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THE  
GARDENS' BULLETIN  
SINGAPORE

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Volume XXI

1965 — 1966

A periodical reflecting the interests  
and activities of the Botanic Gardens,  
Singapore.

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*Director, Botanic Gardens,  
Singapore.*

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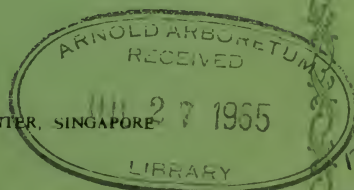
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Vol. XXI, Part I

1st March, 1965

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Check-List of *Ficus* in Asia and Australasia with  
Keys to Identification

By E. J. H. CORNER

Botany School, University of Cambridge

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MY STUDIES ON *Ficus*, begun in a desultory way in Malaya in 1930 and carried on with the help of my friend C. E. Carr in Borneo and Papua, where he died in botanical exploration, quickened since 1950 into a monograph, now completed, for the Flora Malesiana. They have taken me in herbaria to Pakistan where the Asiatic figs start, to China, Japan, Micronesia, Melanesia, Polynesia, and Australia with a glance only, to my regret, at the African mainland and islands of the Indian Ocean. They have taken me in fact to Java, Borneo, Eastern New Guinea, and Bougainville Island, with a glimpse of India and Pakistan. Thus, I have studied some 20,000 collections, not once but as often as London, Kew, Edinburgh, Paris, Caen, Brussels, Leiden, Utrecht, Copenhagen, Berlin, Geneva, Florence, Bangkok, Singapore, Bogor, Kuching, Lae, and Brisbane, have provided the material. And I have studied over 300 species in the living state.

There are about 470 species in this whole region, and the Malaysian centre holds about 350. Therefore, the body of the research is to be published in the Flora Malesiana. To repeat in a greater monograph is impossible. A check-list with synonyms and the valid species numbered for the whole region is necessary. It will guide in the location of new records and it will knit the bulk of the genus. Botanically, however, the African species of sect. *Urostigma*, subgen. *Sycomorus*, and sect. *Sycidium* subsect. *Varinga* should have been included. These groups are being revised for the African floras, and I am unwilling to copy until the very critical revision in the light of the newer collections has been completed. About 2,600 names are indexed, and these average 5 synonyms per species.

I have included the keys for the whole region but I intend later to publish with suitable illustrations keys to identifications for local floras. These will be based on the descriptions in the Flora Malesiana and the classification in this check-list. The Latin diagnoses of new taxa have been published in the Gardens' Bulletin, Singapore (vol. xvii and xviii).

I wish to thank the staffs of the herbaria where I have worked, borrowed, and worried, and to apologise for the many labels which, at the outset, were unavoidably non-basic; the evaluation of types is slow and late. Then am I grateful to my friends H. M. Burkill, Chew Wee Lek, J. W. Purseglove, and J. Sinclair (Singapore), T. Smitinand (Thailand), T. B. Worthington (Ceylon), J. A. R. Anderson and P. S. Ashton (Sarawak), W. Meijer (Sumatra and North Borneo), A. Kostermans (Indonesia), E. Henty and J. S. Womersley (Territory of New Guinea), H. S. McKee (Australia), S. L. Everist (Brisbane), H. Eichler (Adelaide), A. Fedorov (Leningrad), L. J. Brass, I. Condit, F. R. Fosberg, A. C. Smith, and E. H. Walker (United States) who, active in the field, have supplied so much recent material. Thus have I built up at Cambridge a critical herbarium though one in which I have rarely preferred the disposal of holotypes. But in all ways I am most indebted to the editor of Flora Malesiana, C. G. G. J. van Steenis, for his invigorating leadership and for the loan of the facile fingers of his artist Ruth v. Crevel. Lastly, I acknowledge my gratitude to the Librarian of the University of Cambridge, H. R. Creswick, who allowed me to keep for several years in my room at the Botany School Miquel's monograph.

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## FICUS L. (1753)

*Pella* Gaertn. (1788)—*Gonusuke* Raf., *Mastosuke* Raf., *Necalistis* Raf., *Oluntos* Raf., *Perula* Raf., *Rephesis* Raf., *Tremotis* Raf., *Varinga* Raf. (1838)—*Sycomorphe* Miq. (1844)—*Caprificus* Gasp., *Covellia* Gasp., *Cystogyne* Gasp., *Erythrogynne* Vis. ex Gasp., *Galoglychia* Gasp., *Sycomorus* Gasp., *Tenorea* Gasp., *Urostigma* Gasp., *Visiania* Gasp. (1844)—*Macrophthalmia* Gasp. (1845)—*Pharmacosyceae* Miq., *Pogonotrophe* Miq. (1847)—*Synoecia* Miq. (1848)—*Bosscheria* Teysm. et Vr. (1861)—*Stilpnophyllum* (Endl.) Drury (1869)—*Dammaropsis* Warb. (1891)—*Sycodendron* Rojas (1918).

subgen. *Urostigma* (Gasp.) Miq. (1867)

*Pella* Gaertn. (1788)—*Mastosuke* Raf., *Oluntos* Raf., *Perula* Raf., *Rephesis* Raf. (1838)—*Galoglychia* Gasp., *Urostigma* Gasp., *Visiania* Gasp. (1844)—*Macrophthalmia* Gasp. (1845)—*Stilpnophyllum* (Endl.) Drury (1869)—*Sycodendron* Rojas (1918).

sect. *Urostigma*

sect. *Gasparriniella* Sata. (1934).

Africa, Asia, Australasia.

ser. *Religiosae* Miq. (1867)

Africa, Asia, Australasia.

1. **F. religiosa** L. (1753)—*F. caudata* Stokes (1812)—*F. superstiosa* Link (1822)—*F. rhynchophylla* Steud. (1840)—*Urostigma religiosum* (L.) Gasp. (1844)—*U. affine* Miq. (1847)—*F. peepul* Griff. (1854)—*F. religiosa* L. v. *cordata* Miq., v. *rhynchophylla* Miq. (1867).

Subhimalayan forest from Rawalpindi to Yunnan, Cochinchina, North Thailand; widely cultivated.

Vern. *Bo*, *bohd*, *peepul*, *pipal*; *arasi* (Tamil), *açvattha* (Sansk.).

2. **F. saxophila** Bl. (1825)—*Urostigma saxophilum* (Bl.) Miq. (1859)—*F. petrophila* Hassk. (1844)—*F. populnea* Decne. ined.

Laos, Cochinchina, east Java, Bali, Christmas Isl., Timor, Moluccas (Boeroe), Celebes (central, north), Philippines (Luzon, Negros, Cebu), New Guinea (Manokwari).

3. **F. cardiophylla** Merr. (1926)—*F. bonii* Gagnep. (1927)—  
? *F. glabella* Bl. v. *tonkinensis* Drake (1896).  
South China (Lungchow), Tonkin.
4. **F. tsjahela** Burm. f. (1768)—*Pella ribesioides* Gaertn. (1788)  
—*F. infectoria* Willd. (1806)—*Urostigma tjakela* (Burm. f.)  
Miq., *U. caulobotryum* Miq., *U. ceylonense* Miq. (1847)—*F.*  
*caulobotrya* (Miq.) Miq. (1867)—*F. surattensis* Burm. f. nom-nud.  
Peninsular India, Ceylon.  
*F. densifolia* Miq. from Réunion is closely related.

ser. *Superbae* Corner (1960)

Asia, New Guinea, Australia.

5. **F. superba** Miq. (1867)—*Urostigma superbum* Miq. (1851)—  
*F. tenuipes* S. Moore (1925).  
Japan, China, south-east Asia to Australia; chiefly coastal.

Key to the varieties

1. Twigs 5–12 mm. thick. Stipules villous. Lamina 5–13 cm. wide. Figs  
18–25 mm. wide, ramiflorous; peduncles 7–35 mm. long v. *superba*.
1. Twigs 2–6 mm. thick. Stipules thinly hairy to glabrous. Lamina 2.5–10  
cm. wide. Peduncles shorter.
  2. Figs 15–22 mm. wide, axillary; peduncles 3–11 mm. long. Aus-  
tralia ..... v. *henneana*.
  2. Figs 7–11 mm. wide, axillary and ramiflorous; peduncles 2–15 mm.  
long.
    3. Lamina 4–7 × 2.5–5 cm., ovate-rotund, short; petiole 2  
cm. long. Tonkin ..... v. *alongensis*.
    3. Lamina larger, 18 × 10 cm., elliptic to ovate or obovate; petiole  
6 cm. long. Japan to Malaya ..... v. *japonica*.

a. v. **superba**.

Cambodia, Cochinchina, Thailand, Malaya (Perlis, and east coast from Kelantan to Singapore), Anamba and Natuna Isl., Java, Soemba, Soembawa, Timor, Celebes (Saleyer), Ceram.

b. v. **alongensis** (Gagnep.) Corner (1960)—*F. alongensis* Gagnep. (1927).

Tonkin (Baie d'Along, Ile de Biches).

Possibly only a xerophytic state of v. *japonica*.

c. v. **japonica** Miq. (1866–7)—*F. geniculata* Kurz v. *abnormalis* Kurz (1877)—*F. subpisocarpa* Gagnep. (1927)—*F. wightiana* auct. (non vera = *F. virens* Ait.).

Japan, Ryu Kyu Isl., Formosa, China, Hainan, Indochina, Thailand, Malaya (west coast).

d. v. **henneana** (Miq.) Corner (1960)—*F. henneana* Miq. (1867)  
—*F. gracilipes* F. M. Bailey (1891)—*F. parkinsoni* Hiern (1901)  
—*F. pritzelii* Warb. (1905).

Australia (Gulf of Carpentaria, Queensland).

6. **F. prasnicarpa** Elm. (1937)—*F. glabella* Bl. v. *papuana* King (1887).

Philippines (Luzon), Celebes, Moluccas (Morotai), Waigeo, Key Isl., Aru Isl., New Guinea, Bougainville Isl.

7. **F. concinna** Miq. (1867)—*Urostigma concinnum* Miq. *U. parvifolium* Miq. (1847)—*F. parvifolia* Miq. (1867)—*F. affinis* Wall. ex Kurz (1873)—*F. glabella* Bl. v. *affinis* (Wall.) King, v. *concinna* King (1887)—*F. arayatensis* Warb. (1905)—*F. fecundissima* Lév. et Vant. (1911)—*F. pseudoreligiosa* Lév. (1914-5).

India and south China to Malaya (Pahang, Kota Glanggi), Philippines generally, and North Borneo (Bud Goya Isl.).

*Key to the varieties*

1. Fig sessile or with a very short peduncle -0.5 mm. .... v. *subsessilis*.  
 1. Fig with peduncle 1-5 mm. long.  
     2. Peduncle and fig glabrous ..... v. *concinna*.  
     2. Peduncle and fig villous ..... v. *dasycarpa*.

a. v. **concinna**.

As above.

b. v. **subsessilis** Corner (1960)—*F. subpedunculata* Miq. (1867).

North-east India, Chekiang, Yunnan, Kwantung, Thailand (north-west).

c. v. **dasycarpa** Corner v. nov.

Receptaculi pedunculus corpusque pilis albidis patentibus 0.2-0.3 mm. longis villosi.

Orissa (Bathipathar; leg. G. Panigrahi 20790; herb. Shillong, Botanical Survey of India, East Circle).

ser. *Caulobotryae* Miq. (1859)

ser. *Infectorieae* Miq. (1867)—sect. *Gasparriniella* Sata (1934, subgen. *Urostigma*).

Africa, Asia, Australasia.

8. **F. lacor** Buch. Ham. (1826)—*F. insignis* Kurz (1873)—*F. avium* Gagnep. (1927)—*F. lacor*, *F. lacur* auct. = *F. virens* Ait.

India (Madras to Himalayas), Burma, Indochina (Annam, Cambodia).

*F. ingens* Miq. of Africa is very similar and seems to merge into *F. lacor*.

9. **F. cupulata** Haines (1914).

India (Central Provinces, Pachmarhi).

10. **F. virens** Ait. (1789)—*F. infrafoliacea* J. E. Sm. (1810)—*F. terminalis* Heyne ex Roth (1817)—*F. scandens* Buch. Ham. (1826)—*Urostigma apiculatum* Miq., *U. aegiophyllum* Miq., *U. lambertianum* Miq., *U. perseaeifolium* Miq., *U. wightianum* Miq. (1847)—*U. infectorium* Miq. (1854)—*U. nesophilum* Miq. (1861)—*F. wightiana* (Miq.) Benth. (1861)—*F. aegiophylla* Miq., *F. apiculata* Miq. *F. infectoria* Miq. and v. *aegiophylla* Miq., *F. lambertiana* Miq., *F. monticola* Miq., *F. nesophila* Miq. (1867)—*F. nesophila* (Miq.) F.v.M. (1866).—*F. infectoria* Miq. v. *lambertiana* (Miq.) King, v. *wightiana* (Miq.) King (1887)—*F. glabella* Bl. v. *nesophila* (Miq.) Laut. et K. Schum. (1901)—*F. carolinensis* Warb. (1905)—*F. lacor* Buch. Ham. v. *lambertiana* (Miq.) Barrett (1946)—*F. proluxa* Forst. f. v. *carolinensis* (Warb.) Fosberg (1955)—*F. infectoria* Willd. sensu auct. (non vera = *F. tsjahela* Burm. f.)—? *F. ampla* Kunth et Bouch. (1846).

Ceylon, India, Burma, south China, Hainan, Andaman Isl., Indochina, Thailand, Malaya (Langkawi Isl.), Sumatra (north, and west coast), Java, Lesser Sunda Isl., Timor, Celebes, Philippines, Caroline Isl., Moluccas, New Guinea, New Britain, Solomon Isl., North Australia.

a. v. **virens**.

As above.

- b. v. **sublanceolata** (Miq.) Corner (1960)—*F. saxophila* Bl. v. *sublanceolata* Miq. (1867)—*F. pilhasi* J. E. Sm. (1810)—*F. timorensis* Decne (1834)—*Urostigma cunninghamii* Miq., *U. fraseri* Miq., *U. psychotriifolium* Miq.—*U. accedens* Miq. (1859)—*U. timorensis* Miq. (1847)—*F. terminalioides* Griff. (1848)—*F. cunninghamii* Miq., *F. psychotriifolia* Miq., *F. timorensis* Miq., *F. caulobotrya* Miq. v. *fraseri* Miq., *F. glabella* Bl. f. *grandifolia* Miq. (1867)—*F. fraseri* (Miq.) F.v.M. (1868)—*F. infectoria* Willd. v. *forbesii* King (1887)—*F. syringifolia* C. Fraser ex C. Moore (1893)—*F. suberosa* Lévl. et Vant. (1910)—*F. infectoria* Willd. v. *cunninghamii* (Miq.) Domin, v. *fraseri* (Miq.) Domin, v. *psychotriifolia* (Miq.) Domin (1921)—*F. nitentifolia* S. Moore (1925)—*F. lacor* Buch. Ham. v. *cunninghamii* (Miq.) Barrett (1964).

Distribution as v. *virens*.

- c. v. **glabella** (Bl.) Corner (1960)—*F. glabella* Bl. (1825)—*Urostigma canaliculatum* Miq. (1847)—*U. moritzianum* Miq. (1854)—*U. glabellum* (Bl.) Miq. (1859).

Lower Thailand, Malaya, Sumatra, Java, Riouw, Bangka, Borneo.

11. **F. geniculata** Kurz (1877)—*F. tenii* Lévl. (1908).

China (Szechuan, Yunnan), Laos, Annam, (Cambodia ?), Thailand, Burma, India (Assam, Sikkim, Orissa, Madras), Andaman Isl.

12. **F. caulocarpa** Miq. (1867)—*Urostigma caulocarpum* Miq.,  
*U. stipulosum* Miq. (1847)—*F. stipulosa* Miq. (1867)—*F.*  
*infectoria* Willd. v. *caulocarpa* (Miq.) King (1887).

Ceylon, lower Burma, Thailand, Malaya (Langkawi, Perak, Pulau Tioman), Lombok, Borneo, Philippines, Celebes (north), Moluccas (Morotai, Amboina), New Guinea.

a. v. **caulocarpa**.

As above.

b. v. **dasycarpa** Corner (1960).

Philippines (Luzon, Mindoro).

13. **F. prolixa** Forst. f. (1786)—*F. forsteriana* Endl. (1836)—  
*Urostigma prolixum* (Forst. f.) Miq. (1847)—*F. umbilicata*  
Bur. (1893)—*F. aoa* Warb. (1898)—*F. inaequibractea* Warb.,  
*F. prolixoides* Warb., (1905)—*F. mariannesis* Merr., *F. tenuis-*  
*tipula* Merr. (1914).

Micronesia, Polynesia; Caroline Isl. (Palau eastwards), Marianna Isl. (Pagan Isl. southwards), New Hebrides, Loyalty Isl., New Caledonia, Fiji, Cook Isl., Niue, Samoa, Tonga, Tahiti, Austral Isl., Pitcairn Isl., Tuamotu Isl.

a. v. **prolixa**.

As above.

- b. v. **subcordata** Corner (1960)—*F. marquesensis* F.B.H. Brown (1935).

Caroline Isl., Mariannas, Marquesas, Fanning Isl.

ser. *Orthoneuræ* Corner (1960)

Sinohimalaya.

14. **F. orthoneura** Lév. et Vant. (1907)—*F. hypoleucogramma*  
Lév. et Vant. (1907)—*F. caesia* Hand. Maz. (1922)—*F.*  
*federovii* W. T. Wang (1957).

China (Kweichow, Kwangsi, Yunnan), Tonkin, Burma (Maymyo Plateau), Thailand (north-west).

15. **F. hookeriana** Corner (1960)—*F. hookeri* Miq. (1867).  
Sikkim, Assam, Yunnan.

sect. *Leucogyne* Corner (1960)

Asia (? also in Madagascar as *F. menabeensis* H. Per.).

16. **F. rumphii** Bl. (1825)—*F. cordifolia* Roxb. (1832)—*F. conciliorum* Oken (1841)—*F. populnea* Kunth et Bouch. (1846)—*Urostigma cordifolium* (Roxb.) Miq. (1847)—*U. rumphii* (Bl.) Miq. (1854)—*F. populiformis* Schott ex Miq. (1867)—*F. damit* Gagnep. (1927)—*F. religiosa* L. v.  $\beta$  Lamk. (1788)—? *F. affnior* Griff. (1854)—*F. cordifolia* Dalz. et Gibs. (1861).

Cocos Isl., Nicobars, Andamans, India (north and central), Burma, Indochina, Thailand, Malaya (Perak northwards), Java, Sumbawa, Timor, Alor, Wetar, Moluccas (Amboina, Banda, Boeroe, Ternate), Tenimbar, Celebes (south east).

17. **F. amplissima** J. E. Sm. (1810)—*F. tsiela* Roxb. ex Buch. Ham. (1826)—*F. indica* Willd. (1806)—*Urostigma pseudo-benjamineum* Miq., *U. pseudotsiela* Miq. (1847)—*F. pseudo-benjaminea* Miq., *F. tjiela* Miq. (1867).

Peninsular India (Central Provinces and southwards), Ceylon, Maldive Isl.

sect. *Conosycea* (Miq.) Corner (1960)

*Urostigma* Gasp. sect. *Conosycea* Miq. (1859).

Asia, Australasia.

subsect. *Conosycea*

sect. *Stilpnophyllum* Endl. subsect. *Pedunculatae* Sata and subsect. *Sessiliflorae* Sata (1944).

Asia, New Guinea, Solomon Isl., Queensland.

ser. *Validae* Miq. (1867)

sect. *Stilpnophyllum* Endl. subsect. *Pedunculatae* Sata (1944).

Asia, New Guinea.

18. **F. arnottiana** Miq. (1867)—*Urostigma arnottianum* Miq., *U. courtallense* Miq. (1847)—*Pogonotrophe emodi* Miq. (1848)—*F. arnottiana* Miq. v. *courtallensis* Miq., *F. emodi* Miq. (1867).

Key to the varieties

1. Leaf acuminate. Fig 5–8 mm. wide; peduncle 2–5 mm. long. Cuticle slightly striate round the stomata ..... v. *arnottiana*.
1. Leaf subacute to obtuse. Fig 10 mm. wide; peduncle 5–8 mm. long. Cuticle plicate-striate round the stomata ..... v. *subcostata*.

a. v. **arnottiana**.

India (central, and south), Ceylon.

b. v. **subcostata** Corner (1960).

Himalayas (north-west and central).

19. **F. costata** Ait. (1789)—*F. venusta* Kunth et Bouch. (1846)—*F. caudiculata* Trimen (1885)—*F. mooniana* King (1887)—*Urostigma wightianum* Miq. v. *majus* Thw. (1864).

Ceylon, Annam (pr. Tourane).

20. **F. beddomei** King (1887)—*F. rama-varmae* Bourd. (1900).  
South India (Nilghiri, Anaimalai, Tinnevilli Hills).
21. **F. dalhousiae** Miq. (1867)—*Urostigma dalhousiae* Miq. (1847)  
—*Covellia ? costata* Miq. (1848)—*F. costigera* Miq. (1867).  
South India (Madras, Travancore).
22. **F. annulata** Bl. (1825)—*F. flavescens* Bl. (1825)—*F. valida*  
Bl. (1825)—*Urostigma flavescens* (Bl.) Miq. (1851)—*U. annu-*  
*latum* (Bl.) Miq. (1854)—*U. validum* (Bl.) Miq. (1859)—*U.*  
*biverrucellum* Miq. (1860)—*U. conocarpum* Miq. (1859)—*F.*  
*annulata* Bl. v. *biverrucella* Miq., v. *elliptica* Miq. (1867)—*F.*  
*annulata* Bl. v. *flavescens* (Bl.) King, v. *valida* (Bl.) King (1887)  
—*F. balabacensis* Quisumbing (1930).  
Burma, Indochina, Yunnan, Thailand, Malaya, Sumatra, Java,  
Bangka, Borneo, Celebes, Philippines (Balabac Isl.).
23. **F. chrysolepis** Miq. (1867)—*F. chrysolepis* Miq. v. *longepe-*  
*dunculata* Merr. (1905)—*F. longepedunculata* (Merr.) Elm.  
(1907)—*F. hallieri* Merr. ex Elm. (1908)—*F. magallanensis*  
Elm. (1911).  
Philippines, Celebes, Moluccas (Amboina, Obi).
24. **F. novoguineensis** Corner (1961).  
Eastern New Guinea, New Britain.
25. **F. depressa** Bl. (1823)—*F. pruniformis* Bl. (1825)—*Urostigma*  
*depressum* (Bl.) Miq. (1847)—*U. pruniforme* (Bl.) Miq. (1854)  
—*F. johnsoni* Elm. (1906)—*F. iwahigensis* Elm. (1912), pr. p.  
foliorum; alt. p. *F. forstenii* Miq.  
Malaya, Sumatra, Java, Bali, Soembawa, Soemba, Borneo,  
Philippines.
26. **F. globosa** Bl. (1825)—*Urostigma onustum* Miq. (1847), pr.  
p. foliorum; alt. p. *F. pisocarpa* Bl.—*U. globosum* (Bl.) Miq.  
(1859)—*U. manok* Miq. (1854)—*F. onusta* Wall. ex Miq.,  
*F. manok* Miq. (1867)—*F. globosa* Bl. v. *manok* (Miq.) King  
(1887).  
Lower Burma, Thailand, Malaya, Sumatra, Java, Riouw,  
Lingga, Bangka, Borneo.

ser. *Drupaceae* Corner (1960)

Asia, New Guinea, Solomon Isl., Queensland.

subser. *Drupaceae*

Asia, New Guinea, Solomon Isl., Queensland.

27. **F. drupacea** Thunb. (1786)—*F. pilosa* Reinw. ex Bl. (1825)—*F. chrysocoma* Bl. (1825)—*F. payapa* Blanco (1837)—*Urostigma drupaceum* (Thunb.) Miq. (1847)—*U. bicorne* Miq. (1851)—*U. chrysothrix* Miq., *U. pilosum* (Reinw. ex Bl.) Miq., *U. subappendiculatum* Miq., *U. subcuspidatum* Miq. (1854)—*F. pilosa* Reinw. ex Bl. v. *chrysocoma* (Bl.) King (1887)—*F. chrysochlamys* Laut. et K. Schum. (1901)—*F. vidaliana* Warb. (1905).

India, Ceylon, to Solomon Isl. and Queensland.

Key to the varieties

1. Basal bracts 2–6 × 4–8 mm. Fig-body often hairy at first. Lateral nerves 9–15 pairs ..... v. *pubescens*.
1. Basal bracts generally smaller and concealed by the base of the glabrous fig-body. Lateral nerves 7–12 pairs.
  2. Basal bracts brown hairy ..... v. *drupacea*.
  2. Basal bracts glabrous or white puberulous.
    3. Basal bracts 2–3 × 3–5 mm. .... v. *auranticarpa*.
    3. Basal bracts 0.5–1 mm. long.
      4. Fig-body shortly pedicellate; internal bristles abundant ..... v. *pedicellata*.
      4. Fig sessile; internal bristles none or few and minute .. v. *glabrata*

a. v. **drupacea**.

Burma, Indochina, Thailand, Malaya (not south of Perak and Pahang), Sumatra (Mentawai Isl., west coast, Lake Toba), Java to Timor, Borneo (excluding Sarawak and the south-west), Philippines, Celebes, Moluccas, New Guinea, Solomon Islands, Queensland. Absent from the Riouw-pocket.

b. v. **auranticarpa** (Elm.) Corner (1960)—*F. auranticarpa* Elm. (1937).

Luzon (Sorsogon Prov.), Celebes (Kandani).

c. v. **glabrata** Corner (1960).

Kangeen Archipelago, Sumbawa, Sumba, Flores, Alor, Timor Laut, Solomon Isl.

d. v. **pedicellata** Corner (1960).

Eastern New Guinea (Western Highlands, Jimmi Valley).

e. v. **pubescens** (Roth) Corner (1960)—*F. mysorensis* Heyne ex Roth and v. *pubescens* Roth (1817)—*F. citrifolia* Willd. (1806; non P. Mill.)—*F. mollis* Spreng. (1826)—*F. gonia* Buch. Ham., ? *F. rupestris* Buch Ham. (1827)—*Urostigma mysorense* (Heyne ex Roth) Miq., *U. dasycarpum* Miq. (1847)—*F. mysorensis* Heyne f. *parvifolia* Miq. (1867)—*F. mysorensis* Heyne v. *subrepanda* Wall. ex King (1887)—*F. subrepanda* Wall. ex King (1888)—*F. mysorensis* Heyne v. *dasycarpa* (Miq.) Barrett (1951)—*F. cotoneaefolia* Vahl sensu Alston (1931).

Ceylon, India, East Pakistan, Laos, ? Burma.

28. **F. cucurbitina** King (1887)—*F. elliptifolia* Merr. (1921).

Malaya (southeast Johore), Borneo (Pontianak, Sandakan, Nunukan Isl.), Philippines (Mindanao).

a. v. **cucurbitina**.

As above.

b. v. **eubracteata** Corner (1960).

Philippines (Samar).

29. **F. cordatula** Merr. (1908)—*F. strangularis* Elm. (1912)—*F. camarinensis* Merr. (1914)—*F. sylvestrei* Elm. (1937).

Philippines (Luzon to Palawan and Mindanao), Celebes (Minahassa).

a. v. **cordatula**.

As above.

b. v. **sericea** (C. B. Robinson) Corner (1960)—*F. sericea* C. B. Robinson (1911).

Mindanao.

subser. *Indicae* Corner (1960)

Ceylon, India, south China to Philippines and Celebes.

30. **F. mollis** Vahl (1790)—*F. tomentosa* Roxb. ex Willd. (1806)—*F. asinina* Buch. Ham. (1827)—*Urostigma connivens* Miq., *U. obversum* Miq., *U. tomentosum* (Roxb.) Miq. and ? v. *obtusatum* Miq. (1847)—*F. tomentosa* Roxb. v. *brevifolia* Miq. and v. *connivens* Miq. (1867).

India (north-west, central, and south), Ceylon.

31. **F. benghalensis** L. (1753)—*F. indica* L. (1753)—*F. umbrosa* Salisb. (1796)—*F. cotoneaeifolia* Vahl. (1806)—*F. cotonifolia* Stokes (1812)—*F. pubescens* Roth (1817)—*F. lasiophylla* Link (1822)—*Perula benghalensis* Raf. (1838)—*F. banyana* Oken (1841)—*F. crassinervia* Kunth et Bouch. (1846)—*F. chauvierei* Hort. ex Guillaumin (1945)—*Urostigma benghalense* (L.) Gasp. (1844)—*F. mysorensis* Heyne ex Roth v. *pubescens* (Roth) King (1887).

Pakistan, India; widely cultivated.

Vern. Bor, burr, bot, banyan (Hind.); al, ala, arla (Tamil); peralu (Malayalam); nyadgrodha Sanskt.); Indian Banyan.

a. v. **benghalensis**.

As above.

b. v. **krishnae** (C.DC) Corner—*F. krishnae* C.DC (1902).

India (cultivated).

Vern. Krishna bor, Krishna's cup.

32. **F. fergusonii** (King) Worthington (1959)—*F. altissima* Bl. v. *fergusonii* King (1887).

Ceylon.

33. **F. altissima** Bl. (1825)—*F. laccifera* Roxb. (1832)—*F. latifolia* Oken (1841)—*Urostigma lacciferum* (Roxb.) Miq. (1847)—*U. altissimum* (Bl.) Miq. (1854).

India (Sikkim eastwards), Burma, Yunnan, Indochina, Hainan, upper Thailand, Andaman Isl., Sumatra, Java, Celebes, Philippines (Luzon, Mindoro, Mindanao).

34. **F. pubilimba** Merr. (1942).

Burma, Indochina, Hainan, Thailand, Malaya (Perak and Penang northwards).

a. v. **pubilimba**.

As above.

b. v. **ovata** Corner (1960).

Penang (? wild).

35. **F. kerkhovenii** Val. (1906)—*F. lamaoensis* Merr. (1921).

Malaya, Sumatra, Bangka, Java (west), Borneo, Philippines (Luzon).

subser. *Zygotricheae* Corner (1960)

Burma, Indochina, Thailand, West Malaysia.

36. **F. consociata** Bl. (1825)—*Urostigma consociatum* (Bl.) Miq. (1854).

a. v. **consociata**.

Lower Burma, Cambodia, Sumatra, Java, Bangka, Billiton, Riouw, Borneo.

b. v. **murtoni** King (1887).

Annam, Cambodia, lower Burma, lower Thailand, Malaya, Sumatra, Riouw, Lingga, Borneo.

37. **F. bracteata** Wall. ex Miq. (1867)—*Urostigma bracteatum* Wall. ex Miq. (1847).

Malaya (Perak southwards), Sumatra, Borneo.

subser. *Crassirameae* Corner (1960)

sect. *Stilpnophyllum* Endl. subsect. *Sessiliflorae* Sata (1944).

Lower Burma, Indochina to New Guinea.

38. **F. stupenda** Miq. (1867)—*Urostigma giganteum* Miq. (1854).

a. v. **stupenda**.

Malaya (Selangor), Java (Batavia, Preanger), Sumatra, Borneo.

b. v. **minor** Corner (1960).

Malaya (Singapore, Johore), North Borneo.

39. **F. crassiramea** Miq. (1867)—*Urostigma crassirameum* Miq. (1851)—*F. procera* Bl. v. *crassiramea* (Miq.) King (1887)—*F. crassicalyx* Elm. (1937).  
 a. v. **crassiramea**.  
 Lower Burma, lower Thailand, Malaya, Sumatra, Java, Bangka, Borneo, Philippines (Luzon, Mindanao), Talaud Isl.  
 b. v. **brevicupulata** Corner (1960).  
 Celebes (south-east), Moluccas (Obi).  
 c. v. **celebica** Corner (1960).  
 Celebes (Minahassa).  
 d. v. **clementis** (Merr.) Corner (1960)—*F. clementis* Merr. (1908).  
 Philippines (Luzon, Mindoro, Panay, Mindanao, Basilan).  
 e. v. **patellifera** (Warb.) Corner (1960).—*F. patellifera* Warb. (1905).  
 New Guinea, New Britain.
40. **F. phanrangensis** Gagnep. (1927).  
 Annam (Phanrang, Nhatrang).
41. **F. xylophylla** Wall. ex Miq. (1867)—*Urostigma xylophyllum* Miq. (1847).  
 Laos, Thailand, Malaya, Sumatra, Riouw, Lingga, Bangka, Borneo.
42. **F. forstenii** Miq. (1867)—*F. palawanensis* Merr. (1905)—*F. iwahigensis* Elm. (1912) pr. p. recept.; alt. p. *F. depressa* Bl.  
 a. v. **forstenii**.  
 Celebes, Philippines (including Palawan), ? Borneo.  
 b. v. **pacifica** (Elm.) Corner (1960)—*F. pacifica* Elm. (1937).  
 Malaya (Perak), Philippines.  
 c. v. **umbobracteata** (Elm.) Corner (1960)—*F. umbobracteata* Elm. (1911).  
 Philippines (Mindanao).  
 d. v. **villosa** Corner (1960).  
 Malaya (Perak), Borneo (north, West Koetai, Sarawak).
43. **F. juglandiformis** King (1887).  
 Sumatra (Mt. Singalan, Tapanuli, Baniana).
44. **F. subsecta** Corner (1960)—*F. procera* Bl. (1825), non Salist. (1796)—*Urostigma procerum* (Bl.) Miq. (1859).  
 a. v. **subsecta**.  
 Annam, Malaya, Sumatra, Java, Borneo.  
 Generally confused with *F. crassiramea*.  
 b. v. **depressa** Corner (1960).  
 Sumatra (G. Koerintji).

45. **F. subgeldereri** Corner (1960).a. v. **subgeldereri**.

Malaya (Perak to Singapore), Borneo.

b. v. **rigida** Corner (1960)—*Urostigma rigidum* Miq. (1847)—*F. rigida* Miq. (1867), non Jack.

Cochinchina, Cambodia, Thailand, Malaya, Sumatra, Java, Sarawak.

46. **F. paracamptophylla** Corner (1960)

Borneo.

subsect. *Dictyoneuron* Corner (1960)

Asia, New Guinea.

ser. *Glaberrimae* Corner (1960)47. **F. glaberrima** Bl. (1825)—*Urostigma glaberrimum* (Bl.) Miq. (1859)—*F. bistipulata* Griff. (1854)—*F. fraterna* Miq., *F. thomsoni* Miq. (1867)—*F. suberosa* Lévl. et Vant. (1910)—*F. feddei* Lévl. et Vant. (1911)—*F. kingiana* Lévl. (1915).

Key to the varieties

1. Lamina-base rounded to subcordate; 1-4 vague intercostals. Basal bracts 1-2 mm. long, caducous. Fig-orifice closed by three small umbonate apical bracts. Cuticle striate round the stomata. Thailand v. *siamensis*.
1. Lamina-base cuneate; 0-2 vague intercostals. Fig-orifice closed by 2-3 flat apical bracts. Cuticle not striate.
2. Basal bracts 3, 0.5-1.5 mm. long, narrowly crescentic to ovate, persistent. Fig-apex often umbonate with thick apical bracts. Gall-flowers mostly sessile . . . . . v. *bracteata*.
2. Basal bracts none or as a slight rim at the apex of the peduncle. Fig-orifice not umbonate. Gall-flowers pedicellate . . v. *glaberrima*.

a. v. **glaberrima**.

Andaman Isl., India (north, east), Burma, south China (Yunnan, Kweichou), Hainan, Indochina, Thailand, Sumatra, Java, Sumbawa.

b. v. **bracteata** Corner (1960)—*F. travancorica* King (1887)—*F. lawesii* King (1887)—*F. adamii* Elm. (1911)—*F. villamilii* Merr. ex Sata (1944).

Peninsular India, Borneo (East Koetai, Sarawak), Philippines (Luzon, Mindanao), New Guinea.

c. v. **siamensis** Corner (1960).

Thailand (limestone hills).

ser. *Dubiae* Corner (1960)

South China, Indochina, Thailand, West Malaysia.

48. **F. dubia** Wall. ex King (1887).

Malaya (Penang to Singapore), Sumatra, Brunei, North Borneo.

49. **F. kurzii** King (1887)—*F. nuda* Miq. v. *macrocarpa* Kurz (1877)—? *F. euphylla* Kurz (1887).

Yunnan, Cochinchina, lower Burma, lower Thailand, Malaya (Pulau Tioman and neighbouring islets), Sumatra (Bt. Tinggi). Java, Lombok.

ser. *Subvalidae* (Miq.) Corner (1960)

*Urostigma* Gasp. ser. *Subvalida* Miq. (1859).

Ceylon, India to Philippines and Celebes.

50. **F. sundaica** Bl. (1825)—*F. rubescens* Bl. (1825)—*Urostigma tjiela* Miq. (1847)—*U. sundaicum* (Bl.) Miq., *U. rubescens* (Bl.) Miq., *U. pseudorubrum* Miq., *U. pyrifolium* (1859)—*F. pseudoruba* Miq., (1867)—*F. indica* L. v. *sundaica* (Bl.) Miq. (1851)—*F. pyrifolia* (Miq.) Boerl. (1900)—*F. rigida* Miq. v. *trichocalyx* Val. (1906)—*F. indica* L. v. *trichocalyx* (Val.) Back. (1948)—? *F. mangiferifolia* Griff. (1854)—*F. indica* auct. non L.

a. v. **sundaica**.

(Assam ?), Lower Burma, Cochinchina, Thailand, Malaya, Riouw, Bangka, Sumatra, Java, Borneo.

b. v. **beccariana** (King) Corner (1960)—*F. korthalsii* Miq. (1867)—*F. korthalsii* Miq. v. *beccariana* King (1887).

Malaya (Trengganu, Pahang), Borneo.

51. **F. involucrata** Bl. (1825)—*Urostigma involucratum* (Bl.) Miq. (1859)—*U. tjiela* Miq. v. *sundaicum* Miq. (1851)—*F. macrocalyx* Miq. (1867).

Malaya, Sumatra, Java, Bali, Philippines (Luzon, Mindanao).

52. **F. lowii** King (1887).

a. v. **lowii**.

Malaya (Perak).

b. v. **minor** Corner (1960).

Malaya (G. Tahan).

c. v. **borneensis** Corner (1960).

Borneo (Balik Papan, G. Mentawir).

53. **F. sumatrana** Miq. (1867)—*Urostigma sumatranum* Miq. (1851)—*U. zollingerianum* Miq. (1854)—*U. monadenum* Miq. (1860)—*F. zollingeriana* Miq. (1867)—*F. pseudoacamptonphylla* Val. (1906).

a. v. **sumatrana**.

Lower Burma, Indochina, Thailand, Malaya, Sumatra, Java, Bangka, Borneo, Philippines, Celebes, Sumbawa.

b. v. **circumscissa** Corner (1960)—*F. acamptophylla* sensu King (1887).

Malaya (Johore, Perak, Trengganu).

c. v. **microsyce** Corner (1960).

Malaya, Sumatra, Java, Borneo, Philippines, Celebes.

d. v. **subsumatrana** (Gagnep.) Corner (1960)—*F. subsumatrana* Gagnep. (1927).

Indochina, Malaya, Sumatra, Borneo.

54. **F. delosyce** Corner (1960).

a. v. **delosyce**.

Malaya (Singapore, east Johore, Selangor, Negri Sembilan), Borneo.

b. v. **obtusa** Corner (1960).

Borneo (North Borneo, East Kutai, Brunei).

55. **F. spathulifolia** Corner (1960).

Key to the varieties

1. Lamina acuminate. Fig-body sessile. Annam ..... v. *annamensis*.

1. Lamina obtuse to obtusely subacuminate.

2. Fig-body sessile ..... v. *spathulifolia*.

2. Fig-body shortly pedicellate ..... v. *substipitata*.

a. v. **spathulifolia**.

Malaya (Selangor), Sarawak, Brunei, North Borneo.

b. v. **annamensis** Corner (1960).

Annam.

c. v. **substipitata** Corner (1960).

North Borneo.

56. **F. maclellandi** King (1887)—*F. thorelii* Gagnep. (1927).

a. v. **maclellandi**.

Assam, Burma, Yunnan, Indochina, Thailand, Malaya (Kedah).

b. v. **rhododendrifolia** Corner (1960)—*Urostigma rhododendrifolium* Miq. (1847)—*F. rhododendrifolia* Miq. (1867), non Kunth et Bouch. (1847).

Himalayas, Khasia Hills, Chittagong Hills, north Burma, Pegu, Yunnan, (? Thailand).

57. **F. talboti** King (1887)—*F. pierrei* Gagnep. (1927).

Ceylon, India (Travancore, Madras, Mysore, Concan), Burma, Laos, Cambodia, north Thailand.

58. **F. calcicola** Corner (1960).

Burma, Thailand, Malaya (Perak, Selangor).

59. **F. retusa** L. (1767)—*Perula retusa* Raf. (1838)—*Urostigma retusum* (L.) Miq. (1847)—*U. truncatum* Miq. (1854)—*F. truncata* Miq. (1867)—(non sensu auct. = *F. microcarpa* Linn. f.).
- a. v. **retusa**.  
Malaya, Sumatra, Java, Borneo.
- b. v. **borneensis** Corner (1960).  
Borneo.
- ser. *Perforatae* Corner (1960)
- Assam to Philippines and Celebes.
60. **F. pellucido-punctata** Griff. (1854)—*F. gelderi* Miq. (1867)—*F. indica* L. v. *gelderi* (Miq.) King (1887)—*F. everettii* Elm. (1908).
- Assam, Indochina, Thailand, Malaya, Sumatra, Borneo, Philippines.
61. **F. episima** Corner (1960).  
Mindanao.
62. **F. pisocarpa** Bl. (1825)—*Urostigma pisocarpum* (Bl.) Miq. (1859)—*U. cycloneuron* Miq. (1860)—*F. pseudorubra* Miq. (1867, pr. p.)—*F. cycloneura* (Miq.) King (1887)—*F. microstoma* Wall. ex King (1887)—*Urostigma onustum* Wall. ex Miq. (1847, pr. p.).
- Lower Thailand, Malaya, Sumatra, Java, Borneo.
63. **F. binnendykii** Miq. (1867)—*Urostigma binnendykii* Miq., *U. peracutum* Miq. (1859)—*F. peracuta* (Miq.) King (1887).
- a. v. **binnendykii**.  
Malaya, Java, Borneo.
- b. v. **coriacea** Corner (1960)—*Urostigma tjiela* Miq. (1847) pro p. Cuming 1931.  
Annam, Malaya, Bangka, Sarawak, Brunei, Philippines (Luzon).
- c. v. **cupulata** Corner (1960).  
Celebes (Matano, Sorvako).
- d. v. **latifolia** Corner (1960).  
Borneo (Kapoeas, Pontianak, Sandakan).
64. **F. acamptophylla** Miq. (1867)—*Urostigma acamptophyllum* Miq. (1860)—*F. pachyphylla* King (1887).  
Borneo, Bangka, St. Barbe Isl.

65. **F. microsyce** Ridley (1924).

Malaya (Selangor and Trengganu to Singapore), Riouw (Pulau Durian), Sumatra (Indragiri).

subsect. *Benjamina* (Miq.) Corner (1960)

*Urostigma* Gasp. sect. *Benjamina* Miq. (1859).

Asia, Australasia.

ser. *Benjamineae* Miq. (1867)

Asia, Australasia.

66. **F. subcordata** Bl. (1825)—*Urostigma balicum* Miq., *U. subcordatum* (Bl.) Miq. (1859)—*F. garciniifolia* Miq. (1867)—*F. balica* (Miq.) Boerl. (1900)—*F. calophylloides* Elm. (1911)—*F. acrorrhyncha* Summerh. (1932)—*F. fairchildii* Back. (1947).

a. v. **subcordata**.

Tonkin, Java, Krakatau, Enggano Isl., Bali, Borneo, Celebes, Philippines (? Palawan), Sumbawa, Timor, New Guinea, New Britain, Solomon Isl., New Hebrides.

b. v. **malayana** Corner (1960).

Malaya (Selangor), North Borneo (Mt. Trus).

67. **F. stricta** Miq. (1867)—*Urostigma strictum* Miq. (1851).

Yunnan, Indochina, Andaman Isl., Malaya, Sumatra, Java, Sarawak, Celebes (Minahassa), Luzon.

68. **F. benjamina** L. (1767)—*F. nitida* Thunb. (1786)—*F. pyrifolia* Salisb. (1796)—*F. striata* Roth (1817)—*F. pendula* Link (1822)—*F. reclinata* Desf. (1829)—*F. haematocarpa* Bl. ex Decne. *F. neglecta* Bl. ex Decne. (1834)—*F. parvifolia* Oken (1841)—*F. nepalensis* Blanco (1845)—*Urostigma benjaminum* (L.) Miq., *U. haematocarpum* (Bl.) Miq., *U. nitidum* (Thunb.) Miq. (1847)—*U. neglectum* (Bl.) Miq. (1859)—*F. benjamina* L. v. *haematocarpa* (Bl.) Miq., *F. retusa* L. v. *nitida* (Thunb.) Miq. (1867)—*F. benjamina* L. v. *Le Huntei* F. M. Bailey (1900)—*F. umbrina* Elm. (1906)—*F. cuspidato-caudata* Hayata (1919)—*F. benjamina* L. v. *typica* f. *warringiana* Barrett (1951).

a. v. **benjamina**.

India and south China throughout Malaysia to Solomon Isl. and north Australia (Arnhem Land, Queensland).

Vern. Waringin.

b. v. **bracteata** Corner (1960).

Cochinchina, Celebes, Moluccas (Morotai), Sumbawa, Timor, Philippines, New Guinea, New Britain.

c. v. **nuda** (Miq.) Barrett (1951)—*Urostigma nudum* Miq. (1847)—*U. benjamineum* Miq. v. *nudum* Miq. (1851)—*F. nuda* Miq. (1867)—*F. comosa* Roxb. (1798)—*F. papyrifera* Griff. (1854)—*F. benjamina* L. v. *comosa* (Roxb.) Kurz (1877)—*F. xavieri* Merr. (1922).

North-east India, south China, Indochina, Thailand, Philippines, New Guinea.

ser. *Callophyllae* Corner (1960)

Asia, Australasia.

69. **F. callophylla** Bl. (1825)—*Urostigma callophyllum* (Bl.) Miq. (1859)—*F. tylophylla* Hassk. (1844)—*Artocarpus tylophyllus* Miq. (1854)—*U. clusioides* Miq. (1847)—*F. clusioides* Miq. (1867).

a. v. **callophylla**.

Hongkong, Indochina, Thailand, Malaya (Kelantan, Trengganu), Sumatra, Java, Borneo, Philippines, Celebes.

b. v. **leytensis** Corner (1960)—*F. pachyphylla* Merr. (1913).  
Philippines (Leyte).

c. v. **malayana** Corner (1960).

Indochina, lower Thailand, Malaya, Sumatra.

d. v. **minor** Corner (1960).

Celebes, Sumbawa.

70. **F. curtipes** Corner (1960)—*F. obtusifolia* Roxb. (1832), non HBK.—*Urostigma obtusifolium* (Roxb.) Miq. (1847).

India (north-east), Burma, Yunnan, Indochina, Thailand, Malaya (Langkawi Isl.) Sumatra (Atjeh).

71. **F. tristaniifolia** Corner (1960).

Malaya (Malacca, west Johore), Sumatra (East coast, S. Rawa), south Borneo (Sampit), Sarawak (Binatang).

72. **F. microcarpa** Linn. f. (1781)—*F. aggregata* Vahl (1806)—*F. indica* Heyne ex Roth, *F. rubra* Roth (1821)—*F. littoralis* Bl. (1825)—*F. condoravia* Buch. Ham. (1826)—*Urostigma microcarpum* (Linn. f.) Miq., *U. amblyphyllum* Miq., *U. pisi-ferum* Miq. (1847)—*F. amblyphylla* Miq., *F. retusa* L. v. *pisifera* Miq., v. *nitida* (Thunb.) Miq. f. *parvifolia* Miq. (1867)—*F. cairnsii* Warb. (1905)—*F. retusifolmis* Lévl. et Vant. (1910).  
Generally miscalled *F. retusa* or *F. nitida*.

Key to the varieties

1. Figs pedunculate, basal bracts caducous ..... v. *naumannii*.
1. Figs sessile, basal bracts persistent.
2. Basal bracts 4-5 mm. long and wide. Lamina rather broadly elliptic.  
Thailand ..... v. *eubracteata*.
2. Basal bracts 1.5-3.5 mm. long and wide.
3. Lamina broadly elliptic, -12 × 9 cm., rounded, obtuse or shortly acuminate, base rounded to widely cuneate: venation often rather prominent beneath and approaching that of *F. elastica*, but oblique ..... v. *latifolia*.  
(Fig ripening yellow to orange, spotted red, 10-15 mm. wide  
v. *rigo*).

3. Lamina rather small or narrow,  $-11 \times 6$  cm., subacute to acuminate: venation scarcely raised beneath, more as in *F. sundaica*, but oblique.
4. Lamina ovate-cordate, subcordate or rounded at the base, acuminate ..... v. *saffordii*.
4. Lamina cuneate, rarely rounded, at the base, elliptic to elliptic-ovate, subacute to acuminate, rarely obtuse.
5. Basal nerves not prominent: petiole subarticulate. Internal bristles few or none ..... v. *hillii*.
5. Basal nerves usually elongate, petiole not articulate. Internal bristles few to abundant, short ..... v. *microcarpa*.
6. Glabrous, ..... f. *microcarpa*.
6. Twigs, stipules, and figs hairy ..... f. *pubescens*.

a. v. **microcarpa**.

Ceylon, India, south China, Ryu Kyu eastwards throughout south-east Asia and Malaysia to New Britain, Australia (Queensland, New South Wales), Caroline Isl., Cocos and Christmas Isl. (Indian Ocean).

Vern. Jawi-jawi, jejawi.

i. f. **pubescens** Corner (1960)—? *F. retusa* f. *pubescens* Miq. (1867).

Thailand (limestone hills).

b. v. **eubracteata** Corner (1960).

North Thailand.

c. v. **hillii** (F. M. Bailey) Corner (1960)—*F. hillii* F. M. Bailey (1891)—*F. prolixa* Vieill. et Depl. (1863), non Forst. f.—*F. schlechteri* Warb. (1903).

Sunda Isl. (Alor Kechil), New Guinea, Queensland, New Caledonia, Loyalty Isl.

d. v. **latifolia** (Miq.) Corner (1960)—*Urostigma accedens* Miq. v. *latifolia* Miq. (1859)—*F. dilatata* Miq., *F. dyctiophleba* F.v.M. ex Miq. (1867; indice *F. dyctiophylla*)—*F. thynneana* F. M. Bailey (1897), and v. *minor* Domin (1921).

Celebes, Moluccas, New Guinea, Queensland, Caroline Isl.

e. v. **naumanni** (Engl.) Corner (1960)—*F. naumanni* Engl. (1886)—*F. dahlii* K. Schum. (1898)—*F. regnans* Diels (1935).

Eastern New Guinea, New Britain, New Ireland, Solomon Isl.

f. v. **rigo** (F. M. Bailey) Corner (1962)—*F. rigo* F. M. Bailey (1897)—*F. retusa* L. v. *rigo* (F. M. Bailey) Diels (1935).

Papua (Port Moresby, Rigo).

g. v. **saffordii** (Merr.) Corner (1960)—*F. saffordii* Merr. (1914)—*F. prolixa* Forst. f. v. *saffordii* (Merr.) Fosberg (1955).

Caroline, Marianas, and Palau Isl.

73. **F. balet** Merr. (1921).

Philippines (Luzon, Mindoro, Panay).

74. **F. trimenii** King (1885).

Peninsular India (Canara), Ceylon.

75. **F. palaquiifolia** Corner (1960).

Borneo (Kinabalu; Liang Gagang).

76. **F. polygramma** Corner (1960).

Celebes (Minahassa, and south-east Celebes).

77. **F. archboldiana** Summerh. (1941)—*F. retusa* L. v. *papuana* Diels (1935).

East New Guinea.

78. **F. benjaminoides** Corner (1960).

South and east New Guinea (Mafulu, Koitaki), and west New Guinea (Asmat).

79. **F. patellata** Corner (1960).

West New Guinea (McCluer Bay, Jakati).

sect. *Stilpnophyllum* Endl. (1847)

*Visiania* Gasp. (1844)—*Macrophthalmia* Gasp. (1845)—*Urostigma* Gasp. sect. *Macrophthalmia* (Gasp.) Miq. (1859)—subgen. *Urostigma* (Gasp.) Miq. ser. *Elasticae* Miq. (1867).—*Stilpnophyllum* (Endl.) Drury (1869).

80. **F. elastica** Roxb. ex Hornem. (1819)—*F. elastica* Roxb. v. *bengalensis* Bl. (1825)—*Visiania elastica* (Roxb.) Gasp. (1844)—*Macrophthalmia elastica* (Roxb.) Gasp. (1845)—*F. taeda* Kunth et Bouch., *F. cordata* Kunth et Bouch. (1846)—*Urostigma elasticum* (Roxb.) Miq., and v. *latifolium* Miq. (1847)—*U. odoratum* Miq. (1851)—*U. circumscissum* Miq. (1854)—*U. karet* Miq. (1859)—*F. elastica* Roxb. v. *odorata* Miq., v. *minor* Miq., v. *karet* Miq. (1867)—*Stilpnophyllum elasticum* (Roxb.) Drury (1869)—*F. karet* (Miq.) King (1888)—*F. clusiaefolia* Summerh. (1929)—*F. skytinodermis* Summerh. (1933)—*F. elastica* v. *belgica* and v. *rubra* L. H. et E. Z. Bailey (1941), v. *rubinervis* Sata (1944), v. *decora* Guillaum. (1949), v. *variegata* (Gent.) Nehrting, *F. decora* Hort., *F. opulens* Hort. India (Assam, Sikkim), Burma, Malaya (north), Sumatra, Java; often cultivated.

Vern. India-rubber fig.

sect. *Malvanthera* Corner (1960)

**Mastosuke** Raf. (1838).

Eastern Malaysia, Australasia.

ser. *Malvanthereae* Corner (1960)

Eastern Malaysia, Australasia.

subser. *Eubracteatae* Corner (1960)

81. **F. triradiata** Corner (1960).a. v. **triradiata**.

North Queensland.

b. v. **sessilicarpa** Corner (1960).

North Queensland.

subser. *Malvanthereae**Mastosuke* Raf. (1838).

Celebes, New Guinea, Solomon Isl., New Hebrides, Lord Howe Isl., Queensland, New South Wales.

82. (This number omitted).

83. **F. glandifera** Summerh. (1932).a. v. **glandifera**.

Papua (Cape Vogel Peninsula), New Britain, Solomon Isl., Russell Isl., New Hebrides.

b. v. **brachysyce** Corner (1960).

South-east Celebes (Muna Isl.), Territory of New Guinea (Bulolo Valley).

84. **F. watkinsiana** F. M. Bailey (1891)—*F. bellingeri* Moore et Betche (1893)—*F. simmondsii* F. M. Bailey (1910).

New South Wales (Bellinger River) to north Queensland.

85. **F. macrophylla** Desf. ex Pers. (1807)—*F. huegelii* Kunth et Bouch., *F. macrocarpa* Huegel ex Kunth et Bouch. (1846)—*Urostigma macrophyllum* (Desf.) Miq., *U. platypodum* A. Cunn. ex Miq. f. *majus* Miq., *U. huegelii* Miq. (1847)—*U. squamellosum* Miq. (1861)—*F. macrophylla* Desf. f. *minor* Miq., *F. squamellosa* Miq. (1867)—*F. platypoda* A. Cunn. ex Miq. v. *petiolaris* Benth. (1873) pro p.—*F. columnaris* C. Moore et F.v.M. (1874)—*F. magnolioides* Borzi and v. *macrophylla* Borzi, *F. nervosa* Haenke ex Borzi (1897)—*F. macrophylla* Desf. v. *stenophylla* Domin (1921)—*F. angladei* C. E. C. Fischer (1925).

Australia (New South Wales, Shoalhaven River, to Queensland, Rockingham Bay), Lord Howe Isl.

Vern. Moreton Bay fig.

