-toothed. Petals very small 4 or 5 ovate, leathery, silky. Stamens 5 or 4; anthers cordate, oblong. Ovary 1-celled; ovule 1; style cylindric. Drupe ellipsoid crowned by calyx-limb, putamen grooved down one face. Species 18, S. India, Malaya.

Flowers tetramerous.

Leaves stiff coriaceous, strong-nerved and tomentose or pubescent beneath; corymbs tomentose (1) **M. Maingayi**

Leaves sub-glabrous or quite glabrous.

Leaves pale beneath, strong-nerved, elliptic acuminate, stiff (2) **M. rostrata**

Leaves glabrous, coriaceous, ovate acute (3) **M. propinqua**

Leaves thin, small 3 by 1·25 in., elliptic-acuminate (4) **M. Clarkeana**

Leaves thin, 6·25 by 2·5 in., elliptic, abrupt cuspidate or acuminate var. **macrophylla**

Flowers pentamerous; leaves alternate.

Cymes small with linear bracts .3 to .4 in. long (5) **M. bracteata**

Bracts minute, lanceolate (6) **M. Scortechinii**

Bracts whorled at base of pedicels (7) **M. gracilis**

Fruit .75 in. long (8) **M. megacarpa**

(1) **M. Maingayi** *Clarke, in Hook. fil. F.B.I. ii. 746; King, l.c. 74.*

Big tree. Branchlets, petioles, underside of leaves, inflorescence and calyx softly tomentose. Leaves coriaceous opposite, elliptic or elliptic-ovate, acute; nerves 6 pairs impressed above, strongly elevate beneath, 4 to 6 in. long, 1·5 to 2 in. wide; petioles .75 to 1 in. long. Cymes stout 1 to 1·25 in. long, sub-terminal, 1·5 in. across. Flowers numerous .15 in. long. Calyx campanulate, 4-lobed. Petals 4 to 5. Fruit ellipsoid not compressed, narrowed to tip, 1·2 in. long, .6 in. wide. *Hab.* Lowland forests. Singapore (Maingay).

(2) **M. rostrata** *Bl. Ann. Mus. Bot. Lugd. Bat. i. 258. M. Maingayi Clarke var. subtomentosa King, l.c. M. Junghuhniana Clarke, l.c. ii. 746.*

Tall tree. Leaves opposite, elliptic shortly acuminate, base slightly narrowed, glabrous above, minutely silvery tomentose beneath; nerves 5 pairs prominent beneath, 3·75 in. long, 1·5 in. wide; petioles .4 in. long. Panicles 1·5 in. long and wide, dichotomously branched, appressed pilose. Flowers .1 in. long. Calyx campanulate, teeth 4, minute. Petals 4, ovate. Drupe ovoid 1 in. long. *Hab.* Lowland forests. Malacca (Maingay); Sungei Hudang (Derry). Penang Hill (Curtis). *Distrib.* Java. *Native name:* Kayu Maura.

(3) **M. propinqua** *Ridl. Journ. F.M.S. Mus. iv. 25.*

Tree. Leaves ovate acute, base narrowed, coriaceous, glabrous; nerves impressed above, elevate beneath, midrib puberulous, 5 in. long, 2 in. wide; petioles pubescent, .5 in. long. Panicles shorter than leaves, pubescent. Bracts lanceolate, one below each branch. Calyx hairy; lobes very short, pubescent. Petals 4, ovate, pubescent outside. Stamens 4. *Hab.* Pahang, Telom forests at 4000 ft. altitude (Ridley).

(4) **M. Clarkeana** *King, l.c. 75.*

Tree 40 to 60 ft. tall, 10 to 15 in. through. Leaves opposite, thin coriaceous oblong or oblong-lanceolate, base round or sub-acute, glabrous; nerves 5 to 7 pairs, slender, prominent beneath, 3 to 4·75 in. long, 1 to 2 in. wide; petioles .3 to .35 in. long. Cymes

3 in. long, 4 in. wide, spreading compound; branch peduncles 1.5 in. long, glabrous. Flowers .15 in. long, green, sessile. Calyx funnel-shaped, pubescent teeth 4, ovate. Corolla depressed, globose. Petals 4. *Hab.* Dense forest 400 to 600 ft. altitude. Perak, Ulu Bubong (Kunstler).

var. *macrophylla* King. Leaves 6.25 in. long, 2.5 in. wide, elliptic cuspidate. Perak (Scortechini).