86. **F. baileyana** Domin (1921)—*F. macrophylla* Desf. v. *pubescens* F. M. Bailey (1911).

South Queensland.

87. **F. rhizophoriphylla** King (1887).

New Guinea (Idenberg and Fly Rivers eastwards).

subser. *Platypodeae* Corner (1960)

Soemba, Moluccas, New Guinea, Australasia.

88. **F. destruens** F.v.M. ex C. T. White (1933).

North Queensland.

89. **F. rubiginosa** Desf. ex Ventenat (1805)—*F. australis* Willd. (1806)—*F. ferruginea* Desf. (1829)—*Mastosuke rubiginosa* Raf., *Perula rubiginosa* Raf. (1838)—*Urostigma rubiginosum* (Desf.) Gasp. (1844)—*F. fulva* Kunth et Bouch. (1846)—*Urostigma ferrugineum* (Desf.) Miq. (1847)—*F. rubiginosa* Desf. v. *variegata* Guilfoyle (1911), v. *glabrescens* F. M. Bailey (1913).

Australia (New South Wales from Eden and Bateman's Bay to the northern rivers).

Vern. Port Jackson fig, rusty fig.

90. **F. leucotricha** Miq. (1867)—*Urostigma leucotrichum* Miq. (1861)—*U. platypodum* A. Cunn. ex Miq. f. *ellipticum* Miq. (1861).

Key to the varieties

1. Twigs 5–7 mm. thick. Peduncle 8–14 mm. long; basal bracts 8–12 mm. long and wide, apiculate; fig-body 14 mm. wide . . . . v. *megacarpa*.
1. Twigs 3–5 mm. thick. Fig 10–12 mm. wide.
  2. Fig sessile; basal bracts  $10 \times 7$  mm., caudiculate . . . . . v. *sessilis*.
  2. Fig-peduncle 4–35 mm. long; basal bracts 4–6 mm. long and wide, ovate-lanceolate . . . . . v. *leucotricha*.

a. v. **leucotricha**.

West Australia, Northern Territory, north Queensland.

b. v. **megacarpa** F.v.M. ex Corner (1960).

West Australia (Kimberley), Sea Range.

c. v. **sessilis** Corner (1960).

West Australia (Kimberley), New South Wales.

91. **F. obliqua** Forst. f. (1786)—*F. laevis* Desf. (1829)—*F. elegans*, *F. sapotaefolia*, *F. sororia* Kunth et Bouth. (1846)—*Urostigma obliquum* (Forst. f.) Miq. (1847)—*U. eugenoides* Miq., *U. backhousei* Miq. (1861)—*F. boothiana* Miq. (1867)—*F. graeffii* Warb. (1898)—*F. virginea* Banks et Sol. ex Hiern, (1901)—*F. aphanoneura* Warb. (1905)—*F. tryoni* F. M. Bailey (1906).

Key to the varieties

1. Fig 10–14 mm. wide; peduncle 2.5–10 mm. long . . . . . v. *petiolaris*.
1. Fig 6–9 mm. wide; peduncle 0–4 mm. long.
  2. Lamina cuneate at the base . . . . . v. *obliqua*.
  2. Lamina narrowly and rather abruptly rounded at the base; petiole short, 3–5 mm. long . . . . . v. *puberula*.

a. v. **obliqua**.

Celebes (south-east), Ternate, New Guinea, Australia (West Australia, Queensland, New South Wales in the north-east), New Caledonia, Loyalty Isl. New Hebrides, Fiji, Tonga, Niue.

b. v. **petiolaris** (Benth.) Corner (1960)—*F. platypoda* A. Cunn. ex Miq. v. *petiolaris* Benth. (1873).

Queensland, New South Wales (from Taree northwards).

c. v. **puberula** (Benth.) Corner (1960)—*F. eugenoides* F.v.M. v. *puberula* Benth. (1873)—*Urostigma brachypodum* Miq. (1847)—*F. brachypoda* Miq. (1867).

North Queensland (York Sound).

92. **F. subpuberula** Corner (1960)—*Urostigma puberulum* Miq. (1847)—*F. puberula* A. Cunn. ex Miq. (1867), non Kunth. et Bouch. (1847).

Australia (Northern Territory, Redbank Creek; Queensland, York Sound).

93. **F. platypoda** A. Cunn. ex Miq. (1867)—*Urostigma platypodum* A. Cunn. ex Miq. (1847)—*U. vitellinum* Miq. (1861)—*F. vitellina* Miq. (1867).

#### Key to the varieties

1. Lamina ovate, base cordate to rounded. Glabrous or shortly hairy  
v. *cordata*
1. Lamina elliptic, base cuneate to somewhat rounded.
  2. Glabrous, or twigs and stipules minutely puberulous. Lamina often stiffly coriaceous.
    3. Lamina lanceolate-elliptic, 1–4 cm. wide ..... v. *minor*.
    3. Lamina elliptic, 3–7 cm. wide ..... v. *platypoda*.
  2. Twigs and petioles distinctly hairy.
    4. Lamina thinly to closely velutinate on both sides. Peduncle 2–10 mm. long ..... v. *angustata*.
    4. Lamina glabrous or velvety beneath ..... v. *lachnocaula*.

#### a. v. **platypoda**.

Soemba, Key Isl., Australia (West Australia, Vansittart Bay, to south-east Queensland, Darling Downs).

b. v. **angustata** (Miq.) Corner—*Urostigma leichhardtii* Miq., *U. muelleri* Miq. (1861)—*F. leichhardtii* Miq. and v. *angustata* Miq., *F. muelleri* Miq. (1867)—*F. platypoda* A. Cunn. v. *mollis* Benth., v. *subacuminata* Benth. (1873)—*F. shirleyana* Domin (1921).

Australia (Arnhem Land to Queensland, Leichhardt Bay.).

c. v. **cordata** Specht (1958).

Soemba (Waingapoe), Australia (Kimberley to Cape York, Alice Springs).

d. v. **lachnocaula** (Miq.) Benth. (1873)—*Urostigma lachnocaulon* Miq. (1861)—*F. lachnocaula* Miq. (1867).

Australia (West Australia, Ashburton River, to Arnhem Land, Pt. Darwin).

e. v. **minor** Benth. (1873)—*Urostigma platypoda* A. Cunn. ex Miq. f. *minus* Miq. (1847)—*U. platypoda* f. *glabrius* Miq. (1861).

Australia (West and South north of lat. 26° S., Northern Territory, north-west Queensland).

subser. *Hesperidiiformes* Corner (1960)

New Guinea, Queensland.

94. **F. augusta** Corner (1960).

Territory of New Guinea (Eastern Highlands).

95. **F. hesperidiiformis** King (1887)—*F. sclerotiara* Diels (1935).

a. v. **hesperidiiformis**.

Hollandia, eastern New Guinea.

b. v. **myrmekiocarpa** (Summerh.) Corner (1960)—*F. myrmekiocarpa* Summerh. (1941).

Eastern New Guinea (Orioma River, Western Division; Fly River).

96. **F. mafuluensis** Summerh. (1941).

Territory of New Guinea (Central Division, Mafulu).

97. **F. heteromeka** Corner (1961).

West New Guinea (Adjar, Kebar Valley).

98. **F. xylosydia** Diels (1935).

a. v. **xylosydia**.

Eastern New Guinea.

b. v. **cylindrocarpa** (Diels) Corner (1960)—*F. cylindrocarpa* Diels (1935).

Eastern New Guinea, Solomon Isl.

99. **F. pleurocarpa** F.v.M. (1874)—*F. cylindrica* Warb. (1905).

North Queensland.

100. **F. crassipes** F. M. Bailey (1890).

North Queensland (Atherton, Malanda, Russell River).

ser. *Cyclanthereae* Corner (1960)

101. **F. sterrocarpa** Diels (1935).

a. v. **sterrocarpa**.

Eastern New Guinea (Sepik, Bulolo, Morobe; Papua, Boridi, Lala Valley).

b. v. **pubigemma** Diels (1935).

Territory of New Guinea (Sepik).

subgen. *Pharmacosycea* Miq. (1867)

*Pharmacosycea* Miq. (1847)—*Ficus* sect. *Pharmacosycea* (Miq.) Benth. et Hook. (1880).

America, Asia, Melanesia, Madagascar.

sect. *Oreosyceae* (Miq.) Corner (1960)

*Urostigma* Gasp. sect. *Oreosyceae* Miq. (1847)—subgen. *Urostigma* (Gasp.) Miq. sect. *Oreosyceae* Miq. (1867)—*Ficus* sect. *Leiosyceae* Miq. (1848)—*Ficus* subgen. *Urostigma* sect. *Stilpnophyllum* Endl. subsect. *Pedunculatae* Sata (1944).

Madagascar, Asia, Australasia.

ser. *Vasculosae* Corner (1960)

Madagascar, Asia, New Guinea, Queensland.

subser. *Albipilae* Corner (1960)

Madagascar, Indochina, Thailand, Andaman Isl., Malaysia, New Guinea, Queensland.

102. **F. albipila** (Miq.) King (1888)—*Covellia* ? *albipila* Miq. (1860)—*Morus leucophylla* Miq. (1860)—*F. mollis* Miq. v. *albipila* Miq. (1867)—*F. colossea* F.v.M. ex Benth. (1873)—*F. mallotoides* Val. ex Back. (1948)—*F. microtricherinos* Back. (1948).

a. v. **albipila**.

Thailand, Malaya, Sumatra, Java, Timor, Queensland, New Guinea (Manokwari, Morobe, Papua).

Very closely related is *F. assimilis* Baker (Madagascar).

b. v. **glabra** Corner (1960).

Borneo (Banjermasin).

103. **F. capillipes** Gagnep. (1927).

Cambodia, Cochinchina, Thailand, Andaman Isl.

subser. *Vasculosae*

sect. *Leiosyceae* Miq. (1848)—subsect. *Pedunculatae* Sata (1944).  
Asia.

104. **F. callosa** Willd. (1798)—*F. scleroptera* Miq. and f. *elongata* Miq. (1851)—*F. basidentula* Miq. (1859)—*F. porteana* Regel (1862)—*F. cinerascens* Thw. (1864)—*F. malunuensis* Warb. (1905)—*F. cordatifolia* Elm. (1911)—*F. longespathulata* Sata, v. *elongato-spathulata* Sata, v. *grandifolia* Sata (1944).

Ceylon, India, Burma, Indochina, Thailand, South Andaman Isl., Malaya (north of Kuala Lumpur), Sumatra (Medan, Priaman), Billiton, Krakatau, Java, Madura, Kangean Isl., Bali, Soemba, Timor, Alor, Moluccas (Wetar, Soeloe, Sanana), Celebes (Minahassa), North Borneo, Philippines, Sumbawa.

105. **F. vasculosa** Wall. ex Miq. (1848)—*F. championi* Benth. (1854).  
a. v. **vasculosa**.  
South China, Hainan, Indochina, Thailand, Malaya, Riouw Archipelago.  
b. v. **acuminata** Miq. (1851)—*F. renitens* Miq., *F. variabilis* Miq. (1859)—*F. variabilis* Miq. v. *integrifolia* Miq. (1867).  
Malaya (east coast of Kelantan, Pahang, Johore), Sumatra, Java, Borneo (north and west).
106. **F. bataanensis** Merr. (1905)—*F. bataanensis* f. *minima* Sata, f. *sorsogonensis* Sata (1944).  
Philippines (Luzon, Negros, Palawan).
107. **F. gratiosa** Corner (1960).  
a. v. **gratiosa**.  
Celebes (north, central, south-east).  
b. v. **caudata** Corner (1960).  
Celebes (Todjamboe).  
ser. *Nervosae* Corner (1960)  
Asia, New Guinea, Solomon Isl.,
108. **F. pachysyca** Diels ex Corner (1960).  
Eastern New Guinea (Morobe).
109. **F. ihuensis** Summerh. (1929).  
Papua.
110. **F. hombroniana** Corner (1960).  
Moluccas (Amboina, Batjan, Boeroe, Saparoea), New Guinea (Asmat, west New Guinea; Woodlark Isl., Papua), Bougainville Isl.
111. **F. edelfeltii** King (1887).—*F. edelfeltii* v. *glyptoneura* Diels (1935).  
a. v. **edelfeltii**.  
New Guinea.  
b. v. **bougainvillei** Corner (1961).  
Bougainville Isl.
112. **F. kjellbergii** Corner (1960).  
Celebes (Tolala).
113. **F. polyantha** Warb. (1905)—*F. frondosa* S. Moore (1923).  
Philippines (Luzon, Leyte, Mindanao), Moluccas (Morotai, Halmahera, Soeloe, Ceram), Key Isl., New Guinea, New Ireland, New Britain, Solomon Isl.

114. **F. pubinervis** Bl. (1825)—*F. decaisnei* Steud. (1840)—*Urostigma hasseltii* Miq. (1851)—*F. similis* Merr. (1906)—*F. crassitora* Elm. (1908)—*F. pubinervis* Bl. f. *crassitora* (Elm.) Sata (1944).

a. v. **pubinervis**.

Sumatra (west coast), Java, Borneo, Soembawa, Flores, Timor, Philippines, Celebes (north), Moluccas (Halmahera, Boeroe, Soeloe, Wetar, Aru).

b. v. **diandra** Corner (1960).

Celebes (Bonthain, Maros, Pangkadjena).

c. v. **sibulanensis** (Elm.) Corner (1960)—*F. sibulanensis* Elm. (1911)—*F. pubinervis* f. *sibulanensis* (Elm.) Sata (1944).

Philippines (Mindanao, Mt. Apo; Samar).

d. v. **teysmannii** King (1887).

Celebes (Bonthain, Lokka).

115. **F. subnervosa** Corner (1960).

New Guinea, (? Key Isl.).

116. **F. magnoliifolia** Bl. (1825)—*Urostigma modestum* Miq., *U. longifolium* Miq. (1851)—*U. euneuron* Miq. (1859)—*F. apoensis* Elm. (1911)—*F. nervosa* Heyne f. *lanceolata* Sata, f. *apoensis* (Elm.) Sata, (1944).

Great Nicobar Isl., South Andaman Isl., Malaya (Pahang northwards), Sumatra (west coast), Java, Borneo (West Koetai, Kuching), Celebes (Minahassa, Malili), Philippines (Luzon, Negros, Leyte, Mindanao).

117. **F. nervosa** Heyne ex Roth (1817)—*F. undulata* Buch. Ham. (1826)—*F. angustifolia* Roxb. (1832)—*Urostigma modestum* Miq., *U. nervosum* Miq. (1847)—*F. modesta* Miq. (1867)—*F. blinii* Lévl. et Vant. (1910)—*F. nervosa* v. *longifolia* Sata (1944)—? *F. cuneatonervosa* Yamam. (1925)—*F. da Gagnep.* (1928).

a. v. **nervosa**.

Ceylon, India, Burma, China (Kweichou, Kwangtung, Hainan), Hongkong, Indochina (Tonkin, Annam), Formosa.

b. v. **minor** King (1887).—*Urostigma modestum* Miq. f. *brevifolium* Miq. (1859).

Ceylon, Peninsular India (Madras, Travancore).

118. **F. gigantifolia** Merr. (1905).

Philippines (Luzon, Bohol, Samar, Mindanao).

119. **F. subtrinervia** Laut. et K. Schum. (1901).  
 a. v. **subtrinervia**.  
 Eastern New Guinea (Morobe district), New Britain.  
 b. v. **doormaniana** (Diels) Corner (1960)—*F. doormaniana* Diels,  
*F. behrmanniana* Diels (1935).  
 New Guinea generally.
120. **F. pachystemon** Warb. (1905)—*F. mangiferifolia* Laut. et  
 K. Schum. (1901)—*F. brassii* Summerh., *F. saxicola* Summerh.  
 (1929)—*F. aechmophylla* Summerh. (1933).  
 New Guinea (Hollandia, Sigar, Terr. New Guinea, Papua), New  
 Mecklenberg, New Britain.
121. **F. madhucifolia** Corner (1960).  
 South Celebes (Bantimoeroeng, Tjambu).
122. **F. hadroneura** Diels (1935).  
 New Guinea, New Britain.
123. **F. pseudojaca** Corner (1960).  
 New Guinea (West N.G., Salawati Isl.; Terr. N.G. Madang  
 district).
- ser. *Austrocaledonicae* Corner (1960)
- New Caledonia, Loyalty Isl., New Hebrides, Fiji, Solomon Isl.
124. **F. crescentioides** Bur. (1872).  
 New Caledonia.
125. **F. auriculigera** Bur. (1872).  
 New Caledonia.
126. **F. barraui** Guillaum. (1954).  
 New Caledonia.
127. **F. asperula** Bur. (1872)—*F. asperula* v. *nuda* Bur., v. *foliosa*  
 Bur. (1872)—*F. trachyleia* Bur. (? also v. *chantiniana* Bur., v.  
*heterophylla* Bur.), (1872)—*F. punctulosa* Warb. (1905)—*F.*  
*campicola* S. Moore (1921).  
 New Caledonia.
128. **F. mutabilis** Bur. (1872)—*F. mutabilis* v. *coriacea* Bur., v.  
*membranacea* Bur., v. *parvifolia* Bur. (1872).  
 New Caledonia.
129. **F. versicolor** Bur. (1872).  
 New Caledonia.
130. **F. heteroselis** Bur. (1872).  
 New Caledonia.

131. **F. habrophylla** Bennett ex Seem. (1868)—*F. bennettii* Seem. (1868)—*F. tanensis* Bennett ex Seem. (1868)—*F. edulis* Bur., v. *attenuata* Bur., v. *cordata* Bur., v. *dentata* Bur., v. *elliptica* Bur., v. *glabrescens* Bur., v. *ovata* Bur., v. *variegata* Bur. (1872).  
New Caledonia, Loyalty Isl., Tanna; cultivated.

132. **F. maialis** Guillaum. (1949)—*F. longipes* Warb. (1905).  
New Caledonia.

133. **F. granatum** Forst. f. (1786)—*F. moorei* Seem. (1868)—*F. cooperi* Hort. ex Regel (1866)—*F. sanguinervium* Hort.

## Key to the varieties

1. Twigs 5–9 mm. thick. Figs 20–30 mm. wide ..... v. *granatum*.  
1. Twigs 2–4 mm. wide. Figs 8 mm. wide ..... v. *minor*.

a. v. **granatum**.

New Hebrides (Tanna, Aneityum, Ambryon).

b. v. **minor** Corner (1960).

New Hebrides (Aneityum, Eromanga).

134. **F. otophora** Corner et Guillaum. (1959).

New Caledonia.

135. **F. dzumacensis** Guillaum. (1926).

New Caledonia.

a. v. **dzumacensis**.b. v. **brevipetiolata** Guillaum. (1959).

136. **F. leiocarpa** (Bur.) Warb. (1905)—*F. edulis* Bur. v. *leiocarpa* Bur. (1872).

New Caledonia.

137. **F. webbiana** Miq. (1867)—*Covellia webbiana* Miq. (1848)—*F. webbiana* Miq. v. *cordata* Bur. (1872)—*F. cretacea* S. Moore (1921)—*F. pseudomangiferifolia* Guillaum. (1943)—? *F. pallidinervis* Warb. (1905).

New Caledonia.

138. **F. racemigera** Bur. (1872)—*F. leptorachis* S. Moore, *F. oreadam* S. Moore (1921)—? *F. trachyleia* Bur. v. *heterophylla* Bur. (1872).

New Caledonia.

139. **F. nitidifolia** Bur. (1872)—*F. rigidifolia* Bur. (1872).

New Caledonia.

140. **F. smithii** Horne ex Baker (1883).

Key to the varieties

- 1. Fig 5–7 mm. wide. Lamina 2.5–4.5 cm. wide; lateral nerves 7–10 pairs; petiole 4–14 mm. . . . . v. *smithii*.
- 1. Fig 10–13 mm. wide. Lamina 4–9.5 cm. wide; lateral nerves 8–13 pairs; petiole 15–35 mm. . . . . v. *robusta*.

a. v. **smithii**.

Fiji, Solomon Isl.

b. v. **robusta** Corner (1960).

Fiji, New Hebrides (Aneityum).

141. **F. austrocaledonica** Bur. (1872)—*F. austrocaledonica* v. *angustifolia* Bur., v. *latifolia* Bur., v. *subattenuata* Bur. (1872)  
—*F. semecarpifolia* Warb. (1905).

Key to the varieties

- 1. Twigs, petioles, pedicels, and fig-body rather closely appressedly hairy . . . . . v. *balansaeana*.
- 1. Glabrous or the stipules and figs finely puberulous . . . . . v. *austrocaledonica*.

a. v. **austrocaledonica**.

New Caledonia.

b. v. **balansaeana** (Bur.) Corner (1960)—*F. balansaeana* Bur. (1872).

142. **F. pancheriana** Bur. (1872).

New Caledonia.

143. **F. vieillardiana** Bur. (1872).

New Caledonia.

144. **F. cataractorum** Vieill. ex Bur. (1872).

New Caledonia.

145. **F. pritchardii** Seem. (1868).

Fiji.

subgen. *Sycomorus* (Gasp.) Miq. (1867)

*Sycomorus* Gasp. (1844)—*Ficus* sect. *Sycomorus* (Gasp.) Miq. (1859)—*Ficus* "group *Heterochlamydées*" Perr. de la Bathie (1952).

Africa, Arabia, Asia, Australia.

146. **F. racemosa** L. (1753)—*F. glomerata* Roxb. (1798)—*Covellia glomerata* (Roxb.) Miq. (1848)—*F. vesca* F.v.M. ex Miq. (1861)—*F. semicostata* F. M. Bailey (1911)—*F. racemosa* L. v. *vesca* (F.v.M. ex Miq.) Barrett (1946).

Key to the varieties

- 1. Lamina elliptic, ovate-elliptic, or oblong; lateral nerves 4–8 pairs.
  - 2. Twigs, young leaves, and figs thinly appressedly hairy . . . . . v. *racemosa*.
  - 2. Densely pubescent . . . . . v. *miquelii*
- 1. Lamina lanceolate or lanceolate-elliptic; lateral nerves (4–) 6–12 pairs
  - 3. Glabrous or thinly appressedly hairy on the young shoots . . . . . v. *elongata*.
  - 3. Softly villous, the hairs –1 mm. long . . . . . v. *mollis*.

a. v. *racemosa*.

Ceylon, Pakistan, India, south China (Yunnan) to Sumatra (north), Lesser Sunda Isl. (Alor), south Celebes, New Guinea (Merauke), Australia (W. Australia, Ord and Canon Rivers; Queensland).

b. v. *miquelii* (King) Corner comb. nov.—*Urostigma leucocarpum* Miq. (1847)—*F. leucocarpa* Miq., *F. chittagonga* Miq. (pro p. foliorum; alt. p. receptaculorum, *F. prostrata* Wall.), (1867)—*F. glomerata* Roxb. v. *chittagonga* (Miq.) King, v. *miquelii* King (1888).

India (United Provinces eastwards), north Burma, Yunnan, Tonkin.

(I use King's varietal name because the type of *F. chittagonga* is a mixture of two species.)

c. v. *elongata* (King) Barrett (1946)—*F. glomerata* Roxb. v. *elongata* King (1888)—*F. lucescens* Bl. (1825)—*Urostigma lucescens* (Bl.) Miq. (1859)—*F. lanceolata* Buch. Ham. ex Roxb. (1832)—*Covellia lanceolata* (Buch. Ham.) Miq. (1848)—*Sycomorhus riparia* Hochst. ex Miq. (1848)—*F. riparia* (Hochst.) Miq. (1867)—*F. acidula* King, *F. henrici* King (1888).

Abyssinia, India, Burma, Sumatra, Java, Borneo, Celebes, Bali, Soemba, Sumbawa, Flores.

d. v. *mollis* (King) Barrett (1946)—*Covellia mollis* Miq. (1848)—*F. mollis* Miq. (1867)—*F. glomerata* Roxb. v. *mollis* (Miq.) King (1888)—*F. trichocarpa* Decne ex Miq. (1867), f. *glabrescens* Engl. (1886).

Sumatra, Java, Timor.

subgen. *Ficus*

subgen. *Eusyce* Miq. (1867)—subgen. *Carica* Mildbr. et Bur. (1912)—subgen. *Metamorphe* Sata (1934)—subgen. *Eumetamorphe* Sata (1944)—subgen. *Caricae* Sata (1944).

East Africa, Mascarene Isl., Asia, Australasia.

sect. *Ficus*

sect. *Carica* Miq. (1844)—sect. *Caricoides* Miq., sect. *Caprificus* (Gasp.) Miq., (1848)—sect. *Eusyce* (Miq.) Benth. et Hook. (1880)—sect. *Eucarica* Sata, *Fericarica* Sata (1944).

East Africa to Japan and New Guinea.

subsect. *Ficus*

subsect. *Eucarica* Miq. (1844).

East Africa to Japan and New Guinea.

ser. *Rivulares* Corner (1960)

147. **F. rivularis** Merr. (1914).

Luzon.

ser. *Pseudopalmeae* Corner (1960)

sect. *Pseudopalma* Elm. (1908).

148. **F. pseudopalma** Blanco (1837)—*F. palmifolia* Usteri (1904)—*F. haenkei* Warb. (1905)—*F. blancoi* Elm. (1908), v. *longe-grandifolia* Sata, v. *oblanceifolia* Sata (1944).

Philippine Isl.

ser. *Sinosyceae* Corner (1960)

India, Burma, China, Indochina, Thailand.

149. **F. henryi** Warb. ex Diels (1900)—*F. acanthocarpa* Lév. et Vant. (1907).

China (Szechuan, west Hupeh, Kweichou, Yunnan), east Tibet, Tonkin.

150. **F. subincisa** J. E. Sm. (1810)—*F. chinch*a Roxb. (1832)—*F. clavata* Wall. ex Miq. (1848)—*F. caudata* Griff. (1854).

Key to the varieties

1. Fig-body subglobose 6–12 mm. wide, smooth or merely lenticellate; peduncle 2–4 × 0.7 mm., slender; pedicel none .. v. *paucidentata*.
1. Fig-body ellipsoid 12–25 × 10–18 mm., smooth to verrucose.
  2. Fig strongly and closely verrucose; peduncle –2 × 2 mm., short and thick; pedicel –5 mm. .... v. *trachycarpa*.
  2. Fig smooth to slightly verrucose; peduncle –10 × 1–1.5 mm.; pedicel –2 mm. long ..... v. *subincisa*.

a. v. **subincisa**.

Himalayas, Assam, Yunnan, north Burma, Laos, Tonkin, Thailand.

- b. v. **paucidentata** (Miq.) Corner comb. nov.—*F. trachycarpa* Miq. v. *paucidentata* Miq. (1848)—*F. caudata* Wall. ex Miq. (1848).

Eastern Himalayas, Yunnan, north-east Thailand, Tonkin.

- c. v. **trachycarpa** (Miq.) Corner comb. nov.—*F. trachycarpa* Miq. (1848).

Western Himalayas.

ser. *Cariceae* Corner (1960)

East Africa, Asia Minor, Pakistan, India, Bonin Isl.

151. **F. carica** L. (1753)—for synonymy, see Condit, *The Fig* (1948); Hilgardia 23 (1955) 323–538, and 25 (1956) 1–663.

Turkey to Afghanistan; widely cultivated.

Vern. Edible or Cultivated fig; anjir (Persian).

152. **F. palmata** Forsk. (1775)—*F. morifolia* Forsk. (1775)—*F. forskalaei* Vahl (1806)—*F. pseudosycomorus* Decne (1834)—*F. caricoides* Roxb., *F. virgata* Roxb. (1832)—? *F. urticifolia* Roxb. (1832)—*F. pseudocarica* Miq. (1847)—*F. petitiiana* A. Rich. (1851).

Sudan, Somaliland, Eritrea, Abyssinia, Egypt, Arabia, Afghanistan, Pakistan, north India (Nepal westwards).

153. **F. iidaiana** Wilson (1919).

Bonin Isl.

ser. *Erythroyneae* Corner (1960)

*Erythroyne* Vis. ex Gasp. (1844)—*Ficus* sect. *Erythroyne* (Vis. ex Gasp.) Endl. (1847)—*Ficus* subgen. *Erythroyne* (Vis.) Miq. (1867).

Western Malaysia.

154. **F. deltoidea** Jack (1822)—*F. diversifolia* Bl. v. *latissima* Miq. (1867)—*F. diversifolia* v. *deltoidea* (Jack) Ridley (1924).a. v. **deltoidea**.

Malaya (Singapore, east Johore, south-east Pahang), Riouw and Lingga archipelagos, Bangka, Sumatra, Borneo, (? Palawan).

b. v. **angustifolia** (Miq.) Corner (1960)—*Synoecia diversifolia* (Bl.) Miq. v. *angustifolia* Miq. (1851)—*F. ovoidea* Jack (1822)—*Urostigma ovoideum* (Jack) Miq. (1847)—*F. viscifolia* Kunth et Bouch. (1846)—*F. spathulata* Miq. (1848)—*F. sideroxyliifolia* Griff. (1854)—*F. diversifolia* Bl. v. *ovoidea* (Jack) King (1888)—*F. retusa* L. v. *ovoidea* (Jack) Miq. (1867).

Lower Thailand, Malaya, Riouw archipelago, Sumatra, south Borneo, Anamba and Natuna Isl.

i. f. **angustissima** Corner (1960).

Mentawai Isl. (Batoe, Siberut, Sipora).

c. v. **arenaria** Corner (1960).

Borneo.

d. v. **bilobata** Corner (1960).

Malaya (Selangor and Pahang to Kedah).

e. v. **borneensis** Corner (1960).

Borneo.

i. f. **subhirsuta** Corner (1960).

Borneo.

f. v. **intermedia** Corner (1960)—*F. kinabaluensis* Stapf (1894)—*F. burkillii* Ridley (1924).

Malaya, Borneo, (? Celebes).

g. v. **kunstleri** (King) Corner (1960)—*F. diversifolia* Bl. v. *kunstleri* King (1888).

Lower Thailand, Malaya (Mt. Ophir northwards).

h. v. **lutescens** (Desf.) Corner (1960)—*F. diversifolia* Bl. (1825)—*F. lutescens* Desf. (1829)—*F. diversifolia* Bl. v. *lutescens* (Desf.) King (1888)—*F. ovoidea* Jack v. *lutescens* (Desf.) O.K. (1891)—*Erythroyne lutescens* (Desf.) Vis. ex Gasp. (1844)—*Synoecia diversifolia* (Bl.) Miq. (1848), ? v. *latifolia* Kurz (1864).

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Sumatra, Java, Sarawak, North Borneo.

i. f. **longipedunculata** Corner (1960).

Java, Sumatra.

ii. f. **subsessilis** (Miq.) Corner (1960)—*F. diversifolia* Bl. v. *v. sessilis* Miq., *subsessilis* Miq. (1867).

Java, Sumatra.

i. v. **motleyana** (Miq.) Corner (1960)—*F. motleyana* Miq. (1867)—*F. landonii* Sym. (1936).

Borneo, Malaya (Pahang, G. Tapis), Sumatra (Pajakumbuh), Biliton, Celebes.

j. v. **oligoneura** (Miq.) Corner (1960)—*Urostigma oligoneuron* Miq. (1860)—*F. oligoneura* Miq. (1867)—*Synoecia grandifolia* Kurz (1864).

Central Sumatra.

k. v. **peltata** Corner (1960).

Sumatra (Mt. Sago, Harau-canyon).

l. v. **trengganuensis** Corner (1960).

Malaya (Trengganu, east coast of Pahang).

155. **F. oleaefolia** King (1888)—*F. oleaefolia* v. **major** King (1888).

a. v. **oleaefolia**.

Central Sumatra.

b. v. **dodonaeformis** (Gagnep.) Corner (1960)—*F. dodonaeiformis* Gagnep. (1927).

Sarawak (Mt. Matang, Bintulu), Brunei (G. Pagan Priok).

c. v. **epiphytica** (Elm.) Corner (1960)—*F. williamsii* C. B. Robinson (1908), and v. *epiphytica* Elm. (1914).

Philippines (Basilan, Mindanao), north Celebes.

d. v. **memecylifolia** Corner (1960).

Borneo, Celebes (central, south).

e. v. **myrsinoides** Corner (1960).

Borneo.

f. v. **riparia** Corner (1960).

Sarawak (Upper Baram River), Brunei (G. Pagan Priok).

ser. *Podosyceae* Corner (1960)

Ficus sect. *Podosycea* Miq., sect. *Thamnosycea* Miq. sect. *Didymophora* Miq. (1848)—sect. *Eusyce* (Miq.) King. subsect. *Frutescentiae* Sata (1944).

Himalayas, China, Japan, to New Guinea.

subser. *Podosyceae*

156. **F. neriifolia** J. E. Sm. (1810)—*F. gemella* Wall. ex Miq., (1848)—*F. nemoralis* Wall. ex Miq. v. *gemella* (Wall.) King (1888)—*F. wardii* C. E. C. Fischer (1936).

## Key to the varieties

1. Fig sessile or nearly.
  2. Fig-wall thin, with few or no sclerotic cells . . . . . v. *fieldingii*.
  2. Fig-wall thick (1–1.3 mm.), with abundant sclerotic cells v. *neriifolia*.
1. Figs with peduncles 2–6 mm. long, the wall thin with few or no sclerotic cells.
  3. Fig-body subglobose; peduncle 4–6 mm. . . . . v. *nemoralis*.
  3. Fig-body cylindrical-clavate; peduncle 2 mm. long . . . . . v. *trilepis*.

a. v. **neriifolia**.

Nepal, Sikkim, Assam, east Tibet, west Yunnan.

- b. v. **fieldingii** (Miq.) Corner (1960)—*F. fieldingii* Miq. (1848)—*F. nemoralis* Wall. v. *fieldingii* (Miq.) King (1888).

Sikkim, Assam, Burma, west Yunnan.

- c. v. **nemoralis** (Wall. ex Miq.) Corner (1960)—*F. nemoralis* Wall. ex Miq., *F. densa* Miq. (1848).

Himalayas generally.

- d. v. **trilepis** (King) Corner (1960)—*F. nemoralis* Wall. v. *trilepis* King (1888)—*F. trilepis* Miq. (1867).

Sikkim, Assam, Burma, west Yunnan.

157. **F. pyriformis** Hook et Arn. (1836)—*F. milletii* Miq. (1848, err. *millesii*)—*F. rectinervia* Merr. (1918).

China (Kwangtung), Hongkong, north Tonkin.

158. **F. filicauda** Hand. Mazz. (1923)—*F. xiphias* C. E. C. Fischer (1936).

Yunnan, north Burma, Assam.

159. **F. variolosa** Lindl. ex Benth. (1842)—*F. cavaleriei* Lév. et Vant. (1907)—*F. langbianensis* Gagnep. (1927)—*F. pyriformis* Hook et Arn. v. *brevifolia* Gagnep. (1928).

China (Chekiang, Fukien, Kwangsi, Kwangtung, Kweichow, Hunan, Hainan), Hongkong, Tonkin, Laos, Annam, Cochinchina.

160. **F. pedunculosa** Miq. (1848)—*F. ataktophylla* Miq. (1867)—*F. luzonensis* Merr. (1904).

## Key to the varieties

1. Hispid-villous with short spreading hairs 0.5 mm. long.
  2. Lamina obtuse to subacute; basal nerves elongate. Peduncles 3–12 mm. long. Hairs white . . . . . var. *macropoda*.
  2. Lamina acute to subacuminate; basal nerves not elongate. Peduncles 10–40 mm. long. Hairs brown . . . . . var. *velutina*.

1. Thinly appressedly hairy to glabrous.
  3. Lamina rather narrowly elliptic, often acute; base cuneate; basal nerves  $\frac{1}{4}$ – $\frac{1}{2}$  lamina or less.
  4. Appressedly hairy. Peduncles 10–30 mm. . . . . var. *pedunculosa*.
  4. Glabrous or glabrescent.
    5. Lamina 2–6 × 1–2.5 cm., lanceolate-elliptic. Peduncle 6–15 mm. long . . . . . var. *confertifolia*.
    5. Lamina larger, peduncles often longer, as in var *pedunculosa* var. *imberbis*.
  3. Lamina broad, obtuse; basal nerves  $\frac{1}{2}$ – $\frac{2}{3}$  lamina. Peduncles 6–25 mm. long.
    6. Lamina 7–21 × 4–14 cm., base more or less cordate var. *segaarensis*.
    6. Lamina 4–9 × 3.5–5.5 cm., base cuneate to subcordate var. *mearnsii*.

a. v. **pedunculosa**.

Formosa, Philippines, Celebes, Moluccas (Soeloe, Talaud, Boeroe), New Guinea (Japan Isl.).

b. v. **confertifolia** (Merr.) Corner (1960)—*F. confertifolia* Merr. (1921).

Luzon.

c. v. **imberbis** (Elm.) Corner (1960)—*F. luzonensis* Merr. v. *imberbis* Elm. (1911)—*F. imberbis* (Elm.) Sata, v. *typica* Sata, v. *basiacuta* Sata (1944).

Sibuyan Isl.

d. v. **macropoda** (Miq.) Corner (1960)—*F. macropoda* Miq. (1848).

Luzon, Mindanao, Amboina.

e. v. **mearnsii** (Merr.) Corner (1960)—*F. mearnsii* Merr. (1908)—*F. garanbiensis* Hayata (1919).

South Formosa, Philippines (Babuyon, Batanes, Luzon).

f. v. **segaarensis** (Engl.) Corner (1960)—*F. segaarensis* Engl. (1886)—*F. moseleyana* King (1888).

Ceram, Key Isl., New Guinea.

g. v. **velutina** Corner (1960).

Burma (Toong Dong), north Thailand.

161. **F. erecta** Thunb. (1786)—*F. pumila* Thunb. (1784), non L. —*F. japonica* Bl. (1825)—? *F. cornifolia* Kunth et Bouch. (1846)—*F. pseudopyriformis* Lévl. et Vant., *F. taquetii* Lévl. et Vant. (1908)—? *F. tenax* Bl. (1825).

Key to the varieties

1. Glabrous or nearly.
  2. Lamina elliptic-obovate . . . . . v. *erecta*.
  2. Lamina lanceolate-oblong . . . . . f. *sieboldii*.
1. Hispid-villous; lamina scabrid.
  3. Lamina elliptic-obovate . . . . . v. *beecheyana*.
  3. Lamina lanceolate-oblong . . . . . f. *koshunensis*.

a. v. **erecta**.

Japan, Korea, Ryu Kyu Isl.

i. f. **sieboldii** (Miq.) Corner (1960)—*F. sieboldii* Miq. (1865)—*F. erecta* Thunb. v. *sieboldii* King (1888)—*F. pseudopyriformis* Lévl. et Vant (1908; pro p. Faurie 2024; alt. p., v. *erecta* f. *erecta*)—*F. taquetii* Lévl. et Vant. (1908; pro p. Faurie 900, Taquet 315, 317; alt. p., f. *erecta*).

Japan, Korea, Ryu Kyu Isl.

b. v. **beeheyana** (Hook. et Arn.) King (1888)—*F. beeheyana* Hook. et Arn. (1836)—*F. maruyamensis* Hayata (1911)—*F. beeheyana* f. *tenuifolia* Sata (1934)—*F. gressittii* Merr. (? ined.).

Ryu Kyu Isl., Formosa, China (Honan and Kiangsu southwards), Hongkong, (? Annam).

i. f. **koshunensis** (Hayatta) Corner (1960)—*F. koshunensis* Hayata (1911)—*F. beeheyana* Hook. et Arn. v. *koshunensis* (Hayata) Sata (1934).

Formosa, China (Anhwei, Kweichou).

162. **F. trivialis** Corner (1960).—*F. cuneata* Lévl. et Vant. (1907; pro p. Bodinier 2363, alt. p. *F. heteromorpha* Hemsl.).  
China (Kweichow, Kwangsi, Kwangtung), Tonkin.

163. **F. chapaensis** Gagnep. (1927).  
Burma, Yunnan, Tonkin.

164. **F. heteromorpha** Hemsl. (1897)—*F. kouytchensis* Lévl. et Vant., *F. pinfaensis* Lévl. et Vant. (1907)—*F. mairei* Lévl. (1913)—*F. cuneata* Lévl. et Vant. (1907; pro p. Cavalerie 1351, alt. p. *F. trivialis* Corner).

China (Shensi, Honan, Hupeh, Hunan, Kiangsi, Fukien, Kwangtung, Kweichow, Yunnan, Szechuan).

165. **F. gasparriniana** Miq. (1848)—*F. silhetensis* Miq. (1867)—*F. leekensis* Drake (1896)—*F. silhetensis* Miq. v. *annamica* Gagnep. (1928).

## Key to the varieties

1. Nearly glabrous. Leaf smooth. Fig-body 10–14 × 8–12 mm., often ellipsoid; peduncle 2–10 mm. long ..... v. *gasparriniana*.
1. Thinly to closely villous, at least on the twigs and petioles. Lamina scabrid above. Fig-body 7–10 mm. wide, subglobose; peduncle 1–3 mm. long.
  2. Lamina pandurate with two basal lobes and two short subapical lobes, becoming lacerate-dentate, then entire. Seeds 2.5–3.5 mm. long ..... v. *laceratifolia*.
  2. Lamina not pandurate at first, entire. Seeds 1.5–2.5 mm.
    3. Lamina elliptic-obovate; lateral nerves 4–9 pairs .. v. *viridescens*.
    3. Lamina lanceolate; lateral nerves 9–15 pairs; petioles 2–5 mm. long; often thinly hairy ..... v. *esquirolii*.

a. v. **gasparriniana**.

India (Bihar, Assam), north Burma, Tonkin, Annam.

b. v. **esquirolii** (Lévl. et Vant.) Corner (1960)—*F. esquirolii* Lévl. et Vant. (1907).

China (Szechuan, Kweichow, Kwangtung).

c. v. **laceratifolia** (Lévl. et Vant.) Corner (1960)—*F. laceratifolia* Lévl. et Vant. (1907)—*F. rhomboidalis* Lévl. (1915)—*F. bhoutanica* King (1888).

Bhutan, Assam, South China (Yunnan, Szechuan, Kweichow, Hupeh, Fukien).

d. v. **viridescens** (Lévl. et Vant.) Corner (1960)—*F. bistipulata* Griff. (1854)—*F. cyanus* Lévl. et Vant., and v. *viridescens* Lévl. et Vant. (1907)—*F. stapfii* Lévl. (1911)—*F. congesta* Lévl. et Vant. (1915)—*F. vanioti* Lévl. (1915)—*F. comata* Hand. Mazz. (1921).

Assam to Upper Burma, South China (Yunnan, Kweichow, Kwangsi, Fukien, Hainan), Laos, Tonkin, Annam, north Thailand.

166. **F. pandurata** Hance (1862).

China (south Anhwei, Hunan, Fukien, Kwangtung, Hainan, Kwangsi, Kwangsi), Hongkong, Tonkin, Annam.

167. **F. stenophylla** Hemsl. (1897)—*F. nerium* Lévl. et Vant. (1907)—? *F. stenophylla* v. *elongata* Metcalf (? ined.).

Key to the varieties

1. Lamina elliptic; lateral nerves 5–10 (–14) pairs. Peduncle 17–20 mm. long ..... v. *nhatrangensis*.
1. Lamina narrowly elliptic to lanceolate or subobovate; lateral nerves 7–17 pairs.
  2. Peduncles 13–55 mm. long. Lamina 4.5 cm. wide v. *macropodocarpa*.
  2. Peduncles 2–6 mm. long. Lamina 0.8–2.5 cm. wide .. v. *stenophylla*.

a. v. **stenophylla**.

China (Kweichow, Hunan, Hupeh, Fukien, Kwangtung, Hainan), Tonkin, north Thailand.

b. v. **macropodocarpa** (Lévl. et Vant.) Corner (1960)—*F. macropodocarpa* Lévl. et Vant. (1907)—*F. kingiana* Lévl. (1915).

China (Kwangsi, Kweichow), Laos, Annam, Thailand.

c. v. **nhatrangensis** (Gagnep.) Corner (1960)—*F. nhatrangensis* Gagnep. (1927).

Annam, (? Thailand).

168. **F. ischnopoda** Miq. (1867)—*F. pyriformis* Hook. et Arn. v. *ischnopoda* (Miq.) King (1888)—*F. pyriformis* v. *angustifolia* Ridley (1924)—*F. petelotii* Merr. (1926)—*F. delavayi* Gagnep. (1927)—*F. langbianensis* Gagnep. (1927; pro p. Hahn 143, alt. p. *F. variolosa* Lindl.).

a. v. **ischnopoda**.

Assam, Chittagong, Burma, Yunnan, Indochina, Thailand, Malaya (south to Selangor).

b. v. **subcylindrica** Corner (1960).

Annam (pr. Tourane).

169. **F. formosana** Maxim. (1883)—*F. lageniformis* Lév. et Vant. (1907)—*F. taiwaniana* Hayata (1911).

Formosa, China (Hunan, Fukien, Kwangtung, Kiangsi, Hainan), Hongkong, Tonkin (Dong-dang).

i. f. **shimadai** Hayata (1919).

China (Yunnan, Kweichow, Kiangsi, Kwangtung), Hongkong, Tonkin, Formosa.

170. **F. tannoensis** Hayata (1917)—f. *rhombofolia* Hayata (1919).  
Formosa.

i. f. **angustifolia** Hayata (1919).

Formosa.

171. **F. vaccinioides** Hemsl. ex King (1888).

Formosa.

172. **F. edanoi** Merr. (1921).

Philippines (Luzon, Prov. Tayabas, Mt. Tulaog).

173. **F. boninsimae** Koidzumi (1913)—*F. nishimurae* Koidzumi (1918).

Bonin Isl.

subser. *Basitepalae* Corner (1960)

India, China, Indochina, Philippines.

174. **F. tikoua** Bur. (1888)—*F. nigrescens* King (1888)—*F. bonatii* Lév. (1908).

Assam, Tibet, south China (Yunnan, Szechuan, Hupeh, Kweichow, Kwangsi), Tonkin, Laos.

175. **F. abelii** Miq. (1867)—*F. subpyriformis* Miq. (1867)—*F. pyriformis* Hook. et Arn. v. *abelii* (Miq.) King, v. *subpyriformis* (Miq.) King (1888)—*F. pyriformis* v. *rivularis* Gagnep. (1928)—*F. schinzii* Lév. et Vant. (1910).

Assam, east Bengal, Burma, south China, Indochina.

176. **F. pustulata** Elm. (1912)—v. *lobulata* Sata, v. *obovata* (1944).

a. v. **pustulata**.

Philippines (Palawan, Dumarán).

b. v. **lanceifolia** (Sata) Corner (1960)—*F. cardinalicarpa* Elm. (1912)—*F. cardinalicarpa* v. *linearifolia* Sata, v. *lanceifolia* Sata (1944).

Philippines (Palawan, Luzon).

177. **F. glareosa** Elm. (1912)—*v. oblanceolata* Sata, *obpandurifolia* Sata (1944).

Philippines (Palawan, Luzon).

subsect. *Eriositycea* (Miq.) Corner (1960)

- Ficus* sect. *Eriositycea* Miq. (1848)—sect. *Trichosycea* Miq. (1859)—sect. *Eusyce* (Miq.) King subsect. *Arboreae* Sata (1944, pro p.).

Asia, New Guinea.

ser. *Eriosityceae* Corner (1960)

Asia, New Guinea.

subser. *Eriosityceae*

Asia.

178. **F. padana** Burm. f. (1768)—*F. toxicaria* L. (1771)—*F. toxica* Thunb. (1786)—*F. elegans* Hassk. (1844).

Sumatra, Java.

179. **F. grossularioides** Burm. f. (1768)—*F. alba* Reinw. ex Bl., *F. nivea* Bl. (1825)—*F. palmata* Roxb. (1832)—*F. hunteri* Miq., *F. gossypina* Wall. ex Miq. and f. *integrifolia*, f. *lobata* Miq. (1848)—*F. chloroleuca* Miq. (1859)—*F. mappan* Miq. (1860)—*F. alba* Reinw. v. *mappan* Miq. (1867)—*F. alba* Reinw. v. *gossypina* (Wall.) O.K., v. *nudinervis* O.K. (1891)—*F. lobata* Hunter ex Ridley (1909).

a. v. **grossularioides**.

Lower Thailand, Malaya, Sumatra, Java, Riouw archipelago, Sarawak, south Borneo.

b. v. **kingii** O.K. (1891).

Malaya, Sumatra, Borneo (south and central).

c. v. **robusta** Corner (1960).

Malaya (Fraser's Hill), Sumatra (Lake Toba).

d. v. **stenoloba** Corner (1960).

Sumatra (Sibolangit, Sibajak, Toba, Siboga).

180. **F. tricolor** Miq. (1851)—*F. leucocoma* Miq., *F. tricolor* f. *pilosior* Miq. (1851)—*F. tricolor* v. *leucocoma* (Miq.) King (1888).

a. v. **tricolor**.

Sumatra, Java, south Borneo, (? Malaya).

- b. v. **serroh** Miq. (1851)—*F. leucoptera* Miq. (1851)—*F. leucoptera* v. *validior* Miq. (1867).

Sumatra, Java, south Borneo.

181. **F. esquiroliana** Lév. (1914)—*F. laus-esquirolii* Lév., *F. neo-esquirolii* Lév. (1915).

China (Yunnan, Szechuan, Kweichow, Kwangtung, Hainan), Tonkin, Laos, north Thailand.

subser. *Trichosyceae* Corner (1960)

sect. *Trichosyceae* Miq. (1859).

India and China to the Moluccas.

182. **F. hirta** Vahl (1806)—*F. setosa* Bl. (1825)—*F. setosa* Hook. et Arn. (1836)—*F. setifera* Steud. (1840)—*F. hibiscifolia* Champ. ex Benth. (1854)—*F. hirta* Vahl v. *integrifolia* Miq., v. *setosa* (Bl.) Miq. (1859)—*F. hirta* v. *normalis* O.K. (1891)—*F. porteri* Lév. et Vant. (1910)—*F. palmatiloba* Merr. (1922)—*F. hirta* v. *hibiscifolia* (Champ.) Chun, v. *palmatiloba* (Merr.) Chun (1934)—*F. hirta* v. *typica* Barrett (1951)—? *F. katsu-madai* Hayata (1919).

Key to the varieties

1. Fig 10–15 (–20) mm. wide, subglobose. Basal bracts 1.5–5 mm. long, generally persistent. Twigs 1.5–5 mm. thick. Lamina palmate then simple, or simple from the first, (persistently palmate in var. *dumosa*).
  2. Hairs –1 mm. long, spreading. Lamina usually entire .. var. *brevipila*.
  2. Hairs 1–4 mm. long. Lamina denticulate.
  3. Densely hairy.
    4. Villous with erect hairs ..... var. *hirta*.
    4. Appressedly hairy on the twigs and petioles .... var. *appressa*.
  3. Thinly hairy and glabrescent, especially the figs; hairs spreading.
    5. Hairs 2–4 mm. long on twigs and petioles. Leaf persistently palmate ..... var. *dumosa*.
    5. Hairs 1–2 mm. long on twigs and petioles. Leaf simple, oblong-elliptic ..... var. *imberbis*.

(Hairs appressed, sparse. Lamina coriaceous smooth  
*F. schefferiana*).
  1. Fig larger, subglobose or conical ellipsoid. Twigs 5–10 mm. thick. Leaves often persistently, if shortly, palmately lobed.
  6. Basal bracts 12–25 mm. long, caducous, as stipules. Fig 25–35 mm. wide, subglobose, or 25–30 × 18–25 mm. .... var. *roxburghii*.
  6. Basal bracts 6–9 mm. long.
    7. Fig 20 mm. wide, subglobose, with several stout lateral bracts and persistent basal bracts ..... var. *squamosa*.
    7. Fig 12–25 × 10–16 mm., conical ellipsoid, without lateral bracts; basal bracts caducous. Male and gall-perianth generally cupular with 3–4 teeth ..... var. *malayana*.
- a. v. **hirta**.  
India (Sikkim, Nepal, Assam), Burma, south China, Hainan, Indochina, Thailand, Malaya, Sumatra, Java.
- b. v. **appressa** Corner (1960).  
Laos, north Thailand.
- c. v. **brevipila** Corner (1960).  
Yunnan, Tonkin, Annam.
- d. v. **dumosa** (King) Corner (1960)—*F. dumosa* King (1888).  
Sumatra.

e. v. **imberbis** Gagnep. (1928)—*F. tridactylites* Gagnep. (1927).  
China (Yunnan, Kweichow, Kwangtung, Hainan), Tonkin, Laos, Annam, Cochinchina, north Thailand.

f. v. **malayana** Corner (1960)—*F. cordata* Ridley (1911).  
India (Nepal, Assam), Indochina, Thailand, Hainan, Malaya (Perak, Pahang).

g. v. **roxburghii** (Miq.) King (1888)—*F. hirsuta* Roxb., *F. hirta* Roxb. (1832)—*F. triloba* Buch. Ham. ex Voigt (1845)—*F. roxburghii* Miq. (1848)—*F. hirta* v. *triloba* (Buch. Ham.) O.K. (1891)—*F. hirta* v. *roxburghiana* Cowan and Cowan (1929)—*F. quangtriensis* Gagnep. (1927).

India (Sikkim, Assam), Burma, south China (Yunnan), Hainan, Indochina, Thailand, Sumatra.

h. v. **squamosa** Corner (1960).  
Sumatra.

183. **F. schefferiana** King (1888).  
Sumatra (G. Dempo, Merapi, Sago, Singgalang).

184. **F. simplicissima** Lour. (1709).  
a. v. **simplicissima**.  
Hainan, (? Chinese mainland), Tonkin, Annam, Cambodia, Cochinchina.

b. v. **annamica** (Gagnep.) Corner (1960)—*F. silhetensis* Miq. v. *annamica* Gagnep. (1928)—*F. touranensis* Gagnep. (1927).  
Annam.

All parts finely villous with short, stiff, minutely hooked hairs—0.5 mm. long.

185. **F. halmaherae** Corner (1960).  
Halmahera (G. Sembilan).

186. **F. mollissima** Ridley (1924).  
Malaya (Negri Sembilan, Kedah).

187. **F. fulva** Reinw. ex Bl. (1825)—*F. chrysocarpa* Reinw. ex Bl. (1825)—*F. reinwardtii* Link et Otto (1828)—*F. apiculata* Miq. (1854)—*F. suborbicularis* Miq. (1860)—*Pogonotrophe flavidula* Miq. (1860)—*F. flavidula* Miq., *F. discolor* Miq. (1867)—*F. patens* Ridley (1922)—*F. fulva* v. *rubinervia* Hassk. (1844), v. *orbicularis* Miq. (1867), v. *minor* King (1888), f. *typica* King (1888), v. *contracta* O.K. (1891), v. *chrysocarpa* Koord. (1912), v. *typica* Barrett (1951)—*F. chrysocarpa* v. *flavidula* Miq. (1867).

a. v. **fulva**.  
Nicobar Isl., lower Thailand, Malaya, Sumatra, Java to Sumbawa, Celebes, Moluccas (Batjan), Borneo.

b. v. **timorensis** Corner (1960).  
Timor.

188. **F. subfulva** Corner (1960).a. v. **subfulva**.

Borneo (Kinabalu; G. Klam).

b. v. **villosula** Corner (1960).

Sarawak, south Borneo.

subser. *Dehiscentes* Corner (1960)

India to New Guinea.

189. **F. lamponga** Miq. (1960)—*F. lepidosa* Wall. ex Kurz (1873)  
—*F. lepidosa* v. *martabanica* King (1888)—*F. balansae* Gagnep.  
(1927).Assam, Burma, Indochina, Thailand, Malaya, Andaman Isl.,  
south Sumatra, Borneo (south-east, Sarawak), north Celebes.190. **F. ruficaulis** Merr. (1904)—*F. gerontocarpa* Warb. (1905)—  
*F. paloensis* Elm. (1908)—*F. antaoensis* Hayata, *F. hiiranensis*  
Hayata (1919)—*F. zambalensis* Elm. (1937)—*F. ruficaulis* v.  
*paloensis* Elm. (1906)—*F. ruficaulis* f. *typica* Sata, f. *paloensis*  
(Elm.) Sata (1944).Formosa, Philippines (Luzon to Mindanao, ? Palawan), Celebes,  
(? New Guinea).191. **F. glandulifera** (Wall. ex Miq.) King (1888)—*Pogonotrophe*  
*glandulifera* Miq. (1848)—*P. aurantiaca* Miq. (1854)—*P. sumat-*  
*rana* Miq. (1860)—*F. aurantiaca* Miq. (1867)—*F. hasskarlii*  
Merr., *F. henschelii* Merr. (1916).a. v. **glandulifera**.Malaya, Riouw, Bangka, Sumatra, Java, Borneo, Celebes,  
Moluccas.b. v. **camiguinensis** (Merr.) Corner (1960)—*F. banahaensis* Elm.  
(1907)—*F. camiguinensis* Merr. (1914)—*F. banahaensis* v. *typica*  
Sata, v. *camiguinensis* (Merr.) Sata (1944).