(5) *M. bracteata* Clarke, *l.c.* ii. 746; King, *l.c.* 73; Wangerin, *Pflanzenreich* 26. pl. 1, N-O.

Tree 50 to 60 ft. tall. Leaves alternate, thinly coriaceous, elliptic abruptly acuminate, base cuneate, glabrous; nerves 5 to 6 pairs, impressed above, prominent beneath, 1.75 to 3 in. long, .75 to 1.35 in. wide; petioles .25 to .5 in. long. Cymes .75 to 1.5 in. long, spreading, many-flowered, with linear-oblong bracts at bases of branches. Flowers .1 in. long, light yellow. Calyx funnel-shaped, silky, hardly toothed. Corolla hemispheric in bud. Petals ovate 5. Fruit obconic. *Hab.* Malacca, Selendor (Holmberg). Perak, Larut (Kunstler).

(6) *M. Scortechinii* King, *l.c.* 73.

Small tree, glabrous. Leaves coriaceous, elliptic-oblong or oblanceolate narrowed to base, acuminate at tip; nerves 4 or 5 pairs, 1.75 to 2.5 in. long, .85 to 1.25 in. wide; petioles .25 to .5 in. long. Cymes corymbose, 1.25 to 1.75 in. long, puberulous. Flowers sessile. Calyx-tube narrow, campanulate, teeth 5. Corolla depressed globose in bud, petals 5, ovate acute. Ovary 1-celled. *Hab.* Perak (Scortechini), apparently very rare.

(7) *M. gracilis* King, *l.c.* 74.

Small tree. Branches angled. Leaves thin coriaceous, lanceolate caudate-acuminate, base narrowed acuminate; nerves very fine, 8 to 14 pairs, 2 to 4.5 in. long, 8 to 1.5 in. wide; petioles .2 to .25 in. long. Cymes in threes, much shorter than leaves; branches short and crowded at the tips, many-flowered with a whorl of bracts at base of flower-pedicels. Flowers .1 in. long, ovoid. Calyx campanulate, obscurely 5-toothed. Petals 5. *Hab.* Perak at 5000 ft. altitude (Wray 1528).

I have not seen this. King wrote up a sheet of Wray's 128 as *Mastixia gracilis* in Kew Herbarium, but it is an *Araliaceous* plant (*Dendropanax lancifolia* Ridl.), and the description given by him does not fit it at all.

(8) *M. megacarpa* Ridl.

Tree 30 to 40 ft. tall. Leaves thin coriaceous, oblong elliptic cuspidate, base cuneate, pale beneath, glabrous; nerves 5 pairs slightly elevate beneath, 5 in. long, 2 in. wide; petioles .75 in. long. Flowers unknown. Fruit oblong .75 in. long, disc radiated from the short persistent style. *Hab.* Penang, Pulau Betong reserve (Curtis 919).

I have only seen a fruiting specimen of this, but it is quite distinct from any other species known to me.

2. **ALANGIUM**, Lam.

Trees or shrubs. Leaves alternate. Flowers in axillary fascicles or cymes, bisexual, hairy, white, rather large. Calyx-tube toothed or truncate. Petals 5 to 6, linear oblong, valvate. Stamens as many, twice as many or more. Anthers long, linear; filaments short, hairy. Ovary 1-celled, 1-ovuled (or 2- to 3-celled at base); style very long. Stigma large. Fruit a flattened drupe with thin pulp, crowned by the calyx. About 16 species, Asia, Africa, Australasia.

Stamens more than 6 (15 to 20) (1) **A. Lamarckii**

Stamens 5 or 6; fruit much compressed; stigma not lobed; leaves thickly coriaceous, large.

Calyx with distinct teeth; leaves broad elliptic, cordate hairy beneath often oblique (2) **A. nobile**

Calyx-limb nearly or quite entire; leaves oblique at base.