Philippines (? Palawan), Celebes, south-east Borneo.

c. v. **villosa** Corner (1960).

Borneo, Celebes, Moluccas (Morotai, Ceram), New Guinea.

subser. *Cuneifoliae* Corner (1960)India, Burma, south China, Indochina, Thailand, Malaya,  
Sumatra, Borneo.192. **F. chartacea** Wall. ex King (1888)—*F. lamponga* Miq. v.  
*chartacea* Wall. ex Kurz (1877).

Key to the varieties

1. Lamina lanceolate, 1–3 cm. wide; lateral nerves 9–16 pairs, at a wide angle; intercostals 0–1. Fig shortly pedunculate . . . . v. *lanceolata*.
1. Lamina elliptic to obovate, –7 cm. wide; lateral nerves 3–5 pairs; intercostals 1–4, lax.
  2. Fig sessile . . . . . v. *torulosa*.
  2. Fig pedunculate . . . . . v. *chartacea*.

a. v. **chartacea**.

Burma, Indochina, Thailand, Malaya, North Borneo, Brunei.

b. v. **lanceolata** Corner (1960).

Annam, Thailand.

c. v. **torulosa** King (1888).

Yunnan, Indochina, Thailand, Malaya, Sumatra (Asahan).

193. **F. litseifolia** Corner (1960).

Malaya (Trengganu, G. Padang), Sumatra (Atjeh; G. Sago; G. Dempo; G. Raja of Ranaumeer).

194. **F. oreophila** Ridley (1920).

Malaya (Kelantan, Perak, Pahang).

195. **F. tuphapensis** Drake (1896)—*F. potingensis* Merr. et Chun (1940).

## Key to the varieties

1. Fig 5–8 mm. wide. Stamen usually solitary. Style glabrous. Lamina usually with abundant cystoliths underneath . . . . . v. *tuphapensis*.
1. Fig. 8–12 mm. wide. Stamens generally 2. Style puberulous. Lamina without cystoliths . . . . . v. *annamensis*.

a. v. **tuphapensis**.

China (Yunnan, Kwangtung pr. Kinchoo, Hainan), Tonkin.

b. v. **annamensis** (Gagnep.) Corner (1960)—*F. annamensis* Gagnep., *F. cambodica* Gagnep. (1927).

Annam, Cambodia, Thailand.

196. **F. langkokensis** Drake (1896)—*F. harmandii* Gagnep. (1927)—*F. tenuicaudata* W. Y. Chun (ined.).

China (Hainan, Kwangtung, Kwangsi, Fukien), Tonkin, Laos, Annam, Assam.

ser. *Auratae* Corner (1960)

Indochina, Thailand, Malaya, Sumatra, Borneo, Palawan.

subser. *Auratae*197. **F. endospermifolia** Corner (1960).

North Borneo (Kinabalu).

198. **F. bruneiensis** Corner (1960).

Brunei.

199. **F. brunneoaurata** Corner (1960).

Borneo generally.

200. **F. aurata** Miq. (1867)—*Covellia aurata* Miq., *F. densiserra* Miq. (1860)—*F. aurata* Miq. v. *densiserra* Miq. (1867)—*F. chrysocarpa* Reinw. ex Bl. v. *undulata* H. Winkler (1913)—*F. chrysocarpa* sensu King (1888), non vera = *F. fulva* Reinw.

a. v. **aurata**.

Annam, Malaya, Sumatra, Riouw archipelago, Bangka, Borneo.

b. v. **brevipilosa** Corner (1960)—*F. inaequipetiolata* Merr. (1922).

North Borneo.

c. v. **longipilosa** Corner (1960).

Malaya, Sumatra, Riouw archipelago, Borneo.

d. v. **palawanensis** Corner (1960).

Philippines (Palawan, Balabac), (? North Borneo; Kinabalu).

e. v. **pedunculata** Corner (1960).

Malaya (Perak, Selangor, Trengganu).

201. **F. aureocordata** Corner (1962).

West Borneo (Bt. Raja).

subser. *Monandreae* Corner (1960)

Borneo.

202. **F. androchaete** Corner (1960).

Borneo (North Borneo, Brunei, Tepoese).

203. **F. macilenta** King (1888).

a. v. **macilenta**.

Sarawak (Mt. Matang).

b. v. **gibbsiae** (Ridley) Corner (1960)—*F. gibbsiae* Ridley (1915).

North Borneo (Kinabalu).

c. v. **ilicifolia** Corner (1960).

North Borneo (Kinabalu).

204. **F. eumorpha** Corner (1960).

a. v. **eumorpha**.

North Borneo (Kinabalu), Sarawak (G. Mulu).

b. v. **subglabra** Corner (1960).

Central east Borneo (West Koetai, Mt. Kemoel).

205. **F. paramorpha** Corner (1960).

North Borneo (Kinabalu).

206. *F. setiflora* Stapf (1894).a. v. *setiflora*.

North Borneo (Kinabalu).

b. v. *adelpha* Corner (1960).

North Borneo (Kinabalu).

c. v. *puberula* Corner (1960).

Central east Borneo (West Koetai, Mt. Kemoel), Brunei.

sect. *Rhizocladus* Endl. (1847)

Asiatic mainland to New Hebrides and Queensland.

ser. *Plagiostigmaticae* Corner (1960)

*Varinga* Raf. (1838)—*Plagiostigma* Zucc. (1846, nom. nud.)—*Ficus* sect. *Plagiostigma* Zucc. ex Miq. (1848)—*Ficus* subgen. *Plagiostigma* Zucc. ex Miq. (1867)—*Tenorea* Gasp. (1844).

Asiatic mainland, Sumatra, Java, Borneo.

subser. *Plagiostigmaticae*

207. *F. pubigera* (Wall. ex Miq.) Miq. (1867)—*Pogonotrophe pubigera* Wall. ex Miq., *P. verrucosa* Miq. (1848)—*F. verrucosa* Miq. (1867)—*F. erecta* Thunb. v. *khasiana* Miq. (1867)—*F. howii* Merr. et Chun (1940).

Key to the varieties

1. Basal nerves not elongate or to  $\frac{1}{2}$  lamina; lateral nerves 6–10 pairs. Fig 12–20 mm. wide ..... v. *pubigera*.
1. Basal nerves  $\frac{1}{2}$ – $\frac{2}{3}$  lamina; lateral nerves 4–7 pairs. Figs larger.
  2. Fig-body 4–6 × 4–5 cm., with a pedicel 10–20 mm. long. Gall-tepals flexuous, yellowish in the lower half ..... v. *anserina*.
  2. Fig-body 2.5–4 × 2–3.5 cm., without a pedicel. Gall-tepals not flexuous, red throughout ..... v. *maliformis*.

a. v. *pubigera*.

Himalayas (Garhwal eastwards), Khasia, Burma, south China (Yunnan, Kwangsi, Hainan), Indochina, Thailand, Malaya (Pahang).

b. v. *anserina* Corner (1960).

Laos.

c. v. *maliformis* (King) Corner (1960)—*F. foveolata* Wall. v. *maliformis* King, v. *oleaeformis* King (1888).

Sikkim, Khasia, Assam, upper Burma, Yunnan.

208. *F. sarmentosa* Buch. Ham. ex J. E. Sm. (1810)—*F. cabur* Buch. Ham. ex J. E. Sm. (1810)—*Pogonotrophe* ? *foveolata* Wall. ex Miq., *P. reticulata* Miq. (1848)—*F. foveolata* Wall. ex Miq., *F. reticulata* Miq. (1867).

## Key to the varieties

1. Underside of lamina glabrous, pale green, shallowly foveolate, the reticulations flat. Fig 5–9 mm. wide, glabrous or thinly pubescent  
var. *lacrymans*.
1. Underside of lamina white or greyish from the minutely velutinate (pruinata), and often raised, reticulations; often brown pilose.
2. Apical bracts 2–4 mm. long, prominent, erect; basal bracts 3–6.5 mm. long. Fig-body somewhat conical, sessile or shortly pedunculate  
var. *henryi*.
2. Apical and, generally, basal bracts shorter. Fig-body subglobose.
3. Fig 7–10 mm. wide. Reticulations not or scarcely raised below  
var. *impressa*.
3. Fig larger, or the reticulations prominent beneath.
4. Reticulations nor or scarcely raised beneath, not or sparsely brown hairy.
5. Fig-peduncles 5–15 mm. long ..... var. *sarmentosa*.
5. Peduncles 0–4 mm. long ..... var. *nipponica*.
4. Reticulations prominent and brown pilose below.
6. Lamina  $-6 \times 3$  cm., lateral nerves 4–6 pairs, basal nerves rather prominent ..... var. *thunbergii*.
6. Lamina larger, lateral nerves 6–11 pairs, basal nerves mostly short.
7. Fig 7–12 mm. wide, peduncle rather long, wall 0.5–1 mm. thick ..... var. *luducca*.
7. Fig 18–23 mm. wide, peduncle short or none, wall 2–3 mm. thick ..... var. *duclouxii*.

a. v. *sarmentosa*.

Sikkim, Bhutan, Nepal.

b. v. *duclouxii* (Lévl. et Vant.) Corner (1960)—*F. duclouxii* Lévl. et Vant (1907).

Yunnan.

c. v. *henryi* (King ex D. Oliver) Corner (1960)—*F. foveolata* Wall. v. *henryi* King ex D. Oliver (1889)—*F. arisanensis* Hayata (1919)—*F. foveolata* v. *arisanensis* (Hayata) Kudo (1936).

Formosa, China (Szechuan and Yunnan to Chekiang).

d. v. *impressa* (Champ.) Corner (1960)—*F. impressa* Champ. ex Benth. (1854)—*F. wrightii* Benth. (1861)—*F. foveolata* Wall. v. *impressa* (Champ.) King (1888)—*F. bodinieri* Lévl. et Vant., *F. martini* Lévl. et Vant. (1907)—*F. leucodermis* Hand. Mazz., v. *saxicola* Hand. Mazz. (1921)—*F. baileyi* Hutch. (1920).

China (Chekiang, Szechuan, Hunan, Hopei, Anhwei, Kwangsi, Kwangtung, Kweichow, Yunnan, Hainan), Tonkin, Annam, Khasia hills.

e. v. *lacrymans* (Lévl.) Corner (1960)—*F. botryoides* Lévl. et Vant. (1907), non Baker—*F. lacrymans* Lévl. (1915)—*F. kwangtungensis* Merr. (1927).

China (Szechuan, Hunan, Hupeh, Kwangtung, Kweichow, Yunnan), Tonkin.

f. v. **luducca** (Roxb.) Corner (1960)—*F. luducca* Roxb. (1832)—*F. longepedata* Lévl. et Vant. (1907)—*F. trichopoda* Lévl. (1913)—*F. sordida* Hand. Mazz. (1922).

China (Kweichow, Kwangtung, Yunnan), Himalayas generally.

i. f. **sessilis** Corner (1960).

China (Szechuan, Hupeh, Kweichow, Yunnan).

g. v. **nipponica** (Fr. et Sav.) Corner (1960)—*F. oxyphylla* Miq. (1854)—*F. erecta* Thunb. f. *khasyana* Miq. (1866)—*F. nipponica* Fr. et Sav. (1875)—*F. foveolata* Wall. v. *nipponica* (Fr. et Sav.) King (1888)—*F. chaffanjonii* Lévl. et Vant., *F. fortunati* Lévl. et Vant. (1907)—*F. rufipes* Lévl. et Vant. (1907, pro p. Cavalerie 340)—*F. mairei* Lévl. (1913, pro p.; alt. p. *F. heteromorpha* Hemsl.)—*F. seguini* Lévl. (1913)—*F. foveolata* Wall. v. *eburnea* Gagnep. (1928).

Japan, Ryu Kyu Isl., Formosa, China, Tonkin, Annam, Burma, Tibet, Assam, Sikkim, Bhutan.

h. v. **thunbergii** (Maxim.) Corner (1960).—*F. thunbergii* Maxim. (1883)—*F. foveolata* Wall. v. *thunbergii* (Maxim.) King (1888)—*F. fauriei* Lévl. et Vant. (1908), v. *macrocarpa* Lévl. (1912)—*F. hederifolia* Lévl. (1911)—? *F. sonoharae* Hatusima (1956).

Japan, Ryu Kyu Isl., Korea, China (Szechuan).

209. **F. pumila** L. (1753)—*F. stipulata* Thunb. (1786)—*F. scandens* Lamk. (1788)—*F. vestita* Desf. (1829)—*Varinga repens* Raf. (1838)—*Tenorea heterophylla* Gasp. (1844)—*F. hanceana* Maxim. (1883)—*F. repens* Hort.—v. *lutchuensis* Koidz. Bot. Mag. Tokyo 39 (1925) 14.

#### Key to the varieties

1. Lamina 4–10 × 2.5–6 cm., ovate-cordate to somewhat oblong. Fig-body 3–6 × 2.5–3.5 cm., subglobose to pyriform; peduncle 4–20 mm. long ..... v. *pumila*.
1. Lamina 10–15 × 4–7 cm., narrowly ovate-oblong. Fig-body 6–8 × 3–5 cm., oblong; peduncle ~7 mm. long ..... v. *awkeotsang*.

#### a. v. **pumila**.

Japan, Ryu Kyu Isl., Formosa, China, north Indochina.

b. v. **awkeotsang** (Makino) Corner (1960)—*F. awkeotsang* Makino (1904)—*F. nagayamai* Yamamotu (1927).

Formosa, commonly cultivated.

subser. *Pogonotropheae* (Miq.) Corner (1960)

*Pogonotrophe* Miq. (1847)—*Ficus* subgen. *Pogonotrophe* Miq. (1867).

210. **F. laevis** Bl. (1825)—*F. vagans* Roxb. (1832)—*Pogonotrophe vagans* (Roxb.) Miq., *P. emodi* Wall. ex Miq., *P. assamica* Miq., *P. wightiana* Miq. (1848)—*P. laevis* Miq., v. *oblongata* Miq., v. *cordata* Miq. (1854)—*F. emodi* Miq., *F. laevis* Bl. v. *assamica* Miq., *F. subpedunculata* Miq. (1867)—*F. jamini* Lévl. et Vant. (1910).

## Key to the varieties

1. Figs cauliflorous in dense clusters; fig-body 20–30 mm. wide (3–6 cm., living); peduncle –6 mm. long. South India . . . . v. *macrocarpa*.
1. Figs axillary, 18–25 mm. wide; peduncle 10–32 mm. long.
  2. Glabrous or thinly white to brownish hairy . . . . . v. *laevis*.
  2. Twigs, petioles, underside of the veins, and figs densely brown villous . . . . . v. *tomentosa*.

a. v. **laevis**.

Ceylon, India, Burma, south China, Indochina, Thailand, Malaya, Sumatra, Java, Borneo.

b. v. **tomentosa** King (1888)—*Pogonotrophe dasyphylla* Miq., *P. ceylanica* Miq. (1848)—*F. ceylanica* Miq. (1867)—*F. zeylanica* Trim. (1885) *F. laevis* Bl. v. *dasyphlla* (Miq.) King (1888).

Ceylon, Malaya, Sumatra.

c. v. **macrocarpa** (Miq.) Corner (1960)—*Pogonotrophe macrocarpa* Miq. (1848)—*Covellia guttata* Wight (1853)—*F. vagans* Roxb. v. *macrocarpa* Miq. (1867)—*F. macrocarpa* Wight ex King (1888)—*F. guttata* (Wight) King (1888).

Madras, Travancore.

ser. *Ramentaceae* Corner (1960)

*Ficus* sect. *Trematosyceae* Miq. (1848)—subgen. *Trematosyceae* Miq. (1867)—subgen. *Eumetamorphe* Sata sect. *Eusyce* (Miq.) Benth. et Hook. subsect. *Punctulifoliae* Sata (1944).

India and south China to the Solomon Isl.

subser. *Pantonianae* Corner (1960)

Moluccas and eastwards.

211. **F. pantoniana** King (1887)—*F. nugentii* Domin (1921)—*F. scandens* Roxb. v. *australis* F. M. Bailey (1897).

a. v. **pantoniana**.

Moluccas (Ceram, Ternate, Morotai), New Guinea, New Britain, Queensland.

b. v. **colobocarpa** Diels ex Corner (1960).

Terr. of New Guinea (Morobe).

c. v. **rhytidophloea** Corner (1960).

Papua (Alola, Mt. Dayman).

212. **F. amblysyce** Corner (1960)

New Guinea (Cyclops Mts.).

213. **F. ampulliformis** Corner (1962).  
West New Guinea.
214. **F. hypobrunnea** Corner (1962).  
West New Guinea.
215. **F. floccifera** Diels (1935).  
Terr. New Guinea (Kani Mts.), Papua (Boridi).  
subser. *Balanotae* Corner (1960)  
Moluccas and eastwards.
216. **F. balanota** Diels (1935).  
Terr. New Guinea.
217. **F. oxymitroides** Corner (1961).  
a. v. **oxymitroides**.  
Terr. New Guinea (Eastern Highlands).  
b. v. **brevipes** Corner (1962).  
Western New Guinea (Vogelkop, Lake Ajamaroe), Terr. New Guinea (Okapa), Papua (Woitapi).
218. **F. devestiens** Corner (1960).  
Amboina, Ternate.
219. **F. sageretina** Diels (1935).  
Terr. New Guinea (Finisterre Mts.).
220. **F. ceanothifolia** Corner (1960).  
West New Guinea (Wissel Lake region).  
subser. *Irritantes* Corner (1960)  
New Guinea.
221. **F. odoardi** King (1887)—*F. conspicabilis* King (1888)—*F. trichosphaeridia* Diels (1935).  
a. v. **odoardi**.  
New Guinea.  
b. v. **glabrata** Corner (1960)—*F. cinnabarina* S. Moore (1923).  
New Guinea.
222. **F. sphaerocarpa** Corner (1960).  
Papua (Boridi).
223. **F. irritans** Summerh. (1941).  
New Guinea.
224. **F. insculpta** Summerh. (1941).  
New Guinea.

225. **F. convexa** Corner (1962).

Terr. New Guinea (Eastern Highlands).

subser. *Ramentaceae* Corner (1960)

Malaysia, chiefly western.

226. **F. baeuerleni** King (1887)—*F. mespiloides* King (1888)—*F. hollrungii* Laut. et K. Schum. (1901)—*F. laurentina* Diels (1935)—*F. baeuerleni* v. *glabrata* Diels (1935).a. v. **baeuerleni**.

New Guinea, Solomon Isl.

b. v. **vulcaniformis** Corner (1960).

Terr. New Guinea, New Britain, Solomon Isl.

227. **F. camptandra** Diels (1935).

Aru Isl., New Guinea.

228. **F. grossivenis** Miq. (1867)—*F. propinqua* Merr. (1905)—*F. lagunensis* Merr. (1914)—*F. jaroensis* Merr. (1915).

Borneo, Celebes, Philippines, Moluccas.

229. **F. sagittata** Vahl. (1806)—*F. compressicaulis* Bl. (1825)—*F. radicans* Desf. (1829)—*F. ramentacea* Roxb. (1832)—*Pogonotrophe rigida* Miq. (1848)—*F. crinineria* Miq., *F. subrigida* Miq. (1860)—*F. rigescens* Miq. (1867)—*F. leptocarpa* Steud. v. *borneensis* Miq., v. *crassa* Miq., v. *subglabra* Miq., v. *timorensis* Miq. (1867)—*F. ramosii* Merr. ex Sata (1944)—? *F. lanoensis* Merr. ex Sata (1944)—*F. radicans* Hort. and *F. rostrata* v. *radicans* Hort.a. v. **sagittata**.

Andaman Isl., Sikkim, Assam, Chittagong, Burma, Thailand, Indochina, south China (Kwangtung), Hainan, Malaya, Sumatra, Java, Borneo, Celebes, Moluccas, Timor, Key Isl., Philippines, Caroline Isl. (Palau group).

b. v. **adhaerens** (Miq.) Corner (1960)—*F. adhaerens* Miq. (1851)—*F. leptocarpa* Steud. v. *adhaerens* Miq. (1867).

Malaya, Sumatra, Java, Borneo.

c. v. **minor** Corner (1960)—*F. tayabensis* Elm. (1907)—*F. rubrocarpa* Elm. (1937).

Malaya, Sumatra, Java, Borneo, Philippines.

d. v. **oligosperma** (Miq.) Corner (1960)—*F. oligosperma* Miq. (1851)—*F. leptocarpa* Steud. v. *oligosperma* Miq. (1867).

Malaya, Sumatra, Java, Borneo, Philippines.

230. **F. urnigera** Miq. (1854)—*F. strigosa* Bl. v.  $\beta$  Miq. (1867)—*F. recurva* Bl. v. *urnigera* (Miq.) King (1888)—*F. ramentacea* Roxb. v. *urnigera* (Miq.) Back. (1948)—? *F. gracilis* Kurz (ined.).

Tenasserim, lower Thailand, Malaya, Sumatra, Java, Borneo, Philippines.

231. **F. spiralis** Corner (1960).  
Sarawak (Sematan, Kuching).
232. **F. villosa** Bl. (1823)—*F. barbata* Wall. ex Miq. (1848)—*F. barbata* Wall. v. *glabriuscula* Miq., *F. hirsuta* Wall. ex Miq. (1859)—*F. dives* Miq. (1864).  
a. v. **villosa**.  
Andaman Isl., Assam, Burma, Indochina, Thailand, Malaya, Sumatra, Java, Borneo.  
b. v. **appressa** Corner (1960).  
North Borneo.  
c. v. **subglobosa** Corner (1960).  
Lower Thailand, Penang, Mentawai Isl., North Borneo.  
d. v. **tonsa** Corner (1960).  
Malaya (Pahang, Cameron Highlands).
233. **F. recurva** Bl. (1825)—*F. microcarpa* Bl., *F. strigosa* Bl. (1825)—*F. spanogheana* Miq., *F. villipes* Miq. (1848)—*F. leptocarpa* Steud. (1840)—*F. recurva* Bl. f. *parvifolia* Miq., f. *glabrior* Miq. (1860)—*F. samarensis* Merr. (1921).  
a. v. **recurva**.  
Malaya (Perak), Sumatra, Java, Lombok, Borneo, Philippines (Palawan, Leyte, Samar, Catanduanes).  
b. v. **bridelioides** Corner (1960).  
Lower Thailand, Malaya, Sumatra, Borneo.  
c. v. **elegantior** Corner (1960).  
Malaya (Trengganu), Bangka, south-east Borneo (Pulau Laut).  
d. v. **lasiocarpa** Corner (1960).  
North Borneo (Kinabalu).  
e. v. **pedicellata** Corner (1960).  
Borneo (West Koetai).  
f. v. **ribesioides** (Wall. ex Miq.) King (1888)—*F. ribesioides* Wall. ex Miq. (1867)—*Pogonotrophe ribesioides* Miq. (1848)—*F. strigosa* Bl. f. *longifolia* Miq. (1859)—*F. bulusanensis* Elm. (1937).  
Malaya, Sumatra, Borneo, Riouw and Lingga archipelagos, Bangka, Billiton, Anamba and Natuna Isl., Philippines (Luzon, Leyte, Palawan).
234. **F. uncinulata** Corner (1960).  
Johore, Natuna Isl., Borneo (North Borneo, West Koetai, Sarawak).

235. **F. pendens** Corner (1960).

a. v. **pendens**.

Malaya, Sumatra, Sarawak, North Borneo.

b. v. **appressa** Corner (1960).

Borneo (East Koetai).

subser. *Excavatae* Corner (1960)

West Malaysia.

236. **F. lanata** Bl. (1825).

a. v. **lanata**.

Java, Sumatra, Borneo.

b. v. **foveolata** Corner (1960).

North Borneo (Kinabalu).

237. **F. superforata** Corner (1960).

Sarawak, west Borneo (Pontianak).

238. **F. excavata** King (1888)—*F. abbreviata* Wall. ined.

Sumatra (Bencoolen residency), Malaya (Singapore to Trengganu and Perak), Borneo (Sarawak, Balikpapan).

239. **F. callicarpides** Corner (1960).

Sarawak.

subser. *Araneosae* Corner (1960)

240. **F. araneosa** King (1888).

Malaya (Perak), Sumatra (Sibolangit).

ser. *Distichoideae* Corner (1960)

Moluccas, New Guinea, Solomon Isl.

241. **F. distichoidea** Diels (1935)—v. *platyphylla* Diels, *F. pernitida* Diels (1935).

a. v. **distichoidea**.

Terr. New Guinea, Papua.

b. v. **megacarpa** Corner (1960).

Papua (Isuarava).

242. **F. ovatacuta** Corner (1962).

Terr. New Guinea (Eastern Highlands).

243. **F. phatnophylla** Diels (1935).

a. v. **phatnophylla**.

Terr. New Guinea (Sepik region).

b. v. **glochidioides** Corner (1960).

West New Guinea (Rouffaer River).

c. v. **meiocarpa** (Diels) Corner (1960)—*F. meiocarpa* Diels (1935).

Terr. New Guinea (Sepik region).

244. **F. calodictya** Summerh. (1929).a. v. **calodictya**.

Halmahera, Ternate, New Guinea.

b. v. **gamophylla** Corner (1960).

West New Guinea.

245. **F. agapetoides** Diels (1935).a. v. **agapetoides**.

Terr. New Guinea, Papua.

b. v. **solomonensis** Corner (1960).

Bougainville Isl., Guadalcanal.

ser. *Distichae* Corner (1960)*Ficus* sect. *Kissoseyce* Miq. (1848)—sect. *Eusyce* (Miq.) Benth. et Hook. subsect. *Areolatifoliae* Sata (1944).

Ceylon, Asiatic mainland, west Malaysia to the Philippines and Moluccas.

246. **F. diversiformis** Miq. (1848)—*F. thwaitesii* Miq. (1867).Ceylon.—*F. stipulata* Moon (1824).247. **F. hederacea** Roxb. (1832)—*F. scandens* Roxb. (1832), non Lamk.—*F. fruticosa* Roxb. (1832)—*F. longipes* Griff. (1854)—*F. cantoniensis* Bodinier ex Levl. (1907)—*F. anabatos* Voigt (1845)—*F. ludens* Wall. ined.

North India, Burma, south China (Yunnan, Kweichow, Kwangtung, Hainan), Tonkin, Laos, Annam, north Thailand, Andaman Isl.

248. **F. allutacea** Bl. (1825)—*F. teysmanniana* Miq. (1859)—*F. allutacea* Bl. v. *teysmanniana* (Miq.) King (1888)—*F. areolata* Elm. (1911)—*F. alutacia* Back. (1948).

Malaya (Perak), Sumatra, Java, Anamba and Natuna Isl., North Borneo, Celebes (Minahassa), Mindanao.

249. **F. detonsa** Corner (1960).

Borneo (Kinabalu; West Koetai, Mt. Kemoel).

250. **F. disticha** Bl. (1825)—v. *brunneinervia* Hochr. (1925).

Burma, ? Thailand, Malaya, Sumatra, Java, Borneo, Celebes, Philippines, Moluccas (Ternate).

ser. *Trichocarpeae* Corner (1960)

Indochina, Thailand, throughout Malaysia to Solomon Isl. and New Hebrides.

251. **F. trichocarpa** Bl. (1825)—*F. filiformis* Bl. (1825)—*Urostigma trichocarpum* (Bl.) Miq. (1859)—*F. obtusa* Hassk. v. *gedehensis* Val. (1909)—? *F. aspera* Forst. f. v. *volubilis* Blanco (1837).

a. v. **trichocarpa**.

Indochina, Thailand, Malaya, Sumatra, Java, Borneo.

b. v. **borneensis** (Miq.) Corner (1960)—*F. piperifolia* Miq. v. *borneensis* Miq. (1867)—*Pogonotrophe borneensis* Miq. (1859).

Borneo (south and east).

c. v. **obtusa** (Hassk.) Corner (1960)—*F. obtusa* Hassk. (1844), v. *genuina* Val. (1906).—*Pogonotrophe javana* Miq., *P. phaeopoda* Miq. (1848)—*P. pyrrhopoda* Miq. (1860)—*P. obtusa* (Hassk.) Miq., *F. phaeopoda* Miq. (1867)—*F. pyrrhopoda* (Miq.) King (1888)—*F. ahernii* Merr. (1921).

Bangka, Sumatra, Java, Celebes, Philippines, Sumbawa.

d. v. **piperifolia** (Miq.) Corner (1960)—*Pogonotrophe piperifolia* Miq. (1854)—*F. platycaula* Miq. (1859)—*F. piperifolia* Miq. (1867)—*F. obtusa* Hassk. v. *piperifolia* Val. (1906).

Java, Sarawak, South Borneo, Mindanao.

252. **F. perfulva** Elm. ex Merr. (1923)—*F. fulva* Elm. (1914).

Luzon, Mindanao.

253. **F. bakeri** Elm. (1914).

Luzon, Mindanao.

254. **F. pleiadenia** Diels (1935).

New Guinea.

255. **F. nasuta** Summerh. (1933).

a. v. **nasuta**.

Santa Cruz Isl., Solomon Isl.

b. v. **glabrata** Corner (1960).

Terr. New Guinea, Papua.

256. **F. alococarpa** Diels (1935).

Terr. New Guinea (Sepik region).

257. **F. phaeobullata** Corner (1960).

Papua (Rouna).

258. **F. semilanata** Corner (1960).

Papua.

259. **F. fuscata** Summerh. (1941).

Papua.

260. **F. supfiana** Schlecht. ex Diels (1935).

Terr. New Guinea.

261. **F. cinnamomea** Corner (1960).

Papua (Alola).

262. **F. hypophaeola** Corner (1960).

West New Guinea.

263. **F. hypophaea** Schlecht. ex Diels (1935).

Terr. New Guinea, Papua.

sect. *Kalosyce* (Miq.) Corner (1960)

*Synoecia* Miq. (1848), sect. *Verae* Miq. and sect. *Kalosyce* Miq. (1859)—*Urostigma* Gasp. sect. *Apiosycea* Miq. (1860)—*Ficus* subgen. *Synoecia* Miq. (1867)—*Ficus* sect. *Synoecia* (Miq.) Benth. et Hook. (1880).

Nicobar Isl., Burma, Indochina, Formosa, to New Guinea.

ser. *Apiocarpeae* Corner (1960)

West Malaysia.

264. **F. apiocarpa** Miq. (1867)—*Urostigma apiocarpum* Miq. (1860)—*Synoecia apiocarpa* Miq. (1867).—*Ficus tetangis* Miq. (1860).

a. v. **apiocarpa**.

Malaya, Sumatra, Bangka, Lingga, Borneo.

b. v. **villosa** Corner (1960).

Sarawak.

265. **F. peninsula** Elm. (1937).

Philippines, Celebes.

266. **F. warburgii** Elm. (1907).

Luzon, Mindanao.

267. **F. diandra** Corner (1962).

Sarawak (Kuching).

ser. *Punctatae* Corner (1960)

Nicobar Isl., Burma, Indochina, Formosa, to New Guinea.

subser. *Punctatae*

268. **F. dens-echini** Corner (1939).

North Borneo (Kinabalu).

269. **F. grandiflora** Corner (1939).

Borneo (Kinabalu; Brunei; Indonesian Borneo, S. Kenepai).

270. **F. trachycoma** Miq. (1854)—*F. asperrima* Teysm. et Binn. (1855).

Java (Tjibodas, G. Salak).

271. **F. simiae** H. Winkler (1913).

South-east Borneo (Hayup).

272. **F. aurantiacea** Griff. (1854)—*Synoecia sumatrana* Miq. (1859)  
—*F. gibbosa* Bl. v. *pygmaea* Miq. (1860)—*F. callicarpa* Miq.  
(1867)—*F. pomifera* Kurz (1873).

a. v. **aurantiacea**.

Lower Burma, Indochina, Thailand, Malaya, Sumatra, Java, Bali, Borneo, Anamba and Natuna Isl., Sumbawa.

b. v. **angustifolia** Corner (1960)—*F. callicarpa* Miq. v. *angustifolia* Corner (1939)—*F. megacarpa* Merr. v. *angustifolia* Sata (1944).

Malaya, North Borneo, Luzon.

c. v. **parvifolia** Corner (1960)—*F. elliptica* Miq. (1848)—*F. megacarpa* Merr. (1904)—*F. terasoensis* Hayata (1919)—*F. callicarpa* Miq. v. *parvifolia* Corner (1939)—*F. megacarpa* Merr. v. *rotundifolia* Sata, subvar. *rotundi-tenuifolia* Sata, subv. *rotundi-crassiusculifolia* Sata, v. *angustifolia* Sata subvar. *lepto-crassiusculifolia* Sata, subvar. *tenui-longifolia* Sata (1944).

Nicobar Isl., Indochina, Formosa, Philippines, North Borneo, Celebes, Moluccas, Timor, Alor, Bali.

273. **F. punctata** Thunb. (1786)—*F. falcata* Thunb. (1786)—*F. macrocarpa* Bl. (1823)—*Synoecia falcata* (Thunb.) Miq., v. *glabrior* Miq. (1848)—*Synoecia serpens* Miq. (1851).

Lower Thailand, Malaya, Sumatra, Java, Borneo, Celebes (south-east).

274. **F. scratchleyana** King (1887).

a. v. **scratchleyana**.

New Guinea, New Britain.

b. v. **aurantiola** Corner (1960).

New Guinea.

c. v. **rhopalosycia** (Diels) Corner (1960)—*F. rhopalosycia* Diels (1935).

New Guinea (Hellwig Mts.).

subser. *Ruginerviae* Corner (1960)

Malaya to New Guinea.

275. **F. singalana** King (1888)—*F. callicarpa* Miq. v. *multinervia* Corner (1939).

Sumatra (Singalan, Brastagi, Sibolangit).

276. **F. ruginervia** Corner (1960)—*F. callicarpa* Miq. v. *crassinervia* Corner (1939).

Malaya, Sumatra, Sarawak.



285. **F. prostrata** Wall. ex Miq. (1867)—*Covellia prostrata* Wall. ex Miq. (1848).  
Assam, Sikkim, Yunnan, Tonkin.  
ser. *Pungentes* Corner (1960)  
*Bosscheria* Teysm. et Vr. (1861)—*Ficus* sect. *Covellia* (Gasp.) Miq. subsect. *Pandaniflorae* Sata (1944, ut *Pandanusiiflorae*).  
Borneo, Philippines, Eastern Malaysia.
286. **F. pungens** Reinw. ex Bl. (1825)—*F. myriocarpa* Miq. (1867)—*F. ovalifolia* Ridley (1916)—*F. kalingaensis* Merr. (1922).  
Philippines (Luzon, Kalinga), Amboina, Ternate, Morotai, Ceram, Aru Isl., New Guinea, New Britain.
287. **F. minahassae** (Teysm. et Vr.) Miq. (1867)—*F. glomerata* Blanco (1837)—*Bosscheria minahassae* Teysm. et Vr. (1861).  
North Borneo, Philippines (? not Palawan), Celebes, Talaud Isl.
288. **F. petrotica** Diels (1935).  
New Guinea.  
ser. *Phaeopilosae* Corner (1960)  
Borneo, Philippines, Eastern Malaysia.
289. **F. conocephalifolia** Ridley (1917).  
New Guinea.
290. **F. complexa** Corner (1960).  
Terr. New Guinea, Papua.
291. **F. eustephana** Diels (1935).  
Terr. New Guinea.
292. **F. porphyrochaete** Corner (1960).  
Papua, Solomon Islands.
293. **F. gul** Laut. et K. Schum. (1901)—*F. rudis* Miq. (1867, non Pers.)—*F. keyensis* Laut. et K. Schum. (1901)—*F. manilensis* Warb. (1905)—*F. rudis* Miq. v. *arborea* Elm. (1906)—*F. bismarckiana* Diels, *F. subconcolor* Diels (1935)—*F. manilensis* Warb. v. *lata* Sata, v. *obovata* Sata (1944).

## Key to the varieties

1. Fig-body 10–13 mm. wide (? more), villous with white hairs 0.5–1 mm. long. Lateral bracts 4–10 mm. long; apical bracts 2–4 mm. long, projecting ..... v. *eubracteata*.
1. Fig-body and lateral bracts smaller.
  2. Fig-body 9–12 mm. wide, brownish hispidulous with hairs 0.5 mm. long. Lateral bracts 1.5–3 mm. long, conspicuous; apical bracts 1–1.5 mm. long, projecting. Becoming cauliflorous v. *solomonensis*.
  2. Fig-body 6–9 mm. wide. Lateral bracts 1–1.5 mm. long. Not cauliflorous.
    3. Fig densely villous with hairs 1–2 mm. long, concealing the lateral bracts ..... v. *lasiocarpa*.
    3. Fig glabrescent, scabridulous ..... v. *gul*.

a. v. **gul.**

Borneo (north, east), Philippines (? Palawan), Celebes, Moluccas, Tanimbar Isl., Key Isl., Flores, New Guinea, Admiralty Isl., New Britain.

b. v. **eubracteata** Corner (1961).

Terr. New Guinea (Morobe district).

c. v. **lasiocarpa** Corner (1960).

Morotai, Halmahera, West New Guinea.

d. v. **solomonensis** Corner (1960).

Bougainville, San Cristoval.

294. **F. badiopurpurea** Diels (1935).

Terr. New Guinea (Sepik River).

295. **F. phaeosyce** Laut. et K. Schum. (1961).

Terr. New Guinea, Papua.

ser. *Copiosae* Corner (1960)

India to the Solomon Islands.

296. **F. montana** Burm. f. (1768)—*F. humilis* Roxb., *F. quercifolia* Roxb. (1832)—*F. inconstans* Miq. (1848)—*F. sclerocoma* Miq., *F. polycarpa* Roxb. v. *latifolia* Miq. (1851)—*F. quercifolia* Roxb. v. *humilis* (Roxb.) King (1888)—*F. quercifolia* Roxb. v. *inconstans* (Miq.) Ridley (1924)—*F. ampelas* Burm. f. v. *bogoriensis* (Val.) Hochr. f. *microcarpa* Hochr. (1925).a. v. **montana**.

India (?), Lower Burma, Thailand, Malaya (north of Malacca) Sumatra, Java, Borneo.

b. v. **purpurascens** (Bl.) Corner (1960)—*F. purpurascens* Bl. (1825)—*F. purpurascens* Desf. (1829).

Java.

297. **F. madurensis** Miq. (1867)—*F. smaragdina* S. Moore (1925).a. v. **madurensis**.

Tenasserim, Thailand, Malaya (north of Malacca), Sumatra, Java, Madura.

b. v. **angustifolia** Corner (1960).

Sumatra.

298. **F. andamanica** Corner (1960)—*F. macropoda* Kurz (1875, non Miquel).

Andaman, Nicobar Isl.

299. **F. subsidens** Corner (1960).

North Borneo (Kinabalu).

300. **F. heteropoda** Miq. (1867)—*F. decussata* Warb. (1905)—*F. anomala* Merr. (1906).

Philippines generally, Celebes, Sangi and Talaud Isl., Halmahera, Amboina.

301. **F. copiosa** Steud. (1841)—*F. polycarpa* Roxb. (1832, non Jacqu.)—*F. muriculata* Miq. (1854)—*F. brevicuspis* Miq. (1859)—*F. magnifolia* F.v.M. (1863)—*F. copiosa* Steud. v. *muriculata* (Miq.) King (1888)—*F. subinflata* Warb., *F. senftiana* Warb. (1905)—*F. longipedunculata* Rechinger (1912)—*F. duriuscula* King v. *grandifolia* Diels (1935).

a. v. **copiosa**.

Celebes, Moluccas, Tenimber and Aru Isl., New Guinea, Admiralty Isl., New Britain, New Ireland, Solomon Isl., Queensland, Palau Isl., Yap.

- b. v. **pubescens** Corner (1960)—*F. krausseana* Rechinger (1912)—*F. acanthophylla* Summerh. (1929).

Moluccas, New Guinea, New Britain, New Ireland, Solomon Isl., Queensland.

302. **F. wassa** Roxb. (1832)—*F. duriuscula* King (1888)—*F. eulampra* and *F. lamprophylla* Laut. et K. Schum. (1901)—*F. portus-finschii* Warb. (1905)—*F. rhodocarpa* Summerh. (1929)—*F. anggica* Diels (1935).

a. **wassa**.

Moluccas, Alor, Key Isl., Aru Isl., New Guinea, New Britain, Solomon Isl., New Hebrides.

- b. v. **nubigena** (Diels) Corner (1960)—*F. nubigena* Diels, *F. caroli* Diels (1935).

New Guinea.

- c. v. **obversifolia** (Miq.) Corner (1960)—*F. ampelas* Burm. f. v. *obversifolia* Miq. (1867)—*F. reticulatissima* S. Moore (1925).

Flores, Morotai, Halmahera, Timor.

303. **F. hystricarpa** Warb. (1905).

Terr. New Guinea (Morobe district), Papua, (central, east).

304. **F. balica** Miq. (1859)—*F. albinervia* Miq. (1859).

a. v. **balica**.

Java (Besoeki, Kediri), Bali, Flores.

- b. v. **colfsii** Corner (1960).

Lombok, Sumbawa, Flores.

305. **F. griseifolia** Corner (1960).

Papua (north).

306. *F. primaria* Corner (1960).

Terr. New Guinea (Madang, Morobe districts), New Britain (Keravat).

ser. *Scabrae* Miq. (1848)

*Necalistis* Raf. (1838)—*Ficus* subgen. *Palaeomorphe* (King) Sata ser. *Nonminutuliflorae* Sata, subser. *Fulvobrunneifoliae* Sata, subser. *Metallicifoliae* Sata (1944)—*Ficus* subgen. *Eumetamorphe* Sata sect. *Sycidium* Miq. subsect. *Sycidium* ser. *Viridifoliae* Sata, ser. *Lineariangustifoliae* Sata (1944)—subsect. *Pseudosycidium* Sata, and ser. *Scabricordatogibbosiifoliae* Sata, ser. *Lanceifoliae* Sata, ser. *Subscabririgidiiifoliae* Sata (1944).

Madagascar, Ryu Kyu, Formosa, Malaysia (excluding Malaya), Australasia.

307. *F. cumingii* Miq. (1848)—*F. cumingii* v. *auriculifera* Sata (1944).

a. v. **cumingii**.

Philippine Islands.

b. v. **androbrot**a (Summerh.) Corner (1960)—*F. androbrot*a Summerh., *F. dichroa* Summerh. (1929).

New Guinea.

c. v. **angustissima** (Merr.) Corner (1960)—*F. angustissima* Merr. (1905)—? *F. lineari-pseudopalma* Sata (1944).

Luzon, Mindanao.

d. v. **terminalifolia** (Elm.) Sata (1944)—*F. multiramea* Elm., *F. terminalifolia* Elm. (1911)—*F. celtoides* Elm. (1912)—*F. producta* Merr. (1914)—*F. cumingii* v. *linearicaudata* Sata (1944)—? *F. euphlesia* Merr. (1913)—? *F. kusanoi* Hayata (1911)—? *F. somai* Hayata (1919).

Philippines, North Borneo (Tawao), Formosa.

e. v. **worcesteri** (Merr.) Corner (1960)—*F. worcesteri* Merr. (1914).

Philippines (Samar, Panay, Mindanao, Sulu Archipelago).

308. *F. fallax* Miq. (1859).

Celebes.

309. *F. ulmifolia* Lam. (1788)—*F. difformis* Lam. (1788)—*Covellia ulmifolia* (Lam.) Gasp. (1844)—*F. sinuosa* Miq., and v. *integrifolia* Miq. (1848)—*F. blepharostoma* Warb. (1905)—*F. sparsifolia* Merr. (1921)—? *F. velascoi* Merr. ex Sata (1944)—*F. hispida linearis* and *F. hispida hastata* Blanco (1837)—*F. ulmifolia* f. *integra* Sata, f. *sinuosa* (Miq.) Sata (1944).

Philippines (? Palawan and Mindanao).

310. **F. fiskei** Elm. (1906)—*F. hemicardia* Merr. (1914)—*F. hemicardia* v. *curvata* Sata, v. *grandifolia* Sata (1944).  
 a. v. **fiskei**.  
 Philippines (? Palawan).  
 b. v. **cebuensis** Merr.  
 Luzon, Cebu.  
 c. v. **laevifolia** Merr.  
 Siargao, Mindanao.  
 d. v. **multinervia** Corner (1960).  
 Mindanao.
311. **F. riedelii** Miq. (1867).  
 a. v. **riedelii**.  
 Celebes, Amboina, Boeroe.  
 b. v. **minor** Corner (1960).  
 Celebes.
312. **F. ampelas** Burm. f. (1768)—*F. rubricaulis* Dcsne (1834)—*F. javensis* Miq., v. *subcrenata* Miq. (1848)—*F. bandana* Miq. (1859)—*F. ampelas* v. *bandana* Miq., v. *laevior* Miq., v. *oblongifolia* Miq., v. *politoria* Miq. (1867)—*F. ampelas* v. *politoria* (Lam.) O.K. (1891)—*F. kingiana* Hemsley (1897)—*F. ampelas* v. *bogoriensis* K. et Val. (1906), and f. *incrassata* Hochreut. (1925).—? *F. tashiroi* Maxim. (1888).  
 a. v. **ampelas**.  
 Sumatra (west coast and islands), Java, Borneo (?), Bali, Lombok, Flores, Timor, Ryu Kyu, Formosa, Philippines, Celebes, Moluccas, West New Guinea.  
 b. v. **hispidula** Corner (1961).  
 Celebes.  
 c. v. **linearis** Corner (1960).  
 Celebes.  
 d. v. **soronensis** (King) Corner (1960)—*F. exasperata* Roxb. (1832, non Vahl)—*F. biglandulosa* Miq. (1848)—*F. asperior* Miq. (1867)—*F. soronensis* King (1887)—*F. blepharosepala* Warb. (1905).  
 Amboina, Boeroe, Halmahera, Key Isl., Aru Isl., New Guinea, New Britain.
313. **F. guyeri** Elm. (1906)—? v. *minimifolia* Sata (1944).  
 a. v. **guyeri**.  
 Philippines (? Palawan).  
 b. v. **sibuyanensis** (Elm.) Corner (1960)—*F. sibuyanensis* Elm. (1911).  
 Luzon, Sibuyan, Panay, Samar.

314. **F. cauta** Corner (1960).  
Celebes.
315. **F. goniophylla** Corner (1960).  
Celebes.
316. **F. melinocarpa** Bl. (1825)—f. *glabrior* Miq. (1860)—*Pogonotrophe alnifolia* Miq. (1851)—*F. daemonum* Zoll. et Mor. (1854)—*F. obliqua* Miq. (1854)—*F. alnifolia* Miq. (1867)—*F. haggeri* Merr. (1921)—*F. irosinensis* Elm. (1937).  
a. v. **melinocarpa**.  
Sumatra (south), Java, Borneo (north, east), Celebes, Philippines, Moluccas, Aru Isl., New Guinea, New Britain, Solomon Isl.  
b. v. **hololampra** (Diels) Corner (1960)—*F. hololampra* Diels (1935)—*F. collinsii* Elm. (1937).  
Distribution as v. *melinocarpa* (perhaps only the glabrous upper leaves).
317. **F. trachypison** K. Schum. (1901)—*F. lima* K. Schum (1901) *F. pteleaephylla* S. Moore (1923)—*F. xanthosyce* Summerh. (1929).  
a. v. **trachypison**.  
Amboina, Aru Isl., Key Isl., New Guinea, New Britain, Solomon Isl.  
b. v. **pallida** Corner (1960).  
Terr. New Guinea, Papua, Bougainville Isl.
318. **F. quercetorum** Corner (1961)—*F. tonsa* Miq. v. *aspera* Corner (1960).  
Terr. New Guinea, Papua.
319. **F. macrorrhyncha** Laut. ex K. Schum. (1901)—*F. stenorrhyncha* Warb. (1905).
320. **F. tonsa** Miq. (1867).  
a. v. **tonsa**.  
Celebes, Talaud Isl.  
b. v. **leptodictya** (Diels) Corner (1960)—*F. leptodictya* Diels (1935).  
New Guinea.
321. **F. leptoclada** Benth. (1873).  
North Queensland.
322. **F. todayensis** Elm. (1911).  
Mindanao, Celebes.

323. **F. irisana** Elm. (1906)—*F. ampelas* Burm. f. v. *rugosa* Miq., v. *sublanceolata* Miq. (1867)—*F. fachikoogi* Koidz. (1913).  
a. v. **irisana**.

Ryu Kyu, Formosa, Philippines (? Palawan), Celebes.

- b. v. **validicaudata** (Merr.) Corner (1960)—*F. fastigiata* Elm. (1906)—*F. validicaudata* Merr. (1906)—*F. guyeri* Elm. v. *validicaudata* (Merr.) Sata (1944), ? v. *minimaefolia* Sata (1944).

Okinawa, Luzon, Leyte.

324. **F. tenuicuspida** Corner (1960).

- a. v. **tenuicuspida**.

Celebes.

- b. v. **major** Corner (1960).

Mindanao.

325. **F. elmeri** Merr. (1905)—*F. semicordata* Miq. (1867, non J. E. Sm.).

- a. v. **elmeri**.

Celebes, Philippines (Luzon, Polillo, Bohol).

- b. v. **subintegra** Merr. (1905)—*F. subintegra* (Merr.) Elm. (1906)—*F. kamelii* Merr. ex Sata (1944).

Philippines (Luzon, Samar).

326. **F. odorata** (Blanco) Merr. (1904)—*F. hispida* Linn. f. v. *odorata* Blanco (1837)—*F. arenata* Elm. (1911).

Philippines (Batan, Luzon, Negros, Bohol, Leyte, Samar, Panay, Mindanao).

327. **F. oleracea** Corner (1960).

Key to the varieties

1. Glabrous or thinly pubescent with soft hairs 2-3 mm. long. Lamina smooth or subscabrid below ..... v. *oleracea*.  
1. Villosulous with minute hairs -0.5 mm. long. Lamina very harshly scabrid above ..... v. *pugnans*.

- a. v. **oleracea**.

Solomon Islands (Bougainville, New Georgia, ? San Cristoval).

- b. v. **pugnans** Corner (1960).

Bougainville Isl.

328. **F. imbricata** Corner (1960).

Key to the varieties

1. Scabrid, hairy. Lateral nerves 4-7 (-9) pairs, oblique; intercostals 5-10; basal nerves  $\frac{1}{4}$ - $\frac{1}{3}$  lamina. Basal bracts 1-2 mm. long, acute. Internal bristles few. Lamina with an auricle on the acroscopic side of the base ..... v. *imbricata*.  
1. Glabrous, smooth. Lateral nerves 7-11 pairs, inarching; intercostals 2-5; basal nerves short. Basal bracts 1 mm. long, obtuse. Internal bristles copious. Leaf-base more or less symmetric, rounded to subcordate ..... v. *subcordata*.

a. v. **imbricata**.

Bougainville Isl.

b. v. **subcordata** Corner (1961)—*F. tonsa* Miq. v. *subcordata* Corner (1960).

Bougainville Isl.

329. **F. chrysochaete** Corner (1960).

Solomon Isl. (Bougainville, Malaita, New Georgia, Ulawa, Ysabel).

330. **F. arawaensis** Corner (1961).

Bougainville Isl.

331. **F. gryllus** Corner (1960).

Solomon Isl. (Ysabel, Tiratona).

332. **F. erinobotrya** Corner (1960).

## Key to the varieties

1. Hairs 1–2 mm. long on twigs and petioles; leaf-base with the broad side overlapping the petiole; lateral nerves 7–11 pairs. Figs without a collar of basal bracts; tepals 5–7; flower-pedicels hairy  
v. *erinobotrya*.
1. Hairs –1 mm. long, or glabrescent; leaf-base not obscuring the petiole; lateral nerves 5–8 pairs. Figs pedunculate with a collar of basal bracts; tepals 4–5; flower-pedicels glabrous.
2. Hairs –1 mm. long . . . . . v. *solomonensis*.
2. Hispidulous to nearly glabrous . . . . . f. *glabrior*.

a. v. **erinobotrya**.

New Britain.

b. v. **solomonensis** Corner (1960).

Solomon Isl. (Bougainville, Florida, Ysabel, Malaita, South Georgia).

f. **glabrior** Corner (1960).

Bougainville, Guadalcanal, San Cristoval, Nggela.

333. **F. schumanniana** Warb. (1905).

Terr. New Guinea, New Britain.

334. **F. opposita** Miq. (1848)—*F. fitzalani* Miq. (1861)—*F. conjugata* Miq. (1867)—*F. radula* Banks ex Hiern (1901)—*F. xerophila* Domin, *F. yarrabensis* Domin (1921)—*F. apolepomena* Summerh. (1929)—*F. branderhorstii* Diels (1935).

## Key to the varieties

1. Petioles 10–30 mm. long; lamina 6–16 × 3–7.5 cm., the areolae usually villous beneath. Fig 10–12 mm. wide . . . . . v. *opposita*.
1. Petioles 2–12 mm. long; lamina 9 × 4 cm., small. Fig 8–10 mm. wide, the lateral bracts on the stalk often scattered.
2. Lamina aculeate on the upperside and edges with short stiff hairs, villous beneath then glabrescent, not foveolate or merely from the bulging reticulations . . . . . v. *micracantha*.
2. Lamina scabrid, minutely foveolate beneath with puberulous stomatal pits; not villous . . . . . v. *indecora*.

a. v. **opposita**.

Java (Pulau Sangrang), New Guinea (south coast and Eastern Highlands), Australia (Queensland, Northern Territory, New South Wales).

b. v. **indecora** (A. Cunn. ex Miq.) Corner (1960)—*F. indecora* A. Cunn. ex Miq. (1948).

Australia (north-west, Dampier Archipelago to Arnhem Land).

c. v. **micracantha** (Miq.) Corner (1960)—*F. aculeata* A. Cunn. ex Miq., *F. orbicularis* A. Cunn. ex Miq. (1848)—*F. micracantha* Miq. (1867)—*F. aculeata* A. Cunn. ex Miq. v. *micracantha* (Miq.) Benth. (1873)—? *F. beckleri* Miq. (1861).

Australia (north coast), New Guinea (Merauki district, Papua west division).

335. **F. scobina** Benth. (1873).

Australia (Northern Territory, Darwin).

336. **F. fraseri** Miq. (1848)—*F. proteus* Bur., v. *dentata* Bur., v. *lobata* Bur. (1872)—*F. stenocarpa* F.v.M. ex Benth. (1873)—*F. aspera* Forst. f. v. *subglabra* Benth. (1873)—*F. subglabra* F.v.M. (1875).

Australia (Queensland, north New South Wales), New Caledonia, New Hebrides.

337. **F. coronulata** Miq. (1861)—*F. salicina* F. v. M. (1863).

Australia (Arnhem Land; West Australia, Carson River).

338. **F. coronata** Spin. (1818)—*F. muntia* Link (1822)—*F. stephanocarpa* Warb. (1905).

Australia (Northern Territory, Queensland, New South Wales, Victoria).

339. **F. aspera** Forst. f. (1786)—*Necalistis aspera* Raf. (1838)—*F. parcelli* Veitch ex Cogn. et March. (1874)—*Artocarpus canoni* Bull. ex v. Houtte (1875)—*F. canoni* (Bull.) N. E. Brown (1888)—*F. exasperata* Hort., *F. exsculpta* Hort., *Artocarpus exsculpta* Hort., *Artocarpus laciniatus* Hort. v. *metallicus* Hort.

New Hebrides.

340. **F. uniauriculata** Warb. (1898).

Samoa.

341. **F. scabra** Forst. f. (1786)—*F. turbinata* Willd. (1806)—*F. ciliata* Warb., *F. reineckii* Warb. (1898)—*F. storckii* Seem. v. *pubescens* Bur. (1872)—*F. mareensis* Warb. in Saras. et Roux (1921).