Leaves oblong, glabrous; cymes sessile (3) **A. Ridleyi**

Leaves oblong, glabrous; cymes peduncled (4) **A. ebenaceum**

Leaves thin, coriaceous, base cuneate glabrous (5) **A. tutela**

Calyx toothed; leaves thin 4 in. long, bases oblique.

Leaves lanceolate acuminate (6) **A. uniloculare**

Leaves oblong ovate, densely hairy beneath (7) **A. begoniæfolium**

(1) **A. Lamarckii** Thw. Enum. 133; King, l.c. 76. *A. salvifolium* Wangner, in *Pflanzenreich* 9.

Shrub or treelet. Leaves oblong elliptic to ovate round, base round, blunt apiculate, glabrous above, hairy beneath; nerves 4 to 5 pairs, 3 to 6 in. long, 2 to 3.5 in. wide; petioles .2 to .3 in. long. Flowers in short fascicles of 4 to 8, about .75 in. long; peduncle and calyx tomentose. Calyx cupular, slightly 6-toothed. Petals lanceolate, hairy outside with a hairy line inside. Stamens 18 pilose. Fruit ellipsoid contracted below calyx, tomentose .75 to 1 in. long, .65 in. through. *Hab.* Forests in low country, not common. Singapore, Sungei Jurong; Changi (Ridley). Perak, Larut (Kunstler). *Distrib.* Indo-Malaya.

(2) **A. nobile** Harms, *Pflanzenfamilien* iii. (8), 262; King, l.c. 79. *Maralea nobilis* Clarke, l.c. ii. 743.

A big tree up to 150 ft. tall. Stem 3 to 4 ft. through. Leaves coriaceous, elliptic or obovate, tip rounded, base rounded, minutely cordate, above glabrous midrib and nerves tomentose beneath densely tomentose (as are young shoots); nerves 8 to 10 pairs, elevate beneath, 4.5 to 2 in. long, 3 to 6 in. wide; petioles .8 to 1.75 in. long. Cymes 4- to 8-flowered, very short, about 1 in. long. Flowers .5 to .6 in. long. Calyx narrow campanulate, 6-grooved; teeth large lanceolate 6. Petals narrow oblong, tomentose. Stamens 6. Fruit ellipsoid, tomentose, 1 in. long, .65 in. wide. *Hab.* Forests on hills. Singapore (Maingay); Bukit Timah. Malacca, Selandor (Cantley). Selangor, Sungei Buloh (Long).

Perak, Goping; Ulu Kal (Kunstler). Penang, road to highlands (Curtis). *Native names*: Setubal; Kalong.

(3) **A. Ridleyi** King, *l.c.* 78.

A big tree about 80 ft. tall, 2 ft. through. Leaves coriaceous, elliptic or obovate, short, blunt acuminate, base cuneate, glabrous; nerves 10 pairs, prominent beneath, 6 to 8 in. long, 2.5 to 3.5 in. wide; petioles .9 to 1.3 in. long. Cymes sessile, short, 3- to 5-flowered. Flowers 1 in. long; pedicels .2 to .25 in. long, velvety. Calyx campanulate truncate, velvety. Petals 6, oblong lanceolate, sub-acute white. Fruit ellipsoid, grooved dark purple, 2 in. long.

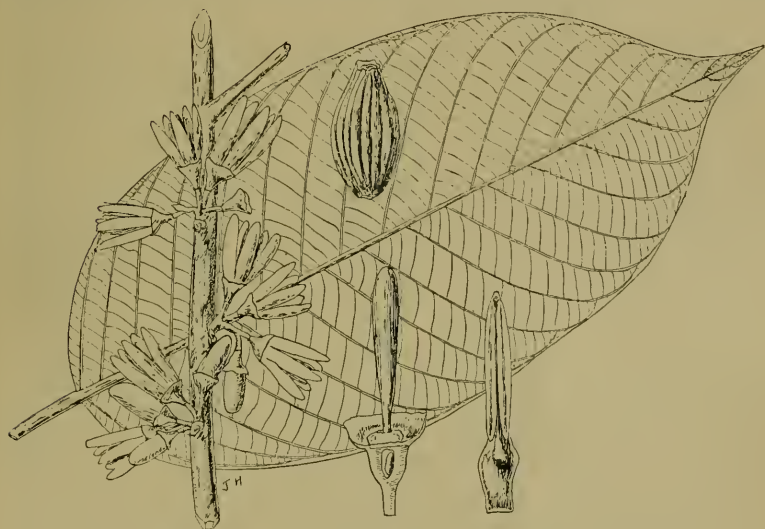


FIG. 75.—*Alangium Ridleyi*.