New Caledonia, Loyalty Isl., New Hebrides, Fiji, Samoa, Tonga.

342. **F. storckii** Seem. (1868).—*F. cavei* Horne ex Baker (1883).

Key to the varieties

- 1. Lamina 6–18 × 4–13 cm.; lateral nerves 5–8 pairs; petiole 7–40 mm. long. Fig 7–10 mm. wide ..... v. *storckii*.
- 1. Smaller in all parts; lateral nerves 3–5 pairs ..... v. *kajewskii*.

a. v. **storckii**.

Fiji.

b. v. **kajewskii** (Summerh.) Corner (1960)—*F. kajewskii* Summerh. (1932).

New Hebrides, Fiji.

343. **F. masoni** Horne ex Baker (1883)—*F. begoniifolia* Summerh. (1936).

Fiji.

344. **F. greenwoodii** Summerh. (1936).

Fiji.

345. **F. fulvopilosa** Summerh. (1936).

Fiji.

346. **F. barclayana** Miq. (1867)—*Covellia barclayana* Miq. (1848)—*F. barclayi* Seem. (1868).—*F. barclayana* (Miq.) Summerh. (1932).

Fiji.

347. **F. bambusaefolia** Seem. (1868).

Fiji.

348. **F. longecuspidata** Warb. (1898).

Samoa, Niue Isl.

349. **F. godeffroyi** Warb. (1898)—*F. upoluensis* Rechinger (1910).

Key to the varieties

- 1. Lamina elliptic or oblong-elliptic, bluntly subacuminate .. v. *godeffroyi*.
- 1. Lamina ovate-elliptic to lanceolate-elliptic, narrowly and acutely acuminate ..... v. *hygrophila*.

a. v. **godeffroyi**.

Samoa, Niue.

b. v. **hygrophila** (Rechinger) Summerh. (1939)—*F. hygrophila* Rechinger (1910).

Samoa.

350. **F. samoensis** Summerh. (1939).

Samoa.

subsect. *Varinga* (Miq.) Corner (1960)

*Ficus* sect. *Carica* Miq. subsect. *Varinga* Miq. (1844).

Africa, Ceylon, Asiatic mainland, Sumatra, Java, Borneo.

ser. *Heterophyllae* Corner (1960)

Africa, Asia (not east of Borneo).

351. **F. heterophylla** Linn. f. (1781)—*F. cannabina* Lour., ? *F. politoria* Lour. (1790)—*F. denticulata* Vahl, *F. truncata* Vahl (1790)—*F. rufescens* Vahl (1806)—*F. aquatica* Koen. ex Willd. (1806)—*F. biglandula* Bl. (1825, etiam *biglandulosa*)—*F. scabrella* Roxb. (1832)—*F. acutiloba* Miq., *F. elongata* Miq., *F. subpanduraeformis* Miq. (1848)—*F. heterophylla* v. *elongata* Miq. (1867)—*F. heterophylla* v. *scabrella* (Roxb.) King (1888)—*F. grossularioides* Burm. f. f. *assamica* O. K., var. *subpanduriformis* (Miq.) O.K. (1891).

## Key to the varieties

1. Lamina ovate-cordate, varying palmately 3–5-lobed; petiole –80 mm. long. Fig-peduncle –25 mm. long, pedicel –15 mm. . . v. *assamica*.  
 1. Lamina more or less elliptic or lanceolate; petiole –50 mm. Peduncle –12 mm., pedicel 0–10 mm. . . . . v. *heterophylla*.

a. v. **heterophylla**.

Ceylon, India, Burma, China (Kwangtung, Hainan), Indochina, Thailand, Malaya (north of Negri Sembilan), Java, Borneo (south, east, north).

b. v. **assamica** (Miq.) Corner comb. nov.—*F. repens* Roxb. ex Willd. (1806)—*F. morifolia* Vahl (1806)—*F. assamica* Miq. (1848)—*F. rubifolia* Griff. (1854)—*F. repens* Roxb. v. *assamica* Miq. (1867)—*F. heterophylla* v. *repens* (Roxb.) King (1888).

East Bengal, Tonkin, Cambodia, Thailand.

ser. *Cyrtophylleae* Corner (1960)

Africa, Asia (not east of Borneo).

352. **F. asperiuscula** Kunth et Bouch. (1846)—*F. coronata* Reinw. ex Bl. (1825)—*F. grewiaefolia* Kunth et Bouch. (1846)—*Covellia zollingeriana* Miq. (1848)—*F. leptorhyncha* K. et Val. (1906)—*F. inaequilatera* Ridley (1923).

Sumatra, Java.

353. **F. cyrtophylla** Wall. ex Miq. (1867)—*Covellia cyrtophylla* Wall. ex Miq. (1848)—*F. asymmetrica* Lévl. et Vant. (1907).

India (Himalayas from Sikkim eastwards, Khasia Hills), Upper Burma, south China (Yunnan, Szechuan, Kweichou), Tonkin, Thailand (Chieng-mai).

354. **F. leptogramma** Corner (1960).

North Borneo (Kinabalu), Sarawak.

355. **F. praetermissa** Corner (1960).

Indochina, Thailand.

ser. *Exasperatae* Corner (1960).

Africa to India, Ceylon.

356. **F. exasperata** Vahl (1806)—*F. serrata* Forsk. (1775)—*F. teregam* Pennant (1800)—*F. scabra* Willd. (1806)—*F. politoria* Moon (1824)—*F. asperrima* Roxb. (1832)—*F. hispidissima* Wight ex Miq. (1848).

East Africa, Arabia, central and south India, Ceylon.

subsect. *Palaeomorpha* (King) Corner (1960)

*Ficus* sect. *Palaeomorpha* King (1887)—subgen. *Palaeomorpha* (King) Sata (1934)—*Ficus* sect. *Grossularia* O.K. (1904). Asia, Australasia.

ser. *Pallidae* Miq. (1848)

ser. *Euglabrifoliae* Sata, *Glabrifoliae* Sata (1944).

Asia, Australasia.

357. **F. tinctoria** Forst. f. (1786)—*F. laeta* Dcne (1834)—*F. altimeeralou* Roxb. ex Miq., *F. reticulosa* Miq. (1848)—*F. excelsa* Miq. (1859)—*F. altimeeralou* v. *laeta* (Dcne) Miq. (1867)—*F. validinervis* F.v.M. ex Benth. (1873)—*F. chlorosykon* Rechinger (1910)—*F. neoebudarum* Summerh. (1932)—*F. tinctoria* v. *neoebudarum* (Summerh.) Fosberg (1955).

Key to the subspecies and varieties of *F. tinctoria*

1. Lamina obtuse to acute or subacuminate, oblong, elliptic, or ovate-elliptic, not angled or toothed: base subcordate, rounded or widely cuneate on the broader side. Figs pedicellate. Stomata sunken.
  2. Lamina 4–13 cm. wide, smooth or subscabrid, usually drying brown-areolate beneath; tree or banyan ..... ssp. *tinctoria*.
  2. Lamina small, harshly scabrid, stiffly coriaceous, not brown areolate beneath: creeping shrub on rocks ..... ssp. *swinhoei*.
1. Lamina acute to strongly acuminate, narrowly elliptic to lanceolate, often obovate, varying subrhombic, sometimes angled or angular-dentate: base cuneate.
  3. Lamina coriaceous, drying brown-areolate beneath: large banyans ssp. *gibbosa*.
  4. Fig pedicellate. Lamina pliant, stomata sunken .... var. *gibbosa*.
  4. Fig more or less sessile with 3–6 basal bracts 1–2 mm. long. Lamina very stiff, rigid; stomata superficial ..... var. *rigida*.
  3. Lamina subcoriaceous, rather thin, not brown-areolate beneath; stomata superficial ..... ssp. *parasitica*.
  5. Large banyan. Fig 7–11 mm. wide ..... var. *parasitica*.
  5. Creeping shrub: leaves small, dentate. Fig 5–6 mm. wide var. *anastomosans*.

a. ssp. **tinctoria**.

Hainan, Formosa, Philippines generally, Celebes, Sumbawa, Moluccas, Alor, New Guinea, north Australia, Micronesia, Polynesia (to Tahiti and Austral Isl.).

b. ssp. **gibbosa** (Bl.) Corner (1960)—*F. reticulata* Thunb. (1786)—*F. gibbosa* Bl., *F. cuneata* Bl., *F. paradoxa* (1825)—*F. irregularis* Steud. (1840)—*F. angulata* Miq. (1848)—*F. gibbosa* v. *cuneata* (Bl.) Miq. (1859)—*F. gibbosa* v. *unigibba* Miq. (1860), v. *dodonaefolia* Miq., v. *latifolia* Miq. (1867)—*F. subobliqua* Miq., v. *latiuscula* Miq. (1867)—*F. michelii* Lévl. (1910)—*F. antoniana* Elm. (1912).

South Andaman Isl., south China, Hainan, Indochina, Thailand, Malaya, Sumatra, Java to Sumbawa, Celebes, Halmahera, Banda, Palawan, Borneo; (absent from Johore, Singapore, Riouw Archipelago).

i. v. **rigida** (Miq.) Corner (1960)—*F. rigida* Bl. (1825)—*F. pereng* Steud. (1840)—*F. gibbosa* Bl. v. *rigida* Miq. (1867)—v. *rigida* (Bl.) Val. (1906).

Sumatra, Java, Sumbawa, Alor, south Borneo.

c. ssp. **parasitica** (Willd.) Corner (1960)—*F. parasitica* Willd. (1798)—*F. excelsa* Vahl, *F. rhomboidalis* Vahl (1806)—*F. scabriuscula* B. Ham. ex J. E. Sm. (1810)—*F. ampelas* Koen. ex Roxb., *F. sclerophylla* Roxb., *F. tuberculata* Roxb. (1832)—*F. angustata* Miq., *F. cuspidifera* Miq., *F. pervia* Miq. (1848)—*Urostigma volubile* Dalz. (1861)—*F. gibbosa* Bl. v. *cuspidifera* (Miq.) King, v. *parasitica* (Willd.) King, v. *tuberculata* (Roxb.) King (1887)—*F. volubilis* (Dalz.) King (1888)—*F. pseudobotryoides* Lévl. et Vant., *F. rhomboidalis* Lévl. et Vant. (1907)—*F. clarkei* King (1888, pro p. foliorum; alt. p. fructuum, *F. racemosa* L.)—*Urostigma excelsum* Miq. (1859).

Ceylon, India, Burma, south China, Indochina, Andaman and Nicobar Isl.

i. v. **anastomosans** (Wall.) Corner (1960)—*F. anastomosans* Wall. ex Kurz (1873).

Burma (Moulmein), Thailand (west, south).

d. ssp. **swinhoei** (King) Corner (1960)—*F. swinhoei* King (1888)—*F. fenicis* Merr. (1921).

Formosa, Mindanao (Bukidnon).

358. **F. virgata** Reinw. ex Bl. (1825)—*Urostigma virgatum* (Reinw.) Miq., *F. decaisneana* Miq. (1859)—*F. firmula* Miq., *F. trymatocarpa* Miq. (1867, *trematocarpa*)—*F. pinkiana* F.v.M. (1882)—*F. decaisneana* Miq. v. *firmula* (Miq.) King, v. *trymatocarpa* (Miq.) King (1888, *trematocarpa*)—*F. esmeralda* Bailey (1897) *F. inaequifolia* Elm. (1907)—*F. caudato-longifolia* Sata (1934)—*F. subulata* Bl. f. *inaequifolia* (Elm.) Sata (1944)—*F. ellipsoidea* Miq. (1867, pr. p. Amboina; alt. p. Celebes, *F. subulata* Bl.)—*F. cuspidatolongifolia* Kanehira (1936).

a. v. **virgata**.

Ryu Kyu, Formosa, Philippines (excluding Palawan), Celebes, Moluccas, Flores, Alor, Wetar, Timor, Key and Aru Isl., New Guinea, New Britain, Solomon Isl., New Hebrides, New Caledonia, Queensland, Caroline Isl. (Ponape).

b. v. **philippinensis** (Miq.) Corner (1960)—*F. philippinensis* Miq., *F. insularis* Miq. (1848)—*F. magnifica* Elm. (1906)—*F. setibracteata* Elm. (1914)—*F. philippinensis* f. *magnifica* (Elm.) Sata, f. *ovata* Sata, f. *setibracteata* (Elm.) Sata (1944).

Ryu Kyu, Formosa, Luzon, Mindanao.

c. v. *sessilis* (Bur.) Corner (1960)—*F. philippinensis* v. *sessilis* Bur. (1872).

Luzon, Soela Isl., New Guinea, New Britain, Solomon Isl., New Caledonia, Loyalty Isl., New Hebrides.

359. **F. celebensis** Corner (1960)—*F. irregularis* Miq. (1867).

Celebes (Minahassa).

ser. *Subulatae* Corner (1960)

India to Solomon Isl.

360. **F. subulata** Bl. (1825)—*F. saxatilis* Bl. (1825)—*F. acuminata* Roxb. (1832)—*F. salicifolia* Miq. (1848)—*F. ancolana* Miq. (1851)—*F. ellipsoidea* Miq. v. *ancolana* Miq., v. *borneensis* Miq., v. *boiei* Miq., *F. iteoides* Miq., *F. sikkimensis* Miq. (1867) *F. klinkii* Laut. et K. Schum. (1901)—*F. erythropareia* K. Schum. ex Warb. (1905)—*F. confusa* Elm. (1906)—*F. driveri* Elm. (1914)—*F. sanhday* Gagnep. (1927)—*F. subulata* f. *ovoidea* Sata, f. *minima* Sata, f. *sessilis* Sata, f. *driveri* Sata (1944)—? *F. dicarpa* Blanco (1837).

a. v. **subulata**.

Sikkim and south China throughout Malaysia to New Britain and the Solomon Isl.; (absent from Johore, Singapore, Riouw Archipelago, Banka, Flores, Timor).

b. v. **gracillima** (Diels) Corner (1960)—*F. gracillima* Diels, *F. otariophylla* Diels (1935).

New Guinea.

361. **F. armiti** King (1887)—*F. fuscipes* Warb. (1905).

New Guinea (central, eastern).

ser. *Cuspidatae* Miq. (1848)

ser. *Glabriusculifoliae* Sata (1944).

India to western Malaysia.

362. **F. sinuata** Thunb. (1786)—*F. rostrata* Lamk. (1788)—*F. quercifolia* Bl. (1825)—*F. raridens* Miq. (1848)—*F. obtusidens* Miq. (1851)—*F. angulidens* Miq. (1859)—*F. radicans* Roxb. v. *angulosa* Miq. (1859).

a. ssp. **sinuata**.

Assam, lower Thailand, Malaya, Sumatra, Riouw, Java, Borneo, (Moluccas ?).

i. v. **oblonga** Corner (1960)—*F. cuspidata* Reinw. v. *sinuata* King (1888).

Malaya (Perak, Johore, ? Pahang), Sumatra (Lake Toba), Java.

b. ssp. **cuspidata** (Reinw.) Corner (1960)—*F. cuspidata* Reinw. ex Bl. (1825)—*F. cuspidata* Desf. (1829)—*F. tenuiramis* Kunth et Bouch. (1846)—*F. cuspidata* Reinw. f. *angustifolia* Miq. (1859).

Malaya, Sumatra, Java.

363. **F. heteropleura** Bl. (1825)—*F. radicans* Roxb. (1832)—*F. acuminata* Wall. ex Kunth et Bouch., *F. euryaefolia* Kunth et Bouch. (1846)—*F. urophylla* Wall. ex Miq. (1848)—*F. intermedia* Griff. (1854)—*F. radicans* Roxb. f. *brevifolia* Miq. (1859)—*F. caudatifolia* Warb. (1905)—*F. eucaudata* Elm. (1906)—*F. rostrata* Lamk. v. *urophylla* (Wall.) K. et Val. (1906)—*F. caudatifolia* Warb. v. *eucaudata* Sata, v. *ovata* Sata (1944).

a. v. **heteropleura**.

Assam, Bengal, Bhutan, Burma, Indochina, Hainan, Thailand, Malaya, Sumatra, Riouw, Java, Borneo, Celebes, Philippines, Batjan, Amboina.

b. v. **hirta** Corner (1960).

Sarawak, Brunei.

c. v. **mindanaensis** (Warb.) Corner (1960)—*F. mindanaensis* Warb. (1905).

Luzon, Leyte, Samar, Biliran, Mindoro, Mindanao.

364. **F. parietalis** Bl. (1825)—v. *ovalis* Bl. (1825)—*F. cerasiformis* Desf. (1829)—*F. grandifolia* Wall. ex Miq. (1848)—*F. jung-huhniana* Miq. (1851)—*F. phlebophylla* Miq., *F. rufipila* Miq., *F. tabing* Miq. (1860)—*F. concentrica* Hassk. ex Miq. (1864)—*F. parietalis* v. *angustifolia* Miq., v. *rufipila* Miq., v. *tabing* Miq. (1867).

South Annam, Thailand, Malaya, Sumatra, Java, Borneo, Philippines (Palawan, Balabac); (? not in Singapore or Riouw).

365. **F. lasiocarpa** Miq. (1860)—*F. lasiophlebia* Miq. (1860)—*F. parietalis* Bl. v. *hirsutissima* Merr. (1934).

Sumatra.

ser. *Minutuliflorae* Sata (1944)

Subsect. *Scabrifolieae* Sata.

Sumatra, Borneo, Philippines to New Guinea.

366. **F. aurita** Bl. (1825)—*F. hispidulosa* Elm. (1914).

a. v. **aurita**.

Borneo (Koetai, Sarawak), Philippines (Samar, Mindanao), Celebes, Amboina, Morotai, Noesa Laut, Aru Isl., New Guinea (western half).

b. v. **auriculifera** (Merr.) Corner (1960)—*F. auriculifera* Merr. (1929).

Borneo (Sarawak, North Borneo, west Koetai), Celebes, Philippines (Bohol), Amboina.

c. v. **celebica** (Reinw.) Corner (1960)—*F. celebica* Reinw. ex Bl. (1825).

Celebes.

367. **F. stipata** King (1888).

Sumatra (Padang).

368. **F. microsphaera** Warb. (1905).

Philippines (Panay, Mindoro, Mindanao, Bohol).

ser. *Fibrosifoliae* Corner (1960)

Burma, Thailand, western Malaysia to the Philippines and Moluccas.

369. **F. obscura** Bl. (1825)—*Covellia dasycaula* Miq. (1848)—*F. pisifera* Wall. v. *scaberrima* (Bl.) Val. f. *obscura* (Bl.) Val. (1906)—*F. dasycaula* (Miq.) Val. (1906)—? *F. obscura* Bl. v. *serrata* Miq. (1859).

a. v. **obscura**.

Java, Sumatra, Borneo, Celebes, Philippines (Luzon, Bohol), Talaud; (? Penang).

b. v. **angustata** (Miq.) Corner (1960)—*F. grewiaefolia* Bl. (1825)—*F. lobbii* Miq. (1848)—*F. hypsophila* Miq., v. *angustata* Miq., *F. brevipes* Miq., *F. remblas* Miq., *F. tadjam* Miq. (1851)—*F. saxatilis* Miq. (1854)—*F. grewiaefolia* Bl. v. *angustata* Miq., v. *anonaefolia* Miq., v. *brevipes* Miq., v. *hypsophila* Miq., v. *remblas* Miq. (1867)—*F. microtus* Miq. v. *tondana* Miq. (1867, pro p. Forsten, Celebes; alt. p., v. *borneensis*)—*F. subulata* Bl. v. *tadjam* Miq. (1867)—? *F. angustifolia* Bl. (1825).

Java, Sumatra, Lingga, Borneo, Celebes, Soela.

c. v. **borneensis** (Miq.) Corner (1960)—*F. pisifera* Wall. ex Miq. (1848)—*F. tondana* Miq. (1859)—*F. microtus* Miq. (1860)—*F. microtus* Miq. v. *borneensis* Miq., v. *lanceolata* Miq., v. *parvifolia* Miq. (1867)—*F. microtus* Miq. v. *tondana* Miq. (1867, pro p. Reinwardt; alt. p., v. *angustata*)—? *F. obscura* Bl. v. *glabrior* Miq. (1867)—*F. pisifera* Wall. v. *microtus* (Miq.) O.K. (1891, err. *pisiformis* Wall.)—*F. scaberrima* Bl. v. *pisifera* (Wall.) Hochr. (1925)—*F. microsyrce* Ridley (1926).

Lower Thailand, Malaya, Riouw, Sumatra, Java, Borneo, Celebes, Philippines (Negros, Samar, Mindoro, Sulu).

d. v. **kunstleri** (King) Corner (1960)—*F. acuminatissima* Miq., *F. lancifolia* Miq. (1848)—*F. lancea* Miq. (1867)—*F. celebica* Bl. v. *kunstleri* King (1887)—*F. celebica* Bl. v. *lanceolata* Sata (1944).

Malaya (Perak), Sumatra (Fort de Kock), Banka, Sarawak, North Borneo, Celebes, Philippines.

e. v. **scaberrima** (Bl.) Miq. (1867)—*F. scaberrima* Bl. (1825)—*F. leucoxyton* Miq. (1851)—*F. scaberrima* Bl. v. *angustata* Miq. (1859)—*F. obscura* Bl. v. *leucoxyton* Miq. (1867)—*F. pisifera* Wall. v. *scaberrima* (Bl.) Val. (1906)—*F. flavocortica* Elm. (1911)—*F. viridifolia* Merr. (1913)—*F. celebica* Bl. v. *ovata* Sata (1944)—? *Covellia subdenticulata* Miq. (1859)—? *F. subdenticulata* Miq. (1867).

Sumatra, Java, Borneo, Philippines, Celebes.

370. **F. jaheriana** Corner (1961).

West Borneo (S. Tjehen, Kalimintang).

371. **F. midotis** Corner (1960).

Borneo.

372. **F. leptocalama** Corner (1960).

North Borneo (Kinabalu).

373. **F. hemsleyana** King (1888).

Borneo.

374. **F. uniglandulosa** Wall. ex Miq. (1848)—*F. subsubulata* Miq. (1867, pro p. Korthals Sumatra; alt. p., v. *parvifolia*).

a. v. **uniglandulosa**.

Burma (Salween district), lower Thailand, Malaya, Sumatra, Borneo, Celebes.

b. v. **parvifolia** Miq. (1867)—*F. subsubulata* Miq. (1867, pro p. Korthals, Borneo)—*F. uniglandulosa* v. *latior* Miq., v. *minor* Miq. (1867)—*F. copelandii* C. B. Robinson (1908).

Borneo, Philippines (Palawan, Sulu, Mindanao); (? Celebes).

375. **F. rubrocaudata** Corner (1960).

Borneo.

376. **F. rubromidotis** Corner (1960).

Sarawak, Brunei.

sect. *Adenosperma* Corner (1958)

Celebes, Moluccas, New Guinea, New Britain, New Ireland, Solomon Isl., New Hebrides, Queensland.

ser. *Amphigenae* Corner (1958)

377. **F. saccata** Corner (1960).

Terr. New Guinea, Papua.

378. **F. megalophylla** Diels (1935).

Terr. New Guinea.

379. *F. ochrochlora* Ridley (1916).  
New Guinea.
380. *F. endochaete* Summerh. (1941).  
Terr. New Guinea.
381. *F. umbonata* Reinw. ex Bl. (1825)—*Covellia umbonata* (Reinw.) Miq. (1859)—*F. bembicarpa* Warb. ex Diels (1935).  
Moluccas (Obi, Nuffa Laut), West New Guinea (Sorong).
382. *F. mollior* Benth. (1873)—*F. gazellae* Engl. (1886)—*F. chrysolaeana* Laut. et K. Schum. (1901)—*F. dielsii* Warb. (1905)—*F. stelechosycia* Diels (1935).  
a. v. **mollior**.  
Amboina, New Guinea, New Britain, New Ireland, Bougainville Isl., Queensland.  
b. v. **pseudocovellia** Corner (1960).  
West New Guinea (Mamberamo).  
c. v. **sessilis** Corner (1960).  
Papua, d'Entrecasteaux and Louisiade Isl.  
i. f. **riparia** Corner (1960).  
West New Guinea (Sorong).
383. *F. comitis* King (1888)—*F. nuruensis* Warb. (1905).  
New Guinea, (? Papua).
384. *F. arbuscula* Laut. et K. Schum. (1901)—*F. charadrophila* Summerh. (1929).  
Morotai, Halmahera, New Guinea.
385. *F. verticillaris* Corner (1960).

## Key to the varieties

1. Twigs 3-4 mm. thick. lamina 12 x 4.5 cm. Fig 12-15 mm. wide. Stomata deeply sunken ..... v. *robusta*.  
1. Slender with smaller parts. Stomata not or slightly sunken ..... v. *verticillaris*.

a. v. **verticillaris**.

Solomon Isl. generally.

b. v. **robusta** Corner (1960).

San Cristoval, Guadalcanal.

386. **F. adenosperma** Miq. (1867)—*F. pauper* King (1888)—*F. trichoneura* Summerh. (1932).

a. v. **adenosperma**.

Celebes, Moluccas, Tenimber Isl., Aru Isl., New Guinea, Admiralty Isl., New Hebrides.

i. f. **angustifolia** Corner (1960).

Celebes, Soeloe Isl.

b. v. **chaetophora** (Warb.) Corner (1960)—*F. novae-hannoverae* Engl. (1886)—*F. chaetophora* Warb., *F. thelostoma* Warb. (1905).  
New Guinea, New Britain.

c. v. **glabra** Corner (1960)—*F. depressa* Benth. (1873)—*F. frutescens* F. M. Bailey (1914)—*F. turbinata* Ridley (1916).

Key Isl., New Guinea, New Britain, Solomon Isl., Queensland.

d. v. **microlepis** Corner (1960).

New Guinea.

ser. *Hypogena* Corner (1958)

387. **F. austrina** Corner (1960).

Key Isl., (? Amboina), New Guinea (Ransiki), Solomon Isl. (San Cristoval, New Georgia), New Hebrides (Banks Group, Vanua Levu Isl.).

388. **F. casearioides** King (1887)—*F. kingii* F. v. M. (1890)—*F. hylobia* Diels (1935).

a. v. **casearioides**.

Morotai, New Guinea.

b. v. **gamosepala** Corner (1960).

Ternate, New Guinea.

389. **F. subcuneata** Miq. (1867)—*F. stoechotricha* Diels, *F. trichoneura* Diels (? v. *latifolia* Diels), (1935)—*F. formosa* Summerh. (1941).

Celebes, Ceram, Halmahera, Morotai, New Guinea, New Britain.

390. **F. pleioclada** Diels (1935).

Terr. New Guinea (Sepik district).

391. **F. tenella** Corner (1960).

Papua (south-east).

392. **F. funiculosa** Corner (1960)—*F. trichoneura* Diels v. *lachnocarpa* Diels (1935).

New Guinea, New Britain.

393. **F. trichocerasa** Diels (1935)—*F. incompta* Diels (1935).  
 a. v. **trichocerasa**.  
 New Guinea.  
 b. v. **glabristipula** Corner (1960).  
 Papua (south-east).
394. **F. erythrosperma** Miq. (1867)—*F. pycnoneura* Laut. et K. Schum. (1901)—*F. lachnocarpa* Warb. (1905)—*F. xanthoxyla* Summerh. (1929).  
 Celebes (north), Ceram, Ternate, Amboina, Key Isl., New Guinea, New Britain, Solomon Isl.  
 sect. *Neomorphe* King (1887)  
 India, south China, to Solomon Isl. and Queensland.  
 ser. *Auriculatae* Corner (1960)  
 Sect. *Sycocarpus* Miq. subsect. *Pomifera* Corner, ser. *Pomiferae* Corner (1960).  
 Asiatic mainland.
395. **F. auriculata** Lour. (1790)—*F. macrophylla* Roxb. et B. Ham. ex J. E. Sm. (1810)—*F. rotundifolia* Roxb. (1832)—*Covellia macrophylla* (Roxb.) Miq. (1848)—*F. sclerocarpa* Griff., *scleroptera* Griff. (1854)—*F. regia* Miq. (pro p.; alt. p. *F. oligodon*), *F. roxburghii* Wall. ex Miq. (1867)—? *F. macrocarpa* Lévl. et Vant. (1907).  
 Himalayas from Pakistan to south China, Bihar, Thailand, Indochina, Hainan: cultivated elsewhere.
396. **F. oligodon** Miq. (1867)—*F. regia* Miq. (1867, pro p.; alt. p. *F. auriculata*)—*F. pomifera* Wall. ex King (1888)—*F. hainanensis* Merr. et Chun (1935).  
 Himalayas, south China, Hainan, Indochina, Thailand, Malaya (to Selangor and Pahang).  
 ser. *Variiegatae* Corner (1960)  
 sect. *Neomorphe* King subsect. *Subcrassiusculifoliae* Sata, subsect. *Tenuifoliorae* Sata (1944).  
 subser. *Variiegatae* Corner (1960)
397. **F. variegata** Bl. (1825)—*F. subracemosa* Bl., *F. cordifolia* Bl. (1825)—*F. amboinensis* Kostel. (1831)—*F. racemifera* Roxb. (1832)—*Covellia racemifera* (Roxb.) Miq. (1848)—*F. laevigata* Blanco (1837)—*Sycomorus capensis* Thunb. f. *tropica* Miq., *S. gummiflua* Miq. (1851)—*F. ceriflua* Jungh. (1853)—*F. cerifera* Bl. ex Bleekrode (1855)—*F. subopaca* Miq., *Urostigma javanicum* Miq. (1859)—*F. variegata* Bl. v. *pilosior* Miq. (1867)—*F. ehretioides* F.v.M. ex Benth. (1873)—*F. latsoni* Elm. (1906)—*F. polysyce* Ridley (1920)—*F. tenimbrensis* S. Moore (1925)—*F. sum* Gagnep. (1927)—*F. variegata* Bl. f. *rotundata* Sata (1944) v. *kondang* Val., v. *leles* Val. (1906).

## Key to the varieties

1. Intercostals few, lax; lamina -12 x 5.5 cm.; lateral nerves 5-6 pairs. Figs ellipsoid or pyriform ..... v. *ilangoides*.
1. Intercostals numerous, regular; lamina often larger.
  2. Lateral nerves 7-14 pairs; basal nerves often not elongate; leaf-apex attenuate subacute or shortly acuminate ..... v. *garciae*.
  2. Lateral nerves 4-8 pairs; basal nerves elongate; leaf-apex acuminate.
    3. Lamina elliptic to obovate; base rounded to cuneate; basal nerves  $\frac{1}{2}$ - $\frac{2}{3}$  lamina ..... v. *sycomoroides*.
    3. Lamina ovate; base cordate to rounded; basal nerves  $\frac{1}{3}$ - $\frac{1}{2}$  lamina.
      4. Fig green to yellow. Tepals gamophyllous ..... v. *chlorocarpa*.
      4. Fig red, or green striped pink to red. Tepals more or less free.
        - v. *variegata*.
        - (5. Fig elongate-obconic, -35 mm. wide ..... v. *kondang*).
        - (5. Fig spherical or depressed spherical, 40-55 mm. wide (living) v. *leles*).

a. v. *variegata*.

Patna to Burma, Indochina, South Andaman Isl., through Malaysia to Solomon Isl. and Queensland.

b. v. *chlorocarpa* King (1888)—*F. chlorocarpa* Benth. (1861).  
China, Hainan, Annam, Thailand.

c. v. *garciae* (Elm.) Corner (1960)—*F. garciae* Elm. (1908)—*F. konishii* Hayata (1911)—*F. glochidiifolia* Hayata (1919).

Ryu Kyu, Formosa, Philippines, Celebes.

d. v. *ilangoides* (Elm.) Corner (1960)—*F. ilangoides* Elm. (1937).  
Philippines (Luzon), North Borneo (Pababag Isl.).

e. v. *sycomoroides* (Miq.) Corner (1960)—*F. sycomoroides* Miq. (1867)—*F. integrifolia* Elm., *F. paucinervia* Merr. (1906)—*F. compressorata* Elm. (1937)—*F. agusanensis* Elm. (1939)—*F. variegata* Bl. f. *paucinervia* (Merr.) Sata (1944).

Philippines (except Palawan), Celebes, Moluccas, Borneo (Banjermasin).

398. *F. viridicarpa* Corner (1933).

Lower Thailand, Malaya, west Java.

subser. *Laciniatae* Corner (1960)

Moluccas to Solomon Isl.

399. *F. nodosa* Teysm. et Binn. (1866)—*F. du* Laut. et K. Schum. (1901)—? *F. suringari* Carr. (1866).

Moluccas, New Guinea, New Britain, New Ireland, Solomon Isl.

400. *F. robusta* Corner (1960).

New Guinea.

401. *F. semivestita* Corner (1960).

New Guinea.

sect. *Sycocarpus* Miq. (1844)

*Ficus* sect. *Sycomorpha* (Miq.) Endl., sect. *Cystogyne* (Gasp.) Endl. (1847); sect. *Covellia* (Gasp.) Miq., sect. *Cystogyne* (Gasp.) Miq., sect. *Paracovellia* Miq. (1867); sect. *Covellia* (Gasp.) Benth. et Hook. (1880)—*Covellia* Gasp. sect. *Cystogyne* (Gasp.) Miq. (1848); sect. *Eucovellia* Miq., sect. *Paracovellia* Miq. (1859)—*Ficus* subgen. *Covellia* Miq. (1867)—*Gonusuke* Raf. (1838)—*Sycomorpha* Miq. (1844)—*Covellia* Gasp. (1844) emend. Miq. (1848)—*Cystogyne* Gasp. (1844)—*Dammaropsis* Warb. (1891).

Tropical Asia, Australasia.

subsect. *Auriculisperma* Corner (1960)

Solomon Isl., Fiji.

ser. *Cynaroides* Corner (1960)

402. **F. cynaroides** Corner (1960).

Bougainville Isl.

403. **F. lancibracteata** Corner (1960).

Bougainville Isl.

ser. *Theophrastoides* Corner (1960)

404. **F. salomonensis** Rechinger (1912).

Bougainville Isl., Ysabel Isl.

405. **F. theophrastoides** Seem. (1868).

Solomon Isl. (Bougainville, Guadalcanal, New Georgia), Fiji (Ovalau, Viti Levu).

ser. *Vitienses* Corner (1960)

406. **F. indigofera** Rechinger (1912)—*F. bukaensis* Rechinger, *F. kietana* Rechinger (1912).

Solomon Isl. (Bougainville, Buka, San Cristoval, Ysabel, Malaita, Owa Raha).

407. **F. vitiensis** Seem. (1868).—*F. harveyi* Seem. (1868).

Fiji.

subsect. *Dammaropsis* (Warb.) Corner (1960)

*Dammaropsis* Warb. (1891).

408. **F. dammaropsis** Diels (1933)—*Dammaropsis kingiana* Warb. (1891).

a. v. **dammaropsis**.

Western New Guinea, Terr. New Guinea.

b. v. **obtusa** Corner (1960).

Terr. New Guinea, Papua.

subsect. *Papuasyce* Corner (1962)

New Guinea.

409. **F. itoana** Diels (1935).  
New Guinea, New Britain.
410. **F. microdictya** Diels (1935).  
New Guinea, Papua.  
    subsect. *Lepidotus* Corner (1962)  
    subsect. *Pomifera* Corner ser. *Lepidotae* Corner (1960).
411. **F. griffithii** Miq. (1867)—*Covellia griffithii* Miq. (1848).  
Mergui, Thailand.  
    subsect. *Macrostyla* Corner (1960)  
Sino-Himalaya, Sarawak.
412. **F. squamosa** Roxb. (1832)—*F. saemocarpa* Miq. (1867)—*F. pyrrocarpa* Kurz (1873)—? *F. laminosa* Hardw. ex Roxb. (1832).  
North India, Burma, Yunnan, north Thailand.
413. **F. macrostyla** Corner (1960).  
Sarawak (Bintulu, Saribas).  
    subsect. *Sycocarpus*  
*Ficus* sect. *Covellia* (Gasp.) Miq. subsect. *Communisiflorae* Sata (as *Communisiiiflorae*), sect. *Pseudopalmae* Elm. subsect. *Covelliae-pseudopalmae* Sata (1944).  
Tropical Asia to Solomon Isl. and Queensland.  
    ser. *Longetuberculatae* Sata (1944)  
*Covellia* Gasp. sect. *Paracovellia* Miq. (1859)—*Ficus* subgen. *Covellia* (Gasp.) Miq. sect. *Paracovellia* Miq. (1867).
414. **F. ribes** Reinw. ex Bl. (1825)—*Covellia paniculata* Miq. (1848)—*C. ribes* (Bl.) Miq. (1859).—*F. staphylosyce* Ridley (1924)—*F. yatesii* Merr., *F. bartlettii* Merr. (1934).  
a. v. **ribes**.  
Malaya (north of Tampin), Sumatra, Java.  
b. v. **cuneata** (Miq.) Corner (1960)—*Covellia cuneata* Miq., *C. microcarpa* Miq. (1848)—*F. cuneata* Miq. (1867).—*F. pseudo-ribes* Koord. (1898)—*F. merrillii* Elm. (1908)—*F. olivacea* Elm. (1937).  
Philippines (? except Palawan), Celebes.  
    i. f. **stenophylla** Corner (1960).  
Luzon.  
c. v. **serraria** (Miq.) Corner (1960)—*F. serraria* Miq. (1860).  
Sumatra.

415. **F. botryocarpa** Miq. (1867)—*F. caulocarpa* Miq. (1867)—*F. miquelii* King (1887)—*F. conora* King (1888)—*F. barnesii* Merr. (1904)—*F. endotherix* Warb. (1905)—*F. sosorogonensis* Elm. (1937).

a. v. **botryocarpa**.

Philippines (? except Palawan, Negros), Celebes, Talaud, Ternate, Halmahera.

b. v. **linearifolia** (Elm.) Corner (1960)—*F. linearifolia* Elm. (1907)—*F. cervina* Elm. (1908).

Luzon.

c. v. **subalbidoramea** (Elm.) Corner (1960)—*F. mindorensis* Merr. (1904)—*F. trichantha* Warb. (1905)—*F. sordidissima* Elm. (1911)—*F. subalbidoramea* Elm. (1914).

Philippines generally, Celebes, Ternate, Amboina, New Guinea.

i. f. **scabrida** Corner (1960).

New Guinea, New Britain.

416. **F. parvibracteata** Corner (1960).

Celebes (Porema).

417. **F. cassidyana** Elm. (1906).

a. v. **cassidyana**.

Philippines (Negros, Samar, Leyte, Biliran, Mindanao).

b. v. **casiguranensis** (Quis. et Merr.) Corner comb. nov.—*F. casiguranensis* Quis. et Merr. (1928).

Luzon.

ser. *Tuberculifasciculatae* Sata (1944)

*Ficus* sect. *Sycidium* Miq. ser. *Harlandifoliae* Sata, ser. *Eusyceifoliae* Sata (1944).

Tropical Asia to Solomon Isl. and Queensland.

subser. *Praestantes* Corner (1960)

New Britain, Solomon Isl.

418. **F. praestans** Corner (1960).

New Britain.

419. **F. longibracteata** Corner (1960).

a. v. **longibracteata**.

Solomon Isl. (Bougainville, Guadalcanal, Florida).

b. v. **lebetoides** Corner (1960).

Guadalcanal.

subser. *Calopilinae* Corner (1960)

Malaya to Solomon Isl., absent from the Philippines.

420. **F. pachyrachis** Laut. et K. Schum. (1901)—*F. grandis* King (1888)—*F. hypoglauca* Laut. et K. Schum. (1901)—*F. pachythyrsa* Diels (1935).  
 a. v. **pachyrachis**.  
 New Guinea.  
 b. v. **porrecta** Corner (1960).  
 Western New Guinea.
421. **F. neobritannica** Corner (1961).  
 New Britain.
422. **F. d'albertisii** King (1888).  
 Papua.
423. **F. profusa** Corner (1960).  
 Bougainville Isl.
424. **F. baccaureoides** Corner (1960).  
 Bougainville Isl.
425. **F. calopilina** Diels (1935)—*F. setistyla* Warb. apud K. Schum. (1905, Nachtr. Fl. Schutzgeb.; non Fedde Rep. 1, 77).  
 New Guinea, (? New Britain.).
426. **F. papuana** Corner (1960).  
 Terr. New Guinea, Papua.
427. **F. bernaysii** King (1887).  
 New Guinea, New Britain, (? Solomon Isl.).
428. **F. adelpha** Laut. et K. Schum. (1901)—*F. platysycia* Diels (1935).  
 New Guinea.
429. **F. hahliana** Diels (1935).  
 New Guinea.
430. **F. vrieseana** Miq. (1867)—*Covellia rufescens* Kurz ex Teysm. et Binn. (1864)—*F. sulcata* Elm. (1912)—*F. mirabilis* Merr. (1921)—? *F. serraria* Miq. v. *membranacea* Miq. (1861).  
 a. v. **vrieseana**.  
 Java, Sumatra, Philippines, Celebes, New Guinea.  
 i. f. **appressipilosa** Corner (1960)—*F. brachiata* King (1888).  
 Java, Sumatra.  
 b. v. **chamaecarpa** (Ridley) Corner (1960)—*F. chamaecarpa* Ridley (1926).  
 Malaya, Sumatra (Sipora Isl.).  
 i. f. **obliqua** Corner (1960).  
 Malaya, Sumatra, New Guinea.

431. **F. iodotricha** Diels (1935).

New Guinea.

432. **F. sublimbata** Corner (1960).

New Guinea (southern part).

433. **F. tunicata** Corner (1960).

Great Key Isl.

434. **F. obpyramidata** King (1888).

Lower Burma, Thailand, Malaya (except Singapore).

subser. *Congestae* Corner (1960)

sect. *Sycidium* Miq. ser. *Harlandifoliae* Sata, sect. *Pseudopalmae*

Elm. subsect. *Covelliae-pseudopalmae* Sata (1944).

Malaysia, Solomon Isl.

435. **F. nota** (Blanco) Merr. (1904)—*F. aspera* Forst. f. v. *nota*

Blanco (1837).

Philippines, North Borneo.

436. **F. congesta** Roxb. (1832)—*Covellia congesta* (Roxb.) Miq.

(1848)—*F. fasciculata* F.v.M. ex Benth., v. *opposita* Benth.

(1873)—*F. setistyla* Warb. (1905, Fedde Rep. 1, 77)—*F.*

*trichostyla* Warb. (1905)—*F. satterthwaitei* Elm. (1906)—*F.*

*appendiculata* Merr., *F. binuangensis* Merr. (1921)—*F. chaeto-*

*styla* Diels (1935).

a. v. **congesta**.

Philippines, Celebes, Moluccas, New Guinea, New Britain, Solomon Isl., Queensland.

b. v. **chalmersii** (King) Corner (1960)—*F. chalmersii* King (1887)

—*F. caulothyrsa* Laut. et K. Schum. (1901).

Amboina, Key Isl., New Guinea, New Britain, Solomon Isl.

c. v. **menadena** (Miq.) Corner (1960)—*F. menadena* Miq. (1867).

Celebes.

436A. **F. merrittii** Merr. (1909).

Philippines (Luzon, Samar, Mindoro). See p. 95.

437. **F. subcongesta** Corner (1961).

Key to the varieties

1. Leaf-base narrowed cordate, symmetric. Fig with a pedicel 3-7 mm. long above the basal bracts 2-3 mm. long ..... v. *symmetrica*.

1. Leaf-base asymmetric. Fig without a pedicel above the basal bracts 1-2 mm. long ..... v. *subcongesta*.

a. v. **subcongesta**.

New Britain.

b. v. **symmetrica** Corner (1961).

Bougainville Isl.

438. **F. schwarzii** Koord. (1898).

Lower Burma, Thailand, Malaya, Sumatra, Anamba and Natuna Isl., Borneo, Celebes.

439. **F. benguetensis** Merr. (1905)—*v. leytenis* Elm., (1906)—*v. negrosensis* Elm., (1908)—*F. cuernosensis* Elm. (1908)—*F. laevicarpa* Elm., *F. peabodyi* Elm. (1912)—*F. wenzelii* Merr. (1913)—*F. miyagii* Koidz. (1913)—*F. urdanetensis* Elm. (1914)—*F. maquilingensis* Elm. (1919)—*F. kotoensis* Hayata (1919)—*F. coronata* Sasaki (1928)—*F. harlandii* Benth. *v. kotoensis* (Hayata) Sata (1934)—*F. harlandii* Benth. *v. grandifolia* Sata, *F. benguetensis* Merr. *f. leytenis* Sata, *f. negrosensis* Sata, *f. urdanetensis* Sata, *F. cuernosensis* Elm. *v. elongata* Sata (1944)—? *F. ochobiensis* Hayata (1918).

Ryu Kyu, Formosa, Philippines generally.

440. **F. carpenteriana** Elm. (1906)—*F. castanea* Elm. (1937)—*F. weberi* Merr. (1914)—*F. wenzelii* Merr. *v. weberi* Sata (1944).

Philippines (Luzon, Camarines, Albay, Catanduanes, Samar, Leyte, Biliran, Mindanao, Basilan, Sulu).

441. **F. multistipularis** Merr. (1921.—*F. palmae-covellia* Sata (1944).

Philippines, (Luzon, Catanduanes, Samar, Dinigat).

subser. *Hispidae* Corner (1960)

Tropical Asia to Queensland, absent from the Philippines.

442. **F. moderata** Corner (1962).

North Borneo (Kinabalu).

443. **F. conglobata** King (1888).

Sikkim, Bhutan, Bihar, Assam, Chittagong.

444. **F. hispida** Linn. f. (1781)—*F. symphytifolia* Lamk. (1788)—*F. scabra* Jacqu. (1798)—*F. oppositifolia* Roxb. (1798)—*F. mollis* Willd. (1798)—*F. perinteregam* Pennant (1800)—*F. daemonum* Koen. ap. Vahl (1806)—*F. fecunda* Bl. (1823)—*F. goolerea* Roxb. (1832)—*Gonusuke scabra* (Jacqu.) Raf., *G. hispida* (Linn. f.) Raf., *G. demonum* (Koen.) Raf. (1838)—*Sycomorpha roxburghii* Miq. (1844)—*Covellia oppositifolia* (Roxb.) Gasp. (1845)—*C. hispida* (Linn. f.) Miq., *C. daemonum* (Koen.) Miq., *C. setulosa* Miq., *C. courtallensis* Miq., *C. wightiana* Miq., *C. assamica* Miq., *C. dasycarpa* Miq., *F. prominens* Wall. ex Miq. (1848)—*F. hispida* *f. borneensis* Miq., *f. minor* Miq. (? ined.), (1867)—*F. courtallensis* (Miq.) Baillon (1875)—*F. hispida* *v. viridis* O.K., *v. incana* O.K. (1891)—*F. setistyla* Warb. (1905, Fedde Rep. 1, 77, pro p. fructuum; alt. p., *F. congesta* Roxb.)—*F. letacqui* Lévl. et Vant. (1910)—*F. sambucixylon* Lévl. (1911)—*F. hispida* *f. obovifolia* Hochr. (1925) *F. poilanei* Gagnep. (1927).—*F. lima* Royen nom. nud.

## Key to the varieties

1. Figs not geocarpic or with pale hairs .....v. *hispida*.  
 1. Figs geocarpic. Hairs dark brown.  
 2. Figs red; peduncles -5 mm. long ..... v. *rubra*.  
 2. Figs yellow; peduncles -12 mm. long ..... v. *badiostrigosa*.

a. v. ***hispida***.

Ceylon, India and south China to Malaya (absent from the southern part of the Malay Peninsula), Andaman Isl., Sumatra, Java, Anamba and Natuna Isl., Borneo (rare), Celebes (south-east), Lesser Sunda Isl., Timor, Tenimber Isl., Queensland, Papua.

b. v. ***badiostrigosa*** Corner (1960)—*F. heterostyla* Merr. (1942).  
 Annam, Laos, Tonkin.

c. v. ***rubra*** Corner (1960).  
 Kwangsi, Annam.

445. ***F. hispidioides*** S. Moore (1923).a. v. ***hispidioides***.

Papua, (? north Australia).

b. v. ***flavescens*** Corner (1961).  
 Papua, New Britain.

c. v. ***succosa*** Corner (1961).  
 Terr. New Guinea, Papua, New Britain.

subser. *Axillares* Corner (1960)

Burma to New Guinea.

446. ***F. lepicarpa*** Bl. (1825)—*Covellia volkameriifolia* Miq. (1848)  
 —*C. didyma* Miq. (1851)—*C. lepicarpa* (Bl.) Miq. (1859)—  
*F. volkameriaefolia* Wall. ex Miq. (1867)—*F. lepicarpa* Bl. v.  
*bunjeng* Solms-Laubach (1885)—*F. volkameriifolia* (Wall.  
 ex Miq.) Winkler (1913)—? *F. malaica* Hunter ex Ridl. (1909).

a. v. ***lepicarpa***.

Lower Burma, peninsular Thailand, Malaya (excl. Singapore),  
 Sumatra, Java, Borneo, Anamba and Natuna Isl., Celebes,  
 Amboina, Philippines (Sulu Archipelago, Tawi-Tawi).

b. v. ***brevibracteata*** Corner (1960).  
 Sarawak, North Borneo, Amboina.

c. v. ***pedunculata*** Corner (1960).  
 Thailand, Borneo.

d. v. ***suluensis*** Corner (1960).  
 Tawi-Tawi.

447. ***F. decipiens*** Reinw. ex Bl. (1825).  
 Celebes (Minahassa).

448. **F. latimarginata** Corner (1960).  
Celebes (Todjamboe, Liasa).
449. **F. calcarata** Corner (1960).  
Halmahera, Ternate, Morotai.
450. **F. saurauoides** Diels (1935).  
New Guinea.  
subser. *Fulvidulae* Corner (1960)  
Sumatra, Borneo.
451. **F. cereicarpa** Corner (1960).  
North Borneo, Brunei, central Borneo (Sungei Mendjaloe).
452. **F. francisci** Winkler (1913).  
Borneo.
453. **F. gilapong** Miq. (1860)—*F. hypogaea* King (1888).  
Sumatra (Brastagi; Gilapong Isl., Battang Baroes).
454. **F. virescens** Corner (1962).  
North Borneo (Kinabalu).
455. **F. treubii** King (1888).  
Borneo.  
subser. *Geocarpicae* Corner (1960)  
Malaya, Lingga, Borneo, Celebes.
456. **F. stolonifera** King (1888).  
Sarawak, Brunei, North Borneo.
457. **F. geocarpa** Teysm. ex Miq. (1867).  
Celebes (Minahassa, Menado).
458. **F. megaleia** Corner (1960).  
a. v. **megaleia**.  
Brunei, North and Central Borneo.  
b. v. **multinervia** Corner (1962).  
North Borneo (Kinabalu).  
c. v. **subuncinata** Corner (1962).  
North Borneo (Kinabalu).
459. **F. uncinata** (King) Becc. (1902)—*F. geocarpa* Teysm. v. *uncinata* King (1888).  
a. v. **uncinata**.  
Borneo.  
b. v. **gracilis** Corner (1960).  
Brunei.

- c. v. **parva** Corner (1960).  
Brunei.
- d. v. **pilosior** Corner (1960).  
Brunei, central and North Borneo.
- e. v. **strigosa** Corner (1960).  
Malaya (Johore to Kelantan and Perak), Lingga, Borneo.
- f. v. **subbeccarii** Corner (1962).  
North Borneo (Kinabalu).
- g. v. **truncata** Corner (1960).  
Brunei, Sarawak.
460. **F. beccarii** King (1888).  
a. v. **beccarii**.  
Malaya (Johore to Trengganu), Borneo.
- b. v. **asymmetrica** Corner (1960).  
Sarawak.
- c. v. **latifolia** Corner (1960).  
Brunei, North Borneo.
461. **F. geocharis** Corner (1960).  
Borneo.
462. **F. subterranea** Corner (1960).  
Brunei, North Borneo.
- subser. *Tuberculifasciculatae* Corner (1960)  
sect. *Sycidium* Miq. ser. *Eusyceaefoliae* Sata (1944).  
India to Solomon Isl.
463. **F. bougainvillei** Rechinger (1912).  
Bougainville Isl.
464. **F. septica** Burm. f. (1768)—*F. verrucosa* Vahl. (1806)—  
*F. venosa* Aiten (1789)—*F. leucantotoma* Poir. (1812)—*F. leucotoma* Roem. et Sch. (1817)—*F. leucopleura* Bl. (1825)—  
*F. leucosticta* Spreng. (1826)—*F. rapiformis* Roxb. (1832)—  
*F. radiata* Dcsne (1834)—*F. hauili* Blanco, *F. laccifera* Blanco (1837)—  
*Cystogyne leucosticta* (Spreng.) Gasp. (1844)—  
*Covellia rapiformis* (Roxb.) Miq., *C. venosa* (Willd.) Miq. (1848)—  
*Covellia stictocarpa* Miq. (1851)—*F. geminifolia* Miq. (1854)—  
*Covellia leucopleura* Miq., *C. radiata* (Dcsne) Miq. (1859)—  
*F. stictocarpa* Miq., *Covellia leucantotoma* (Poir.) Miq. (1867)—  
*F. philippinensis* Bonard ex Hérincq (1869)—  
*F. oldhami* Hance (1870)—*F. casearia* F.v.M. ex Benth. (1873)—  
*F. didymophylla* Warb. (1905)—*F. kaukauensis* Hayata (1918)—?  
*F. paludosa* Perrottet (1825)—*F. eburnea* Hort.

a. v. **septica**.

Sumatra, Java, Borneo (North Borneo, Labuan, West Koetai), Lesser Sunda Isl., Timor, Ryu Kyu, Formosa, Philippines, Celebes, Moluccas, New Guinea, Admiralty Isl., New Britain, New Ireland, Solomon Isl., New Hebrides, Santa Cruz Isl., Queensland.

b. v. **cauliflora** Corner (1960).

Timor Laut, Admiralty Isl., Solomon Isl., New Hebrides, Santa Cruz Isl., Queensland.

c. v. **salicifolia** Corner (1960)—*F. laxiramea* Elm. (1911)—*F. brunnea* Merr., *F. linearis* Merr. (1921).

Philippines (Luzon, Samar, Mindanao), Celebes.

465. **F. fistulosa** Reinw. ex Bl. (1825)—*Covellia subopposita* Miq. (1851)—? *F. millingtonifolia* Griff. (1854)—*F. harlandii* Benth. (1861)—*F. fistulosa* v. *obliqua* Miq. (1867)—*F. repandifolia* Elm., *F. rubrovenia* Merr. (1906)—*F. grandidens* Merr. (1914).

a. v. **fistulosa**.

Assam, Bengal, Burma, south China, Hainan, Indochina, Thailand, Nicobar Isl., Malaya, Sumatra, Riouw, Banka, Java, Bali, Lombok, Sumba, Sumbawa, Flores, Alor, Borneo, Philippines, Formosa.

b. v. **angustifolia** Miq. (1867).

Malaya, Borneo, Sumatra.

c. v. **lucbanensis** (Elm.) Corner (1960)—*F. lucbanensis* Elm. (1907)—*F. curranii* Merr. (1910).

Philippines (? Palawan).

d. v. **tengerensis** (Miq.) O.K. (1891)—*Covellia tuberculata* Miq. (1854)—*F. tengerensis* Miq., *F. tuberculata* Miq. (1867)—*F. fistulosa* v. *cincta* Hochr. (1925).

Thailand, Malaya, Sumatra, Java, Borneo.

466. **F. condensa** King (1888).

Sarawak, North Borneo.

467. **F. dimorpha** King (1888).

a. v. **dimorpha**.

Sumatra.

b. v. **scabra** Corner (1960).

Mentawai Isl. (Siberut, Sipora).

468. **F. tarennifolia** Corner (1960).

North Borneo (Kinabalu).