Hab. Lowland woods, apparently rare; I have only seen one tree. Singapore, rockery in Gardens (Ridley). *Native name*: Lidah Kerbau.

(4) **A. ebenaceum** Griff. King, *l.c.* 78. *Marlea ebenacea* Clarke, *l.c.* ii. 742.

Tree 30 to 40 ft. tall. Leaves coriaceous, oblong acuminate, base cuneate, round, glabrous above, minutely scaly beneath; nerves 13 to 16 pairs, prominent beneath, 6 to 10 in. long, 2.5 to 4 in. wide; petioles .35 to .8 in. long. Cymes 1 in. long, 6- to 12-flowered. Flowers sessile .65 in. long, .1 in. through. Calyx cupular, short, obscurely toothed. Petals 6 (or 5), linear pubescent. Fruit ovate compressed ridged, 1 in. long, .6 in. wide. *Hab.* Dense damp forests. Johor, Sungei Tebrau. Malacca, Alor Gajah

(Griffith). Selangor, Sungei Buluh (Foxworthy); Weld's Hill, Kwala Lumpur (Foxworthy). Perak, Larut (Kunstler). *Native names*: Lidah Kerbau Putih; Lidah Lidah Kayu; Melidah; Puchut Kuning.

(5) **A. tutela** *Ridl. Journ. Roy. As. Soc. S. Br.* lxi. 10.

Small tree. Leaves elliptic-lanceolate cuspidate, base cuneate, alternate, glabrous, thinly coriaceous; nerves 7 to 8 pairs, elevate beneath, 4 to 6 in. long, 2 to 2.5 in. wide; petioles .5 in. long. Cymes of 4 to 5 flowers, short; peduncles .12 in. long. Calyx-tube .12 in. long narrowed to base, ribbed, limb entire. Petals 5 linear-oblong, .5 in. long. Stamens 6. *Hab.* Singapore, Ponggol (Ridley). *Native name*: Kayu Tas.

This plant is supposed to have the property of keeping off tigers, for which purpose pieces of the wood are worn as a charm. Possibly an introduced plant in Singapore, but I have never seen any of it from elsewhere.

(6) **A. uniloculare** *King, l.c.* 77. *Marlea unilocularis* *Griff. Notulæ* iv. 679. *M. Griffithii* *Clarke, l.c.* ii. 742.

Tree 40 to 60 ft. tall, 10 to 15 in. through. Leaves membranous, obliquely ovate-lanceolate or oblong-lanceolate acuminate, base unequal, above glabrous except nerves pubescent, beneath appressed pubescent; nerves 4 to 6 pairs, slender, 3.5 to 5.5 in. long, 1.75 to 2.25 in. wide; petioles .25 to .3 in. long, villous. Cymes peduncled 1.25 in. long; branches spreading, pubescent. Flowers numerous, slender, .4 in. long. Calyx-tube funnel-shaped, toothed. Petals 5, linear. Fruit ovate, compressed, narrowed to tip, faintly ridged, green, .6 in. long, .35 in. wide. *Hab.* Lowland woods. Singapore, Bukit Timah; Sungei Buluh. Johor, Batu Pahat. Malacca (Griffith). Pahang, Belukur Sawar Chini, Kwantan (Foxworthy). Selangor, Weld's Hill, Kwala Lumpur (Burn-Murdoch). Perak, Goping and Ulu Bubong (Kunstler). *Native names*: Pian; Tenyual Lawat.

(7) **A. begoniæfolium** *Baill. Hist. Pl.* vi. 270. *Marlea begoniæfolium* *Roxb. Hort. Beng.* 28; *Pl. Corom.* iii. 80, t. 283.

Tree. Leaves ovate acuminate, base round or slightly cuneate, oblique, glabrous except nerves above, densely yellowish tomentose beneath; nerves 5 radiating from base, prominent beneath 6.5 in. long, 4.75 in. wide; petioles tomentose 1.25 in. long. Cymes several-flowered; peduncle .75 in. long, branches as long. Flowers 3 to 15. Calyx turbinate, teeth triangular. Petals 1 in. long, silky. Drupe glabrous, ovoid, ellipsoid, .4 in. long. *Hab.* Penang, Pulau Betong (Curtis). *Distrib.* India, China, Japan, Malay isles.

3. ARALIDIUM Miq.

A small tree. Leaves fleshy coriaceous thin, entire, elliptic or deeply lobed. Flowers male and bisexual in large compound panicles, minute. Calyx-teeth triangular spreading, tube campanulate. Petals 5, imbricate. Stamens 5. Ovary 3-celled, 2 cells

aborting; styles distinct subulate. Fruit a large ovoid drupe. Seed 1, rugose. Albumen large, ruminant. Species 1, Malayan. This plant has often been referred to the Order *Araliaceæ*. It is quite unlike anything in that Order, and is abnormal for *Cornaceæ*.

(1) *A. pinnatifidum* Miq. *Fl. Ind. Bat.* i. 763, t. 13; Clarke, in *Hook. fil. F.B.I.* ii. 726; Hemsley, *Ic. Pl.* t. 1549.

A tree about 20 ft. tall, glabrous except the inflorescence. Leaves light shining green, 12 to 18 in. long, 8 to 9 in. wide, entire or lobed, the entire leaves oblong shortly acuminate 9 in. long, 4 in. wide; nerves 7 pairs; the lobed forms with 8 to 10 oblong acuminate lobes decurrent on the midrib, 1 in. or more wide; petioles 1.5 to 5 in. long. Panicles much branched, pendulous, 18 in. long, puberulous. Flowers very numerous, minute, white. Petals pubescent. Drupe ellipsoid pointed, fleshy, white turning black, 1.35 in. long, .6 in. through. *Hab.* Common in woods, in lowland districts. Singapore, Bukit Timah (Hullett); Kranji. Johor, Sedenak; Batu Pahat. Malacca, Tabong (Griffith); Ayer Panas (Cantley); Jasin (Derry). Pahang, Kwala Tembeling. Negri Sembilan, Bukit Klana (Cantley). Selangor, Rawang (Kloss); Kwala Lumpur (Curtis). Perak, Larut (Kunstler); Changkat Serdang (Wray). Kedah, Yan. *Distrib.* Sumatra, Borneo. *Native names*: Poko Balai; Sahalat; Lempedu Buaya; Sebalai Tingal.

4. NYSSA, Linn.

Tree (or shrubs). Leaves alternate. Flowers capitate on axillary peduncles unisexual, one or few females and many males in a head, each flower bracteate or the males coalescing. Male flowers, calyx short, cup-shaped, 5- to 7-toothed. Petals 5 to 7, imbricate, hairy. Stamens 10, round a circular disc. Female flowers, calyx-tube campanulate, 5-toothed. Petals none. Ovary 1-celled, 1-ovuled. Drupe oblong or ovoid. Species 5 or 6, chiefly North American, one or more in the tropical Asian mountains.

(1) *N. sessiliflora* Hook. *fil. Gen. Pl.* i. 952; Clarke, *F.B.I.* ii. 747; King, *l.c.* 79.

A tree. Leaves coriaceous, oblanceolate tapering to both ends or elliptic acuminate, 4 to 8 in. long, 1.5 to 2 in. wide; nerves about 8 pairs; petioles .4 to .6 in. long. Peduncles .5 to 1 in. long. Heads .3 in. through. Flowers green. Fruit oblong .6 to .75 in. long. *Hab.* Mountain woods. Very rare. Perak, Gunong Batu Putih at 3400 ft. altitude (Wray). *Distrib.* India, Burma, Sumatra, Java.

INDEX OF ORDERS, GENERA, SPECIES, AND SYNONYMS

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ERRATA.

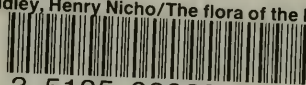
P. 179, line 36, for Vieillara, read Vieillard.

P. 586, line 20, for Adinobotrys, Linn., read Adinobotrys, Dunn.



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