469. *F. ixoroides* Corner (1960).  
Sarawak, North Borneo.
470. *F. scortechinii* King (1888)—*F. fasciculata* King (1888).  
a. v. *scortechinii*.  
Burma (Tavoy), Thailand, Malaya (incl. Singapore).  
b. v. *lanceata* Corner (1962).  
North Borneo (Kinabalu), Sarawak.
471. *F. ternatana* Miq. (1867)—*Covellia ternatana* Miq. (1859)—  
—*F. flagellaris* Diels (1935).  
Ternate, New Guinea (north-east).
472. *F. pleyteana* Corner (1960).  
Halmahera.
473. *F. arfakensis* King (1888)—*F. hylophila* Laut. et K. Schum.,  
*F. stenothyrsus* Laut. et K. Schum., *F. palustris* Laut. et K.  
Schum. (1901)—*F. tristipula* Warb. (1905).  
Aru Isl., New Guinea, Solomon Isl.
474. *F. macrothyrsa* Corner (1961).  
Bougainville Isl.

#### Species Incertae Sedis

*F. apocynoidea* Griff. Notul. 4 (1854) 399.—This was overlooked by King. There seems to be no specimen and I cannot place it.

*F. argentea* Blanco, Fl. Filip. (1837) 681; Merr. Sp. Blanc. (1918) 129; Philip. J. Sci. 20 (1922) 368; Sata, Monogr. (1944) 216.—I have not been able to recognise this. Merrill suggested that it was *F. ruficaulis* Merr. and, later, that it was what I call *F. caulocarpa* Miq. v. *dasycarpa*. If two such different plants can be mistaken for Blanco's description, it is indeed ambiguous.

*F. comptonii* S. Moore, J. Linn. Soc. Bot. 45 (1921) 412.—The type-specimen seems to me to consist of fruiting inflorescences of *F. racemigera* Bur. mounted with leaves of *F. webbiana* Miq. The field-note states "Large tree; fruits in long racemes on main trunk, speckled red", and this indicates *F. racemigera*.

*F. cornifolia* Kunth et Bouch. Ann. Sci. Nat. ser. 3, 7 (1847) 246.—This was supposed to have come from Java. I have seen no specimen and cannot place it.

*F. crenulata* Hassk. Cat. Hort. Bog. (1844) 76; Miq. Fl. Ind. Bat. 1, 2 (1859) 321; Ann. Mus. Bot. Lugd. Bat. 3 (1867) 295.—I have found no specimen and the description is too brief for identification. ? *F. heteropleura* Bl.

*F. forbesii* King, Spec. Ficus 2 (1888) 109, pl. 143.—I have found no specimen or one that would correspond. It was based on an unnumbered collection of Forbes from Sumatra. I suspect that it is a mixture of leaves which are not Moraceous, because they are described as stellate hairy beneath, and infructescences of *F. ribes* Reinw.

*F. glabra* Griff. Notul. 4 (1854) 390 (non Vellozo, 1827).—This was omitted by King. I have found no specimen and cannot identify it.

*F. hayatae* Sata, J. Soc. Tr. Agr. Taiwan 6 (1934) 28; Tr. Nat. Hist. Soc. Formos. 28 (1938) 223; Monogr. (1944) 28.—I have seen no specimen and cannot identify this. It may be *F. irisana* Elmer or a species of sect. *Ficus*.

*F. hirtaeformis* Lévl. et Vant. Fedde Rep. 4 (1907) 84.—I have not found the type-number (Cavalerie 1593).

*F. karet* Baill. Hist. Pl. 6 (1875) 176.—This was said to be *F. indica* Lamk., but what Baillon thereby intended I do not know. *F. indica* Linn. sensu Lamk. is *F. benghalensis* Linn.

*F. merrittii* Merr. Philip. J. Sci. Bot. 4 (1909) 252; En. Philip. 2 (1923) 57; Sata, Monogr. (1944) 303.—This may be *F. carpenteriana* Elmer or *F. nota* (Blanco) Merr., or an intermediate. I have not seen the type-numbers (Bur. Sci. 11466, 11477, leg. Merritt) and, as these cauliflorous figs of the Philippines have been much confused, I hesitate to identify it. It seems to have longer, more racemose, fruiting branches, up to 75 cm. long, than either of these species, but it has no clear diagnostic character. (Since writing this note I have seen n. 11466 from U.S. National Museum, loaned to me in Aug. 1964. The species comes between *F. carpenteriana* and *F. nota*. See p. 88.)

*F. millingtonifolia* Griff. Notul. 4 (1854) 396; Ic. Pl. As. (1854) 556 (1).—This may be *F. fistulosa* Reinw. I have seen no specimen.

*F. mourilyanensis* F. M. Bailey, Queensl. Agric. J. 1 (1897) 452; Queensl. Fl. 5 (1902) 1478.—I have seen no specimen, but the description fits *F. copiosa* Steud. which has been so often mistaken.

*F. nepalensis* Spreng. Syst. Nat. 3 (1826) 779; King Spec. Ficus 2 (1888) 183.—*F. ovata* Don, Prodr. Fl. Nep (1825) 61 (non Vahl); King, Spec. Ficus 2 (1888) 183.—This was based on the Wallichian specimen labelled "In Nepalia, Wallich Bedoodee Indigenis". I have not found it. King referred *F. nepalensis* to *F. foveolata* Wall. (that is, *F. sarmentosa* J. E. Sm.) on the evidence of two drawings at Leiden; and he referred *F. ovata* to *F. scandens* Roxb. (that is *F. hederacea* Roxb.), without realising that they were the same species. Miquel suggested *U. lambertianum* Miq. (that is *F. virens* Ait.).

*F. oblongifolia* Don, Prodr. Fl. Nep. (1825) 61; King, Spec. Ficus 2 (1888) 183.—As King observed, without specimens this cannot be identified.

*F. obovata* Griff. Notul. 4 (1854) 390; Ic. Pl. As. (1854) 551 (1).—I have seen no specimen. The figure suggests *F. talboti* King or *F. concinna* Miq.

*F. puncticulata* Merr. Philip. J. Sci. Bot. 3 (1908) 131; En. Philip. 2 (1923) 93; Sata, Monogr. (1944) 347.—I have not seen the type (Clemens 1164). It seems to be *F. recurva* Bl.

*F. radicans* Roxb. v. *abnormis* Kurz, Fl. Burma 2 (1877) 452.—I have seen no specimen. It may be a form of *F. heteropleura* Bl., a northerly record of *F. sinuata* Thunb., or *F. praetermissa* Corner.

*F. retusa* Linn. var. *macrocarpa* Kurz, Fl. Burma. 2 (1877) 444; King, Spec. Ficus 2 (1888) 183.—This was not identified by King. I have seen no specimen. It may be *F. sundaica* Bl.

*F. rigida* Jack, Mal. Misc. 2 (1822) 71; Hook. Comp. Bot. Mag. 1 (1836) 222; Merr. J. Arn. Arb. 33 (1952) 225.—I have been unable to identify this. Merrill considered that it was *F. glaberrima* Bl., but the two hardly correspond and *F. glaberrima* is known from very few collections from the north of Sumatra. It may be *F. magnoliifolia* Bl.

*F. rowelliana* King, Spec. Ficus 1 (1887) 38, pl. 43A.—This was based on Forbes 3026 (Sumatra) and placed under sect. *Urostigma*. I have not found this collection or any other referred to the species, and this condition always suggests to me that such species are mixtures of faulty collecting or mounting. The description shows that it is a dioecious climber with disperse male flowers, unistaminate, and should belong therefore in sect. *Kalocyce*. It may be *F. aurantiacea* Griff. or *F. singalana* King.

*F. rupestris* Bl. Bijdr. (1825) 439; King Spec. Ficus 2 (1888) 183.—This is the bathyphyll state of *F. villosa*, *F. recurva*, or *F. lanata*, between which it is impossible to decide.

*F. sargentii* Merr. Philip. J. Sci. 18 (1921) 63; En. Philip. 2 (1923) 64; Sata, Monogr. (1944) 274.—I have not seen the type (Sablaya 10). It seems near to, if not identical with, *F. heteropoda*. Miq.

*F. tashiroi* Maxim. Bull. Ac. Sci. St. Petersb. 32 (1888) 621.—Large glabrous tree. Lamina 5–12 x 2–4 cm., oblong-elliptic, coriaceous-chartaceous, apex caudate-acuminate, very entire, minutely scabrid-punctate above, base 3-nerved for  $\frac{1}{3}$ – $\frac{1}{2}$  the length of the blade; lateral nerves 3–5 pairs, subparallel; reticulations prominent on both sides; petiole 5–10 mm., short. Receptacles axillary, solitary, pisiform, with a pedicel about as long as the body, smooth, the achenes showing through (from pressure), with three minute and early caducous basal bracts at the base of the pedicel. Archip. Ya-Yama (A. Tashiro, 1886).

I have seen no specimen. It was said to be near *F. gibbosa* Bl., but to differ in the paler leaf (dried), the entire perianth of the female flower (or 2-3-lobate), and the elongate style.

*F. velascoi* Merr. ex Sata, Monogr. (1944) 275.—I have not seen the type (For. Bur. 23306), which is the only specimen quoted. It seems to be *F. ulmifolia* Lamk.

### Excluded Species

Several of these species are described from mixtures of leaves of one species and figs of another, which have either been collected in error, as if from the same plant, or muddled in sorting and mounting. In either case, they are artefacts, and are never collected again.

*Covellia composita* Miq. Fl. Ind. Bat. 1, 2 (1859) 324.—This is a sterile specimen of *Poikilospermum* Zipp.

*C. grandifolia* Miq. Fl. Ind. Bat. Suppl. (1860) 434.—This is a sterile specimen of *Poikilospermum* Zipp.

*Ficus aruensis* King, Spec. Ficus 2 (1888) 175, pl. 222.—This is based on an unnumbered collection of Beccari's from the Aru Islands (R. Ist. Fir. 9316, 9316 A, and B). It consists of the leaves of *F. arfakensis* King mounted with the figs of *F. wassa* Roxb. Two sheets of another collection of Beccari's from the Aru Islands (R. Ist. Fir. 9327, A-C), correspond in having the leaves of *F. wassa* with the fruits of *F. arfakensis*; King did not name these.

*F. bordenii* Merr. Govt. Lab. Publ. Philip. 29 (1905) 11; Philip. J. Sci. 1 (1906) 46; En. Philip. 2 (1923) 47; Corner, Gard. Bull. S.S. 10 (1939) 107, f. 7, 36; Sata, Monogr. (1944) 250.—This consists of the leaves of *F. sagittata* Vahl mounted with the figs of *F. aurantiacea* Griff. v. *parvifolia* Corner.

*F. caloneura* Kurz, J. As. Soc. Beng. 42 (1873) 105.—This is a Euphorbiaceous plant (? *Homalanthus*).

*F. castanæaefolia* Roth Nov. Pl. Spec. (1821) 389.—A type-duplicate in the Leiden-herbarium shows that this is not Moraceous. It has an immature round fruit containing one large seed, a sessile capitate stigma, and mucilage (? oil) sacs in the fruit-wall. The lower epidermal cells of the leaf are papillate with plicate cuticle. According to van Steenis (*in litt.*) it is Anacardiaceae, such as *Melanorrhoea* or *Semecarpus*.

*F. caulobotrya* Miq. Ann. Mus. Bot. Lugd. Bat. 3 (1867) 287; Corner Gard. Bull. Sing. 17 (1960).—*Urostigma caulobotryum* Miq. Hook. Lond. J. Bot. 6 (1847) 568.—This is based on a mixture of the leaves of *F. tsjahela* Burm. f. mounted with the figs of *F. arnotiana* Miq.

*F. chrysophthalma* Miq. Ann. Mus. Bot. Lugd. Bat. 3 (1867) 285.—*Urostigma chrysophthalmum* Miq. Hook. Lond. J. Bot. 6 (1847) 575.—This is *Artocarpus chaplasha* Roxb.

*F. clarkei* King, Fl. Br. Ind. 5 (1888) 536; Spec. Ficus 2 (1888) 175, pl. 221.—This consists of the leaves of *F. tinctoria* Forst. f. ssp. *parasitica* (Willd.) Corner and the fruits of *F. racemosa* Linn. Clearly the first was growing on the second and mistaken for one plant by the collector.

*F. corymbifera* Lévl. et Vant. Fedde Rep. 4 (1907) 83.—This is a *Solanum*.

*F. diepenhorstii* (Miq.) King, Spec. Ficus 2 (1888) 183.—*Urostigma diepenhorstii* Miq. Fl. Ind. Bat. Suppl. (1860) 439.—This is *Prainea limpato* (Miq.) Beumee.

*F. gerontocarpa* Warb. Perk. Fragm. Fl. Philip. (1905) 201; Sata, Monogr. (1944) 357.—According to Sata, this consists of leaves of *F. ruficaulis* Merr. and figs of *F. nota* (Blanco) Merr.

*F. hypoglauca* Laut. ex K. Schum. Fl. Schutzgeb. Suds. (1901) 285.—The type consists of figs and infructescences of *F. pachyrhachis* Laut. et K. Schum. and Lauraceous leaves (see p. 87).

*F. inconstantissima* Miq. Fl. Ind. Bat. Suppl. (1860) 431.—This is the sapling state of *Artocarpus dadah* Miq.

*F. iwahigensis* Elmer, Leaf. Philip. Bot. 4 (1912) 1381.—The type-number consists of the leaves of *F. depressa* Bl. and the figs of *F. forstenii* Miq.

*F. malabarica* Miq. Hook. Lond. J. Bot. 7 (1848) 457; King, Spec. Ficus 2 (1888) 182.—The type consists of the twigs and leaves of *Artocarpus hirsutus* Lamk. (not *A. chaplasha* Roxb., as King suggested) and figs of *F. palmata* Forsk. attached to the same sheet.

*F. marchandii* Lévl. Fedde Rep. 12 (1913) 533; Hand. Mazz. Symb. Sin. 7 (1929) 100.—This is a Capparidaceous plant.

*F. onusta* Wall. ex Miq. Ann. Mus. Bot. Lugd. Bat. 3 (1867) 285; Corner, Gard. Bull. Sing. 17 (1960).—*Urostigma onustum* Miq. Hook. Lond. J. Bot. 6 (1847) 575.—This is a mixture of leaves of *F. globosa* Bl. and figs of *F. pisocarpa* Bl.

*F. ouangliensis* Lévl. Fedde Rep. 4 (1907) 66.—This is a species of *Aglaiia*.

*F. peltata* Bl. Bijdr. (1825) 438; King, Spec. Ficus 2 (1888) 183; v. Steenis, Fl. Males. ser. 1, 4 (1948) p. XX.—King ascribed this to an aroid, but it is the juvenile or bathyphyll state of a *Piper*.

*F. polysyce* Ridley, J. R. As. Soc. Str. Br. 82 (1920) 195; Corner, J. Mal. Br. R. As. Soc. 11 (1933) 42.—This is a mixture of *F. fistulosa*, *F. schwarzii*, *F. scortechinii*, and *F. variegata*.

*F. pulchra* Wall. ex Miq. Hook. Lond. J. Bot. 7 (1848) 430.—This is a species of *Kibara*.

*F. pyrifolia* Burm. f. Fl. Ind. (1768) 226; Nakai, Bot. Mag. Tokyo 40 (1926) 564; Merr. J. Arn. Arb. 35 (1954) 134.—This is *Pyrus pyrifolia* (Burm. f.) Nakai.

*F. ralumensis* K. Schum. Notizbl. Kgl. Bot. Gart. Mus. Berlin 2 (1898) 112; Fl. Schutzgeb. Suds. (1901) 282; Diels, Bot. Jahrb. 67 (1935) 231.—The type at Berlin (Warburg 20828) consists of two leaves of *Artocarpus teysmannii* Miq. and a section of a fig of *F. calopilina* Diels.

*F. salix* Lévl. et Vant. Fedde Rep. 4 (1907) 66; Hand. Mazz. Symb. Sin. 7 (1929) 100.—This is a sterile *Salix*, perhaps *S. babylonica*.

*F. serpyllifolia* Bl. Bijdr. (1825) 443.—This is the creeping bathyphyll state of an Apocynaceous climber, identified by Kostermans as *Microchites radicans* (Wall.) Markgr. = *M. serpyllifolia* (Bl.) Kosterm., Reinwardt. 5 (1960) 245.

*F. tampang* Miq. Fl. Ind. Bat. Suppl. (1860) 425; King, Spec. Ficus 2 (1888) 184.—This is *Artocarpus dadah* Miq.

*F. tawaoensis* Merr. Univ. Calif. Publ. Bot. 15 (1929) 48; Corner, Gard. Bull. S.S. 10 (1939) 146, f. 27, 35.—This is a mixture of the leaves of *F. trichocarpa* Bl., intermediate between the bathyphylls and the acrophylls, and the figs of *F. punctata* Thunb.

*F. weinlandii* K. Schum. Nachtr. Fl. Schutzgeb. Suds. (1905) 248; Diels, Bot. Jahrb. 67 (1935) 211.—This consists of the leafless twigs with small figs of *F. caulocarpa* Miq. and the leafy twig of a species of sect. *Sycocarpus*, near to *F. bernaysii*, *F. calopilina*, and *F. pachyrrhachis*.

*Urostigma cuneatum* Miq. Hook. Lond. J. Bot. 6 (1847) 585.—*F. amherstina* Steud. Nomencl. ed. 2 (1840) 635.—*Ficus cuneata* Wall. ined. (n. 4534); King, Spec. Ficus 2 (1888) 181.—This is a twig of *Erythroxylon burmanicum* Griff. mounted with figs of *F. semicordata* B. Ham.

#### Key to the subgenera of Ficus

1. Dioecious. No interfloral bracts . . . . . subgen. *Ficus* (p. 116).
1. Monoecious. Figs often with interfloral bracts, without lateral bracts. Gall- and female flowers often similar. Tepals red or with white edges. Seeds smooth.
  2. Banyans, strangling figs, or creeping with adventitious roots, Lamina often coriaceous, entire, not plicate, with a gland at the back of the petiole-apex or none. Fig often with an outer and an inner layer of sclerotic cells in the wall, or with a single inner layer: interfloral bracts present. Stamen 1. Style mostly simple. Rarely cauliflorous. Pantropical . . . . . subgen. *Urostigma* (p. 100).
  2. Trees, rarely shrubs, not epiphytic. Leaf-glands in the axils of the main basal nerves or none. Sclerotic cells in the fig-wall diffuse or none. Stamens 2 (-3), or 1, often with a pistillode.

- 3. Male flowers disperse or ostiolar, often pedicellate: stamens 1-3: filaments free or slightly joined. Ovary white or reddish at the base on the styler side: stigma generally bifid. Tepals entire. Interfloral bracts often present. Leaves mostly entire (dentate in some saplings), not plicate. Rarely cauliflorous. America, Asia, Australasia, Madagascar.

subgen. *Pharmacosycea* (p. 111).

- 3. Male flowers ostiolar, sessile, compressed: stamens 2 (1-3): filaments joined in the lower part. Gall- and female (sessile) flowers distinct. ovary dark red: stigma simple. Tepals generally laciniate-denticulate (or entire in male flowers). Interfloral bracts absent. Leaf often dentate, more or less plicate in bud. Mostly cauliflorous. Africa, Asia, Australasia.

subgen. *Sycomorus*, 146. *F. racemosa*.

Key to the sections of subgen. *Urostigma*

- 1. Fig-orifice as a pore or bilabiate or triradiate slit closed by 2 (or 3) series of inflexed (not interlocking) apical and internal bracts. Male flowers disperse. Cystoliths amphigenous, hypergenous, or none.
  - 2. Basal bracts 2. Fig-orifice bilabiate. Anther normal. Stigma simple. Ovary with a red mark at the base, not immersed. Africa, Arabia, Mascarene ..... sect. *Galoglychia*.\*
  - 2. Basal bracts 2 or 3. Fig-orifice bilabiate or triradiate, the apical bracts often umbonate. Anther with 2 pollen-sacs, dehiscing with one crescentic or equatorial slit. Stigma bifid or simple. Ovary with a red mark at the base or with red apex and, then, partly immersed in the fig-wall. Venation as in *F. elastica*. Eastern Malaysia, Australasia ..... sect. *Malvanthera* (p. 109).
- 1. Fig orifice more or less closed by interlocking apical and internal bracts. Anther normal. Stigma simple (except *F. orthoneura*).
  - 3. Ovary wholly red-brown or in the upper half. Male flowers ostiolar or disperse. Tepals generally narrow, acute. Basal bracts 3, or as a cupule. Cystoliths hypogenous or none. Venation mostly with intercostals. Africa, Asia, Australasia  
sect. *Urostigma* (p. 101).
  - 3. Ovaries white or with a red mark at the base. Male flowers disperse. Cystoliths amphigenous, hypergenous, or none.
    - 4. Basal bracts 2, often connate. Ovary with a red mark. America  
sect. *Americana*.†
    - 4. Basal bracts 3, free, or joined in a cupule. Asia, Australasia, Mascarene.
      - 5. Ovary white. Venation with or without intercostals. Cystoliths hypergenous or amphigenous .... sect. *Leucogyne* (p. 102).
      - 5. Ovary with a red mark at the base.
        - 6. Venation with the secondary lateral nerves as prominent as the primary. Stipule long. Fig-peduncle short, thick. Basal bracts early caducous. Cystoliths hypergenous.  
80. *F. elastica*, sect. *Stilpnophyllum*.
        - 6. Without such character. Cystoliths mostly amphigenous  
sect. *Conosycea* (p. 102).

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\* sect *Galoglychia* (Gasp.) Endl., Gen. Pl. Suppl. 4, 2 (1847) 35 = subgen. *Bibracteatae* Mildbr. et Burr., Bot. Jahrb. 46 (1912) 175. Not detailed in this work.

† sect. *Americana* Miq., Hook. Lond. J. Bot. 6 (1847) 525 (ut *Americanae*). Not detailed in this work.

Key to the series of sect. *Urostigma*

1. Fig with abundant internal chaffy-vesicular bristles. Basal bracts persistent ..... ser. *Caulobotryae* (p. 102).
1. Without internal bristles or few and minute.
  2. Basal bracts caducous, Fig pedunculate ..... ser. *Superbae* (p. 101).
  2. Basal bracts persistent.
    3. Male flowers disperse. Lamina coriaceous, with an upper hypodermis. Fig pedunculate with small basal bracts, or sessile with a large entire cupule. Sinohimalaya ... ser. *Orthoneurae* (p. 102).
    3. Male flowers ostiolar or, if disperse, then the sessile fig with 3 basal bracts. Fig sessile (except *F. verruculosa*, Africa). Lamina without hypodermis ..... ser. *Religiosae* (p. 101).

Key to the species of ser. *Religiosae*

1. Petiole articulate to the lamina (breaking off in dry leaves); Asia, New Guinea.
  2. Lamina elliptic, lateral nerves 8-14 pairs; figs 5-7 mm. wide, axillary or clustered on the twigs below the leaves; basal bracts 2-2.5 x 3-5 mm.; ovary dark red; S. India, Ceylon. .... 4. *F. tsjahela*.
  2. Lamina ovate, lat. nerves 4-9 pairs; figs paired, mostly axillary.
    3. Lam. caudate, tip 25-90 mm. long; petiole as long as or longer than the lamina; ovaries red-brown in the upper part.
      1. *F. religiosa*.
    3. Lam. acute or acuminate; petiole shorter than the lamina; ovaries wholly dark red-brown.
      4. Lam. 4-11 x 2.5-6.5 cm.; fig 5-8 mm. wide; basal bracts 2-2.5 mm. long; China, Indochina ..... 3. *F. cardiophylla*.
      4. Lam. 8-24 x 4.5-15 cm.; fig 9-10 mm. wide; basal bracts 3-5 mm. long; Indochina to New Guinea ..... 2. *F. saxophila*.
1. Petiole not articulate; African and Mascarene\*.
  5. Basal bracts half-covering the sessile fig; apical bracts in a gibbous disc 2-3 mm. wide; male flowers in 2-3 rows, sessile to pedicellate, sometimes also disperse; lam. elliptic to ovate-cordate, shortly acuminate; lat. nerves 7-9 pairs; petiole 2-6 cm. long; Mauritius, Réunion ..... *F. densifolia*.
  5. Basal bracts small; apical bracts not in a gibbous disc; male flowers in one row, sessile, ostiolar; Africa.
    6. Fig pedunculate ..... *F. verruculosa*.
    6. Fig sessile ... *F. welwitschii*, *F. cordata*, *F. salicifolia*, *F. pretoriae*.

Key to the species of ser. *Superbae*

- Fig 7-25 mm. wide, peduncles 3-35 mm. long, ramiflorous; lamina 5-14 cm. wide, broadly elliptic; stipules generally villous; twigs 3-12 mm. thick ..... 5. *F. superba*.
- Fig 5-8 mm. wide, peduncles 1-2.5 mm. long, ? not ramiflorous; lamina 4-9 cm. wide, broadly elliptic; glabrous or the stipules thinly villous; twigs 2-3 mm. thick ..... 6. *F. prasinicarpa*.
- Fig 4-5 mm. wide, peduncles 1-5 mm. long, axillary and on the twigs below the leaves; lamina 1-4 cm. wide, narrowly elliptic; glabrous; twigs 1-2 mm. thick ..... 7. *F. concinna*.

\* Not enumerated here.

Key to the species of ser. *Caulobotryeae*

- 1. Male flowers disperse; glabrous or minutely puberulous at first; petiole 8–30 mm. long; fig 6–10 mm. wide, peduncle 0–3 mm. long; basal bracts 1.5–4 mm. long and wide; Micronesia, Polynesia
  - 13. *F. prolixa*.
- 1. Male flowers ostiolar; petiole often longer.
  - 2. Lamina oblong, lateral nerves 9–16 pairs; figs 5–8 mm. wide, in groups of 2–8 in the leaf-axils and on the twigs below the leaves; peduncles 1–4 mm. long, slender; basal bracts often connate; stipules silky
    - 12. *F. caulocarpa*.
  - 2. Lamina ovate to elliptic, obovate, or sublanceolate; lateral nerves mostly fewer (5–11 pairs).
  - 3. Twigs, stipules, and fig-body thickly villous or tomentose, (the twigs varying glabrous); fig c. 10 mm. wide.
    - 4. Lam. ovate-cordate, lateral nerves 4–6 pairs, stiffly coriaceous; fig sessile; basal bracts 4–6 mm. long and wide, half-covering the body; thinly pale brown tomentose; cystoliths absent; India (Centr. Prov.) ..... 9. *F. cupulata*.
    - 4. Lam. ovate-elliptic or elliptic, base subcordate to widely cuneate, very coriaceous, lateral nerves 7–11 pairs; fig sessile or shortly pedunculate; basal bracts covering only the base of the body, often glabrous; white villous; cystoliths hypogenous
      - 8. *F. lacor*.
  - 3. Not villous (or rarely the fig-peduncle and stipule thinly tomentose).
    - 5. Figs 5–7 mm. wide, sessile or the peduncle 1 mm. long, in small clusters on the twigs below the leaves, or on short woody burrs from the old twigs; lamina very stiffly coriaceous, shortly elliptic, somewhat caudate-acuminate; petiole long
      - 11. *F. geniculata*.
    - 5. Figs 7–12 mm. wide, sessile or with peduncles –6 mm. long, axillary or short woody burrs; lamina rather thinly coriaceous
      - 10. *F. virens*.

Key to the species of ser. *Orthoneurae*

- Fig sessile, basal bracts united in a cupule 5–10 mm. high; fig-body 20–27 mm. wide, subglobose; lateral nerves 6–9 pairs; basal nerves  $\frac{1}{4}$ – $\frac{1}{2}$  lamina; stigma simple ..... 15. *F. hookeriana*.
- Fig pedunculate; basal bracts free, small; fig-body 13–15 × 12–13 mm., ellipsoid; lateral nerves 7–15 pairs, almost perpendicular to the midrib, scarcely raised below; lamina brown-areolate below; stigma shortly bifid ..... 14. *F. orthoneura*.

Key to the species of sect. *Leucogyne*

Lamina ovate to cordate, truncate or rounded at the base, apex acuminate; lateral nerves 4–5 pairs. Basal bracts 2 (–3). India, Indochina to Malaysia ..... 16. *F. rumphii*.

Lamina elliptic or lanceolate-elliptic, varying ovate, base cuneate to subcordate, apex acute or subacuminate; lateral nerves 6–10 pairs. Basal bracts 3. India, Ceylon, Maldives ..... 17. *F. amplissima*.

Key to the subsections of sect. *Conosycea*

- 1. Venation with intercostals. Figs pedunculate, sessile, or pedicellate.
  - subsect. *Conosycea* (p. 103).
- 1. Venation without intercostals, or 1–2 vague intercostals. Figs mostly sessile.
  - 2. Secondary lateral nerves almost or quite as prominent as the primary and subparallel ..... subsection. *Benjamina* (p. 108).
  - 2. Secondary lateral nerves not so prominent.
    - subsect. *Dictyoneuron* (p. 106).

Key to the series of subsect. *Conosycea*

1. Fig pedunculate, ripening green, brown, or brownish orange  
ser. *Validae*.
1. Fig sessile or the body pedicellate, ripening yellow to red.  
ser. *Drupaceae*.

Key to the subseries of ser. *Drupaceae*

1. Fig oblong, ellipsoid, or pyriform-pedicellate: basal bracts often small or concealed: apical bracts mostly umbonate. Basal nerves not elongate. .... subser. *Drupaceae*.
1. Fig subglobose to ellipsoid: basal bracts mostly well-developed: apical bracts plane, in a flat disc. Basal nerves elongate or not.
  2. Brown villous-tomentose (hairs twinned, microscopically). Fig 12–24 mm. wide ..... subser. *Zygotricheae*.
  2. Glabrous, white hairy, or, if brown hairy, then the fig 8–10 mm. wide (hairs not twinned).
    3. Cystoliths mainly or entirely hypergenous, or none. Lamina elliptic to ovate, obtuse or subacutely acuminate, generally with the reticulations slightly raised on both sides. .... subser. *Indicae*.
    3. Cystoliths amphigenous. Lamina elliptic to obovate, acuminate or stiffly coriaceous: basal nerves generally elongate  
subser. *Crassirameae*.

Key to the species of subsect. *Conosycea*

1. Fig pedunculate (ser. *Validae*).
2. Fig-body 25 mm. or more long; apical bracts rather strongly umbonate. Male flowers abundant. Basal nerves of lamina short.
  3. Twig 2–5 mm. thick. Lamina 2–8 cm. wide; lateral nerves 5–11 pairs, 1–4 vague intercostals. Fig often solitary, ellipsoid; peduncle 11–33 mm. long, slender, without an apical annulus; basal bracts caducous. climber. .... 25. *F. depressa*.
  3. Twigs 3–10 mm. thick. Lamina often wider, intercostals more numerous. Figs mostly paired; peduncles stout; basal bracts persistent. Stranglers.
    4. Peduncle 1–18 mm. long, with an annular swelling at the apex. Fig-body ellipsoid to subglobose; basal bracts 3–11 mm. long. Tepals free. Lateral nerves 12–17 pairs. .... 22. *F. annulata*.
    4. Peduncle not annulate. Basal bracts often smaller. Tepals gamophyllous. Lateral nerves 8–11 (–14) pairs.
      4. a. Fig-body 25–35 mm. wide, globose; peduncle 10–50 mm., generally glabrous; basal bracts 1.5–3 mm. long.  
23. *F. chrysolepis*.
      4. a. Fig-body 15–20 mm. long, subellipsoid; peduncle 7–25 mm., hairy; basal bracts 3–6 mm. .... 24. *F. novoguineensis*.
2. Fig-body smaller, or the apical bracts not umbonate. Male flowers often few.
  5. Young parts rusty scurfy. Fig 12–18 mm. wide. Basal nerves elongate or not. Climber ..... 26. *F. globosa*.
  5. Not rusty scurfy. Banyans.
    6. Intercostals 0–2 (–4), vague; basal nerves short. Lamina elliptic, acuminate. Fig 7–10 mm. wide.
      6. a. Basal bracts early caducous, or very short and crescentic; peduncle 3–12 mm. long. Cystoliths abundant on both sides of the lamina. Ovaries reddish . . . 47. *F. glaberrima*.
      6. a. Basal bracts persistent; peduncle –2 mm. long. Cystoliths sparse or none below. Ovary without red.  
57. *F. talboti*.

6. Intercostals generally numerous. Basal bracts distinct.
7. Lamina oblong-elliptic; lateral nerves 10–16 pairs; basal nerves short. Fig 12–15 mm. wide, drying wrinkled; basal bracts persistent ..... 19. *F. costata*.
7. Lamina ovate or ovate-cordate.
8. Lateral nerves 5–7 (–10) pairs; basal nerves elongate. Fig 5–10 mm. wide; basal bracts finally caducous. 18. *F. arnottiana*.
8. Lateral nerves 10–15 pairs; basal nerves not elongate. Figs larger.
9. Fig-body 20–22 × 15–18 mm., with 2 flat apical bracts; basal bracts 4–6 mm. long. Glabrous. Cystoliths amphigenous. .... 20. *F. beddomei*.
9. Fig 11–12 × 10–11 mm., with 3 velutinate apical bracts; basal bracts 2–3 mm. long. Velutinate. Cystoliths hypergenous ..... 21. *F. dalhousiae*.
1. Fig sessile, in some cases pedicellate (ser. *Drupaceae*).
10. Fig oblong, ellipsoid, or pyriform-pedicellate; basal bracts often small or concealed; apical bracts mostly umbonate (subser. *Drupaceae*).
11. Internal bristles copious. Fig 30–50 × 20–30 mm., ellipsoid to pyriform; basal bracts 2–3 × 4–7 mm., not concealed. Philippines, Celebes ..... 29. *F. cordatula*.
11. Internal bristles sparse or none. Fig ellipsoid or oblong.
12. Irritant-bristly, especially the fig (30–45 × 15–20 mm.). Malaya, Borneo, Philippines ..... 28. *F. cucurbitina*.
12. Brown hairy, at least on young shoots (hairs 2–4 mm.). Fig-body 15–25 × 12–20 mm., more or less glabrous. 27. *F. drupacea*.
- (Not brown hairy or irritant-bristly.)
- Lamina thinly coriaceous, reticulations distinct. Basal bracts annulate ..... 33. *F. altissima*.
- Lamina thickly coriaceous, reticulations invisible. Basal bracts 3, acute, concealed ..... 41. *F. xylophylla*).
10. Fig subglobose to ellipsoid; basal bracts mostly well-developed; apical bracts in a disc.
13. Brown villous-tomentose (hairs twinned microscopically). Fig 12–24 mm. wide. (subser. *Zygotricheae*).
14. Persistently tawny villous, except the upperside of the lamina. Stipules persistent on fruiting twigs. Lamina-base cordate, basal nerves 3–4 pairs. Internal bristles abundant. 37. *F. bracteata*.
14. Glabrescent or the underside of the lamina thinly villous. Stipules caducous. Lamina-base cuneate to subcordate, basal nerves 1–3 pairs. Internal bristles none .. 36. *F. consociata*.
13. Glabrous, white hairy, or if brown-hairy, then the fig 8–10 mm. wide.
15. Cystoliths mainly or entirely hypergenous, or none. Lamina elliptic to ovate, obtuse to subacutely acuminate, generally with the reticulations slightly raised on both sides. (subser. *Indicae*).
16. White to rusty tomentose. Lamina shortly elliptic, obtuse to subacuminate; lateral nerves 5–6 pairs; basal nerves elongate. Fig 8–10 mm. wide, half-covered by the basal bracts. India, Ceylon ..... 30. *F. mollis*.
16. Glabrous to thinly hairy.
17. Lateral nerves 8–12 pairs, Lamina elliptic, acuminate.
18. Fig 13–20 mm. wide. Basal nerves of lamina elongate. Twigs 5–7 mm. thick. Ceylon .... 32. *F. fergusonii*.
18. Fig 9–12 mm. wide. Basal nerves not elongate. Twig 3–4 mm. thick. W. Malaysia .... 35. *F. kerkhovenii*.

17. Lateral nerves 4-8 pairs. Lamina often ovate; basal nerves elongate.
19. Basal bracts 3-7  $\times$  10-14 mm.; fig 14-22 mm. wide. Lamina obtuse ..... 31. *F. benghalensis*.
19. Basal bracts smaller, often concealed.
20. Fig 18-27  $\times$  15-19 mm., ellipsoid; basal bracts concealed, annular. Twig 5-7 mm. thick. Stipule sericeous-villous ..... 33. *F. altissima*.
20. Fig 10-13 mm. wide, subglobose; basal bracts not annular. Twig 2-5 mm. thick .. 34. *F. pubilimba*.
15. Cystoliths amphigenous. Lamina elliptic to obovate, acuminate or stiffly coriaceous; basal nerves generally elongate. (subser. *Crassirameae*).
21. Lamina impressed-areolate beneath, obtuse to shortly, sub-acutely acuminate. Fig medium-size to large; basal bracts conspicuous, often thickened.
22. Fig 25-35 mm. wide, broadly ellipsoid, splitting round the apex. Intercostals 5-10 ..... 38. *F. stupenda*.
22. Fig not so wide, not splitting; basal bracts often thickened or resinous-lucid. Lateral nerves oblique; intercostals 1-5.
23. Lateral nerves 3-6 pairs; basal nerves  $\frac{1}{2}$ - $\frac{2}{3}$  the lamina. Fig 12-14 mm. wide, half-covered by the basal bracts. Indochina. .... 40. *F. phanrangensis*.
23. Lateral nerves 6-9 pairs; basal nerves  $\frac{1}{4}$ - $\frac{1}{2}$  lamina. Fig often larger ..... 39. *F. crassiramea*.
21. Lamina not impressed-areolate beneath.
24. Lamina obtuse, very coriaceous. Fig (25-) 37-50  $\times$  (17-) 23-33 mm., oblong, concealing the basal bracts.  
41. *F. xylophylla*.
24. Lamina acutely acuminate. Fig smaller; basal bracts not concealed.
25. Stipules persistent, 1-7 cm. long. Lamina very stiffly coriaceous. Fig 13-17 mm. wide, subglobose to ellipsoid or subconic. Climber. Borneo.  
46. *F. paracamptophylla*.
25. Stipules caducous. Banyans.
26. Fig 10-14 mm. wide, subglobose or shortly ellipsoid; basal bracts 4-8 mm. long. Twigs 3-5 mm. thick. Lateral nerves 4-7 pairs ..... 45. *F. subgelderi*.  
(Brown hairy. Lamina small. Fig 8-10 mm. wide. Basal bracts 1-3 mm. long. Burma, Thailand, Malaya.  
58. *F. calcicola*).  
(Fig-orifice widely perforate; body 9-12 mm. wide  
62. *F. pisocarpa*).
26. Fig larger; basal bracts longer. Twig thicker.
27. Stipules densely appressed-sericeous. Fig 17-32  $\times$  14-22 mm., ellipsoid; basal bracts 6-11 mm. long. Basal nerves elongate or not.  
42. *F. forstenii*.
27. Stipules glabrous or puberulous. Basal nerves elongate; lateral nerves 5-8 pairs.
28. Fig 13-20 mm. wide, subglobose or depressed-globose, half-covered by the basal bracts 7-13 mm. long. Lamina coriaceous-pliant.  
44. *F. subtectae*.
28. Fig 25-35  $\times$  20-25 mm., ellipsoid or shortly obconic, not half-covered by the basal bracts 8-10 mm. long. Lamina very stiffly coriaceous. Sumatra ..... 43. *F. juglandiformis*.

Key to the species of subsect *Dictyoneuron*

1. Fig pedunculate.
  2. Young parts brown scurfy. Fig 12–18 mm. wide, ripening green. Twig 4–7 mm. thick. Climber ..... 26. *F. globosa*.
  2. Glabrous or whitish puberulous. Fig smaller, ripening yellow to red, or pink to purple. Banyans.
    3. Peduncle 3–12 mm. long, slender. Basal bracts none or very narrow, or as a slight rim. Lateral nerves well-spaced.
      47. *F. glaberrima*.
    3. Peduncle shorter, thick. Lateral nerves close or obscure.
      4. Peduncle 1–5 mm. long; basal bracts caducous, small
        72. *F. microcarpa* var. *naumanni*.
      4. Peduncle very short; basal bracts persistent. Lamina obtuse, thick ..... 55. *F. spathulifolia* var. *substipitata*.
1. Fig sessile, or the body pedicellate.
  5. Fig-body pedicellate-pyriform; basal bracts small or minute; orifice somewhat sunken. (ser. *Dubiae*).
    6. Fig 20–30 mm. wide; basal bracts 2–5 mm. long; orifice becoming perforate. Reticulations distinct on both sides of the lamina; lateral nerves 6–10 pairs, strongly inarching. Cystoliths none
      48. *F. dubia*.
    6. Fig and basal bracts smaller. Reticulations not raised; lateral nerves 6–8 pairs. not arcuate. Cystoliths amphigenous. Aerial roots copious ..... 49. *F. kurzii*.
  5. Fig-body sessile.
    7. Fig-orifice more or less perforate, incompletely closed by the small peripheral apical bracts. (ser. *Perforatae*).
      8. Basal nerves of lamina not elongate; lamina thickly coriaceous, rarely acute. Climbers.
        9. Fig 4–6 mm. wide, truncate-ovoid, widely perforate. Lateral nerves spreading. Malaya ..... 65. *F. microsyce*.
        9. Fig 9–12 mm. wide, conical, often ridged toward the narrowly perforate apex. Lateral nerves oblique. Borneo, Riouw archipelago ..... 64. *F. acamptophylla*.
      8. Basal nerves elongate  $1/3$ – $1/2$  lamina.
        10. Fig ellipsoid-oblong 10–17  $\times$  6–12 mm.
          11. Lamina acutely acuminate; lateral nerves 5–9 pairs
            60. *F. pellucido-punctata*.
          11. Lamina obtuse to subacute; lateral nerves 3–5 pairs; basal nerves  $1/2$ – $2/3$  lamina. Mindanao ..... 61. *F. episima*.
    10. Fig subglobose or ovoid. Lateral nerves 3–6 pairs.
      12. Fig 9–12 mm. wide, orifice rather wide. Lamina broad, often obtuse or subacute ..... 62. *F. pisocarpa*.
      12. Fig 4–10 mm. wide, orifice small. Lamina narrow, generally small, acutely acuminate .... 63. *F. binnendijkii*.

7. Fig-orifice closed by 2-3 flat or convex (rarely conical) overlapping apical bracts forming a disc. (ser. *Subvalidae*).
13. Fig 11 mm. or more wide. Lamina generally acuminate.
14. Stipules persistent, 1-7 cm. long. Lamina stiffly coriaceous, oblong-elliptic; basal nerves elongate. Climber. Borneo  
46. *F. paracamptophylla*.
14. Stipules caducous, short. Banyans.
15. Basal nerves not elongate. Fig more than half-covered by the large basal bracts 9-15 mm. long  
51. *F. involucrata*.
15. Basal nerves elongate. Fig not half-covered by the basal bracts.
16. Basal bracts conspicuous. Lamina pliant-coriaceous  
50. *F. sundaica*.
16. Basal bracts small, concealed. Lamina rigidly coriaceous  
52. *F. lowii*.  
(Lamina acute, thin. Basal bracts minute .. 49. *F. kurzii*.  
Lamina obtuse; petiole short. Fig depressed globose, thick-walled ..... 70. *F. curtipes*).
13. Fig 4-11 mm. wide. Lamina small to medium-size; basal nerves often elongate.
17. Twigs 3-6 mm. thick. Leaves compact, spirally arranged.
18. Young parts brown scurfy. Lamina obtuse to acuminate; nerves often prominent below and impressed above. Stipules often persistent on fruiting twigs  
59. *F. retusa*.
18. Glabrous or white puberulous. Lamina obtuse to subacuminate, stiffly coriaceous; nerves faint or invisible. Fig umbonate with convex disc. Stipules caducous  
55. *F. spathulifolia*.
17. Twigs 1.5-3 mm. thick. Leaves laxly arranged, spirally to subdistichous.
19. Lateral nerves not spreading, the secondaries often almost as strong. Figs commonly pink to purple. Aerial roots copious ..... 72. *F. microcarpa*.
19. Lateral nerves spreading, the secondaries much less marked. Figs orange to red. Without copious aerial roots.
20. Fig 7-14 × 6-8 mm., ellipsoid-fusiform, often puberulous; apical bracts in a short cone; basal bracts narrow. Basal nerves elongate ..... 54. *F. delosycea*.
20. Fig subglobose to obconic; apical bracts in a flat disc.
21. Basal bracts 3-8 mm. wide, obtuse, wider than long. Fig subglobose. Lamina coriaceous; basal nerves elongate ..... 53. *F. sumatrana*.
21. Basal bracts 1-3 mm. long, as wide as long or narrower. Fig somewhat obconic, often with a few internal bristles. Lamina thinly coriaceous; basal nerves short.
22. Lateral nerves 8-14 pairs. Nerves and reticulations raised on both sides of the lamina. Glabrous to pale brown lanuginous. Basal bracts 2-3, often concealed ..... 56. *F. maclellandi*.
22. Lateral nerves 5-8 pairs. Basal bracts not concealed.
23. Brown hairy. Fig 7-10 mm. wide. Lamina with 3-5 intercostals ..... 58. *F. calcicola*.
23. Glabrous or white hairy. Fig 6-7 mm. wide, obconic ..... 57. *F. talboti*.

Key to the species of subject. *Benjamina*

1. Leaves drying pale green to pale brown, thinly coriaceous, the nerves raised on both sides; basal nerves not elongate. (ser. *Benjamineae*).
  2. Basal bracts conspicuous, 3–10 × 3–13 mm. Fig 15–18 mm. wide  
67. *F. stricta*.
  2. Basal bracts small, mostly concealed.
    3. Fig 20–50 × 14–25 mm., ellipsoid to oblong. Lamina 8–20 × 3–9 cm. .... 66. *F. subcordata*.
    3. Fig smaller or, if as wide, then pyriform-pedicellate. Lamina 3–12 × 1.5–6 cm. .... 68. *F. benjamina*.
1. Leaves drying dark brown, thinly to thickly coriaceous; petiole often black; basal nerves elongate or not. (ser. *Callophyllaeae*).
  4. Fig pedunculate; basal bracts large, obtuse; body 15–18 mm. wide. Philippines ..... 73. *F. baletae*.
  4. Fig sessile or smaller.
    5. Lamina obtuse or obtusely acuminate, elliptic to obovate, often thickly coriaceous; primary lateral nerves 6–11 pairs, not raised above; basal nerves elongate.
      6. Lamina very coriaceous, obtuse, spatulate-obovate, 4–10 × 2–5 cm., the veins more or less invisible. Fig 8–10 mm. wide, 1/3–½ covered by the basal bracts. Malaya, Borneo  
71. *F. tristaniiifolia*.
      6. Without such character.
        7. Basal bracts 1–3.5 mm. long. Fig 6–11 mm. wide, with a few short internal bristles ..... 72. *F. microcarpa*.
        7. Figs or basal bracts larger; no internal bristles.
          8. Leaves spirally arranged, the venation distinct on the under-side; petiole short, thick, brown. Fig depressed globose, the wall thick; basal bracts 3–5 mm. long. Asiatic mainland, Sumatra ..... 70. *F. curtipes*.
          8. Leaves subdistichous, venation obscure; petiole blackish Fig-wall not unusually thick; basal bracts 4–10 mm. long. .... 69. *F. callophylla*.
    5. Lamina acutely acuminate, mostly thinly coriaceous, nerves finely raised on both sides, elliptic (5–12 cm. long); primary lateral nerves 7–16 pairs; basal nerves not or little elongate.
      9. Fig 13–18 × 10–14 mm. Primary lateral nerves 10–14 pairs.
        10. Basal bracts joined in a short funnel, the subacute lobes 3–4.5 mm. long; body pyriform. Celebes  
76. *F. polygramma*.
      10. Basal bracts free.
        11. Basal bracts 5–8 × 6–10 mm., covering a third of the ellipsoid fig-body. New Guinea .. 77. *F. archboldiana*.
        11. Basal bracts 2–3 mm. long, often concealed; fig-body subglobose. Ceylon ..... 74. *F. trimeni*.
  9. Fig smaller, subglobose.
    12. Fig 9–10 mm. wide, thin-walled and knobby from the hard seeds, half-covered by the basal bracts 7–10 mm. long. Primary lateral nerves 7–13 pairs; petiole brown. North Borneo ..... 75. *F. palaquiiifolia*.
    12. Fig-body or basal bracts smaller, body not knobby. Petiole black
      13. Basal bracts entirely connate as a thick saucer; body 5–7 mm. wide. Primary lateral nerves 13–16 pairs. New Guinea ..... 79. *F. patellata*.
      13. Basal bracts free.
        14. Basal bracts 2.5–4 × 3–6 mm., wider than long; body 5–7 mm. wide. Primary lateral nerves 7–13 pairs. New Guinea ..... 78. *F. benjaminoides*.
        14. Basal bracts 1.5–3.5 mm. long and wide; body 6–11 mm. wide, mostly with a few short internal bristles. Primary lateral nerves 6–9 pairs; basal nerves often elongate ..... 72. *F. microcarpa*.

Key to the series and subseries of sect. *Malvanthera*

1. Anther depressed-subglobose, dehiscent transversely. Seed-ovaries immersed in the fig-wall; stigma bifid. Fig 7-11 x 4-5 cm., woody. Stipule and venation as in *F. elastica*  
101. *F. sterrocarpa*, ser. *Cyclanthereae*.
1. Anther reniform, dehiscent longitudinally and crescentically  
ser. *Malvanthereae*.
2. Basal bracts 3, persistent or, if caducous, narrowly crescentic.
  3. Basal bracts 5-7 x 7-10 mm., persistent. Secondary lateral nerves not as conspicuous as the primary (6-10 pairs). Ovaries not immersed in the fig-wall; stigma simple  
81. *F. triradiata*, subser. *Eubracteatae*.
  3. Basal bracts 0.5-3 mm. long, inconspicuous. Secondary lateral nerves almost as conspicuous as the primary (more than 10 pairs). Seed-ovaries partly immersed in the fig-wall. Stigma bifid or simple. .... subser. *Hesperidiiformes*.
2. Basal bracts 2 or 3, relatively large, very early caducous.
  4. Seed-ovaries not immersed in the fig-wall; stigma simple. Stipule 1-5 cm. long. Lamina 2-16 x 1.5-7 cm.: primary lateral nerves mostly 8-13 pairs. Fig 6-14 mm. wide, subglobose  
subser. *Platypodeae*.
  4. Seed-ovaries partly immersed in the fig-wall: stigma simple or shortly bifid. Figs, stipules and lamina generally larger, with more numerous primary lateral nerves  
subser. *Malvanthereae*.

Key to the species of subser. *Malvanthereae*

1. Fig-body 7-10 x 6-9 mm., the orifice as a minute slit: peduncle 2-4 x 2 mm., the apex slightly dilated. Lamina 4-14 x 1.5-5.5 cm. Cystoliths amphigenous. New Guinea ..... 87. *F. rhizophoriphylla*.
1. Fig and lamina larger.
  2. Fig-body 25-40 x 15-30 mm., with a probosciform apex 3-4 mm. long: peduncle 6-40 x 4-5 mm., dilated into a cupule 10-17 mm. wide. Cystoliths hypergenous or none Australia  
84. *F. watkinsiana*.  
(Fig-body 40-65 x 13-20 mm., peduncle short, the probosciform apex 4-7 x 2 mm. Queensland ..... 100. *F. crassipes*.)
2. Fig without probosciform apex.
  3. Fig on a sessile or shortly stalked adnate cupule 9-16 mm. wide: body 10-35 x 10-18 mm., subglobose to shortly oblong, the orifice as a slit. Cystoliths amphigenous. Celebes, New Guinea, Solomon Isl., New Hebrides ..... 83. *F. glandifera*.
  3. Fig-peduncle distinct, dilated at the apex into an adnate cupule 5-12 mm. wide: body 14-25 x 13-25 mm. Australia.
    4. Fig-body ellipsoid, apex mammillate: peduncle 6-13 mm. long: basal bracts 3. Young parts finely rusty scurfy. Cystoliths amphigenous. Stomata sunken ..... 86. *F. baileyana*.
    4. Fig-body subglobose, not mammillate: peduncle 12-35 mm.: basal bracts 2. Lamina with the areolae at first finely white felted beneath. Cystoliths hypergenous. Stomata not or scarcely sunken ..... 85. *F. macrophylla*.  
(Fig-body 35-50 x 16-20 mm., cylindrical, the orifice as a small slit between two slightly gibbous apical bracts, Nerves finely impressed above. Queensland ..... 99. *F. pleurocarpa*.)

Key to the species of subser. *Platypodeae*

1. All parts at first brown tomentose or brown scurfy. Basal bracts 3. Australia.
  2. Fig with a short peduncle not dilated into a disc: orifice bilabiate. Lamina lanceolate-elliptic to oblong-elliptic, stiffly coriaceous: petiole 3-6 cm. Tepals 4-6 ..... 88. *F. destruens*.
  2. Fig seated on a sessile or substipitate disc 4-8 mm. wide: orifice 3-4 radiate. Lamina elliptic to obovate-elliptic: petiole 1-3 cm. Tepals 3-4 ..... 89. *F. rubiginosa*.
1. Glabrous or white hairy. Fig-peduncle not or little dilated at the apex. Basal bracts 2 or 3.
  3. Villous lanuginous (hairs 1-1.5 mm.). Lamina with the areolae minutely foveolate beneath. Basal bracts 2. Cystoliths none. Australia ..... 90. *F. leucotricha*.
  3. Thinly villous (hairs 0.5-1 mm.) or glabrous. Areolae not foveolate.
    4. Fig 6-9 or 10-13 mm. wide: peduncle variable, often short, dilated 2-4 mm. wide at the apex: basal bracts 2. Lamina thinly coriaceous. Cystoliths amphigenous or hypergenous. Glabrous to puberulous. Widespread, Celebes to Polynesia ..... 91. *F. obliqua*.
    4. Fig 10-14 mm. wide: basal bracts 3. Cystoliths hypergenous or none.
      5. Peduncle 0-6 (-10) mm., the apex dilated 2-4 mm. wide. Lamina thinly coriaceous. Thinly villous. Australia ..... 92. *F. subpuberula*.
      5. Peduncle 0-6 (-10) mm., the apex dilated 2-4 mm. wide. Lamina thickly or stiffly coriaceous. Glabrous to velutinous. Soemba, Ternate, New Guinea. Australia ..... 93. *F. platypoda*.

Key to the species of subser. *Hesperidiiformes*

1. Fig-body 15-40 x 7-23 mm., ellipsoid to cylindrical, apex somewhat umbonate to shortly rostrate: peduncle 3-15 x 1.5-4 mm., rather slender, not dilated at the apex. New Guinea, Solomon Islands ..... 98. *F. xylosyca*.
1. Fig-body larger and/or the peduncle stouter and, often, dilated upwards as a cupule adnate to the base of the fig-body.
  2. Fig-body cylindrical, 35-65 x 13-20 mm.: peduncle short, obconic or dilated at the apex. Stigma ? simple. Cystoliths hypergenous. Queensland.
    3. Fig with probosciform apex 4-7 x 2 mm. Lamina ovate or broadly elliptic: primary lateral nerves 8-10 pairs: basal nerves rather prominent ..... 100. *F. crassipes*.
    3. Fig without such apex. Lamina lanceolate-ovate or lanceolate-elliptic: primary lateral nerves 15-20 pairs: basal nerves short. .... 99. *F. pleurocarpa*.
  2. Fig-body wider, ellipsoid to subglobose. Stigma bifid. Cystoliths amphigenous or hypergenous. New Guinea.
    4. Lamina ovate-cordate to broadly elliptic, very coriaceous: basal nerves  $\frac{1}{4}$ - $\frac{1}{3}$  lamina, conspicuous. Peduncle not dilated at the apex ..... 94. *F. augusta*.
    4. Lamina elliptic: basal nerves short, inconspicuous. Peduncle generally dilated at the apex.
      5. Peduncle 10-50 x 3-5 mm. (-10 mm., living), distinct, dilated or not at the apex: fig-apex umbonate ..... 95. *F. hesperidiiformis*.
      5. Peduncle short, thick, 6-8 mm. long and wide, dilated 10-14 mm. wide at the apex.
        6. Fig-apex strongly umbonate with 2 (-4) gibbous apical bracts. Primary lateral nerves 15-23 pairs ..... 96. *F. mafuluensis*.
        6. Fig-apex not umbonate, the orifice as a triradiate groove. Primary lateral nerves 24-27 pairs ..... 97. *F. heteromeka*.

Key to the series and subspecies of subgen. *Pharmacosycea*  
sect. *Oreosycea*

1. Leaves drying grey-green to pale brownish; reticulations often raised on one or both sides; basal glands rarely present. Fig-peduncles well-developed; sclerotic cells throughout the fig-wall. Stamens generally 2 in the ostiolar flowers. Medium to large trees ..... ser. *Vasculosae*.
2. Leaves nitid, coriaceous; cystoliths hypogenous ... subser. *Vasculosae*.
2. Leaves not nitid, membranous to chartaceous-subcoriaceous; cystoliths amphigenous to hypogenous Deciduous. .... subser. *Albipilae*.
1. Leaves generally drying brown; basal glands 2, generally distinct.
3. Leaf more or less coriaceous; stipule often elongate. Fig-peduncles often short. Stamen generally 1. Large trees of India to New Guinea, few in the Solomon Isl. .... ser. *Nervosae*.
3. Leaf membranous to coriaceous; stipule not elongate. Stamens 1, 2, or 3. Shrubs to medium-sized trees. Solomon Isl., New Hebrides, New Caledonia, Fiji ..... ser. *Austrocaledonicae*.

Key to the species of sect. *Oreosycea*

1. Internal bristles abundant, conspicuous. Sclerotic cells abundant in the fig-wall (? *F. longipes*, *F. heteroselis*; few or none in *F. habropylla*).
2. Leaves membranous, drying grey-green or (*F. gratiosa*) brown, spirally arranged. Figs pedunculate. Male flowers ostiolar (rarely disperse). Stamen 1 (-2). Asia, New Guinea.
3. Brown hairy. Lamina elliptic, caudate; lateral nerves 10-14 pairs; basal nerves short. Celebes ..... 107. *F. gratiosa* var. *caudata*.
3. White villous to glabrous.
4. Cystoliths amphigenous. Lamina ovate-cordate; lateral nerves 8-16 pairs; basal nerves not elongate ..... 102. *F. albipila*.
4. Cystoliths hypogenous. Lamina obovate; lateral nerves 4-5 pairs; basal nerves  $\frac{1}{3}$ - $\frac{1}{2}$  lamina. Indochina, Thailand, Andamans ..... 103. *F. capillipes*.
2. Without such character. Leaves coriaceous or distichous. Stamens 2-3, rarely 1. New Guinea, New Caledonia, Loyalty Isl., New Hebrides.
5. Fig sessile or nearly. Basal bracts 4-6 mm. long. Male flowers ostiolar. Tepals mostly gamophyllous. Twigs 7-12 mm. thick. Leaves spirally arranged, obovate.
6. Lamina obtuse, base cuneate; lateral nerves 11-14 pairs, thinly brown villous beneath. Fig 10-11 mm. wide, half-covered by the basal bracts ..... 126. *F. barraui*.
6. Lamina acute, base subcordate or subauricled. Basal bracts relatively shorter.
7. Fig 15-22 mm. wide, shortly brown villous. Lamina 30-60 x 8-13 cm.; lateral nerves 12-20 pairs ..... 124. *F. crescentioides*.
7. Fig 10-15 mm. wide, glabrous. Lamina 14-22 x 5-8 cm., stiffly coriaceous; lateral nerves 8-12 pairs ... 125. *F. auriculigera*.
5. Figs stalked; basal bracts generally shorter. Male flowers disperse.
8. Leaves distichous, oblong-elliptic, short-petiolate. Figs villous.
8. a. Lamina submembranous, velvety below: lateral nerves 8-11 pairs, intercostals 0-2. Twigs and petioles 2 mm. thick. Figs 10 mm. wide. New Caledonia ..... 129. *F. versicolor*.
8. a. Lamina coriaceous, smooth: lateral nerves 15-22 pairs, intercostals 2-10. Twigs and petioles 4-5 mm. Fig 20 mm. wide. New Guinea ..... 122. *F. hadroneura*.

8. Leaves spirally arranged, coriaceous; lamina not asymmetric.
9. Lamina stiffly coriaceous, oblong (often narrowly). Cystoliths sometimes amphigenous. Figs generally long-stalked, 10–15. wide Tepals more or less free ..... 127. *F. asperula*.
9. Without such character. Cystoliths hypogenous. Tepals mostly gamophyllous.
10. Lamina rather small; lateral nerves 6–9 pairs. Fig 10–12 mm. wide, glabrous. Male flowers sparse, shorter than the gall-flowers. Internal bristles –0.5 mm.  
128. *F. mutabilis*.
10. Lateral nerves 8–15 pairs. Figs larger or ellipsoid. Internal bristles –1 mm. long.
11. Leaf-base cordate-auricled; petiole short, stout. Fig 10–15 mm. wide, peduncle 4–5 mm. long. Densely velutinous  
130. *F. heteroselis*.
11. Leaf-base not auricled.
12. Basal bracts 3–5 x 3–6 mm. Fig 20–40 mm. wide, pyriform, brown velutinate, the thick wall with few or no sclerotic cells. Leaf-base cordate to widely cuneate ..... 131. *F. habrophylla*.
12. Basal bracts 1–3 mm. long. Fig thinly white to brownish hairy or glabrous.
13. Fig-wall with abundant sclerotic cells; body ellipsoid. Stamens 2 ..... 133. *F. granatum*.
13. Fig-wall without sclerotic cells, body subglobose. Stamen 1 (–2) ..... 132. *F. maiialis*.
1. Internal bristles few and minute, or none.
14. Fig sessile, sclerotic cells abundant in the wall. Tepals 3–4, free or shortly joined. Stipule often prominent. Glabrous or thinly appressedly hairy.
15. Twigs 6–7 mm. thick. Stipule 4–10 cm. long, very prominent. Lamina large, ovate-cordate, intercostals many. Fig 15–25 mm. wide, Basal bracts 5–10 mm. long. Male flowers ostiolar  
Stamens 1–2. Philippines ..... 118. *F. gigantifolia*.
15. Twigs 1.5–4 mm. thick. Stipules 1–5 cm. long. Lamina elliptic to lanceolate; intercostals few or none. Fig smaller.
16. Basal bracts 3.5–11 mm. long. Fig often ellipsoid. Lamina lanceolate-elliptic, attenuate acute to obtuse; lateral nerves 11–19 pairs, at a wide angle. Stipule 2–5 cm. long. Male flowers disperse, abundant; stamen 1 ... 120. *F. pachystemon*.
16. Basal bracts 1–3.5 mm. long. Fig subglobose.
17. Male flowers ostiolar. Lamina elliptic to lanceolate; lateral nerves 9–16 pairs. Fig 7–10 mm. wide.  
119. *F. subtrinervia*.
17. Male flowers disperse.
18. Basal bracts 2–3.5 mm. long. Fig 10–11 mm. wide. Male flowers sessile. Leaves in compact rosettes, narrowly obovate, subacute. Stipule –25 mm. long. Glabrous.  
121. *F. madhucifolia*.
18. Basal bracts 1–1.5 mm. long. Fig 6–8 or 10–15 mm. wide. Disperse male flowers pedicellate. Leaves laxly spiral. Stipule 1–4 cm. long. Thinly appressedly hairy  
114. *F. pubinervis*.

## 14. Figs stalked.

## 19. Male flowers ostiolar.

20. Cystoliths amphigenous. Rami- or cauliflorous. Stamen 1.

21. White hairy. Lamina ovate-cordate. Fig-wall with abundant sclerotic cells. Tepals free. Stigma bifid. Madagascar  
*F. assimilis*.21. Glabrous or thinly puberulous. Lamina elliptic or ovate, veins not raised below. Fig-wall without sclerotic cells. Tepals gamophyllous. Stigma not bifid. Figs in dense, twiggy, cauliflorous bunches. Fiji ..... 145. *F. pritchardii*.

20. Cystoliths hypogenous. Stamens 1-3. Figs mostly axillary.

22. Lamina membranous to coriaceous, drying green to grey-green or pale brown; often no distinct basal glands. Fig-wall with sclerotic cells. Asia.

23. Basal nerves elongate,  $\frac{1}{3}$ - $\frac{1}{2}$  lamina; lateral nerves 4-5 pairs. Lamina membranous, not nitid. Thinly white villous to glabrous. Indochina, Thailand, Andamans.  
103. *F. capillipes*.

23. Basal nerves short; lateral nerves more. Lamina coriaceous, nitid, reticulations often raised above.

24. Brown villous. Lateral nerves strongly raised below. Celebes ..... 107. *F. gratiosa*.

24. Glabrous or thinly white puberulous.

25. Lamina obtuse, spatulate-obovate, stiffly coriaceous. Fig-orifice mammillate; peduncle 6-10 mm.; pedicel 0. Tepals free. Philippines ..... 106. *F. bataanensis*. (Tepals gamophyllous. Leaves in close rosettes. Peduncle none. Celebes ..... 112. *F. kjellbergii*).25. Lamina acute to acuminate, thinly coriaceous. Fig-orifice plane; peduncle 1-11 mm.; pedicel -7 mm. Tepals gamophyllous (gall- and female). China to Java and Borneo ..... 105. *F. vasculosa*

22. Lamina coriaceous or bullate, drying brown or dark, mostly with two basal glands. Perianth often gamophyllous. New Caledonia.\*

26. Leaves large, more than 5 cm. wide. Figs more than 12 mm. wide: basal bracts 2-5 mm. long.

27. Lamina bullate, obovate. Fig 12-15 mm. wide: sclerotic cells abundant in the wall: basal bracts caducous  
142. *F. pantheriana*.

27. Lamina not bullate. No or few sclerotic cells in the wall.

28. Fig 20-40 mm. wide, often brown velutinate, wall thick: basal bracts persistent. Leaf-base cordate to widely cuneate ..... 131. *F. habrophylla*.28. Fig 15-20 mm. wide: basal bracts caducous. Leaf-base cuneate ..... 141. *F. austrocaledonica*.

26. Leaves small, 0.5-5 cm. wide. Fig 8-12 mm. wide: basal bracts 1-1.5 mm. long, often caducous.

29. Fig-wall with few or no sclerotic cells: peduncle 2-4 mm. long: pedicel 0-1 mm. long. Seed strongly keeled. Lateral nerves strongly raised below  
137. *F. webbiana*.

29. Fig-wall with abundant sclerotic cells: peduncle 0-2 mm. long: pedicel 1-8 mm. Seed slightly keeled. Lateral nerves scarcely raised below.

\* New Guinea; fig 12-20 mm. wide, basal bracts caducous: lamina small: lateral nerves 4-6 pairs, impressed above ..... 410. *F. microdictya*.

29. a. Prostrate shrub of rocky rivers. Lamina narrowly lanceolate, acute, 0.5–2 cm. wide: lateral nerves 10–20 pairs. Fig-pedice! 1–3 mm. long  
144. *F. cataractorum*.
29. a. Erect shrub or tree. Lamina elliptic to obovate, obtuse, 2–5 cm. wide: lateral nerves 7–12 pairs. Pedicel 3–8 mm. long ..... 143. *F. vieillardiana*.
19. Male flowers disperse (in some cases sparse).
30. Cystoliths amphigenous. Lamina large, lanceolate-elliptic or lanceolate-obovate, with two free basal auricles 2–3 cm. long; lateral nerves 18–21 pairs. New Caledonia.  
134. *F. otophora*.
30. Cystoliths hypogenous. Lamina without auricles.
31. Male flowers dimorphous, sessile with 2 stamens, stalked with 1 stamen. Tepals 4–6, free. Fig 15–25 mm. wide, mostly solitary, sclerotic cells abundant in the wall. Lamina broad, scabrid beneath, drying pale; sapling leaf very large. Ceylon, India to Moluccas ..... 104. *F. callosa*.
31. Male flowers not dimorphous. Lamina not scabrid beneath. Tepals mostly 3–4, often joined.
32. Fig 20–40 mm. wide. Stamens 2–3. Stipule not elongate.
33. Fig-wall 5–10 mm. thick, wholly sclerotic; cavity compressed. Lamina thickly coriaceous, elliptic, obtuse, base cuneate; lateral nerves 7–9 pairs. Tepals free. New Guinea ..... 108. *F. pachysycea*.
33. Fig-wall soft, with few or no sclerotic cells; cavity not compressed. Lamina thinly coriaceous, subacute, base cordate to rounded or widely cuneate. Tepals joined. New Caledonia. Loyalty Islands.
34. Fig brown velutinate; other parts glabrous or thinly hairy ..... 131. *F. habrophylla*.
34. Fig glabrous.
35. Twigs, petioles, underside of nerves brown villous. Nerves strongly raised beneath. Fig—peduncle 13–18 mm. long ..... 135. *F. dzumacensis*.
35. Thinly appressedly hairy, glabrescent. Fig-peduncle shorter ..... 136. *F. leiocarpa*.
32. Fig smaller or, if 20–30 mm. wide, then the stipule elongate. Stamen 1 or 2.
36. Stipule prominent, often curved, 20–75 mm. long. Stamen 1.
37. Lateral nerves 5–9 pairs, 0–3 vague intercostals. Leaves more or less distichous.
38. Twigs, stipules, underside of midrib thinly appressedly pale brown hairy. Fig-wall with abundant sclerotic cells. Tepals free or shortly joined. Sumatra to Moluccas ..... 114. *F. pubinervis*.
38. Glabrous. Fig-wall with few or no sclerotic cells. Perianth gamophyllous, 3–4 short lobes. New Guinea ..... 115. *F. subnervosa*.
37. Lateral nerves 9–14 pairs or more. Intercostals often numerous. Perianth often gamophyllous.
39. Lamina obtuse to subacute, rarely acute, coriaceous; lateral nerves at a wide angle, scarcely raised below. Fig 9–12 mm. wide, wall with abundant sclerotic cells. Glabrous or minutely appressedly hairy. Moluccas, New Guinea, Solomon Islands  
110. *F. hombroniana*.
39. Lamina acute to acuminate; lateral nerves curved-ascending, raised below. Fig larger.

40. Glabrous. Stipule 2-5 cm. long. Fig 18-30 mm. wide, with or without sclerotic cells; peduncle 2-15 mm. Leaves distichous. Philippines, Moluccas to Solomon Islands  
113. *F. polyantha*.
40. Thinly appressedly pale brown puberulous. Stipule 15-30 mm. long. Fig 14-20 mm. wide, wall with abundant sclerotic cells; peduncle -3 mm. long.
41. Fig without pedicel, apical bracts projecting 1-2 mm., body thinly appressedly hairy. Latex white. Leaves in rosettes. New Guinea, Solomon Isl. .... 111. *F. edelfeltii*.
41. Fig-pedicel 4-13 mm. long, apical bracts not projecting, body soon glabrous. Latex yellow. Leaves distichous. Malaya to Philippines and Celebes ..... 116. *F. magnoliaefolia*.
36. Stipule not so prominent.
42. Leaves distichous, subacute. Fig 8-13 mm. wide, in long panicle cauliflorous bunches, wall with abundant sclerotic cells. Stamen 1. New Caledonia  
138. *F. racemigera*.
42. Leaves spirally arranged. Not cauliflorous.
43. Lateral nerves strongly raised below. Stamens 1-2.
44. Shrub or small tree. Lower laminas -34 x 7 cm., lanceolate-obovate, attenuate to the subcordate base; upper laminas elliptic, 7-14 x 2-4.5 cm., subacute to subacuminate with 6-9 pairs of lateral nerves. Fig 10-12 mm. wide, without sclerotic cells; basal bracts caducous. New Caledonia ..... 137. *F. webbiiana*
44. Large trees. Leaves not so dimorphous, acute or acuminate. Fig-wall with abundant sclerotic cells; basal bracts persistent; peduncle -3 mm. long.
45. Fig without pedicel, 15-20 mm. wide, apical bracts projecting 1-2 mm., body thinly appressedly puberulous. Male flowers sparse. Latex white. New Guinea ... 111. *F. edelfeltii*.
45. Fig-pedicels 3-13 mm. long, apical bracts not projecting, body soon glabrous. Latex yellowish.
46. Fig 14-20 mm. wide. Lateral nerves 8-20 pairs, 3-9 intercostals. Latex yellow to orange yellow. W. Malaysia .. 116. *F. magnoliaefolia*.
46. Fig 8-12 mm. wide. Lateral nerves 7-11 pairs, 0-2 intercostals. Later white, then pale yellow on exposure. Ceylon, Asiatic mainland (except Malaya) ..... 117. *F. nervosa*.
43. Lateral nerves scarcely raised below. Lamina often small or obtuse.
47. Shrub. Lamina lanceolate, 8-13 mm. wide. Fig solitary, wall with sclerotic cells. Stamens 2-3. New Caledonia ..... 144. *F. cataractorum*.
47. Trees. Lamina wider. Figs generally paired.
48. Lamina very stiffly coriaceous, obtuse, nitid, veins obscure. Fig 9-12 mm. wide, peduncle 1-3 mm., pedicel 1-4 mm., wall with sclerotic cells. Stamen mostly 2. New Caledonia .....  
139. *F. nitidifolia*.
48. Lamina thinly coriaceous. Fig-peduncle or pedicel longer.
49. Fig-peduncle 7-13 mm., pedicel none or very short. Stamen 1. Fiji, Solomon Isl. ....  
140. *F. smithii*.
49. Fig distinctly pedicellate, peduncles 0-6 mm. Lateral nerves 6-9 pairs.

50. Lamina broadly elliptic, lateral nerves curved-ascending. Fig 10–17 mm. wide, peduncle –6 mm., wall with few or no sclerotic cells. Perianth gamophyllous. 3–4 lobed. Stamen 1. New Guinea ..... 115. *F. subnervosa*.
50. Lamina small, lateral nerves at a wide angle. Fig 6–12 mm. wide, peduncle none, wall with abundant sclerotic cells.
51. Fig pyriform. Tepals more or less free. Stamens 2. Lamina elliptic, subacute to subacuminate. New Guinea ..... 109. *F. ihuensis*.
51. Fig subglobose. Perianth gamphyllous, 3 (–4) lobed. Stamen 1. Lamina obovate, obtuse to subacute; leaves in compact clusters. Celebes ..... 112. *F. kjellbergii*.

## Species Incertae Sedis (New Guinea)

- Twigs brown velutinate (hairs 0.2 mm. long). Lamina 20–33 x 11–17 cm.; lateral nerves 15–22 pairs; petiole 15–20 x 4–5 mm. Fig stalked ..... 122. *F. hadroneura*.
- Twigs brown villous (hairs 0.5–1 mm. long). Lamina 10–26 x 5–14 cm., narrowly auricled at the base; lateral nerves 10–15 pairs; petiole 6–20 x 3 mm. Fig ? ..... 123. *F. pseudojaca*.

Key to the sections of subgen. *Ficus*

1. Root-climbers. Leaves distichous, entire, mostly coriaceous: appressed bathyphylls usually present. Fig with a collar of 3 basal bracts, no lateral bracts. Female stigma generally bifid. Seeds oblong, generally compressed and keeled. Hairs generally closely septate. Microscopic gland-hairs peltate.
  2. Male and neuter flowers disperse, abundant, pedicellate. Stamen 1, not mucronate. Tepals mostly 3, red or white. Fig usually large, often cauliflorous ..... sect. *Kalosyce* (p. 128).
  2. Male and neuter flowers ostiolar or, if disperse, mostly sessile. Stamens 2, mucronate or not. Tepals 3–5, red. Fig with the internal bracts of the orifice generally strongly inflexed and not interlocking ..... sect. *Rhizocladus* (p. 123).
1. Trees or shrubs, in some cases epiphytic, strangling or scrambling (rarely root-climbing). Seed not oblong-compressed. Hairs not septate. Microscopic gland-hairs various, mostly not peltate.
  3. Perianth gamophyllous (saccate, cupular, annular), entire (or split by the enlarging ovary), membranous, or none. Male flowers ostiolar: stamen 1, less often 2. Gall-stigma widely infundibuliform: female stigma simple. Lamina mostly without basal glands: often with a subnodal gland on the twig. Figs with or without lateral bracts, mostly with a collar of 3 basal bracts, often cauliflorous ..... sect. *Sycocarpus* (p. 147).
  3. Perianth of separate tepals or, if joined, then lobate. Gall-stigma narrowly infundibuliform to subclavate. Lamina often with glands in the axils of the main basal nerves: subnodal glands in some cases.
  4. Stamens 2 or more, in a few species 1\*. Fig with a collar of 3 basal bracts, no lateral bracts. Leaves symmetric.

\* Single stamens in *F. subincisa* and *F. langkokensis* (scattered male flowers); in *F. chartacea*, *F. tuphapensis*, and ser. *Auratae* subser. *Monandreae* (with tuberculate seeds and, in most cases, no cystoliths).

5. Large, often buttressed, trees, mostly cauliflorous. Male flowers ostiolar, often sessile and compressed: filaments shortly joined. Tepals pallid or red, membranous, entire or laciniate. Stigma thick, conical, simple ..... sect. *Neomorphe* (p. 146).
5. Shrubs to medium-sized trees, rarely creepers or cauliflorous. Male flowers mostly pedicellate, ostiolar or disperse, not compressed: filaments mostly free. Tepals dark red or pink and entire, or colourless and setose (then with copious chaffy internal bristles). Style slender; female stigma often bifid  
sect. *Ficus* (p. 117).
4. Stamen 1 or, if 2, then the fig with lateral bracts or without a collar of basal bracts. Seed smooth or minutely reticulate.
6. Male flowers disperse and ostiolar: stamens generally 2. Fig ramiflorous, pedicellate without a collar of basal bracts, with lateral bracts on the body. Ovary white  
282. *F. tsiangii*, sect. *Sinosycidium*.
6. Male flowers ostiolar. Stigma simple.
  7. Seed strongly compressed, generally with a double keel at the base, ovate-oblong to auriculiform. Flowers mostly sessile. Ovaries dark red or red-spotted, compressed: style strongly lateral to gynobasic, glabrous. Leaves entire, usually symmetric. Trees or shrubs, never epiphytic  
sect. *Adenosperma* (145).
  7. Seed lenticular to shortly oblong, rarely with a double keel. Flowers often pedicellate. Ovary white: style subterminal, rarely strongly lateral. Leaves often toothed or asymmetric. Trees, shrubs, banyans, epiphytes or scrambling climbers  
sect. *Sycidium* (p. 130).

Key to the subdivisions of sect. *Ficus*

1. Seed tuberculate or echinate, with double keel at the base, (if smooth or faintly keeled, then the tepals white and densely setose). Male flowers ostiolar (except *F. langkokensis*). Cystoliths none (except *F. langkokensis*, *F. tuphapensis* ..... subsect. *Eriosyceae*).
2. Tepals of gall- and female flowers densely setose, white or yellowish  
ser. *Auratae* (p. 122).
3. Male and neuter flowers with red or white tepals, not setose. Stamens 2. Leaves often large ..... subser. *Auratae*.
3. Male and neuter tepals white and setose. Stamen 1. Fig and leaf often small ..... subser. *Monandreae*.
2. Tepals red, glabrous or ciliolate on the edges or the tip  
ser. *Eriosyceae*
4. Leaves white, grey, or fulvous felted beneath with undulate hairs concealing the areolae ..... subser. *Eriosyceae* (p. 121).
4. Leaves not so felted beneath.
  5. Leaves dentate or denticulate, long-petiolate, often palmately lobed (at least as sapling) ..... subser. *Trichosyceae* (p. 121).
  5. Leaves generally entire, often short-petiolate, not palmately lobed (rarely as sapling).
  6. Gall-figs ripening green or yellow, dehiscent. Leaves with regular, often numerous, intercostals  
subser. *Dehiscentis* (p. 122).
  6. Gall-figs indehiscent, ripening red as the seed-figs. Leaves often small or narrowly cuneate at the base; intercostals mostly few and lax. Stamens 1-2 ..... subser. *Cuneifoliae* (p. 122).

1. Seeds smooth, not or slightly keeled. Tepals mostly glabrous. Leaves with cystoliths ..... subject. *Ficus*.
7. Seed compressed, auriculiform. Perianth cupular. 3-4-lobed. Cystoliths hypogenous. Leaves lanceolate. Philippines  
147. *F. rivularis*, ser. *Rivulares*.
7. Seed lenticular or reniform, not compressed. Tepals free (except *F. abelii*).
8. Cystoliths amphigenous. Figs without sclerotic cells.
  9. Pachycaul shrub. Leaves large, obovate, dentate, short-petiolate. Flowers sessile. Philippines  
148. *F. pseudopalma*, ser. *Pseudopalmeae*.
  9. Freely branched with thin twigs. Leaves elliptic-lanceolate. Flowers pedicellate. Asiatic mainland ... ser *Sinosyceae* (p. 118).
8. Cystoliths hypogenous.
  10. Male flowers disperse (ostiolar in a few species). Seeds 1-3 mm. long, numerous in each fig ..... ser. *Podosyceae*.
  11. Gall-flowers both sessile and pedicellate, the tepals nearly or quite as long as the sessile or substipitate ovary. Female tepals long or short ..... subser. *Podosyceae* (p. 119).
  11. Gall-flowers sessile, rarely substipitate, the tepals much shorter than the long-stalked ovaries. Female tepals much shorter than the ovary ..... subser. *Basitelpalae* (p. 120).
10. Male flowers ostiolar.
  12. Seeds 1-2 mm. long, lenticular, numerous. Tepals white to reddish, thin. Gall-ovary smooth. Fig often solitary and large. Leaves cordate or palmately lobed, often dentate  
ser. *Cariceae* (p. 118).
  12. Seeds 3-6 mm. long, reniform, few in each fig. Tepals dark red, often short and thick. Gall-ovary often rugose-angular. Figs paired, often small. Leaves elliptic-lanceolate, or obovate-obtuse with dichotomous midrib, entire. Often epiphytic. Western Malaysia ... ser. *Erythrogynae* (p. 119).

Key to the species of ser. *Sinosyceae*

1. Tepals white or yellowish: male flowers ostiolar, stamens 2-5, often with a pistillode. Lamina serrato-dentate, at least distally, without basal glands: petiole 5-25 mm. Apical bracts of fig erect, 1-2 mm. long. Medium size to large tree (20 m.) ..... 149. *F. henryi*.
1. Tepals dark red: male flowers ostiolar and disperse, stamen 1 in the subsessile ostiolar flowers, 2 (-3) in the pedicellate disperse flowers. Lamina usually entire, with 2 basal glands: petiole 3-8 mm. Apical bracts of fig scarcely projecting. Shrub or small tree.  
150. *F. subincisa*.

Key to the species of ser. *Cariceae*

1. Leaves smooth, entire, ovate-elliptic, subcordate. Tepals reddish pink. Bonin Isl. .... 153. *F. iidaiana*.
1. Leaves scabrid, generally dentate and, at least the sapling, palmately lobed.
  2. Fig 11-17 mm. wide. Tepals white, puberulous. Twigs slender, 1.5-4 mm. thick. Lamina becoming simple, ovate with cordate, rounded or widely cuneate base, dentate or serrate. north and east Africa, Asia Minor, India ..... 152. *F. palmata*.
  2. Figs larger, Tepals often glabrous, white to pink. Twigs stouter. Leaves generally palmately lobed, denticulate. Asia Minor, and cultivated  
151. *F. carica*.

Key to the species of ser. *Erythroygyneae*

1. Leaves all penninerved, lanceolate, acute or obtuse, to spatulate, small: figs 3-7 mm. wide: gall-flowers sessile with angular-rugose ovary ..... 155. *F. oleaefolia*.
1. Leaves penninerved, lanceolate-acute, and the figs larger, or the leaves obovate-obtuse with the midrib dichotomous: gall-flowers often pedicellate, the ovary angular-rugose or not ..... 154. *F. deltoidea*.

Key to the species of subser. *Podosyceae*

1. Creeping plants, rooting at the nodes. Figs and leaves small. Formosa.
  2. Lamina 0.5-2 × 0.4-1 cm., obtuse or subacute; petiole -3 mm. long. Peduncles 1-2 mm. .... 171. *F. vaccinioides*.
  2. Lamina larger, acute to acuminate; petiole 5-15 mm. Peduncle 3-5 mm. .... 170. *F. tannoensis*.
1. Shrubs or trees, generally erect.
  3. Finely rubiginous scurfy on the young shoots and figs, otherwise glabrous or thinly hairy. Lamina acuminate to shortly caudate, basal nerves  $\frac{1}{2}$ - $\frac{1}{2}$  lamina: intercostals well-marked. China, Indochina ..... 196. *F. langkokensis*.
  3. Not rubiginous scurfy.
    4. Internal bristles abundant. Gall-figs with sclerotic cells in the wall. Stipules generally hairy. Fig pedunculate. Burma, Formosa, Philippines, Celebes, Moluccas, New Guinea ..... 160. *F. pedunculosa*.
    4. Internal bristles none, or few and minute.
      5. Lamina elliptic, attenuato-acuminate, very smooth, thinly coriaceous; nerves scarcely raised below, curved-ascending, basal nerves short. Tree -17 m. high, glabrous or puberulous. Himalayas, Yunnan ..... 156. *F. neriifolia*.
      5. Without such character; generally shrubs or small trees.
        6. Figs 11-20 mm. wide, solitary, pedunculate.
          7. Fig-body 11-15 mm. wide, subglobose, smooth, with obtuse apical and basal bracts 2-3 mm. wide. Male flowers disperse, shorter than the gall-flowers. Leaf rather long-petiolate, not narrowly lanceolate. Japan to Indochina ..... 161. *F. erecta*.
          7. Fig-body often larger, pyriform or ellipsoid, rarely subglobose. Male flowers ostiolar (rarely disperse). Riverside shrubs with narrow or lanceolate leaves.
        8. Fig ribbed or sulcate towards the apex; abundant sclerotic cells in the wall. Lateral nerves curved-ascending. Assam, Burma, Yunnan to Malaya ..... 168. *F. ischnopoda*.
        8. Fig smooth, pyriform, with spongy wall; no sclerotic cells. Lateral nerves short, straight, or little curved. China, Indochina ..... 157. *F. pyriformis*.
  6. Figs smaller or sessile or paired.
    9. Lamina obtuse or subacute. Fig pedunculate.
      10. Fig 7-8 mm. wide, peduncle 7-10 mm. Lamina 4-8 x 1.5-4 cm., minutely auricled at the base. Philippines ..... 172. *F. edanoi*.
      10. Fig 10-15 mm. wide. Lamina not auricled.
        11. Lamina much longer than wide, narrowly elliptic to lanceolate-oblong or obovate; lateral nerves 7-11 (-15) pairs. Tepals longer than the ovaries. Basal bracts caducous; sclerotic cells abundant in the fig-wall. China, Indochina ..... 159. *F. variolosa*.
        11. Lamina little longer than wide, broadly obovate; lateral nerves 4-7 pairs. Bonin Isl ..... 173. *F. boninsimae*.

- 9. Lamina acute, acuminate, or caudate.
- 12. Basal nerves elongate  $\frac{1}{3}$ – $\frac{1}{2}$  lamina. Rather long-petiolate.
  - 13. Stipules hairy. Lamina smooth, base cuneate. Peduncle 3–8 mm. China, Indochina ..... 162. *F. trivialis*.
  - 13. Stipules glabrous. Lamina scabrid, base rounded to widely cuneate. Peduncle 0–3 mm. Burma, Yunnan, Indochina ..... 163. *F. chapaensis*.  
(Fig sessile, 10–16 mm. wide. Lamina smooth. China  
164. *F. heteromorpha*.)
- 12. Basal nerves not elongate.
  - 14. Lamina caudate, lanceolate-oblong; lateral nerves many, perpendicular to the midrib. Assam, Burma, Yunnan  
158. *F. filicauda*.
  - 14. Not caudate.
    - 15. Lamina scabrid above. Fig 7–10 mm. wide, peduncle 1–3 mm. Villous or hispid. India, Burma, China, Indochina ..... 165. *F. gasparriniana*.
    - 15. Lamina not scabrid or, if slightly, then the fig larger and sessile.
      - 16. Fig 10–16 mm. wide, sessile; basal bracts 2–3.5 mm. long. Lamina very variable in shape, pandurate-lobate to elliptic and obovate, often long-petiolate. China ..... 164. *F. heteromorpha*.
      - 16. Fig pedunculate; basal bracts 1–2 mm. long. Short-petiolate.
        - 17. Lamina very thin, membranous, drying bluish green, the reticulations not or scarcely visible. Formosa, China, Indochina  
169. *F. formosana*.
        - 17. Lamina subcoriaceous, not drying bluish green, the reticulations visible.
        - 18. Lamina narrowly elliptic to lanceolate. Fig generally solitary. Riparian shrubs.
          - 19. Fig subcylindric, finely ribbed. Indochina  
168. *F. ischnopoda*.
          - 19. Fig subglobose, smooth; peduncle 2–55 mm. long. China, Indochina, Thailand  
167. *F. stenophylla*.
        - 18. Lamina elliptic, obovate, or pandurate.
          - 20. Fig 6–9 mm. wide, subglobose. Lamina 3–10 x 1.5–5 cm.; petiole 1.5–7 mm. China, Indochina ..... 166. *F. pandurata*.
          - 20. Fig 10–15 x 8–12 mm., subglobose to ellipsoid. Lamina larger, petiole longer. India, Burma, China, Indochina  
165. *F. gasparriniana*.

Key to the species of subser. *Basitepalae*

- 1. Creeper with adventitious roots. Leaves scabrid, denticulate to crenate, obovate. Figs cauliflorous. Male flowers sessile. Seed 0.8 mm. long. Assam, China, Indochina ..... 174. *F. tikoua*.
- 1. Erect shrubs or small trees. Leaves entire. Figs axillary. Male flowers pedicellate (at least, the disperse ones).
  - 2. Tepals gamophyllous. Ovary red-brown. Seed 1.5 mm. long. Shortly hispid-villous; lamina often small. Fig 15–20 x 10–13 mm., ellipsoid or pyriform, solitary. Assam, Burma, China, Indochina  
175. *F. abelii*.

2. Tepals free. Ovary white. Seed 2.5–3 mm. long. Figs paired or solitary. Philippines.
3. Fig closely papillate. Lamina smooth ..... 176. *F. pustulata*.
3. Fig harshly hispid with spreading hairs 1–2 mm. long, as the twigs and leaves, often sessile. Twigs 3–4 mm. thick  
177. *F. glareosa*.

Key to the species of subser. *Eriosyceae*

1. Strigose-pubescent with ferruginous to dark brown hairs 3–5 mm. long. Leaves large, more or less cordate, often lobed. Fig 20–35 mm. wide, sessile; apical bracts projecting 3–7 mm.; basal bracts 12–20 x 7–10 mm. .... 181. *F. esquiroliana*.
1. Hairs shorter, often pale. Apical bracts not projecting and, as the basal bracts, shorter.
  2. Fig 30–35 mm. wide, villous, pedicellate but without peduncle; basal bracts 4–7 mm. long. Lamina large, base cordate  
178. *F. padana*.
  2. Fig and basal bracts smaller; sessile or pedunculate, glabrous or thinly hairy. Leaf-base becoming cuneate.
    3. Lamina closely white to fulvous felted beneath, the reticulations obscured; generally denticulate ..... 179. *F. grossularioides*.
    3. Lamina thinly ashen-grey (cinereous) felted beneath, the reticulations visible; generally entire or subcrenulate ... 180. *F. tricolor*.

Key to the species of subser. *Trichosyceae*

1. Fig sessile (or very shortly pedunculate in *F. simplicissima*), brown hairy or glabrescent, without sclerotic cells in the wall. Flower-pedicels usually glabrous.
  2. Leaves coriaceous, smooth. Thinly appressedly hairy  
183. *F. schefferiana*.
  2. Leaves membranous, hispid, villous, or scabrid.
    3. Thickly hairy, or the hairs to 1 mm., at least, long. Figs with abundant to few internal bristles ..... 182. *F. hirta*.
    3. Glabrous, or with minute hairs –0.5 mm. long, or all the hairs minutely hooked. Fig without internal bristles  
184. *F. simplicissima*.
1. Figs pedunculate, rarely sessile in *F. fulva*, villous or thinly hairy; with or without sclerotic cells in the wall. Flower-pedicels generally hairy.
  4. Twigs 10–15 mm. thick. Figs 20–25 mm. wide or long (dried). Lamina ovate-cordate, thinly villous above.
    5. Hispid with hairs 1–2 mm. long. Fig ellipsoid, the wall densely sclerotic; apical bracts not projecting. Gall-flower pedicels glabrous ..... 185. *F. halmaherae*.
    5. Softly villous with hairs –1 mm. long. Fig subglobose, the apical bracts prominent. Gall-pedicels hairy ..... 186. *F. mollissima*.
  4. Twigs 3–8 mm. thick. Figs smaller. Lamina elliptic or obovate, hispidulous or scabrid above.
    6. Lamina coriaceous, entire. Figs thinly appressedly hairy, glabrescent; sclerotic cells abundant in the wall ..... 188. *F. subfulva*.
    6. Lamina membranous to subcoriaceous, mostly denticulate. Fig-wall with few or no sclerotic cells.
      7. Hispid or villous with hairs 0.5–2 mm. long ..... 187. *F. fulva*.
      7. Glabrous or thinly hairy with hairs –0.5 mm. long, or all the hairs minutely hooked ..... 184. *F. simplicissima*.

Key to the species of subser. *Dehiscentes*

1. Basal nerves not (or rarely) prominent, lateral nerves 7-13 pairs: thinly appressedly hairy: tepals broad: flower-pedicels glabrous: no sclerotic cells in fig-wall ..... 189. *F. lamponga*.
1. Basal nerves  $\frac{1}{2}$ - $\frac{3}{4}$  lamina: lateral nerves 4-8 pairs: flower-pedicels often hairy: sclerotic cells in fig-wall.
  2. Twigs 5-10 mm. thick: lamina 7-18 cm. wide, ovate-cordate: fig 15-18 mm. wide ..... 190. *F. ruficaulis*.
  2. Twigs 3-6 mm. thick: lamina and figs smaller ... 191. *F. glandulifera*.  
(Lamina coriaceous, scabrid ..... 188. *F. subfulva*).

Key to the species of subser. *Cuneifoliae*

1. Young parts rubiginous scurfy. Lamina with cystoliths on the underside: intercostals regular, numerous. Male flowers disperse. Seed echinate at the base. Figs pedunculate ..... 196. *F. langkokensis*.
1. Not rubiginous scurfy. Without cystoliths (except *F. tuphapis* v. *tuphapis*). Male flowers ostiolar. Seed tuberculate.
  2. Glabrous or puberulous at first. Lamina membranous, smooth: intercostals lax: petiole 6-40 mm. Tepals 3-4. Flower-pedicels glabrous. Fig pedunculate or sessile ..... 192. *F. chartacea*.
  2. Twigs, petioles, and, usually, the underside of the veins hairy. Lamina often more or less coriaceous.
    3. Shortly appressedly hairy. Petiole 4-17 mm. Fig 5-8 mm. wide, pedunculate. Tepals 4-5. Flower-pedicels hairy ..... 193. *F. litseifolia*.
    3. Villous, the hairs 0.5-1.5 mm. long. Lamina brownish beneath: petiole -40 mm. long. Flower pedicels glabrous.
      4. Lamina smooth, coriaceous: lateral nerves wide-spreading: basal nerves often short. Fig 8-10 mm. wide: peduncle 3-6 mm. Tepals 4-7. Seed 1.5-2.5 mm. wide ..... 194. *F. oreophila*.
      4. Lamina scabrid above, membranous to subcoriaceous: lateral nerves very oblique: basal nerves elongate. Fig 5-8 or 8-12 mm. wide: peduncle 0-3 mm. Tepals 4-5. Seed 1-1.5 mm. .... 195. *F. tuphapis*.

Key to the species of ser. *Auratae*

1. Stamens 2 (-3). Male flowers pedicellate in several rows, tepals not setose. Fig sessile (except *F. aurata* var. *pedunculata*), densely villous, at least when young. Lamina generally more than 15 cm. long. Seed tuberculate, keeled. subser. *Auratae*.
  2. Male and neuter flowers with yellowish white or pink-spotted tepals. Areolae glabrous. Reticulations not finely velutinate beneath. Figs 10-17 mm. wide; basal bracts 1-3.5 mm.
    3. Lamina ovate, deeply cordate; petiole 8-12 cm. long. Fig sessile, with a few lateral bracts in the distal half. Sessile male flowers 2-staminate, the pedicellate 1-staminate ... 201. *F. aureocordata*.
    3. Lamina elliptic, oblong or obovate; base narrowed subcordate to cuneate; petiole 1-6 cm. long. Fig without lateral bracts. Male flowers all 2-staminate ..... 200. *F. aurata*.
  2. Male and neuter flowers with red or red-brown tepals. Lamina elliptic or ovate-elliptic. Figs and basal bracts larger or the areolae (and reticulations) on the underside of the lamina minutely velutinate.
    4. Lamina as wide as long or wider, ovate-cordate, 13-25 cm. wide; reticulations velutinate beneath, areolae glabrous. Fig 18-25 x 15-20 mm. villous with hairs -1 mm. long, glabrescent; basal bracts 3-5 mm. long, caducous ..... 197. *F. endospermifolia*.
    4. Lamina longer than wide, ovate-elliptic to elliptic; reticulations and areolae minutely velutinate.

5. Fig 24-30 x 20-26 mm., hispid-villous with hairs 1-2 mm. long; basal bracts 6-10 mm. long, caducous. Lamina 16-28 cm. wide; base cordate ..... 198. *F. bruneiensis*.
5. Figs, basal bracts, and lamina smaller.
6. Fig velutinate without long hairs, glabrescent; basal bracts 1-1.5 mm. long. Lamina (entire) with subcordate to cuneate base; saplings leaves large, 3-5 palmately lobed  
199. *F. brunneo-aurata*.
6. [Fig villous; basal bracts 3-4 mm. long. Lamina ovate-cordate; areolae depressed, often bullate ..... 204. *F. eumorpha*].
1. Stamen 1. Male flowers in one row, sessile, or in 2 rows with the second pedicelate; tepals yellowish-white and setose as in the gall-flowers. Fig often pedunculate, often thinly hairy to glabrous. Lamina generally small. Seed tuberculate or smooth. subser. *Monandreae*.
7. Lamina entire or distantly and coarsely dentate, more or less coriaceous, often thinly hairy to glabrous. Figs mostly pedunculate. Seeds tuberculate.
8. Lamina 4-9 cm. wide. elliptic, entire; lateral nerves curved-ascending, -4 intercostals; basal nerves  $\frac{1}{2}$ - $\frac{2}{3}$  lamina. Fig 12-15 mm. wide. Male flowers sessile and pedicellate  
202. *F. androchaete*.
8. Lamina 1-7 cm. wide, elliptic to lanceolate, generally narrow, entire or coarsely dentate; lateral nerves more or less perpendicular to the midrib, 0-2 intercostals; basal nerves short. Fig 7-11 mm. wide. Male flowers sessile  
203. *F. macilenta*.
7. Lamina closely serrate or denticulate, -5 intercostals or more, often hispid above, hairy; reticulations prominent beneath.
9. Fig 6-9 mm. wide, often pedunculate. Lamina membranous, drying grey-green. Hairs whitish to pale brown ..... 206. *F. setiflora*.
9. Fig larger, sessile. Lamina drying brown. Hairs dark brown.
10. Lamina ovate-cordate to subtriangular, areolae often bullate and villous beneath. Fig. 11-15 mm. wide, hispid. Seed subtuberculate ..... 204. *F. eumorpha*.
10. Lamina elliptic, brittle, base cuneate. Fig 9-10 mm. wide, thinly appressedly hairy. Seed nearly smooth  
205. *F. paramorpha*.

Key to the series of section *Rhizocladus*

1. Male and neuter flowers disperse, mostly sessile: leaves distichous.
2. Anthers mucronate, long: filaments free. Gall-ovary red-brown. Figs ripening red or purple, without pedicels but pedunculate: internal bristles often copious: sclerotic cells present or not. Leaves ovate-elliptic, basal nerves prominent: often brown hairy  
*Trichocarpeae* (p. 127).
2. Anthers not mucronate, short: filaments free or slightly joined. Gall-ovary white, yellow, or red-brown. Figs ripening red or purple, pedunculate and, often, pedicellate, without conspicuous internal bristles and without sclerotic cells in the wall. Leaves elliptic to obovate, basal nerves often short: mostly glabrous  
*Distichae* (p. 127).
1. Male and neuter flowers ostiolar in one to several rows, the male mostly stalked (except those next to the orifice).
3. Anthers not mucronate, short: filaments free (? slightly joined): internal bristles absent: fig-wall with sclerotic cells: figs ripening red, generally small, orifice sunken, without pedicel. Leaves distichous, often small and blunt, with the veins not or scarcely raised below ..... *Distichoideae* (p. 126).

3. Anthers mucronate.
4. Filaments joined. Fig ripening red, often pedicellate, the orifice often sunken, with or without internal bristles and sclerotic cells; basal bracts often caducous. Leaves distichous, the veins impressed above or invisible ..... *Ramentaceae* (p. 124).
4. Filaments free or slightly joined. Fig ripening purple (? *F. laevis*), the orifice not or slightly sunken, pedicellate or not; internal bristles generally copious; sclerotic cells none; basal bracts persistent, short. Leaves spirally arranged, long-petiolate, or distichous, short-petiolate, and then with the veins slightly raised on the upperside ..... *Plagiostigmaticae* (p. 124).

Key to the species of ser. *Plagiostigmaticae*

1. Leaves spirally arranged, long-petiolate, generally ovate with elongate basal nerves, not foveolate or prominently reticulate beneath; reticulations not raised above ..... 210. *F. laevis*.
1. Leaves distichous, short-petiolate; reticulations finely raised on the upperside.
  2. Lamina not foveolate beneath. Young parts lanuginous with undulate hairs, or the leaves ovate-elliptic with elongate basal nerves and acuminate ..... 207. *F. pubigera*.
  2. Lamina foveolate beneath. Not lanuginous with undulate hairs.
    3. Basal nerves elongate  $\frac{1}{2}$ – $\frac{2}{3}$  lamina, apex obtuse to subacute. Fig 4–8 × 3–5 cm., mostly solitary ..... 209. *F. pumila*.
    3. Basal nerves mostly short, apex of lamina acute to acuminate. Fig smaller, mostly paired ..... 208. *F. sarmentosa*.

Key to the subseries of ser. *Ramentaceae*

1. Apical bracts exposed, the fig-orifice not or scarcely sunken.
  2. Cystoliths only on the lower side of the lamina. Leaf foveolate beneath in some species. Fig-wall without sclerotic cells. West Malaysia subser. *Excavatae*.
  2. Cystoliths only on the upper side of the lamina. Fig-wall with sclerotic cells. Floccoso-tomentose with undulate hairs. Malaya, Sumatra subser. *Araneosae*, 240. *F. araneosa*.
  2. Cystoliths on both sides of the lamina. Fig-wall with sclerotic cells. Moluccas eastwards ..... subser. *Balanotae*.
1. Apical bracts concealed in the sunken fig-orifice.
  3. Hairs irritant, especially on the figs. Fig-wall with sclerotic cells (except the small *F. convexa*). New Guinea ..... subser. *Irritantes*.
  3. Hairs not irritant.
    4. Fig-wall with sclerotic cells. Moluccas eastwards subser. *Pantonianae*.
    4. Fig-wall without sclerotic cells. Throughout Malaysia, but especially western ..... subser. *Ramentaceae*.

Key to the species of subser. *Pantoniane*

1. Young parts floccoso-tomentose with undulate hairs. Lamina 10–15 cm. long; basal nerves short ..... 215. *F. floccifera*.
1. Glabrous or with straight hairs. Lamina often rather small; basal nerves often elongate.
  2. Fig sessile 7 mm. wide ..... 212. *F. amblysyce*.
  2. Fig stalked.
    3. Fig-apex contracted into a papilla 1 mm. high. Lamina very coriaceous ..... 213. *F. ampulliformis*.
    3. Fig-apex not so contracted.
      4. Fig 7 mm. wide; internal bristles abundant. Lamina 5.5 × 2.5 cm. 214. *F. hypobrunnea*.
      4. Fig larger; internal bristles none or few, minute. Lamina often larger ..... 211. *F. pantoniana*.

Key to the species of subser. *Balanotae*

1. Fig stalked; basal bracts caducous.
  2. Fig strongly umbonate, villous as the twigs, petioles, and underside of the lamina. Internal bristles abundant ..... 216. *F. balanota*.
  2. Fig not umbonate, puberulous, soon glabrous as the leaves and twigs. Internal bristles none ..... 217. *F. oxymitroides*.
1. Figs sessile, not umbonate (unless from projecting apical bracts). Internal bristles sparse or none.
  3. Fig villous; basal bracts connate in a tridentate sheath. Lateral nerves 6-9 pairs ..... 218. *F. devestiens*.
  3. Fig glabrous or thinly hairy; basal bracts free. Lateral nerves fewer.
    4. Apical bracts prominent; basal bracts caducous. Lamina 4-7 cm. long; lateral nerves 5-6 pairs. Hairs -1 mm. long ..... 219. *F. sageretina*.
    4. Apical bracts not prominent; basal bracts persistent. Lamina 1-3 cm. long, very coriaceous, hard, bullate; lateral nerves 3-4 pairs. Hairs -3 mm. long ..... 220. *F. ceanothifolia*.

Key to the species of subser. *Irritantes*

1. Basal bracts 3-6 mm. long. Fig 15-35 mm. wide; peduncle 1-10 mm. long.
  2. Lamina thinly coriaceous, the nerves not or slightly impressed above. Basal bracts caducous. Internal bristles few, small, or none ..... 221. *F. odoardi*.
  2. Lamina coriaceous-brittle, the nerves impressed above. Basal bracts subsistent. Internal bristles 1-2 mm. long. Fig-wall very thick ..... 222. *F. sphaerocarpa*.
1. Basal bracts 1.5-3 mm. long. Fig 7-12 mm. wide; peduncle short. Lamina coriaceous, the nerves impressed above.
  3. Fig subsessile, 7-10 mm. wide. Hairs 2-8 mm. long on twigs and petioles ..... 224. *F. insculpta*.
  3. Figs stalked. Hairs 1-2.5 mm. long.
    4. Figs 10-12 mm. wide; internal bristles often abundant. Lamina 5-28 cm. long ..... 223. *F. irritans*.
    4. Fig 7-9 mm. wide; internal bristles none or few, minute. Lamina -8 cm. long, stiffly coriaceous, convex ..... 225. *F. convexa*.

Key to the species of subser. *Ramentaceae*(Compare also subser. *Pantonianae*)

1. Figs more than 12 mm. wide. Nerves not or slightly impressed above. Moluccas eastwards.
  2. Fig soon glabrous, long-pedicellate, orifice slightly sunken. Lamina soon glabrous; nerves and intercostals crowded ..... 227. *F. camptandra*.
  2. Fig lanuginous or villosulous, orifice deeply sunken. Lamina persistently hairy beneath; venation rather lax .. 226 *F. baeuerleni*.
1. Figs less than 12 mm. wide. Nerves often strongly impressed above. Moluccas westwards.
  3. Lamina attenuate at each end; nerves not impressed above; lateral nerves 11-14 pairs. Stipules persistent. Figs sessile. Sarawak ..... 231. *F. spiralis*.
  3. Lamina often acuminate; base rounded, truncate, cordate, or cuneate; lateral nerves fewer. Stipules generally caducous (except on bathyphylls).
    4. With minute hooked hairs (0.2-1 mm. long) on the twigs, petioles, underside of the nerves, and, often, on the figs.

5. All hairs hooked, none appressed. Basal bracts caducous. Fig-pedicel 2-9 mm. long ..... 234. *F. uncinulata*.
5. With straight appressed hairs, at least on the underside of the nerves, often spreading and concealing the hooked hairs on the twig. Basal bracts persistent. Pedicel often short  
223. *F. recurva*.
4. Without hooked hairs.
6. Nerves strongly impressed above; lateral nerves 6-10 pairs.
7. Hairs 3-6 mm. long, wiry ..... 228. *F. grossivenis*.
7. Hairs 2-4 mm. long, villous or appressed, not wiry. Fig-orifice often umbonate ..... 232. *F. villosa*.
6. Nerves not or scarcely impressed above.
8. Figs 8-11 mm. wide, mostly stalked. Lateral nerves 6-8 pairs ..... 229. *F. sagittata*.
8. Figs 4-6 mm. wide, sessile or shortly stalked. Lateral nerves 2-6 pairs.
9. Densely hairy. Fig without sclerotic cells ... 235. *F. pendens*.
9. Thinly hairy or glabrous. Fig with sclerotic cells, often depressed-globose ..... 230. *F. urnigera*.

Key to the species of subser. *Excavatae*

1. Lamina small, -3 cm. long, obtuse to subacute; lateral nerves 2-4 pairs. Fig 3-6 mm. wide. Slender climbers.
2. Lamina ovate-orbicular, symmetric, minutely foveolate beneath. Fig sessile ..... 238. *F. excavata*.
2. Lamina elliptic or obovate, base asymmetric, not foveolate beneath. Fig shortly stalked ..... 239. *F. callicarpides*.
1. Lamina larger, acuminate.
3. Nerves strongly impressed above, the areolae foveolate or not. Fig 5-6 mm. wide. Hairy ..... 236. *F. lanata*.
3. Nerves not impressed above; areolae foveolate beneath. Fig 7-9 mm. wide. Soon subglabrous ..... 237. *F. superforata*.

Key to the species of ser. *Distichoideae*

1. Figs 8-16 mm. wide.
2. Lamina ovate acute to acuminate. Fig. subsessile. Twigs appressedly hairy ..... 242. *F. ovatacuta*.
2. Lamina obtuse to subacute. Fig pedunculate. Twigs glabrous.
3. Fig 8-12 mm. wide; basal bracts persistent ..... 241. *F. distichoidea*.
3. Fig 14-16 mm. wide; basal bracts caducous ..... v. *megacarpa*.
1. Figs 4-8 mm. wide.
4. Lamina acute to subacuminate; basal nerves short  
243. *F. phatnophylla*.
5. Fig sessile; basal bracts slowly caducous; lamina thinly coriaceous v. *glochidioides*.
5. Fig-peduncle -2.5 mm. long.
6. Lamina thinly coriaceous, subacute, lanceolate elliptic; basal bracts caducous ..... v. *meiocarpa*.
6. Lamina stiffly coriaceous, hard, elliptic or ovate elliptic, acuminate; basal bracts persistent ..... v. *phatnophylla*.
4. Lamina obtuse or retuse; basal nerves often elongate; basal bracts caducous.
7. Lamina suborbicular to broadly elliptic; basal nerves 1/3-1/2 lamina. Fig-peduncle 1-4 mm. long.
8. Fig 4-5 mm. wide. Tepals free or shortly joined  
244. *F. calodictya*.
8. Fig 6-8 mm. wide; tepals gamophyllous with 2-4 short lobes v. *gamophylla*.

7. Lamina small, elliptic to obovate, base cuneate; basal nerves rarely conspicuous.
9. Fig sessile or nearly. Leaves stiffly coriaceous; stomata superficial  
245. *F. agapetoides*.
9. Fig-peduncles 1-3 mm. long. Leaves thinly coriaceous; stomata deeply sunken ..... *v. solomonensis*.

Key to the species of ser. *Distichae*

1. Male flowers pedicellate. Gall-ovary red or brown. Figs generally solitary; basal bracts acute.
2. Anthers with crescentic dehiscence. Tepals dark red, fleshy. Bathyphylls lobed. Cystoliths amphigenous; gland-hairs capitate. Ceylon  
246. *F. diversiformis*.
2. (Anthers with longitudinal dehiscence. Tepals membranous, pink, acute. Bathyphylls not lobed. Cystoliths hypogenous; gland-hairs peltate. Sarawak ..... 267. *F. diandra*).
1. Male flowers sessile, anthers with longitudinal dehiscence. Figs generally paired: basal bracts obtuse. Bathyphylls not lobed.
2. Cystoliths amphigenous; hairs septate. Gall-ovary sclerosed, beaked. Lamina acute to obtuse; basal nerves  $\frac{1}{2}$ - $\frac{1}{2}$  lamina. Basal bracts persistent. Asiatic mainland, Hainan, Andamans  
247. *F. hederacea*.
2. Cystoliths hypogenous; hairs not septate. Gall-ovary not sclerosed or beaked. Basal nerves not so elongate. Burma, Thailand, west Malaysia to Moluccas.
3. Lamina 7-21 cm. long; lateral nerves 6-9 pairs, -5 intercostals. Fig more than 12 mm. wide, peduncle 4-18 mm. long; basal bracts persistent. Male perianth wholly gamophyllous  
248. *F. allutacea*.
3. Lamina smaller, obtuse to subacute; lateral nerves fewer, 0-1 intercostals. Fig 6-10 mm. wide, peduncle -3 mm. long. Male tepals more or less free.
4. Lamina thickly coriaceous; lateral nerves 5-8 pairs at a wide angle from the midrib; petiole -30 mm. long. Stipules and basal bracts subsistent. Borneo ..... 249. *F. detonsa*.
4. Lamina thinly coriaceous; lateral nerves 3-5 pairs, oblique; petiole -12 mm. long. Stipules and basal bracts early caducous. Figs purple ..... 250. *F. disticha*.

Key to the species of ser. *Trichocarpeae*

1. Lamina thickly lanuginous beneath with undulate hairs concealing the reticulations. Fig lanuginous. New Guinea.
2. Robust climber. Twigs 4-5 mm. thick. Lamina more than 9 x 5 cm. Fig-body 15-20 mm. wide; basal bracts 6-10 mm. long  
263. *F. hypophaea*.
2. Slender climbers. Twigs 2 mm. thick. Lamina smaller. Fig-body 7-10 mm. wide; basal bracts 3-4 mm. long.
3. Indumentum dull brown. Lamina attenuato-acute. Fig-body 10 mm. wide, the seed-fig with sclerotic cells in the wall  
262. *F. hypophaeola*.
3. Indumentum rusty cinnamon. Lamina acuminate (without cystoliths). Fig 7-8 mm. wide, the seed-fig without sclerotic cells in the wall ..... 261. *F. cinnamomea*.
1. Lamina not thickly lanuginous beneath with undulate hairs.
4. Figs lanuginous or villous.
5. Fig-body lanuginous or thinly tomentose with undulate hairs, in some species glabrescent. New Guinea.

6. Twigs and petioles with dull brown spreading hairs 2-3 mm. long; underside of nerves finely tomentose with undulate hairs, Lamina 9-17 × 4-12 cm. Fig 15-18 mm. wide; basal bracts caducous ..... 259. *F. fuscata*.
6. Without such spreading hairs. Figs smaller; basal bracts persistent.
7. Lamina 7-14 × 5.5-10 cm., glabrous. Fig 10-12 mm. wide; basal bracts 3-6 mm. long ..... 260. *F. supfiana*.
7. Lamina 4-8 × 2-3.5 cm., nerves thinly hairy beneath. Fig 6-8 mm. wide; basal bracts 1-2 mm. long  
258. *F. semilanata*.
5. Figs villous with straight, erect hairs, not glabrescent. Indochina to Moluccas.
8. Lamina scabrid, without cystoliths (or these very sparse on the underside). Fig with abundant internal bristles. No undulate hairs on the twigs ..... 251. *F. trichocarpa*.
8. Lamina smooth or slightly scabrid; cystoliths hypogenous, abundant. Internal bristles few, short. Twigs with undulate hairs. Philippines ..... 252. *F. perfulva*.
4. Figs glabrous or thinly hairy and soon glabrescent.
9. Lamina closely villous or hispid beneath with erect brown hairs. Basal bracts 1-1.5 long. Robust climbers. New Guinea.
10. Fig-body soon glabrous, 10-12 mm. wide; peduncle 5-9 mm. long; no sclerotic cells in the fig-wall (gall-fig). Lamina coriaceous bullate; cystoliths hypogenous  
257. *F. phaeobullata*.
10. Fig-body thinly appressedly puberulous, 8-10 mm. wide; peduncle 10-15 mm. long; sclerotic cells abundant in the wall (gall-fig). Leaf not bullate; cystoliths amphigenous ... 256. *F. alococarpa*.
9. Lamina thinly appressedly hairy beneath along the nerves or glabrous. Twigs minutely brown puberulous to glabrous.
11. Robust climber. Lamina more than 9 × 5 cm. Fig 15-25 mm. wide; basal bracts 2-4 mm. long. New Guinea, Solomon Isl., New Hebrides ..... 255. *F. nasuta*.
11. Slender climbers. Lamina smaller. Fig 5-8 mm. wide; basal bracts 1-1.5 mm. long. Gall-flowers with the lower half of the tepals yellow and indurate. Gall-figs with sclerotic cells in the walls, seed-figs without.
12. Fig-body and peduncle finely velutinate, glabrescent. Lamina ovate-rotund to broadly elliptic, obtuse to subacute. Philippines ..... 253. *F. bakeri*.
12. Fig-body and peduncle thinly puberulous, glabrescent. Lamina ovate-elliptic to ovate-lanceolate, attenuato-acute. New Guinea ..... 254. *F. pleiadenia*.

Key to the series of sect. *Kalosyce*

1. Areolae of lamina not foveolate beneath ..... ser. *Apiocarpeae*.
1. Areolae of lamina foveolate beneath ..... ser. *Punctatae*.
2. Veins impressed on the upperside of the stiffly coriaceous lamina, drying brown; veins coarse and prominent beneath  
subser. *Ruginerveae* (p. 129).
2. Veins not impressed above, invisible or as fine raised lines; lamina thinly coriaceous, often drying greenish; the veins not so coarse beneath ..... subser. *Punctatae* (p. 129).

Key to the species of ser. *Apiocarpeae*

1. Lamina 4-9 cm. long, acute to obtuse. Fig 10-14 mm. wide (dried). Gall-ovary more or less indurate.
  2. Stamens 2. Gall-ovary not angular. Fig-body not pedicellate. Lamina acute, narrowly cordate at the base; lateral nerves 3-5 pairs. Sarawak ..... 267. *F. diandra*.
  2. Stamen 1, rarely 2. Gall-ovary angular. Fig-body long-pedicellate. Lamina subacute to obtuse, base cuneate; lateral nerves 5-8 pairs. Philippines ..... 266. *F. warburgii*.
1. Lamina larger, more or less acuminate. Fig much larger. Gall-ovary neither indurate nor angled. Stamen 1.
  3. Tepals dark red, entire, free. Neuter flowers present in the seed-figs. Internal bristles abundant. Basal nerves  $\frac{1}{4}$ - $\frac{1}{3}$  lamina, not prominent ..... 265. *F. peninsula*.
  3. Tepals white or pale pink, denticulate, often becoming reticulately adherent. Neuter flowers absent. Internal bristles none or few, minute. Basal nerves  $\frac{1}{2}$ - $\frac{3}{4}$  lamina, conspicuous. .264. *F. apiocarpa*.

Key to the species of subser. *Punctatae*

1. Lamina obtuse, rarely subacute.
  2. Lamina 26 × 13 cm., ovate, symmetric: lateral nerves 9-10 pairs  
271. *F. simiae*.
  2. Lamina elliptic to obovate, asymmetric, small to medium size: lateral nerves 3-5 pairs: petiole 1-20 mm.: internal bristles short, abundant.
    3. Figs glabrous, marmorate with pale innate spots, orifice closed by 3-5 projecting apical bracts: gall- and female tepals 3-4, often with peltate attachment ..... 272. *F. aurantiacea*.
    3. Figs hispid-villous, not marmorate but sparsely papillate, the orifice sunken, the small apical bracts more or less concealed: gall- and female tepals 0-3, simply attached. Lamina small  
273. *F. punctata*.
1. Lamina subacute to acuminate, ovate to elliptic or oblong, often narrowly, symmetric (except *F. grandiflora*): lateral nerves 4-10 (-12) pairs: petiole often longer: internal bristles none (except *F. grandiflora*).
  4. Figs shortly pedunculate, not or indistinctly pedicellate: body 8-30 mm. wide (dried). tepals white or pink .. 274. *F. scratchleyana*. (figs brown-hairy: lamina stiffly coriaceous .... 281. *F. gymnorygma*.)
  4. Figs pedunculate and distinctly pedicellate: body large: tepals dark red.
    5. Leaves and figs scabrid: petiole -15 mm. long: basal bracts 2 mm. long: seeds bluntly keeled ..... 270. *F. trachycoma*.
    5. Leaves and figs smooth: basal bracts 3-4 mm. long.
      6. Lamina ovate-elliptic, base rounded-subcordate: petiole 4-13 cm. long: female tepals linear-lanceolate, free: seed bluntly keeled: fig-orifice with 5 prominent apical bracts  
268. *F. dens-echini*.
      6. Lamina elliptic, base cuneate, often slightly asymmetric: petiole 1.2-3 cm. long: gall-tepals broadly lanceolate, often gamo-phyllous: fig-orifice with 3 suberect apical bracts  
269. *F. grandiflora*.

Key to the species of subser. *Ruginerviae*

1. Petioles 2-10 mm. long. lamina -8 cm. long, rather small.
  2. Lamina obtuse, elliptic to obovate, asymmetric: figs glabrous  
276. *F. ruginervia*.
  2. Lamina acute, narrowly elliptic.

3. Lam. strongly asymmetric at the base, cordate-auricled on one side, scabrid above: fig white-villous . . . . 277. *F. barba-jovis*.
3. Lam. slightly asymmetric: figs thinly pilose to glabrous.
  4. Lam. subscabrid above: lateral nerves 5-7 pairs: figs axillary, soon glabrous: gall-tepals free . . . . . 279. *F. cataupi*.
  4. Lam. smooth: lat. nerves 8-11 pairs: figs cauliflorous, thinly hispid: gall-tepals shortly joined . . . . . 278. *F. tulipifera*.
1. Petiole longer: lamina larger, stiffly coriaceous.
  5. Areolae with flat glabrous foveolae or ciliate round the edge: figs brown-hairy: basal bracts c. 2 mm. long: male flowers -12 mm.: tepals white to pinkish, as long as the ovary: seed scarcely or obtusely keeled . . . . . 281. *F. gymnorygma*.
  5. Foveolae hairy: basal bracts 3-4 mm. long: male flowers c. 20 mm. long: tepals dark red.
    6. Figs white-villous, the orifice sunken: lamina very coriaceous: gall-flowers sessile, the tepals shorter than the ovary: female flowers sessile, the tepals very short: seed scarcely keeled  
280. *F. carri*.
    6. Figs glabrous, orifice not sunken: gall-flowers long-stalked, the tepals as long as the ovary: female flowers sessile or stalked: seed narrowly keeled . . . . . 275. *F. singalana*.

Key to the subsections of sect. *Scyidium*

1. Seed shortly oblong, generally keeled or gibbous at the apex. Ovary white. Male flower generally with a normal gall-ovary. Leaves distichous, short-petiolate. Figs not pedunculate. Cystoliths not papillate. Trees, shrubs or climbers, often epiphytic  
subject. *Palaeomorphe* (p. 140).
1. Seed lenticular (as long as wide) or shortly oblong, slightly keeled all round or in the upper half or not at all. Male flowers mostly without a normal gall-ovary, often with a rudiment. Leaves variously arranged. Figs often pedunculate with a collar of basal bracts. Cystoliths often papillate. Trees, shrubs, not epiphytic.
  2. Seed lenticular. Ovary red or white. Tepals red or white.  
subject. *Scyidium* (p. 130).
  2. Seed shortly oblong. Ovary and tepals white  
subject. *Varinga* (p. 140).

Key to the series of subsect. *Scyidium*

1. Figs on geocarpic stolons. Fig-body 10-20 mm. wide, usually with lateral bracts. Tepals red. Ovary red or white. Style glabrous. Leaves distichous, short-petiolate . . . . . ser. *Prostratae* (p. 131).
1. Figs on long hanging rami-cauliflorous twigs. Fig-body 4-8 mm. wide, without lateral bracts. Tepals red. Ovary red. Style (female) hairy. Leaves long-petiolate to distichous and short-petiolate. Hairs dark brown, wiry . . . . . ser. *Pungentes* (p. 131).
1. Figs axillary or on short leafless twigs from trunk and branches, rarely geocarpic: Ovary white.
  2. Leaves spirally arranged or decussate, mostly long-petiolate, symmetric. Figs pedicellate or nearly sessile, without a collar of basal bracts.
    3. Hairs dark purple or brown. Fig-body often with lateral bracts. Tepals dark red . . . . . ser. *Phaeopilosae* (p. 131).
    3. Hairs white, or merely scabridulous-glabrous. Tepals purple, reddish, or white . . . . . ser. *Copiosae* (p. 132).
  2. Leaves short-petiolate, variously arranged, commonly distichous, often asymmetric. Figs often pedunculate with a collar of basal bracts. Tepals red, pink, or white. Hairs not purple or dark brown.
    4. Seed lenticular . . . . . ser. *Scabrae* (p. 133, 138).
    4. Seed oblong or shortly ellipsoid, compressed, keeled or not. Tepals white . . . . . subject. *Varinga* (p. 133, 140).

Key to the species of ser. *Prostratae*

1. Leaf-base asymmetric, lamina generally scabrid. Stipules caducous. Seed smooth. Stamens 2 (-1) ..... 283. *F. semicordata*.
1. Leaf-base more or less symmetric. Stipules subsistent.
  2. Twigs, petioles, and underside of the main veins densely hispid with white to brown hairs -1.5 mm. long. Lamina scabrid, denticulate; lateral nerves 6-8 pairs. Fig 15-20 mm. wide. Seed smooth. Stamens ? ..... 284. *F. koutumensis*.
  2. Twigs etc. thinly appressedly hairy to shortly white villous. Lamina smooth, entire; lateral nerves 9-14 pairs. Fig 10-16 mm. wide. Seed 3-keeled. Stamen 1 (-2) ..... 285. *F. prostrata*.

Key to the species of ser *Pungentes*

1. Leaves distichous, elliptic-obovate, short-petiolate. Hairs 1-2 mm. long on twigs and petioles ..... 288. *F. petrotica*.
1. Leaves spirally arranged, ovate-cordate, long-petiolate. Hairs 2-10 mm. long on twigs and petioles.
  2. Figs angular-compressed with flattened apex, in compact heads 20-25 mm. wide ..... 287. *F. minahassae*.
  2. Figs separate, not compressed, distinctly pedunculate ..... 286. *F. pungens*.
- (2. Hairs 1-2 mm. Lamina narrowly elliptic-obovate. Fig with lateral bracts, thinly brown-strigose. Perianth cupular, 3-4-toothed. Style glabrous ..... 294. *F. badiopurpurea*).

Key to the species of ser. *Phaeopilosae*

1. Perianth cupular, 3-4-toothed. Fig 6 mm. wide, brown strigose, cauliflorous (? geocarpic). Lamina narrowly elliptic-obovate, dentate. Stipules caducous. Cystoliths hypogenous .. 294. *F. badiopurpurea*.
1. Tepals free, 4-6.
  2. Fig 5-12 mm. wide. Internal bristles abundant. Twigs 1.5-3.5 mm. thick. Stipules small, caducous.
    3. Fig-stalk 3-18 mm. long. Petiole 1-8 cm. long, or more. Fulvous to dark brown hairy. Cystoliths amphigenous .... 293. *F. gul*.
    3. Fig-stalk 0-2 mm. long. Petiole -1.5 cm. long. Dark purple-brown or black hairy. Cystoliths hypogenous ..... 295. *F. phaeosyce*.
  2. Figs mostly larger. Twigs thicker. Stipules often large and persistent.
    4. Fig 8-12 mm. wide, purple-strigose, glabrescent; lateral bracts 1-2.5 mm. long. Irritantly purple-brown bristly. Cystoliths amphigenous, varying hypogenous .... 292. *F. porphyrochaete*.
    4. Figs and lateral bracts larger.
      5. Fig 20-25 mm. wide, globose to ellipsoid; lateral bracts 3-6 mm. long; internal bristles none. Gall- and female flowers with long pedicels (-4 mm.). Lamina obovate, nerves thinly appressedly brown hairy below. Cystoliths amphigenous ..... 289. *F. conocephalifolia*.
      5. Fig 10-17 mm. wide (excluding hairs and bracts); lateral bracts 5-16 mm. long. Cystoliths hypogenous. Densely strigose hairy.
        6. Leaf-base cuneate; stipules caducous. Internal bristles abundant. Flowers pedicellate. Lamina elliptic .. 291. *F. eustephana*.
        6. Leaf ovate or elliptic, base cordate. Stipules persistent. Internal bristles few. minute. Flowers subsessile, the fig hollow ..... 290. *F. complexa*.

Key to the species of ser. *Copiosae*

1. Cystoliths hypogenous. Figs cauliflorous with projecting apical bracts and, often, conspicuous lateral bracts. Leaves not opposite.
2. (Male flowers with 2 stamens, ostiolar and disperse. Fig 16–25 × 12–17 mm., lateral bracts prominent. Basal nerves of lamina elongate. China . . . . . 282. *F. tsiangii*).
2. Male flowers ostiolar, stamen 1. Basal nerves not or little elongate. New Guinea, New Britain.
3. Lamina obovate, lateral nerves 9–13 pairs. Fig large, pyriform, stalks –70 mm. long, no lateral bracts . . . . 306. *F. primaria*.
3. Lamina ovate, lateral nerves 5–8 pairs. Fig small, with a few lateral bracts. Tepals dark red. Internal bristles copious, long . . . . . 305. *F. griseifolia*.
1. Cystoliths amphigenous. Figs axillary to cauliflorous, the apical bracts not projecting, lateral bracts small. Leaves often opposite.
4. Seed reticulate. Leaves spirally arranged. Fig –10 mm. wide. Tepals white. Shrubs or small trees.
5. Fig-stalks 7–12 mm. long. Internal bristles abundant, short. Male flower without gall-ovary. Tepals and style puberulous. Twigs 4–6 mm. thick . . . . . 298. *F. andamanica*.
5. Fig-stalks 2–6 mm. long. Male flower with normal gall-ovary. Tepals and style often glabrous. Internal bristles none.
6. Lax shrub. Twigs 1–3 mm. thick. Leaf-base cuneate. Lateral nerves 7–10 pairs. Stipules caducous. Figs axillary. Tepals lanceolate, entire . . . . . 296. *F. montana*.
6. Small tree. Twigs 3–5 mm. thick. Leaf-base subcordate and the lateral nerves 8–15 pairs, varying lanceolate. Stipules persistent. Figs becoming cauliflorous. Tepals oblong or spatulate, often denticulate . . . . . 297. *F. madurensis*.
4. Seed smooth. Leaves often opposite. Fig often larger.
7. Decumbent shrub with long internodes. Figs axillary, the stalks 5–8 mm. long . . . . . 299. *F. subsidens*.
7. Erect. Internodes crowded towards the end of each twig.
8. Twigs 3–8 mm. thick. Leaves mostly opposite; lamina 6–20 cm. wide, the base cordate to widely cuneate. Figs cauliflorous, 12–20 mm. wide, the stalks 12–55 mm. long. Tepals dark red or purple, fading pink to white. Male flowers rarely with a gall-ovary.
9. Lamina ovate-cordate, harshly scabrid, basal nerves 1/3–1/2 lamina. Tepals closely hispid, reddish purple . . . . . 300. *F. heteropoda*.
9. Lamina elliptic-obovate, less scabrid to nearly smooth, basal nerves 1/5–1/3 lamina. Twigs, petioles, and main nerves often muriculate. Tepals pink, puberulous to glabrous . . . . . 301. *F. copiosa*.
8. Twigs 1.5–3 mm. thick. Leaves usually spirally arranged; lamina 2–12 cm. wide, the base cuneate, or subcordate in saplings. Figs axillary to cauliflorous, 9–15 mm. wide, the stalks –35 mm. long. Tepals dark red or white. Male flowers often with an ovary. Shrubs or small trees.
10. Figs densely echinate-muriculate, axillary, the stalk –7 mm. long. Tepals white . . . . . 303. *F. hystriocarpha*.
10. Figs minutely scabridulous or nearly smooth, or softly villous (*F. balica*).
11. Twigs, petioles, and figs thinly pubescent to villous. Fig 12–15 mm. wide, or more. Internal bristles abundant. Tepals dark red . . . . . 304. *F. balica*.
11. Glabrous or minutely scabridulous. Fig 9–13 mm. wide. Internal bristles none or minute. Tepals white or (var. *nubigena*) red . . . . . 302. *F. wassa*. (*Fig pedunculate, see 334. F. opposita*).

Key to the species of ser. *Scabrae* and of subsect. *Varinga*

1. Leaves opposite or spirally arranged, not or slightly asymmetric. Cystoliths amphigenous or as microscopic hairs on the underside of the lamina.
    2. Leaf-base rounded to cordate, apex blunt to subacute. Harshly scabrid, hispid villous, the leaves even with aculeate hairs. Apical bracts of fig obtuse, not or scarcely projecting . . . 334. *F. opposita*.
    2. Leaf-base cuneate or, if subcordate, then the apex acute to acuminate. Not villous\* or aculeate.
      3. Apical bracts suberect, 1–2 mm. long, projecting. Tepals white, puberulous as the style, or glabrous.
        4. Figs without a collar of basal bracts, body subglobose.
          5. Figs with scattered lateral bracts. Seed shortly oblong, reticulate. Leaf symmetric. Lateral nerves 3–5 pairs, basal nerves  $\frac{1}{2}$ – $\frac{2}{3}$  lamina . . . . . 356. *F. exasperata*.
          5. Figs rarely with lateral bracts. Seed lenticular, smooth. Leaf asymmetric, acuminate. base often widely cuneate to subcordate. Tepals glabrous . . . . . 309. *F. ulmifolia*.
        4. Figs with a collar of basal bracts, the body often ellipsoid and rarely with lateral bracts. Seed smooth.
          6. Lamina elliptic, subacute to acute, often strongly scabrid. Lateral nerves 3–6 pairs, basal nerves usually elongate  $-\frac{1}{2}$  lamina. Fig-stalk  $-7$  mm. long. . . . . 336. *F. fraseri*. (Lamina more or less smooth . . . . . var. *laevis*).
          6. Lamina lanceolate, apex gradually attenuate, slightly scabrid. Lateral nerves 11–25 pairs, basal nerves not elongate. Fig-stalks  $-15$  mm. long . . . . . 337. *F. coronulata*.
          6. Lamina elliptic-obovate, acuminate, dentate. Lateral nerves 6–10 pairs, basal nerves not elongate. China . . . 149. *F. henryi*.
      3. Apical bracts not or scarcely projecting. Fig subglobose.
        7. Leaves not opposite, lanceolate-attenuate, 4–13  $\times$  0.5–1.5 cm. Fig solitary, axillary, no collar of basal bracts . . . . . 347. *F. bambusaefolia*.
        7. Leaves mostly opposite, larger. Fig generally with a collar of basal bracts.
          8. Lamina obtuse to subacute. Petiole 3–8 mm., short. Tepals glabrous . . . . . 335. *F. scobina*.
          8. Lamina acute or acuminate. Petiole usually longer. Tepals hairy.
            9. Tepals dark red, fading pink. Fig becoming cauliflorous, pedicels  $-20$  mm. long, no collar of basal bracts . . . . . 302. *F. wassa* var. *nubigena*.
            9. Tepals white. Fig not cauliflorous, peduncle  $-10$  mm. long, with a collar of basal bracts . . . . . 307. *F. cumingii*.
  - (9. Leaves spirally arranged, symmetric, often rather long-petiolate. Figs without a collar of basal bracts. Shrub . . . . . 296. *F. montana*).
1. Leaves distichous. Cystoliths amphigenous or hypogenous.
  10. Leaf-base cuneate, often narrowly, not or little asymmetric.
    11. Hairy. Lamina caudate, not scabrid. Fig 10–12 mm. wide, peduncle 1–2 mm. long. Internal bristles copious, long. Tepals hairy, red fading white. Cystoliths hypogenous . . . . . 319. *F. macrorrhyncha*.
    11. Without such characters.

\* White to brown villous, compare 195. *F. tuphapensis* (China, Indochina), of subsect. *Eriosycea* (sect. *Ficus*).

12. Tepals dark red. Cystoliths amphigenous. Glabrous-scabridulous. (Cystoliths hypogenous ..... 375. *F. rubrocauspidata*).
13. Figs pedicellate, no collar of basal bracts. Internal bristles minute or none. Basal nerves elongate.
14. Intercostals vague. Lamina not caudate. Fig-wall without sclerotic cells ..... 321. *F. leptoclada*.
14. Intercostals regular, or the lamina small and caudate. Fig-wall with sclerotic cells.
15. Fig 15–20 mm. wide, wall thick, pedicel 3–10 mm. long ..... 322. *F. todayensis*.
15. Fig 5–12 mm. wide, wall thin, pedicel 5–20 mm. long, slender ..... 323. *F. irisana*.
13. Figs pedunculate, rarely without a collar of basal bracts. Internal bristles often conspicuous.
16. Lamina strongly caudate-acuminate, not scabrid. Fig-wall with sclerotic cells ..... 324. *F. tenuicuspidata*.
16. Lamina not caudate. Fig-wall without sclerotic cells.
- 16A. Fig with slender pedicels 3–18 mm. long and slender peduncles. Tepals 4–6. Solomon Islands.
- 16B. Fig axillary, solitary. Lateral nerves 7–11 pairs: intercostals 2–5 ..... 328. *F. imbricata*.
- 16B. Figs cauliflorous. Lateral nerves 11–16 pairs: intercostals 5–11 ..... 330. *F. arawaensis*.
- 16A. Fig with peduncle –12 mm. long: pedicel short or none.
- 16c. Lamina smooth. Tepals 3–4 ..... 320. *F. tonsa*.
- 16c. Lamina scabrid. Tepals 4–6 .. 317. *F. trachypison*.
- (Fig solitary. Asiatic Mainland .... 150. *F. subincisa*).
12. Tepals white or pale pink.
17. Cystoliths hypogenous. Leaves more or less smooth. Figs pedunculate, with a collar of basal bracts. Samoa.
18. Lamina lanceolate, caudate-acuminate, –2 cm. wide  
350. *F. samoensis*.
18. Lamina elliptic or oblong-elliptic.
19. Acuminate. Lateral nerves 7–11 pairs, basal nerves not elongate. Fig-peduncle 4–6 mm. long  
348. *F. longecuspidata*.
19. Obtusely subacuminate. Lateral nerves 4–7 pairs, basal nerves elongate. Peduncle 6–11 mm.  
349. *F. godeffroyi*.
17. Cystoliths amphigenous (except *F. goniophylla*). Leaves generally scabrid. Not in Samoa.
20. Cystoliths hypogenous. Lamina harshly scabrid, more or less lobate-angular on each side. Figs cauliflorous, hispidulous, with 1–2 lateral bracts on the body  
315. *F. goniophylla*.
- (Cystoliths hypogenous. Lamina not lobate angular. Figs pedicellate, small ..... subsect. *Palaemorphe*).
20. Without such character. Cystoliths amphigenous.
21. Fig pedunculate with a collar of basal bracts, 10–20 mm. wide. Tepals white.
- 21A. Petiole with a single gland on the back at the junction with the midrib. Fig with abundant internal bristles. Twigs and petioles villous. Lamina scabrid  
333. *F. schumanniana*.
- 21A. Without such characters. Lamina with 2 basal glands, if at all. No internal bristles. Fig solitary.

22. Lamina large 13–37 × 5–17 cm.: lateral nerves 6–11 pairs: basal nerves not elongate  
307. *F. cumingii* v. *worcesteri*.
22. Lamina small, lateral nerves fewer, basal nerves elongate  $\frac{1}{4}$ – $\frac{1}{2}$  lamina.
23. Lamina elliptic-obovate, smooth. Lateral nerves 3–5 pairs. Tree ..... 314. *F. cauta*.
23. Lamina oblong-elliptic, scabrid. Shrub  
351. *F. heterophylla*.
21. Figs mostly pedicellate with scattered lateral bracts on the stalk. Leaves mostly scabrid.
24. Internal bristles few, minute, or none. Basal nerves not elongate.
25. Lamina lanceolate.
26. Lamina 0.5–1.5 cm. wide, lateral nerves 7–11 pairs. Petiole 2–4 mm. long. Tepals hairy.  
347. *F. bambusaefolia*.
26. Lamina 2–2.5 cm. wide, lateral nerves 11–16 pairs. Petiole 7–14 mm. long. Tepals glabrous  
308. *F. fallax*.
25. Lamina elliptic, caudate, dentate.
27. Fig 10–13 mm. wide, pedicel 17–25 mm. long, cauliflorous. Tepals 5–8. Twigs, stipules striate (dried) ..... 354. *F. leptogramma*.
27. Figs 6–8 mm. wide, pedicels 2–5 mm. long, axillary. Tepals 3–5 .. 355. *F. praetermissa*.
24. Internal bristles abundant. Basal nerves usually elongate.
28. Harshly scabrid, hispid or hispidulous. Apical bracts projecting.
29. Hispidulous with hairs 0.5 mm. long. Lamina subsymmetric. Fig mostly solitary, distinctly pedicellate. Seed reticulate  
356. *F. exasperata*.
29. Hispid with hairs 1–2 mm. long on twigs and petioles. Lamina mostly asymmetric, often oblong, cuspidate. Fig sessile or shortly stalked, lateral and apical bracts linear. Seed smooth  
311. *F. riedelii*.
28. Glabrous-scabridulous.
30. Apical bracts projecting; fig 10–20 mm. wide. Lamina small to medium-size  
309. *F. ulmifolia*.
30. Apical bracts not projecting; fig 5–10 mm. wide.
31. Internal bristles 1–1.5 mm. long. Lamina acuminate to caudate. Fig-stalk 3–24 mm. long  
313. *F. guyeri*.
31. Internal bristles 0.5 mm. long. Lamina subacute to shortly acuminate. Fig-stalk 3–6 (–10) mm. long ..... 312. *F. ampelas*.

10. Leaf-base broadly cuneate to cordate, asymmetric.
32. Leaf-base strongly asymmetric, the broader side generally concealing the petiole.
33. Basal nerves not markedly elongate (at most  $-1/3$  lamina).
34. Figs solitary, axillary, generally without a collar of basal bracts. Tepals pinkish to white. Cystoliths hypogenous. Twigs 1-3 mm. thick.
35. Lamina small, -6 cm. wide, base narrowly cordate. Fig 8-11 mm. wide. Tepals hairy. Glabrous or nearly  
346. *F. barclayana*.
35. Lamina larger, the base very strongly asymmetric, the larger side overlapping the smaller. Tepals nearly or quite glabrous ..... 340. *F. uniauriculata*.
34. Figs cauliflorous, pedunculate with a collar of basal bracts. Tepals red, fading whitish. Cystoliths amphigenous. Twigs 3-5 mm. thick. Leaves large, oblong.
36. Fig 15-30 mm. wide. Internal bristles abundant  
327. *F. oleracea*.
36. Fig 10-15 mm. wide. Internal bristles none  
310. *F. fiskei* var. *multinervia*.
33. Basal veins elongate,  $1/3-1/2$  lamina.
37. Cystoliths amphigenous. Tepals glabrous, white to dark red.
38. Without internal bristles. Tepals pallid. Lamina oblong, often muriculate. Fig pedicellate ..... 310. *F. fiskei*.
38. With internal bristles. Tepals dark red. Often hairy, not muriculate.
39. Fig soon glabrous, 10-15 mm. wide, no sclerotic cells in the wall, apical bracts scarcely projecting  
325. *F. elmeri*.
39. Fig hispid-villous, 18-30 mm. wide, without a collar of basal bracts (? always), abundant sclerotic cells in the wall, apical bracts projecting ..... 326. *F. odorata*.
37. Cystoliths hypogenous, or with scabrid cystolith-hairs above. Tepals white, or red fading white and hispidulous.
40. Apical bracts strongly projecting 2-3 mm. Densely hispid. Twigs 5-6 mm. thick. Stipules 20-30 mm. long. Fig ellipsoid,  $15 \times 12$  mm., with lateral bracts, solitary  
331. *F. gryllus*.
40. Apical bracts not or scarcely projecting. Twigs 1.5-3.5 mm.
41. Figs 10 mm. wide, hispid, becoming cauliflorous. Tepals white. Lamina harshly scabrid, acutely acuminate  
332. *F. erinobotrya*.
41. Fig larger, softly villous, not cauliflorous. Tepals reddish. Lamina slightly scabrid to smooth above, obtusely subacuminate ..... 339. *F. aspera*.
32. Leaf-base not so strongly asymmetric, the petiole not concealed.
42. Lamina subacute to rather obtusely subacuminate, intercostals lax. Basal bracts -1 mm. long. Apical bracts not projecting. Tepals white or pinkish. Polynesia.
43. Brown hispidulous. Lamina scabrid above. Cystoliths amphigenous ..... 345. *F. fulvopilosa*.  
(Lamina acutely acuminate, intercostals numerous and regular  
332. *F. erinobotrya*).
43. White villous or glabrous.
44. Cystoliths hypogenous. Lamina slightly scabrid above to nearly smooth. Tepals hairy ..... 341. *F. scabra*.
44. Cystoliths amphigenous. Tepals glabrous or slightly hairy.

45. Lamina ovate-elliptic, medium-size to small, scabrid above ..... 342. *F. storckii*.
45. Lamina oblong, large, narrowly cordate or auricled at the base, smooth above ..... 343. *F. masoni*.
42. Lamina acute, acutely acuminate, cuspidate, or caudate. Inter-costals generally numerous and regular.
46. Fig pedicellate, the apical bracts projecting or with lateral bracts. Tepals white or pale pink.
47. Apical bracts not projecting. Fig-body ellipsoid. Internal bristles long, copious. Lamina strongly acuminate to caudate-acuminate, asymmetric .... 353. *F. cyrtophylla*.  
(Lamina not or slightly asymmetric. Fig subglobose, no internal bristles ..... 361. *F. armiti*).
47. Apical bracts projecting.
48. Puberulous with minute hooked hairs. Lamina caudate. No internal bristles ..... 352. *F. asperiuscula*.
48. Scabrid puberulous or nearly glabrous. Fig 10–20 mm. wide, subglobose, rarely with a lateral bract. Tepals glabrous. Internal bristles present .. 309. *F. ulmifolia*.  
(Lamina oblong, very asymmetric at the base. No internal bristles ..... 310. *F. fiskei*).
48. Hispid villous, hairs –1 mm. long. Fig ellipsoid, 10–13 mm. wide, with lateral bracts. Internal bristles short. Tepals glabrous. Lamina acute to subacuminate  
338. *F. coronata*.
48. Harshly hispid, hairs 1–2 mm. long. Fig 6–13 mm. wide, subglobose, sessile or shortly stalked, lateral and apical bracts linear. Internal bristles long. Tepals hairy. Lamina cuspidate, harshly scabrid  
311. *F. riedelii*.
46. Figs pedunculate with a collar of basal bracts, or, if without, then the apical bracts not projecting.
49. Figs axillary or on the twigs behind the leaves, not ramiflorous or cauliflorous, usually with a collar of basal bracts. Cystoliths amphigenous (except *F. macrorrhyncha*).
50. Petiole more than 10 mm. long. Lamina ovate- to obovate-elliptic, hairy to glabrous. Fig 10–15 mm. wide, basal bracts –1 mm. long. Tepals reddish pink fading white, glabrous or sparsely hairy. Seed minutely reticulate. Large tree; latex serous  
316. *F. melinocarpa*.
50. Petiole usually less than 10 mm. long. Tepals often very hairy. Basal bracts 1–2 mm. long. Latex white.
51. Fig-stalks –2 mm. long. Lamina subsymmetric, caudate, base widely cuneate. Figs paired. Internal bristles copious, long. Cystoliths hypogenous  
319. *F. macrorrhyncha*.
51. Figs with longer stalks, mostly solitary. Lamina not caudate. Cystoliths amphigenous.
52. Tepals white. Leaf-base cordate: lateral nerves 6–10 pairs. Fig 8–14 mm. wide: internal bristles –1 mm. long, copious. Twigs and petioles white or yellow hairy. Solomon Isl.  
329. *F. chrysochaete*.
52. Tepals red.
- 52A. Fig with slender pedicel 3–18 mm. long, and slender peduncle. no sclerotic cells. Lamina with a small basal auricle on the acroscopic side. Solomon Islands .... 328. *F. imbricata*.
- 52A. Fig with a short peduncle –5 mm. long, no pedicel. with sclerotic cells. Lamina asymmetric, not auricled, New Guinea  
318. *F. quercetorum*.

49. Figs becoming ramiflorous in clusters or cauliflorous.
53. Basal bracts 1.5–4 mm. long. Fig 10–15 mm. wide, the apical bracts projecting. Tepals white or pinkish. Lamina rather large. Cystoliths hypogenous  
344. *F. greenwoodii*.
53. Basal bracts 0.5–1.5 mm. long. Cystoliths amphigenous.
54. Lamina oblong elliptic, large.
55. Fig 15–30 mm. wide, with a collar of basal bracts. Leaf-base cordate on both sides, often unequally, basal nerves not elongate. Tepals red, fading. Internal bristles abundant . . . . 327. *F. oleracea*.
55. Figs 10–20 mm. wide, hispidulous, then glabrous, mostly without a collar of basal bracts. Leaf-base cuneate on one side, cordate on the other, basal nerves mostly elongate. Tepals pinkish or white. Internal bristles few, minute, or none  
310. *F. fiskei*.
55. Fig 7–10 mm. wide, scabridulous. Leaf-base narrowly cordate. Tepals white, glabrous or nearly. Internal bristles few, short . . 343. *F. masoni*.
54. Lamina elliptic to ovate-elliptic, small to medium-size. Figs 6–12 mm. wide.
56. Tepals dark red, sometimes white, glabrous or hispidulous. Seed reticulate. Fig mostly with a collar of basal bracts, 0–2 small lateral bracts on the body. Lamina stiffly chartaceous, harshly scabrid. Twigs, petioles hispidulous to scabridulous . . . . . 317. *F. trachypison*.
56. Tepals pinkish to white. Seeds smooth. Figs without lateral bracts on the body. Leaves not so rigid.
57. Fig 7–10 mm. wide, peduncles –10 mm. long, cauliflorous densely hispid or glabrescent. Leaf-base strongly asymmetric. Intercostals close, regular. Hispidulous or subglabrous  
332. *F. erinobotrya*.
57. Fig 9–12 mm. wide, peduncle –15 mm. long, mostly ramiflorous. Intercostals usually lax. Fulvous hispid . . . . . 345. *F. fulvopilosa*.

Key to the species of ser. *Scabrae* with red or reddish pink tepals in dried specimens

1. Lamina strongly cordate symmetrically to very asymmetrically, often concealing the short petiole. Fig with copious internal bristles.
  2. Lamina 16–40 cm. long, oblong, equally or unequally cordate-auricled: basal nerves short. Fig 15–32 mm. wide, axillary and cauliflorous: without sclerotic cells. Cystoliths amphigenous. Solomon Isl.  
327. *F. oleracea*.
  2. Lamina smaller or ovate-elliptic, very unequally cordate: basal nerves elongate. Fig generally smaller. Cystoliths amphigenous (except *F. aspera*).
  3. Fig long-stalked, 10–15 mm. wide, soon glabrous, axillary and cauliflorous: without sclerotic cells: apical bracts scarcely projecting. Lamina scabrid. P.I., Celebes . . . . . 325. *F. elmeri*.
  3. Fig-stalk usually short, hispid or villous.
    4. Fig hispid, apical bracts projecting, 18–30 mm. wide: sclerotic cells abundant. cauliflorous. Lamina scabrid. P.I.  
326. *F. odorata*.
    4. Apical bracts not or scarcely projecting: no sclerotic cells.
      5. Fig 10 mm. wide, hispid, cauliflorous. Lamina harshly scabrid, acutely acuminate. New Britain, Solomon Islands  
332. *F. erinobotrya*.
      5. Fig larger, softly villous, axillary. Lamina subscabrid, obtusely subacuminate. Cystoliths hypogenous. New Hebrides  
339. *F. aspera*.

1. Lamina more or less cuneate at the base, never so strongly asymmetric, the petiole not concealed.
6. Fig pedicellate without a collar of lateral bracts. Basal nerves elongate. Tepals glabrous.
  7. Fig-body with linear lateral bracts and projecting apical bracts: internal bristles copious: sclerotic cells none: Tepals 4-7. Lamina scabrid, the base asymmetric. Australia  
338. *F. coronata*.
  7. Fig-body without lateral bracts: apical bracts not projecting. Tepals 3-4. Leaf-base cuneate, more or less symmetric (strongly asymmetric, scabrid, see *F. quercetorum*).
  8. Intercostals 1-3, lax. Lamina smooth, not caudate. Fig-wall without sclerotic cells: internal bristles few or none: pedicel 3-8 mm. Australia ..... 321. *F. leptoclada*.
  8. Intercostals 2-6, regular, or the lamina small and caudate. Fig-wall with sclerotic cells. Lamina usually scabrid.
    9. Fig 12-20 mm. wide, with thick wall: pedicel 3-10 mm.: internal bristles abundant, minute. P.I., Celebes  
322. *F. todayensis*.
    9. Fig 5-12 mm. wide, the wall thin: pedicel 5-26 mm. internal bristles few or none. Ryu Kyu, Formosa, P.I., Celebes  
323. *F. irisana*.
6. Fig pedunculate, rarely without a collar of basal bracts: internal bristles mostly abundant. Leaf-base symmetric or not. Tepals often hispidulous.
  10. Fig with distinct slender pedicel 3-18 mm. long and slender peduncle: body 9-14 mm. wide, without sclerotic cells. Tepals 4-6. Solomon Islands.
    11. Cauliflorous. Lamina subsymmetric: lateral nerves 11-16 pairs  
330. *F. arawaensis*.
    11. Fig axillary, solitary. Lamina often asymmetric at the base. Lateral nerves fewer ..... 328. *F. imbricata*.
  10. Fig without or with a short pedicel, the peduncle 2-12 (-17) mm. long Basal nerves usually elongate  $\frac{1}{4}$ - $\frac{1}{2}$  lamina.
    12. Lamina long-caudate, not scabrid: base symmetric. Fig villous: peduncle -2 mm. long: sclerotic cells abundant. Cystoliths hypogenous New Guinea ..... 319. *F. macrorrhyncha*.
  12. Without such character, Cystoliths amphigenous.
    13. Lamina smooth or subsabrid, scarcely asymmetric at the base: intercostals 2-6.
      14. Lamina strongly caudate-acuminate. Fig-wall with sclerotic cells. P.I., Celebes ..... 324. *F. tenuicuspidata*.
      14. Lamina not caudate. Fig without sclerotic cells. Moluccas, New Guinea ..... 320. *F. tonsa*.
  13. Lamina scabrid and/or asymmetric: intercostals 4-11.
    15. Mountain shrub or small tree: latex white. Fig villous or scabrid-puberulous, 8-13 mm. wide, without lateral bracts: sclerotic cells abundant. New Guinea  
318. *F. quercetorum*.
  15. Trees, mostly lowland, with watery latex.
    16. Latex turning yellow on exposure. Fig 6-10 mm. wide, often with 1-2 small lateral bracts: no sclerotic cells. Lamina stiffly chartaceous, harshly scabrid. Moluccas to Solomon Islands ..... 317. *F. trachypison*.
    16. Latex not yellowing. Fig 10-15 mm. wide, without lateral bracts: with or without sclerotic cells. Lamina not so stiff or so scabrid, varying glabrous and smooth. Sumatra to the Solomon Islands  
316. *F. melinocarpa*.

Key to the species of subsect. *Varinga*

1. Seed reticulate. Tepals hispidulous. Figs mostly solitary, axillary, with small lateral bracts. Basal nerves of lamina prominent. Harshly scabrid, hispidulous tree ..... 356. *F. exasperata*.
1. Seed smooth. Tepals nearly or quite glabrous.
  2. Fig solitary, axillary, 10–20 mm. wide, without lateral bracts on the body. No internal bristles. Leaves more or less asymmetric.
    3. (Leaves mostly decussate. Fig with a collar of basal bracts. Africa *F. capraeifolia*).
    3. (Leaves spirally arranged. Fig-stalk with scattered lateral bracts. Africa ..... *F. acutifolia*, *F. pygmaea*).
    3. Leaves distichous. Fig with a collar of basal bracts.
      4. Asia. Leaves elliptic, oblong or (var. *assamica*) ovate-cordate, pinnately lobed in young plants. Shrub, often decumbent 351. *F. heterophylla*.
      4. (Africa ..... *F. asperifolia*, *F. pendens*).
  2. Figs paired, axillary, or clustered and ramiflorous to cauliflorous, with scattered lateral bracts on the stalk and often the body. Leaves distichous, short-petiolate.
  5. Lamina strongly asymmetric at the base.
    6. Figs without lateral bracts on the body. Apical bracts strongly projecting. No internal bristles, or few and minute. Lamina caudate. All parts pubescent with minute hooked hairs 352. *F. asperiuscula*.
    6. Fig with lateral bracts on the body. Apical bracts not projecting. Internal bristles abundant. Hairs not hooked.
      7. Fig ellipsoid. Internal bristles 0.5–1 mm. long. Basal nerves  $1/3-\frac{1}{2}$  lamina (serrate to denticulate) 353. *F. cyrtophylla*.
      7. (Fig subglobose. Internal bristles shorter. Basal nerves not so elongate. Lamina dentato-laciniate. Africa *F. storthophylla*).
  5. Lamina nearly or quite symmetric.
    8. (Internal bristles short, abundant. Lamina acuminate, intercostals few. Africa ..... *F. urceolaris*).
    8. No internal bristles. Lamina caudate, intercostals many.
      9. Fig axillary, 6–10 mm. wide, stalk 2–5 mm. long. Tepals 3–5. Lamina elliptic to obovate ..... 355. *F. praetermissa*.
      9. Fig cauliflorous, 10–13 mm. wide, stalk 17–25 mm. long. Tepals 5–8 (gall-, female). Lamina elliptic to ovate. Twigs and stipules finely striate .... 354. *F. leptogramma*.

Key to the species of subsect. *Palaeomorpha*

(Leaves spirally arranged, not distichous, see subsect. *Sycidium* ser. *Copiosae*)

1. Fig drying smooth, with a layer of sclerotic cells in the wall (at least, in the gall-fig), no lateral bracts on the body. Lamina subcoriaceous (hypodermis 1–2 cells thick), not caudate-acuminate, mostly entire. Cystoliths amphigenous. Stipule straight, rigid, often prominent. Tepals puberulous. Internal bristles minute. Trees or banyans.
2. Lamina lanceolate, –25 mm. wide. Lateral nerves 10–22 pairs, perpendicular to the midrib, no intercostals. Fig 4–5 mm. wide. Tree ..... 359. *F. celebensis*.
2. Lamina elliptic, wider. Lateral nerves fewer, oblique or curved, mostly with intercostals. Fig larger. Often banyans.

3. Lamina symmetric or nearly so, acuminate, base cuneate, not angular, drying grey green. Lateral nerves 7-13 pairs, (4-6 in small leaves). Fig 7-10 mm. wide. Tepals white or red. Stomata superficial ..... 358. *F. virgata*.
3. Lamina more or less asymmetric, often subrhombic or angled, obtuse to acute or shortly acuminate, base rounded or subcordate to cuneate, often drying brown areolate beneath. Lateral nerves 3-9 pairs. Fig. 10-17 mm. wide. Tepals white. Stomata superficial or sunken ..... 357. *F. tinctoria*.
1. Fig-wall without sclerotic cells, the body drying shrunken, often with lateral bracts. Lamina thinly to stiffly membranous (no hypodermis), commonly caudate-acuminate, often dentate or denticulate. Small trees, shrubs, or climbers, often epiphytic.
4. All parts with minute hooked, white or brown hairs. Lamina very asymmetric, caudate, not auricled. Fig with narrow recurved apical bracts. Tepals glabrous ..... 352. *F. asperiuscula*.
4. Glabrous or the hairs not hooked.
5. Twigs and petioles yellow- or brown-hairy. Stipules often persistent.
6. Leaf-base with a small auricle on one side.
7. Auricle crescentic-reniform, obtuse, without a midrib. Fig cauliflorous, pedicel 12-30 mm. long.  
373. *F. hemsleyana*.
7. Auricle lanceolate to subulate, acuminate, with a midrib, often nearly free. Fig axillary, pedicel 1-4 mm.  
366. *F. aurita*.
6. Leaf-base not, or indistinctly, auricled.
8. Fig 15-24 mm. wide. Stipules caducous. Intercostals regular. Climbers.
9. Basal nerves 1/3-2/3 lamina. Lateral nerves 2-6 pairs, very oblique. Fig-pedicels 8-20 mm. .... 364. *F. parietalis*.
9. Basal nerves not elongate. Lateral nerves 6-9 pairs. Fig-pedicels 4-12 mm.  
363. *F. heteropleura* var. *mindanaensis*.
8. Fig smaller.
10. Climber. Stipules caducous. Intercostals ill-defined  
363. *F. heteropleura* var. *hirta*
10. Small trees or epiphytic shrubs, or climbing. Stipules more or less persistent
11. Cauliflorous. Fig-pedicels 20-30 mm. long, the body scabridulous. Lamina large, lateral nerves 8-10 pairs, not scabrid ..... 367. *F. stipata*.
11. Not cauliflorous. Pedicels 1-10 mm. Lateral nerves fewer.
12. Lamina with one basal gland.
13. Lamina acuminate, small, narrowly oblong-elliptic to lanceolate, base often subcordate and unequal  
361. *F. armiti*.
13. Lamina caudate-acuminate, elliptic, often rather large ..... 366. *F. aurita*.
12. With glands in the axils of the main lateral nerves as well as the one basal gland.
14. Lamina caudate, subsymmetric, not scabrid, basal nerves generally elongate, intercostals regular. Fig 11-15 mm. wide, densely hairy, the orifice deeply sunken. Fulvous villous climber  
365. *F. lasiocarpa*.
14. Lamina acute to acuminate or caudate, asymmetric, scabrid, intercostals few and lax. Fig 6-12 mm. wide. Shrub or small tree, hispid or strigose  
369. *F. obscura*.

5. Glabrous or whitish puberulous.
15. Climber. Fig 10–16 mm. wide, pedicel 6–14 mm. long. Lamina elliptic to subrhombic (prominent basal veins), the reticulations finely raised on the upper side  
363. *F. heteropleura*.
15. Small trees or shrubs.
16. Lamina elliptic.
17. Geocarpic, the figs on slender stolons. Twigs 1 mm. thick. petioles and pedicels 1–2 mm. long. Tepals white  
372. *F. leptocalama*.
17. Figs axillary or cauliflorous on short clustered twigs. Not such slender plants.
18. Lateral nerves 12–20 pairs. Stipules large, scarious, persistent. Lamina large. Tepals red.  
376. *F. rubromidotis*.
18. Without such character.
19. Stipule subulate. curved, prominent, caducous. Lamina entire. Tepals white, subulate, the pedicels of the gall-flowers indurate . . . . 360. *F. subulata*.
19. Stipule not so conspicuous. Lamina mostly dentate to crenato-denticulate. Gall- and female flowers sessile, not indurate.
20. Lateral nerves 3–6 pairs.
21. Lamina harshly scabrid, angular-lobate on each side. Fig long-stalked, hispidulous  
315. *F. goniophylla*.
21. Lamina smooth, not angular. Lateral nerves curved-ascending. Fig glabrous, shortly stalked. Tepals red . . . . . 374. *F. uniglandulosa*.
20. Lateral nerves generally more numerous. Tepals white.
22. Reticulations finely raised above. Lamina slightly scabrid below, smooth above, with 1 (–2) basal gland. Fig-pedicel very short, orifice sunken but gaping at maturity  
362. *F. sinuata*.
22. Reticulations invisible above. Glands in the axils of the main lateral nerves as well as the basal nerve. Fig-pedicels longer, the orifice scarcely sunken, not gaping.
23. Lamina asymmetric, scabrid. Stipules often persistent. Lateral nerves 4–7 pairs. Fig-pedicel 1–7 mm. long . . . . . 369. *F. obscura*.
23. Lamina symmetric, subscabrid to smooth, strongly caudate, the base subauricled. Lateral nerves 6–13 pairs. Fig-pedicels 3–25 mm., figs becoming cauliflorous.
24. Stipules subsistent, striate as the twigs. Intercostals numerous, regular. Fig 10–15 mm. wide, with several lateral bracts on the body. Gall- and female flowers pedicellate. Seed not keeled.  
354. *F. leptogramma*.
24. Stipules caducous. Intercostals lax. Fig 5–10 mm. wide, 0–1 lateral bract on the body. Flowers sessile. Seed strongly keeled.
- 24A. Lamina with caudate apex and cuneate base: intercostals 3–7. Fig-pedicels 3–25 mm. long . . . . 371. *F. midotis*.
- 24A. Lamina with acuminate apex and cordate base often concealing the petiole: intercostals 1–3. Fig-pedicel 4–7 mm. long  
370. *F. jaheriana*.

16. Lamina lanceolate, small or narrow, not or scarcely scabrid.
25. Tepals red.
26. Lamina strongly caudate. Fig 4–5 mm. wide, pedicel 0–1.5 mm. long. Male flower without a gall-ovary. Tepals glabrous. Seed scarcely keeled.  
375. *F. rubroscupidata*.
26. Lamina shortly acuminate to subcaudate. Fig 5–10 mm. wide, pedicel 1.5–3 mm. long. Male flower with a gall-ovary. Tepals often puberulous. Seed strongly keeled.  
374. *F. uniglandulosa* var. *parvifolia*.
25. Tepals white.
27. Tepals linear or subulate. Pedicels of gall- and female flowers indurate. Lamina entire, the gland basal or in the axil of a lower costa  
360. *F. subulata* var. *gracillima*.
27. Tepals broader, membranous. Flowers more or less sessile, not indurate.
28. Lateral nerves at a wide angle, 7–13 pairs. Lamina often distantly toothed or denticulate-crenate, or tricuspid at the apex, the reticulations finely raised upon the upper side.
29. Fig 4–6 mm. wide. Lamina lanceolate  
362. *F. sinuata* var. *cuspidata*.
29. Fig 6–10 mm. wide. Lamina oblong  
362. *F. sinuata* var. *sinuata*.
28. Laterals nerves oblique or curved ascending, the reticulations not raised above.
30. Lamina entire, membranous, intercostals fairly regular. Fig 4–6 mm. wide. Male flowers without a gall-ovary. Seed scarcely keeled  
368. *F. microsphaera*.
30. Lamina often dentate or denticulate-crenate, often subcoriaceous or bullate. Fig 5–8 mm. wide. Male flowers with a gall-ovary. Seed knobbed at the apex ..... 369. *F. obscura* var. *angustata*.

Key to the species of ser. *Subulatae*

1. Hispid with light fulvous or brown hairs, glabrescent. Lamina acute to acuminate, base subcordate to asymmetric and subauricled on one side, often scabrid. Seed compressed, strongly keeled. Male flower mostly without an ovary. Tepals glabrous ..... 361. *F. armiti*.
1. Glabrous or the young parts thinly appressedly puberulous. Lamina acuminate to caudate, base usually cuneate, not scabrid. Seed slightly keeled. Tepals mostly puberulous ..... 360. *F. subulata*.

Key to the species of ser. *Cuspidatae*

1. Shrubs or small trees, glabrous or thinly scabridulous. Basal nerves not conspicuous. Fig 4–10 mm. wide, pedicel 1–4 mm. long. Gall- and female flowers sessile. Tepals glabrous ..... 362. *F. sinuata*.
1. Climbers, often hairy. Basal nerves often elongate. Figs mostly 10–25 mm. wide. Gall- and female flowers often pedicellate.
2. Densely fulvous villous, hairs 1–2.5 mm. long. Stipules subpersistent. Intercostals 2–8. Petiole –3 mm. long. Fig 11–15 mm. wide, orifice deeply sunken, pedicel 1–3 mm. long. Internal bristles none. Tepals free, glabrous ..... 365. *F. lasiocarpa*.
2. Hairs shorter, –1 mm. long, or none. Stipules caducous. Petioles and pedicels longer. Fig-orifice slightly sunken.

3. Basal nerves  $1/3$ – $2/3$  the lamina. Lateral nerves 2–6 pairs, very oblique, 3–7 intercostals. Fig 18–25 mm. wide, densely hispidulous, pedicel 5–18 mm. long. Tepals puberulous, strongly gamophyllous in the female flower. Seed slightly keeled  
364. *F. parietalis*.
3. Basal nerves not elongate or, if so, the lamina small with 1–3 intercostals. Tepals glabrous or slightly puberulous, not or scarcely joined. Seed strongly keeled. . . . 363. *F. heteropleura*.

Key to the species of ser. *Minutuliflorae*

1. Glabrous, usually scabridulous. Lamina not auricled. Fig 4–6 mm. wide. Seed slightly keeled. Stipules caducous. . . . 368. *F. microsphaera*.
1. Hairy. Fig 6–8 mm. wide. Seed strongly keeled. Stipules mostly persistent.
2. Cauliflorous. Figs scabridulous, stalks 20–30 mm. long. Lamina large, base rounded to subcordate, not auricled . . . . . 367. *F. stipata*.
2. Figs axillary or clustered on the twigs, hispidulous. Fig-stalk –5 mm. long. Leaf-base often with a small auricle on one side  
366. *F. aurita*.

Key to the species of ser. *Fibrosifoliae*

1. Tepals red.
2. Lamina large, 5–12 cm. wide, with a short decurrent auricle on one side of the petiole. Lateral nerves 12–20 pairs, intercostals numerous. Stipules persistent . . . . . 376. *F. rubromidotis*.
2. Lamina smaller, not auricled. Lateral nerves and intercostals fewer. Stipules small, caducous.
3. Male flowers without gall-ovary. Seed 0.8 mm. long, scarcely keeled. Tepals free, glabrous. Twigs slender, pale ochraceous. Figs 4–5 mm. wide, pedicel 0–1.5 mm. long. Lamina strongly caudate . . . . . 375. *F. rubrocaudata*.
3. Male with gall-ovary. Seed 1.2–1.5 mm. long, strongly keeled. Tepals often puberulous, shortly joined in gall-and female flowers. Twigs brown, then yellowish. Fig-pedicels 1.5–3 mm. long . . . . . 374. *F. uniglandulosa*.
1. Tepals white or yellowish, rarely pale pink.
4. Fruiting on very slender leafless rooting (? geocarpic) twigs. Lamina 2–7 cm. wide; petiole 1–3 mm. long. Twigs 1 mm. thick. Fig-pedicels 1–3 mm. long. Tepals glabrous, free. Seed not keeled  
372. *F. leptocalama*.
4. Figs in compact bunches, if cauliflorous. Twigs stouter. Fig with longer pedicel. Tepals puberulous, mostly joined at the base. Seed keeled.
5. Leaf-base with a reniform or crescentic auricle obscuring the short petiole 1–5 mm. long. Brown hispid or villous with hairs 1–2.5 mm. long. Stipules persistent. Fig-pedicels 3–30 mm. long. Cystoliths hypogenous . . . . . 373. *F. hemsleyana*.
5. Leaf-base not auricled on one side or, if slightly, then glabrous and with longer petiole. Generally with glands in the axils of the main lateral nerves.
6. Lamina usually distinctly asymmetric, not auricled, usually scabrid and dentate. Often brown hairy. Stipules usually persistent Fig-pedicel 1–7 (–12) mm. long. Female tepals extensively joined. Cystoliths amphigenous  
369. *F. obscura*.
6. Lamina more or less symmetrical, smooth or subscabrid, mostly entire. Glabrous or puberulous. Stipules caducous. Cystoliths hypogenous.
7. Lamina with caudate apex and cuneate base. intercostals 3–7. Fig-pedicel 3–25 mm. long . . . . . 371. *F. midotis*.
7. Lamina with acuminate apex and cordate base often concealing the petiole: intercostals 1–3. Fig-pedicel 4–7 mm.  
370. *F. jaheriana*.

Key to the series of sect. *Adenosperma*

- 1. Cystoliths (as minute pustules in dried leaves) on both sides of the lamina ..... ser. *Amphigenae*.
- 1. Cystoliths only on the lower side of the leaf (not minutely pustulate above) ..... ser. *Hypogonae*.

Key to the species of ser. *Amphigenae*

- 1. Fig sessile: lateral bracts conspicuous, 4–10 mm. long: basal bracts 3–5, 5–13 mm. long. Internal bristles abundant.
  - 2. Stipules –2 cm. long, caducous. Twig 3–4 mm. thick. Lamina –20 cm. long, base narrowly cuneate, costas 6–8 pairs. Fig 15 mm. wide, basal bracts 5–9 mm. long. Twigs, petioles, and figs densely fulvous hairy ..... 379. *F. ochrochlora*.
  - 2. Stipules 2–5 cm. long, persistent. Twigs 5–10 mm. thick. Lamina 25–45 cm. long, costas 10–14 pairs. petiole short, stout.
    - 3. Stipules ovate-saccate, apiculate. Lamina obovate, gradually attenuate to the narrowly cordate base. Fig 20 mm. wide, basal bracts 5–7 mm. long. Tepals 4–6, oblong spatulate, free ..... 377. *F. saccata*.
    - 3. Stipules broadly lanceolate. Lamina broadly elliptic to obovate, rounded subcordate to widely cuneate at the base. Fig 20–35 mm. wide, basal bracts 9–13 mm. long. Tepals 3 (–4), ovate-lanceolate, gamophyllous round the stalked ovaries ..... 378. *F. megalophylla*.
- Fig pedunculate or, if sessile, with smaller basal bracts. Stipules not conspicuous.
  - 4. Leaves distichous.
    - 5. Brown hairy. Leaves lanceolate, pendulous. Fig-peduncles 10–12 mm. long. Internal bristles abundant ..... 380. *F. endochaete*.
    - 5. Thinly white puberulous to glabrous. Leaves elliptic, subacute, scabrid. Fig-peduncle 2–6 mm. Internal bristles none. Stomata sunken ..... 381. *F. umbonata*.
  - 4. Leaves spirally arranged. Trees or shrubs with Terminalia-branching.
    - 6. Leaves with regular intercostals.
      - 7. Closely fulvous hairy. Leaf-base widely cuneate to cordate (lanceolate in riparian forms). Fig 12–16 mm. wide, becoming cauliflorous ..... 382. *F. mollior*.
      - 7. Glabrous or thinly appressedly hairy. Leaf-base cuneate. Fig 6–8 mm. wide, ramiflorous ..... 383. *F. comitis*.  
(Solomon Isl. Fig 10–18 mm. wide, ribbed. Perianth gamophyllous, at least in the lower part. Style not strongly lateral. Seed without double basal keel. Lamina often somewhat auricled at the base ..... 406. *F. indigofera*).
    - 6. Leaves with few, lax or irregular intercostals. Figs mostly on the twigs.
      - 8. Riverside shrub –2 m. high. Leaves small, narrow, often greyish white beneath. Fig 9–22 mm. wide, the lateral bracts often equatorial ..... 384. *F. arbuscula*.
      - 8. Trees. Leaves not whitish beneath. Lateral bracts scattered or none.
        - 9. Leaves drying brittle-chartaceous, venation obscure, smooth or scabrid. Glabrous or minutely puberulous. Fig-stalks 10 mm. or more long, slender. Internal bristles few or none ..... 385. *F. verticillaris*.
        - 9. Leaves membranous to subcoriaceous, not brittle or scabrid, venation distinct. Mostly hairy. Fig-stalks mostly less than 10 mm. long, rather thick ..... 386. *F. adenosperma*.

3. Basal nerves  $1/3$ – $2/3$  the lamina. Lateral nerves 2–6 pairs, very oblique, 3–7 intercostals. Fig 18–25 mm. wide, densely hispidulous, pedicel 5–18 mm. long. Tepals puberulous, strongly gamophyllous in the female flower. Seed slightly keeled  
364. *F. parietalis*.
3. Basal nerves not elongate or, if so, the lamina small with 1–3 intercostals. Tepals glabrous or slightly puberulous, not or scarcely joined. Seed strongly keeled. . . . 363. *F. heteropleura*.

Key to the species of ser. *Minutuliflorae*

1. Glabrous, usually scabridulous. Lamina not auricled. Fig 4–6 mm. wide. Seed slightly keeled. Stipules caducous. . . . 368. *F. microsphaera*.
1. Hairy. Fig 6–8 mm. wide. Seed strongly keeled. Stipules mostly persistent.
2. Cauliflorous. Figs scabridulous, stalks 20–30 mm. long. Lamina large, base rounded to subcordate, not auricled . . . . . 367. *F. stipata*.
2. Figs axillary or clustered on the twigs, hispidulous. Fig-stalk –5 mm. long. Leaf-base often with a small auricle on one side  
366. *F. aurita*.

Key to the species of ser. *Fibrosifoliae*

1. Tepals red.
2. Lamina large, 5–12 cm. wide, with a short decurrent auricle on one side of the petiole. Lateral nerves 12–20 pairs, intercostals numerous. Stipules persistent . . . . . 376. *F. rubromidotis*.
2. Lamina smaller, not auricled. Lateral nerves and intercostals fewer. Stipules small, caducous.
3. Male flowers without gall-ovary. Seed 0.8 mm. long, scarcely keeled. Tepals free, glabrous. Twigs slender, pale ochraceous. Figs 4–5 mm. wide, pedicel 0–1.5 mm. long. Lamina strongly caudate . . . . . 375. *F. rubroscupidata*.
3. Male with gall-ovary. Seed 1.2–1.5 mm. long, strongly keeled. Tepals often puberulous, shortly joined in gall-and female flowers. Twigs brown, then yellowish. Fig-pedicels 1.5–3 mm. long . . . . . 374. *F. uniglandulosa*.
1. Tepals white or yellowish, rarely pale pink.
4. Fruiting on very slender leafless rooting (? geocarpic) twigs. Lamina 2–7 cm. wide; petiole 1–3 mm. long. Twigs 1 mm. thick. Fig-pedicels 1–3 mm. long. Tepals glabrous, free. Seed not keeled  
372. *F. leptocalama*.
4. Figs in compact bunches, if cauliflorous. Twigs stouter. Fig with longer pedicel. Tepals puberulous, mostly joined at the base. Seed keeled.
5. Leaf-base with a reniform or crescentic auricle obscuring the short petiole 1–5 mm. long. Brown hispid or villous with hairs 1–2.5 mm. long. Stipules persistent. Fig-pedicels 3–30 mm. long. Cystoliths hypogenous . . . . . 373. *F. hemsleyana*.
5. Leaf-base not auricled on one side or, if slightly, then glabrous and with longer petiole. Generally with glands in the axils of the main lateral nerves.
6. Lamina usually distinctly asymmetric, not auricled, usually scabrid and dentate. Often brown hairy. Stipules usually persistent Fig-pedicel 1–7 (–12) mm. long. Female tepals extensively joined. Cystoliths amphigenous  
369. *F. obscura*.
6. Lamina more or less symmetrical, smooth or subscabrid, mostly entire. Glabrous or puberulous. Stipules caducous. Cystoliths hypogenous.
7. Lamina with caudate apex and cuneate base. intercostals 3–7. Fig-pedicel 3–25 mm. long . . . . . 371. *F. midotis*.
7. Lamina with acuminate apex and cordate base often concealing the petiole: intercostals 1–3. Fig-pedicel 4–7 mm.  
370. *F. jaheriana*.

Key to the series of sect. *Adenosperma*

1. Cystoliths (as minute pustules in dried leaves) on both sides of the lamina ..... ser. *Amphigenae*.
1. Cystoliths only on the lower side of the leaf (not minutely pustulate above) ..... ser. *Hypogonae*.

Key to the species of ser. *Amphigenae*

1. Fig sessile: lateral bracts conspicuous, 4–10 mm. long: basal bracts 3–5, 5–13 mm. long. Internal bristles abundant.
  2. Stipules –2 cm. long, caducous. Twig 3–4 mm. thick. Lamina –20 cm. long, base narrowly cuneate, costas 6–8 pairs. Fig 15 mm. wide, basal bracts 5–9 mm. long. Twigs, petioles, and figs densely fulvous hairy ..... 379. *F. ochrolora*.
  2. Stipules 2–5 cm. long, persistent. Twigs 5–10 mm. thick. Lamina 25–45 cm. long, costas 10–14 pairs. petiole short, stout.
    3. Stipules ovate-saccate, apiculate. Lamina obovate, gradually attenuate to the narrowly cordate base. Fig 20 mm. wide, basal bracts 5–7 mm. long. Tepals 4–6, oblong spatulate, free ..... 377. *F. saccata*.
    3. Stipules broadly lanceolate. Lamina broadly elliptic to obovate, rounded subcordate to widely cuneate at the base. Fig 20–35 mm. wide, basal bracts 9–13 mm. long. Tepals 3 (–4), ovate-lanceolate, gamophyllous round the stalked ovaries ..... 378. *F. megalophylla*.
- Fig pedunculate or, if sessile, with smaller basal bracts. Stipules not conspicuous.
  4. Leaves distichous.
    5. Brown hairy. Leaves lanceolate, pendulous. Fig-peduncles 10–12 mm. long. Internal bristles abundant ..... 380. *F. endochaete*.
    5. Thinly white puberulous to glabrous. Leaves elliptic, subacute, scabrid. Fig-peduncle 2–6 mm. Internal bristles none. Stomata sunken ..... 381. *F. umbonata*.
  4. Leaves spirally arranged. Trees or shrubs with Terminalia-branching.
    6. Leaves with regular intercostals.
      7. Closely fulvous hairy. Leaf-base widely cuneate to cordate (lanceolate in riparian forms). Fig 12–16 mm. wide, becoming cauliflorous ..... 382. *F. mollior*.
      7. Glabrous or thinly appressedly hairy. Leaf-base cuneate. Fig 6–8 mm. wide, ramiflorous ..... 383. *F. comitis*.  
(Solomon Isl. Fig 10–18 mm. wide, ribbed. Perianth gamophyllous, at least in the lower part. Style not strongly lateral. Seed without double basal keel. Lamina often somewhat auricled at the base ..... 406. *F. indigofera*).
    6. Leaves with few, lax or irregular intercostals. Figs mostly on the twigs.
      8. Riverside shrub –2 m. high. Leaves small, narrow, often greyish white beneath. Fig 9–22 mm. wide, the lateral bracts often equatorial ..... 384. *F. arbuscula*.
      8. Trees. Leaves not whitish beneath. Lateral bracts scattered or none.
        9. Leaves drying brittle-chartaceous, venation obscure, smooth or scabrid. Glabrous or minutely puberulous. Fig-stalks 10 mm. or more long, slender. Internal bristles few or none ..... 385. *F. verticillaris*.
        9. Leaves membranous to subcoriaceous, not brittle or scabrid, venation distinct. Mostly hairy. Fig-stalks mostly less than 10 mm. long, rather thick ..... 386. *F. adenosperma*.

## GROUP A

Figs with lateral bracts on the body

1. Leaves distichous, short-petiolate, often asymmetric. Geocarpic. Western and central Malaysia.
2. Lateral bracts few, small, appressed; generally with a collar of three basal bracts. Gall- and female flowers with perianth. Female style hairy.
3. Lamina glabrous and smooth on the upperside, subsymmetric, caudate; base cuneate. Internal bristles few to abundant. Hairs generally appressed. Borneo ..... 455. *F. treubii*.
3. Lamina hairy and scabrid on the upperside, more or less asymmetric, generally denticulate, acute to acuminate; base subcordate to asymmetric.
4. Fig with internal bristles. Dark brown hairy. Lamina symmetric to asymmetric ..... 430. *F. vrieseana*.
4. Fig without internal bristles.
5. Lamina strongly asymmetric at the base, broadly cordate on one side, oblong. Hairs on twigs 2-4 mm. long. Fig 14-17 mm. wide, strigose. Celebes ..... 457. *F. geocarpa*.
5. Lamina much less asymmetric to rounded symmetric at the base, elliptic. Hairs shorter. Fig 9-12 mm. wide, glabrous except the bracts. Borneo ..... 456. *F. stolonifera*.
2. Lateral bracts abundant, uncinata, rarely with a distinct collar of three basal bracts. Gall- and female flowers without perianth. Female style glabrous.
6. Lamina 40-100 × 14-35 cm., very large; base broadly and unequally cordate; upperside smooth or hispid-scabrid. Seed 0.7 mm. long. Borneo ..... 458. *F. megaleia*.
6. Lamina smaller, symmetric or asymmetric with the base cuneate on one side, and cordate on the other.
7. Lamina with the upperside thinly appressedly hairy to hispid, generally scabrid; margin usually denticulate; base usually strongly asymmetric; intercostals raised below. Hairs generally spreading. Malaya. Lingga. Borneo ..... 459. *F. uncinata*.
7. Lamina with the upperside glabrous, smooth or subscabrid; margin entire, or denticulate distally. Hairs appressed or spreading.
8. Intercostals not raised below. Upperside of lamina subscabrid, dull. Leaf-apex abruptly acuminate. Fig glabrous. Appressedly hairy. Borneo ..... 462. *F. subterranea*.
8. Intercostals raised below. Upperside of lamina smooth, often nitid. Fig strigose-villous.
9. Lamina symmetric or, if asymmetric, not auricled, attenuato-caudate to acuminate. Hairs generally appressed. Borneo, Malaya ..... 460. *F. beccarii*.
9. Lamina with a short auricle (-7 mm. long and wide) on one side of the base. Hairs spreading. Borneo ..... 461. *F. geocharis*.
1. Leaves spirally arranged or opposite, symmetric. Rarely geocarpic (*F. hispida*).
10. Lateral bracts numerous, conspicuous.
11. Lateral bracts incurved, rather short, not concealing the body.
12. Figs 25-45 mm. wide, cauliflorous. Lateral nerves 8-12 pairs. Twigs pale brown tomentose. Borneo .. 451. *F. cereicarpa*.
12. Figs smaller, ? cauliflorous. Lateral nerves 4-5 pairs. Glabrous or thinly white hairy. Burma, Thailand .. 411. *F. griffithii*.

11. Lateral bracts long or broad, more or less concealing the body.  
 13. Fig 6–13 cm. wide, axillary. Lamina very large. New Guinea  
 408. *F. dammaropsis*.
13. Fig smaller.  
 14. Figs covered by large blunt bracts, cauliflorous on stout, more or less unbranched twigs. Brown hairy. Stipules persistent. Long-petiolate. New Britain ..... 418. *F. praestans*.
14. Lateral bracts lanceolate, acute.  
 15. Riverside shrub. Lamina lanceolate-obovate, short-petiolate. Styles very long (female). Borneo.. 413. *F. macrostyla*.
15. Trees. Lamina elliptic, long-petiolate. Solomon Isl.  
 16. Twigs, petioles with spreading brown hairs 3–7 mm. long. Fig sessile. Style glabrous. Seed-hilum not projecting ..... 403. *F. lancibracteata*.
16. Shortly, thinly, appressedly hairy. Fig stalked. Female style hairy. Seed-hilum prominent  
 419. *F. longibracteata*.
10. Lateral bracts few, small, appressed.  
 17. Riverside shrub. Lamina lanceolate-obovate, short-petiolate. Stipules persistent. Female style very long, hairy. India, Burma, China, Thailand ..... 412. *F. squamosa*.
17. Trees, without such character.  
 18. Figs axillary. Often short-petiolate.  
 19. Twigs, petioles with dark brown wiry hairs. Stipules persistent, concealing the sessile figs. Lamina elliptic to obovate, scabrid. Moluccas ..... 449. *F. calcarata*.
19. Shortly, often appressedly, pale hairy to glabrous. Stipules not concealing the figs, often caducous.  
 20 Fig sessile or stalked; basal bracts 3–13 mm. long; body ellipsoid. Leaves smooth. Burma to Moluccas  
 446. *F. lepicalpa*.
20. Fig shortly stalked, depressed globose, ridged toward the somewhat sunken orifice; basal bracts 2–4 mm. long. Leaves scabrid. Fiji ..... 407. *F. vitiensis*.
18. Rami- and cauliflorous. Often long-petiolate.  
 21. Figs on stout, much-branched twigs. Basal bracts 5–9 mm. long. Apical bracts projecting. New Guinea  
 420. *F. pachyrrachis*.  
 (Leaves very large. Figs verrucose .. 404. *F. salomonensis*).
21. Figs on short twigs or on slender elongate, hanging or geocarpic twigs. Bracts shorter. Apical bracts not projecting...  
 22. Cystoliths abundant on the upper side of the lamina. Fig 10–15 mm. wide, not ridged; internal bristles abundant. Celebes ..... 416. *F. parvibracteata*.
22. Cystoliths few and inconspicuous or none on the upper side of the lamina.  
 23. Fig 6 mm. wide, the stalk 3–4 mm. long with 2–3 scattered lateral bracts on it. New Guinea  
 294. *F. badiopurpurea*.
23. Fig larger, pedunculate with a collar of three basal bracts.  
 24. Internal bristles present. Fig generally ridged or sulcate towards the apex. Basal nerves short  
 430. *F. vrieseana*.
24. No internal bristles. Fig usually not ridged.  
 25. Leaves generally opposite, usually scabrid; basal nerves usually elongate. Figs on elongate twigs. Female style hairy ..... 444. *F. hispida*.
25. Leaves mostly spirally arranged, occasionally opposite, smooth; basal nerves usually short. Figs on very short knobby twigs. Female style glabrous or sparsely hairy ..... 442. *F. moderata*.

## GROUP B

No lateral bracts. *Cystoliths amphigenous*

1. Leaves distichous, short-petiolate. Figs cauliflorous, paniculate or on stolons; internal bristles brown, few to abundant.
2. Lamina scabrid above, often asymmetric. Figs 10–25 mm. wide, generally ridged towards the apex. Geocarpic .. 430. *F. vrieseana*.
2. Lamina smooth or, if scabrid, not asymmetric. Fig not ridged.
3. Figs (15–) 20–50 mm. wide ..... 415. *F. botryocarpa*.
3. Figs 7–15 mm. wide ..... 414. *F. ribes*.
1. Leaves spirally arranged.
4. Unbranched or sparingly branched pachycaulous trees. Twigs 6–20 mm. thick. Lamina more than 30 cm. long, cordate-auricled; petiole short.
5. Twigs 12–20 mm. thick. Lamina over 80 cm. long, scabrid. Figs cauliflorous, verrucose; basal bracts 9–16 mm. long; peduncles 30–80 mm. Solomon Isl. .... 404. *F. salomonensis*.
5. Twigs 6–10 mm. thick. Lamina 30–90 cm. long, smooth. Figs axillary, concealed, also cauliflorous in small groups, not verrucose; basal bracts 3–9 mm.; peduncle 3–9 mm. Solomon Isl., Fiji ..... 405. *F. theophrastoides*.
4. Twigs not so thick. Leaves smaller. Ramified trees.
6. Cauliflorous. Brown hairy. Lamina scabrid, base cordate to widely cuneate. Seed with prominent hilum.
7. Geocarpic with stolons. Fig 10–25 mm. wide, generally ridged towards the orifice. Female style hairy .. 430. *F. vrieseana*.
7. Not geocarpic. Female style glabrous.
8. Fig (15–) 20–50 mm. wide, in clusters, the orifice with a rosette of apical bracts; basal bracts persistent. Philippines ..... 417. *F. cassidyana*.
8. Fig 13–16 mm. wide, on long hanging twigs, the orifice closed by 5 umbonate apical bracts; basal bracts caducous. Solomon Isl. .... 424. *F. baccaureoides*.
6. Figs axillary or on the twigs behind the leaves. Peduncles –8 mm. long. Solomon Isl.
9. Leaf smooth. Glabrous or finely appressedly hairy. Fig without internal bristles and sclerotic cells. Seed without prominent hilum ..... 406. *F. indigofera*.
9. Leaf scabrid. Hispid-villous. Fig with abundant internal bristles and sclerotic cells. Seed with prominent hilum ..... 463. *F. bougainvillei*.
- (Fig with small lateral bracts. Appressedly hairy. No internal bristles. Fiji ..... 407. *F. vitiensis*).

## GROUP C

No lateral bracts. *Cystoliths hypogenous*. Figs on stolons.

1. Leaves spirally arranged, long-petiolate.
2. Twigs and petioles whitish hispid. Lateral nerves 10–12 pairs; basal nerves short. Basal bracts 2 mm. long. Internal bristles few, short. Geocarpic. Sumatra ..... 453. *F. gilapong*.
2. Twigs and petioles appressedly brown hairy. Lateral nerves 4–8 pairs; basal nerves elongate. Basal bracts 5–8 mm. long. Internal bristles copious. Solomon Isl. .... 423. *F. profusa*. (See 436 A. *F. merrittii*)
1. Leaves short-petiolate or decussate.
3. Leaves spirally arranged or decussate, mostly scabrid.
4. Figs ripening yellow (rarely red); no internal bristles. Basal nerves of lamina usually elongate. Hairs pale to dark brown. Asiatic mainland ..... 444. *F. hispida*.

4. Figs generally ripening red. Hairs dark brown.
5. Fig without internal bristles. Lamina symmetric; basal nerves short. Bougainville Isl. . . 437. *F. subcongesta* v. *symmetrica*.
5. Internal bristles abundant.
  6. Basal bracts 2–4 mm. long; fig 10–25 mm. wide, pyriform, ellipsoid, or subglobose. Lamina often strongly asymmetric; lateral nerves 6–11 pairs, crowded towards the base of the lamina; basal nerves short. Malaysia  
430. *F. vrieseana*.
  6. Basal bracts 4–6 mm. long; fig 20–35 mm. wide, depressed globose with a rosette of apical bracts. Lamina more or less symmetric; lateral nerves 5–7 pairs; basal nerves elongate. Twigs and leaves persistently ferruginous villous. New Guinea . . . . . 431. *F. iodotricha*.
3. Leaves distichous or opposite, more or less symmetric, smooth. White to light brown hairy, or glabrous.
  7. Lamina caudate; intercostals numerous. Internal bristles present. Lamina usually drying greenish. Borneo . . . . . 455. *F. treubii*.
  7. Not caudate; intercostals few or none. Internal bristles none or few, minute.
  8. Fig not ridged. Female style glabrous or sparsely hairy.
    9. Glabrous or nearly. Leaves mostly opposite, attenuate-acute. Figs without sclerotic cells. Borneo . . 468. *F. tarennifolia*.
    9. Twigs, petioles, thinly appressedly hairy. Leaves laxly spiral to distichous acuminate. Fig with sclerotic cells in the wall. Aru Isl., New Guinea, Solomon Isl. . . . 473. *F. arfakensis*.
  8. Figs ridged towards the apex. Female style hairy. Moluccas, New Guinea, Bougainville Isl.
    10. Stipules persistent. Lamina lanceolate, 1–2 cm. wide. Basal bracts 3–4 mm. long. Moluccas . . . . . 472. *F. pleyteana*.
    10. Stipules caducous. Lamina elliptic, wider. Basal bracts 1–3 mm.
      11. Lamina 3–6 cm. wide. Peduncles 2–6 mm. long; basal bracts persistent; fig-body strongly ridged, not pedicellate. Ternate, New Guinea . . . . . 471. *F. ternatana*.
      11. Lamina 5–10 cm. wide. Peduncle 5–20 mm. long; basal bracts caducous; body slightly ridged, distinctly pedicellate. Bougainville Isl. . . . . 474. *F. macrothyrsa*.

## GROUP D

Without lateral bracts. Cystoliths hypogenous. Figs not on stolons. Basal bracts 5 mm. or more long.

1. Figs cauliflorous, pedunculate. Twigs stout.
  2. Lamina over 30 cm. long, cordate-auricled; petiole short, stout. Unbranched or sparingly branched small tree. Solomon Isl., Fiji  
405. *F. theophrastoides*.
  2. Lamina shorter, long-petiolate, scabrid above, hispid-velutinate beneath. Freely branched trees.
    3. Figs 15–17 mm. wide, on elongate twigs from the branches and trunk. Twigs 3–5 mm. thick. Appressedly brown hairy. Bougainville Isl. . . . . 423. *F. profusa*.
    3. Figs larger, on short stout twigs with short internodes. Twigs 5–10 mm. thick.
      4. Stipules persistent. Leaf-base cuneate; basal nerves  $\frac{1}{4}$ – $\frac{1}{2}$  lamina; lateral nerves 6–10 pairs. Fig 25–30 mm. wide. New Guinea  
420. *F. pachyrrachis*.
      4. Stipules caducous. Leaf-base more or less cordate; basal nerves short; lateral nerves 9–13 pairs. Fig 17–22 mm. wide. New Britain . . . . . 421. *F. neobritannica*.

1. Figs axillary, sessile.
  5. Stipules 6–12 cm. long, silky. Lamina long-petiolate. Twigs stout. Brown hairy. Stamens 2. Ovary white. Seed-hilum not prominent. Solomon Isl. . . . . 402. *F. cynaroides*.
  5. Stipules generally shorter. Lamina mostly short-petiolate. Stamen 1. Ovary red-brown. Seed-hilum prominent.
    6. Glabrous or thinly white hairy. Leaf smooth. Female style glabrous. Burma to Moluccas . . . . . 446. *F. lepicarpa*.
    6. Brown hairy. Leaf often scabrid. Female style hairy.
      7. Leaf pandurate, often lobed, ciliate-dentate. Sparingly branched shrub. Celebes . . . . . 447. *F. decipiens*.
      7. Leaf oblong-elliptic to obovate, not lobed.
        8. Leaf obovate, denticulate, scabrid. Fig-orifice closed by 5 umbonate apical bracts. Female perianth embracing  $1/3-1/2$  the ovary. Tree. Moluccas . . . . . 449. *F. calcarata*.
        8. Leaf oblong-elliptic, ciliate-dentate, subscabrid. Fig-orifice closed by a rosette of appressed apical bracts. Female perianth as a short tube round the ovary-stalk. Shrub or treelet. Celebes . . . . . 448. *F. latimarginata*.

GROUP E

Without lateral bracts. Cystoliths hypogenous. Figs not on stolons. Basal bracts less than 5 mm. long. Hairs brown to purple or black, abundant.

1. Shrub. Hairs 2–5 mm. long, purple-brown. Stipules persistent. Leaves panduriform to obovate, ciliate-dentate, short-petiolate. Figs axillary, apical bracts projecting; no internal bristles. New Guinea 450. *F. saurauoides*.
1. Trees of different character. Internal bristles generally present. Figs cauliflorous (except *F. bougainvillei*, *F. multistipularis*).
2. Leaves distichous, short-petiolate, mostly strongly asymmetric at the base. New Guinea.
  3. Figs 20–30 mm. wide, on short stout twigs. Lamina oblong-elliptic 426. *F. papuana*.
  3. Figs 10–17 mm. wide. Lamina obovate.
    4. Figs in large bunches at the base of the trunk; peduncles 30–80 mm. long . . . . . 427. *F. bernaysii*.
    4. Figs in small clusters along the trunk and main branches; peduncle 7–15 mm. long. Lamina often narrow 428. *F. adelpha*.
2. Leaves spirally arranged or decussate.
  5. Figs more than 20 mm. wide.
    6. Basal nerves short. Lamina smooth or subscabrid, base cuneate. Style glabrous or thinly hairy. Internal bristles sparse or none. Philippines, Celebes to Solomon Isl., Australia 436. *F. congesta*.
    6. Basal nerves elongate  $1/3-1/2$  lamina.
      7. Fig large, obconic, truncate, with deeply depressed apical rosette. Hairs dark brown to purple, stiff, spreading. Leaf-base more or less cordate. Burma, Thailand, Malaya 434. *F. obpyramidata*.
      7. Fig-orifice not or slightly sunken. Hairs not so dark. New Guinea.

8. Hairs stiff, spreading, usually bright brown. Figs 20–40 mm. wide, subglobose to pyriform. Leaf-base shallowly cordate to rounded. Stipules caducous  
425. *F. calopilina*.
8. Hairs appressed, white to pale brown. Figs 18–25 mm. wide, depressed globose. Leaf-base more or less cuneate. Stipules persistent ..... 432. *F. sublimbata*.
5. Fig less than 20 mm. wide.
9. Leaves harshly or hispid scabrid on both sides.
10. Without internal bristles. Petiole 4–15 cm. long. Figs in paniculate clusters at the base of the trunk. India  
443. *F. conglobata*.
10. With internal bristles. Petiole often shorter. New Guinea, Solomon Isl.
11. Figs axillary, depressed globose; peduncle 2–6 mm. Lamina entire. Stipules glabrous. Solomon Isl.  
463. *F. bougainvillei*.
11. Cauliflorous. Lamina denticulate. Stipule hairy.
12. Basal bracts early caducous. Figs on hanging twigs –1 m. long. Female style nearly or quite glabrous. Hairs 2–4 mm. long on twigs and petiole. Solomon Isl.  
424. *F. baccaureoides*.
12. Basal bracts persistent. Female style hairy.
13. Hairs 2–4 mm. long. Petiole –15 mm. long. Figs on short twigs. Stipules persistent. New Guinea  
429. *F. hahliana*.
13. Hairs –1.5 mm. long. Petiole –50 mm. long. Figs on simple or sparingly branched stout spiciform twigs without internodes; peduncles 11–25 mm. long; basal bracts 1–2 mm. long. Basal nerves short. New Guinea ..... 422. *F. d'albertisii*.
9. Leaves smooth or slightly scabrid.
14. Figs sulcate towards the orifice, on stout cauliflorous twigs –35 × 2 cm., without internodes. Petioles long. Pale fulvous hairy. Borneo ..... 452. *F. francisci*.
14. Figs not sulcate. Petioles rather short. Hairs brown.
15. Lamina ovate-cordate, basal nerves elongate; lateral nerves 5–7 pairs. Fig 10 mm. wide; peduncle 2–3 mm. long. Key Isl. .... 433. *F. tunicata*.
15. Lamina elliptic to obovate; basal nerves short.
16. Sparingly branched shrub. Stipules persistent, large. Twigs 4–7 mm. thick. Figs axillary, concealed; peduncle 1–3 mm.; basal bracts 2–5 mm.; no internal bristles. Philippines. .... 441. *F. multistipularis*.
16. Branching trees, small to medium-sized. Twigs 2–4 mm. thick. Figs becoming cauliflorous; basal bracts 1–3 mm. long; internal bristles sparse.
17. Figs brown hairy, the orifice closed by 5 apical bracts; peduncle 0–7 mm. long. Stipules often persistent. Philippines ..... 440. *F. carpenteriana*.
17. Fig soon glabrous; peduncle generally longer. Stipules caducous.
18. Fig turbinate-pyriform with a rosette of many apical bracts, at first deeply sunken. Philippines, Celebes to Solomon Isl., Australia  
436. *F. congesta*.
18. Fig subglobose, 5-humped round the scarcely sunken orifice. New Britain . 437. *F. subcongesta*.

## GROUP F

Without lateral bracts. Cystoliths hypogenous. Figs not on stolons. Basal bracts less than 5 mm. long. Glabrous or with white to yellowish hairs, or thinly appressedly brown hairy. Leaves mostly smooth. Internal bristles mostly absent.

1. Stamens 2. Ovaries white (perianth red-brown). Seed-hilum not or slightly prominent. Basal nerves elongate  $\frac{1}{2}$ - $\frac{1}{3}$  lamina.
  2. Monoecious (male, gall-, and seed-flowers in the same fig). Leaves elliptic, coriaceous; nerves slightly impressed above, flat below. Figs axillary and cauliflorous, 10-20 mm. wide; basal bracts early caducous. New Guinea ..... 410. *F. microdictya*.
  2. Dioecious. Figs more than 20 mm. wide, cauliflorous in large bunches; basal bracts persistent.
    3. Leaves obovate, thinly coriaceous, entire. Internal bristles none. Glabrous. New Guinea, New Britain ..... 409. *F. itoana*.
    3. Leaves ovate-cordate to elliptic, membranous, mostly dentate. Internal bristles minute, abundant. Glabrous or white hairy. Asiatic mainland ..... 396. *F. oligodon*.
1. Stamen 1. Ovaries red-brown (perianth colourless). Seed-hilum mostly prominent.
  4. Basal nerves elongate  $\frac{1}{2}$ - $\frac{1}{3}$  lamina. Cauliflorous. Lamina often denticulate, rather broad, often long-petiolate.
    5. Figs in hanging racemes, ripening yellow; no internal bristles. Leaves often scabrid and opposite. Thinly, often appressedly hairy ..... 444. *F. hispida*.
    5. Figs paniculate in bunches on stout twigs. Villous.
      6. Fig 10-20 mm. wide; orifice scarcely depressed, closed by 5 small apical bracts; sclerotic cells abundant; no internal bristles. Leaf-base rounded to cuneate. Sumatra .. 467. *F. dimorpha*.
      6. Fig 20-35 mm. wide, with a conspicuous rosette of apical bracts; internal bristles and sclerotic cells none or sparse. Lamina often shallowly cordate or asymmetric at the base.
        7. Fig-apex at first deeply depressed. Lamina smooth. Borneo, Philippines ..... 435. *F. nota*.
        7. Fig-apex not deeply depressed. Lamina scabrid above. New Guinea, New Britain ..... 445. *F. hispidioides*.
  4. Basal nerves short. Lamina mostly entire.
    8. Figs ridged towards the small, often sunken, orifice. Female style hairy.
      9. Leaves spirally arranged, long-petiolate; intercostals numerous. Figs on stout leafless twigs without internodal extension; internal bristles abundant. Pale fulvous hairy. Borneo.
        10. Hairs 2-4 mm. long, spreading. Leaf-base narrowed subcordate. Fig 15-20 mm. wide, or more. Female perianth covering the ovary. Seed smooth. .... 452. *F. francisci*.
        10. Hairs much shorter, appressed. Leaf-base cuneate. Fig smaller, Female perianth as a very short collar. Seed rough ..... 454. *F. virescens*.
    9. Leaves short-petiolate; intercostals few, lax.
      11. Leaves scabrid. Figs axillary. Bougainville Isl. .... 463. *F. bougainvillei*.
      11. Not scabrid.
        12. Glabrous or villous with pale hairs. Lamina not acuminate. Fig depressed globose, axillary or cauliflorous ..... 464. *F. septica*.
        12. Thinly appressedly white to brown hairy. Lamina acuminate. Internal bristles sparse or none.

13. Figs depressed globose, axillary or geocarpic; peduncle -6 mm. long. Stipules caducous. Moluccas, New Guinea ..... 471. *F. ternatana*.
13. Fig ellipsoid, in compact cauliflorous clusters; peduncle -30 mm. long. Stipules persistent. Leaves distichous. Burma, Thailand, Malaya ..... 470. *F. scortechinii*.
8. Figs not ridged.
14. Intercostals close, numerous; or the figs with a rosette of numerous apical bracts.
15. Fig 15-35 mm. wide, with a wide rosette of apical bracts, cauliflorous.
16. Lamina narrowly elliptic obovate, long-acuminate to caudate. Fig ripening yellow-brown; orifice not or scarcely depressed. Twig 1-2.5 mm. thick, slightly appressedly hairy. Burma to Celebes . . 438. *F. schwarzii*.
16. Lamina acute to shortly acuminate. Fig-orifice more or less deeply depressed. Twigs 2-5 mm. thick. Philippines, Celebes, to Solomon Isl., Australia . . 436. *F. congesta*.
15. Fig 12-20 mm. wide, the orifice closed by apical bracts.
17. Figs axillary, ripening yellow-brown, sessile or, rarely, pedunculate. Stipules often persistent. Twigs and petioles glabrous. Burma to Moluccas  
446. *F. lepicarpa*.
17. Figs becoming cauliflorous, ripening red-brown, pedunculate. Stipules caducous. Twigs and petioles hairy.
18. Fig 5-humped round the orifice; basal bracts 1-2 mm. long. Hairs dark brown, appressed. New Britain  
437. *F. subcongesta*.
18. Fig not gibbous round the orifice, often axillary; basal bracts 2-4 mm. long. Hairs white to pale brown, more or less spreading. Ryu Kyu, Formosa, Philippines ..... 439. *F. benguetensis*.
14. Intercostals few, lax, or none. Fig-orifice without a conspicuous rosette of apical bracts.
19. Riverside shrub. Lamina lanceolate, without intercostals. Fig solitary, axillary, 10 mm. wide. Borneo  
469. *F. ixoroides*.
19. Trees, mostly cauliflorous or ramiflorous. Lamina elliptic to lanceolate-elliptic.
20. Figs in compact masses on short twigs without internodal elongation.
21. Twigs, petioles, and underside of the nerves hispid villous. Sumatra ..... 467. *F. dimorpha*.
21. Glabrous or thinly hairy.
22. Fig ripening yellow. Female style usually glabrous; perianth covering part or all of the ovary. Asiatic mainland, West Malaysia ..... 465. *F. fistulosa*.
22. Fig ripening red. Female style hairy; perianth as a short collar, round the ovary-stalk. Borneo (Philippines ?) ..... 466. *F. condensa*.
20. Figs on elongating twigs, becoming stolon-like, ripening pink, red, or red-brown.
23. Stipules persistent. Fig with internal bristles. Burma, Thailand, Malaya (?Borneo) . . 470. *F. scortechinii*.
23. Stipules caducous. No internal bristles.
24. Leaves mostly opposite. Borneo  
468. *F. tarennifolia*.
24. Leaves mostly alternate. Aru Isl., New Guinea  
473. *F. arfakensis*.

Key to the species of subsect. *Auriculisperma*

1. Twigs, leaves with stiff brown hairs 3–7 mm. long. Fig sessile: basal bracts 7–15 mm. long. Cystoliths hypogenous. Ser. *Cynaroides*.
  2. Stipules –3 cm. long, caducous. Lateral nerves 7–8 pairs. Fig-body with lanceolate lateral bracts ..... 403. *F. lancibracteata*.
  2. Stipules 9–13 cm. long, sericeous, persistent, concealing the figs. Lateral nerves 9–13 pairs. Fig without lateral bracts  
402. *F. cynaroides*.
1. Glabrous or with short, pale hairs. Figs pedunculate. Cystoliths mostly amphigenous.
  3. Sparingly branched, pachycaulous trees. Twigs 5–20 mm. thick. Lamina over 30 cm. long, cordate-auricled. Figs axillary or cauliflorous. Ser. *Theophrastoides*.
    4. Twigs 12–20 mm. thick. Lamina 80–170 cm. long, scabrid. Figs cauliflorous in large bunches, verrucose, with basal and lateral bracts 9–16 mm. long: peduncle 35–80 mm. long  
404. *F. salomonensis*.
    4. Twigs 5–10 mm. thick. Lamina 30–90 cm. long, smooth. Figs axillary, concealed, becoming cauliflorous, not verrucose, without lateral bracts: basal bracts 1.5–9 mm. long: peduncle 3–9 mm. .... 405. *F. theophrastoides*.
  3. Freely branched trees. Twigs and leaves smaller. Figs axillary and on the twigs, slightly ridged towards the apex. Ser. *Vitienses*.
    5. Fig with several small lateral bracts, 15–25 mm. wide. Leaves scabrid: basal nerves  $\frac{4}{3}$  lamina ..... 407. *F. vitiensis*.
    5. Fig smaller, without lateral bracts. Lamina smooth, often subcordate or auricled at the base: basal nerves short  
406. *F. indigofera*.
- (Fig solitary, axillary. Lamina lanceolate-elliptic. Cystoliths hypogenous. Philippines ..... 147. *F. rivularis*.)

Key to the species of subsect. *Papuasyce*

1. Gall-stigma clavate to narrowly infundibuliform, little different from the female. Gall-and female flowers sessile or shortly stalked. Leaves entire. Internal bristles none. New Guinea.
  2. Dioecious. Fig 20–40 mm. wide, stalk 15–100 mm. long. Lamina obovate; lateral nerves 6–9 pairs. Cauliflorous .. 409. *F. itoana*.
  2. Monoecious. Fig often axillary, 12–20 mm. wide; stalk –10 mm. long; basal bracts caducous. Lamina elliptic, small; lateral nerves 4–6 pairs, impressed above in the dried leaf  
410. *F. microdictya*.
- (1. Gall-stigma widely infundibuliform. Female flowers sessile or long-stalked as the gall-flowers. Lamina ovate-cordate to elliptic, often dentate. Internal bristles minute, abundant. Asiatic mainland.  
396. *F. oligodon*.)

Key to the species of subsect. *Macrostyla*

1. Fig-body concealed by large lanceolate lateral bracts (–17 × 6 mm.); internal bristles short, brown. Female perianth hairy, cupular; style 12–15 mm. long. Seed-hilum not prominent. Sarawak  
413. *F. macrostyla*.
1. Fig-body with small scattered lateral bracts (2–4 mm. long); internal bristles none. Female flower without perianth; style 6–10 mm. long. Seed-hilum prominent. Sinohimalaya ..... 412. *F. squamosa*.

Key to the series and subspecies of subsect. *Sycocarpus*

1. Upperside of lamina closely punctate from cystoliths  
ser. *Longetuberculatae* (p. 157).
1. Upperside of lamina not so punctate ... ser *Tuberculifasciculatae*
  2. Leaves distichous, often asymmetric or caudate, short-petiolate. Geocarpic. Figs generally with lateral bracts; without internal bristles ..... subser. *Geocarpicae* (p. 160).
  2. Leaves not distichous or, if so, the figs without lateral bracts.
    3. Figs with large lateral bracts obscuring the body. Brown hairy. Long-petiolate. No. internal bristles  
subser. *Praestantes* (p. 157)
    3. Figs without lateral bracts or these not obscuring the body.
      4. Figs axillary. basal bracts 4–16 mm. long  
subser. *Axillares* (p. 160).
      4. Figs cauliflorous or basal bracts shorter.
        5. Intercostals few, lax. Glabrous or white hairy, or. thinly appressedly brown hairy. Figs without lateral bracts  
subser. *Tuberculifasciculatae* (p. 161).
        5. Intercostals numerous, regular.
          6. Internal bristles abundant.
            7. Brown, purple, or blackish hairy, often stiffly  
subser. *Calopilinae* (p. 158).
            7. Pale brown, softly tomentose or hairs appressed  
subser. *Fulvidulae* (p. 160).
          6. No internal bristles, or few. White to dark brown hairy.
            8. Figs generally with lateral bracts. Leaves generally scabrid and opposite ..... subser. *Hispidae* (p. 159).
            8. Figs without lateral bracts. Leaves not or slightly scabrid, variously arranged ..... subser. *Congestae* (p. 159).

Key to the species of ser. *Longetuberculatae*

1. Leaves spirally arranged, rather long-petiolate. Figs in cauliflorous bunches.
  2. Figs 15–50 mm. wide, without lateral bracts. Brown hairy. Lamina 8–22 cm. wide, obovate to sublyrate, dentate; base cordate. Philippines ..... 417. *F. cassidyana*.
  2. Figs 10–15 mm. wide, with a few small lateral bracts. Shortly white hairy. Lamina –7 cm. wide, narrowly elliptic, base cuneate; margin entire. Celebes ..... 416. *F. parvibracteata*.
1. Leaves distichous, short-petiolate. Figs in highly branched paniculate clusters or on long hanging twigs or geocarpic stolons.
  3. Figs (15–) 20–70 mm. wide. Philippines and Celebes to New Guinea and New Britain ..... 415. *F. botryocarpa*.
  3. Figs 7–15 mm. wide. Malaya, Sumatra, Java, Philippines, Celebes  
414. *F. ribes*.

(Leaves spirally arranged or opposite. Fig ridged .. 430. *F. vrieseana*).

Key to the species of subser. *Praestantes*

1. Lateral bracts obtuse. Cauliflorous fruiting twigs very stout, without internodes. Basal nerves of lamina short; lateral nerves 10–12 pairs. New Britain ..... 418. *F. praestans*.
1. Lateral bracts acute, lanceolate. Cauliflorous fruiting twigs 4–5 mm. wide, with internodes, branching. Basal nerves  $\frac{1}{4}$ – $\frac{1}{2}$  lamina; lateral nerves 6–10 pairs. Solomon Islands ..... 419. *F. longibracteata*.

Key to the species of subser. *Calopilinae*

1. Basal bracts 5–10 mm. long. apical bracts projecting or gibbous.
  2. Figs 15–17 mm. wide on stolon-like twigs 1–3 m. long from the branches and trunk. Twigs 3–5 mm. thick. Appressedly brown hairy. Bougainville Isl. .... 423. *F. profusa*.
  2. Figs larger on shorter stout twigs with short internodes. Twigs 5–10 mm. thick.
    3. Stipules persistent. Leaf-base cuneate: basal nerves 4– $\frac{1}{2}$  lamina: lateral nerves 6–10 pairs. Fig 25–30 mm. wide. New Guinea 420. *F. pachyrrachis*.
    3. Stipules caducous. Leaf-base more or less cordate: basal nerves short: lateral nerves 9–13 pairs. Fig 17–22 mm. wide. New Britain ..... 421. *F. neobritannica*.
1. Basal bracts shorter: apical bracts often appressed.
  4. Fruiting on geocarpic stolons: figs usually ripening red.
    5. Basal bracts 2–4 mm. long: fig-body 10–25 mm. wide, pyriform, ellipsoid, or subglobose. Lamina often asymmetric and the leaves inclining to distichous: lateral nerves 6–11 pairs, crowded towards the short basal nerves .... 430. *F. vrieseana*.
    5. Basal bracts 4–6 mm. long: fig-body 20–35 mm. wide, depressed globose with a rosette of apical bracts. Lamina more or less symmetric: lateral nerves 5–7 pairs, not approximated to the elongate basal nerves  $\frac{1}{4}$ – $\frac{1}{3}$  lamina. Twigs and leaves persistently ferruginous villous. New Guinea .... 431. *F. iodotricha*.
  4. Not fruiting with geocarpic stolons.
    6. Leaves distichous, strongly asymmetric at the base, short-petiolate. New Guinea.
      7. Fig 20–30 mm. wide, on short stout twigs. Lamina oblong elliptic ..... 426. *F. papuana*.
      7. Fig 10–17 mm. wide. Lamina obovate.
        8. Figs in large bunches at the base of the trunk; peduncles 30–80 mm. long ..... 427. *F. bernaysii*.
        8. Figs in small clusters on the trunk and main branches; peduncles 7–15 mm. long. Lamina often narrow 428. *F. adelpha*.
    6. Leaves spirally arranged or opposite: if distichous, then not strongly asymmetric at the base.
      9. Figs more than 20 mm. wide.
        10. Fig obconic, truncate, with a deeply depressed rosette of apical bracts. Hairs dark brown to purple, stiff, spreading. Leaf-base more or less cordate. Burma, Thailand, Malaya 434. *F. obpyramidata*.
        10. Fig-orifice not or slightly sunken. Hairs not so dark. New Guinea.
          11. Hairs stiff, spreading, bright brown. Figs 20–40 mm. wide, subglobose to pyriform. Leaf-base shallowly cordate to rounded. Stipules caducous ..... 425. *F. calopilina*.
          11. Hairs appressed, white to brown. Figs 18–25 mm. wide, depressed globose. Leaf-base more or less cuneate. Stipules persistent, conspicuous .... 432. *F. sublimbata*.
      9. Figs less than 20 mm. wide.
        12. Lamina smooth above, ovate-cordate: lateral nerves 5–7 pairs. Fig 10 mm. wide. Key Isl. .... 433. *F. tunicata*.
        12. Lamina harshly hispid or scabrid on both sides.

13. Basal bracts early caducous. Figs on hanging twigs -1 m. long. Style nearly or quite glabrous. Hairs 2-4 mm. long on twigs and petioles. Solomon Isl.  
424. *F. baccaureoides*.
13. Basal bracts persistent. Style hairy (female).
14. Hairs 2-4 mm. long. Petiole -15 mm. long. Stipules persistent. Figs on short twigs. New Guinea  
429. *F. hahliana*.
14. Hairs -1.5 mm. long. Petiole longer. Stipules caducous. Figs on simple or sparingly branched, stout, spiciform twigs without internodes. New Guinea  
422. *F. d'albertisii*.

Key to the species of subser. *Congestae*

1. Fig-orifice closed by a rosette of many apical bracts, often sunken: figs 15-40 mm. wide, in large clusters on the trunk and branches.
2. Lamina narrowly elliptic-obovate, long-acuminate to caudate. Twigs slender. Thinly appressedly brown hairy, glabrescent. Burma to Celebes ..... 438. *F. schwarzii*.
2. Lamina broadly elliptic, not long-acuminate or caudate. Twigs 3-6 mm. thick.
3. Leaf-base narrowly to broadly cordate, often asymmetric: leaf-margin often dentate: basal nerves  $\frac{1}{3}$ - $\frac{1}{2}$  lamina. Softly white to pale brownish hairy. Philippines, North Borneo .. 435. *F. nota*.
3. Leaf-base subcordate to cuneate, not or slightly asymmetric: margin generally entire: basal nerves short. Hairy or glabrous. Philippines to Solomon Isl., Queensland .... 436. *F. congesta*. (Lamina scabrid, see *F. hispidioides*).
1. Fig-orifice closed by 5 apical bracts, not sunken or in a rosette: body 12-20 mm. wide. Figs axillary, cauliflorous, or on stolons. Philippines (except *F. subcongesta*).
4. Figs axillary, concealed by the large persistent stipules. Brown hairy, sparingly branched shrub ..... 441. *F. multistipularis*.
4. Figs not concealed, becoming cauliflorous. Trees.
5. Stipules more or less persistent. Fig sessile or pedunculate -7 mm. Brown hispid ..... 440. *F. carpenteriana*.
5. Stipules caducous. Fig-peduncle 2-20 mm. long.
6. Hairs dark brown, appressed. Fig 5-humped round the orifice: basal bracts 1-2 mm. long. New Britain, Bougainville Isl.  
437. *F. subcongesta*.
6. Hairs white to pale brownish, more or less spreading. Fig not gibbous at the apex: basal bracts 2-4 mm. long. figs often axillary ..... 439. *F. benguetensis*.

Key to the species of subser. *Hispidae*.

1. Figs with a few conspicuous lateral bracts, at least round the orifice.
2. Leaves generally opposite, scabrid, persistently hairy; basal nerves usually elongate. Figs axillary and in long hanging racemes or stolons, hispid. Female style hairy. Gall-perianth covering the ripe ovary ..... 444. *F. hispida*.
2. Leaves generally spirally arranged, smooth, glabrescent; basal nerves generally short. Figs on very short knobby twigs on the trunk, glabrescent. Female style glabrous or sparsely hairy. Gall-perianth not covering the mature ovary ..... 442. *F. moderata*.

1. Figs without lateral bracts.
  3. Figs clustered along the trunk and main branches; peduncle 4–30 mm. long. Gall-perianth covering the mature ovary  
445. *F. hispidioides*.
  3. Figs clustered at the base of the trunk; peduncles 12–80 mm. long. Gall-perianth not covering the mature ovary. India  
443. *F. conglobata*.

Key to the species of subser. *Axillares*

1. Thinly white hairy to glabrous. Leaves smooth, entire. Fig sessile or pedunculate, with or without lateral bracts, ripening yellow-brown. Burma to Moluccas (? Philippines) ..... 446. *F. lepicarpa*.
1. Brown hairy. Lamina often scabrid, dentate.
  2. Leaves pandurate, ciliate dentate. Fig without lateral bracts Sparingly branched shrubs.
    3. Hairs 3–6 mm. long, rufous. Stipules 30–75 mm. long. Fig sessile; basal bracts 7–16 mm. long. Celebes .... 447. *F. decipiens*.
    3. Hairs 2–4 mm. long, purple-brown. Stipules –30 mm. long. Figs shortly pedunculate; basal bracts 3–4 mm. long. New Guinea  
450. *F. saurauoides*.
  2. Leaves oblong-elliptic to obovate, not pandurate or sublobate. Basal bracts 4–14 mm. long. Hairs dark brown 1–4 mm. long.
    4. Tree. Leaf obovate, denticulate, scabrid. Fig sometimes with lateral bracts, orifice with 5 apical bracts. Female perianth covering  $1/3 - \frac{1}{2}$  the ovary. Moluccas ..... 449. *F. calcarata*.
    4. Sparingly branched shrub or treelet. Leaf oblong-elliptic, ciliate-dentate, subsabrid. Fig-orifice with a rosette of many apical bracts. Female perianth as a short tube round the ovary-stalk. Celebes ..... 448. *F. latimarginata*.

Key to the species of subser. *Fulvidulae*

1. Leaves distichous, short-petiolate. Geocarpic. Figs 8–12 mm. wide. Borneo ..... 455. *F. treubii*.
1. Leaves spirally arranged, long-petiolate. Figs larger.
  2. Fig 23–50 mm. wide, with many stout lateral bracts, borne in large clusters at the base of the stem. Leaf not scabrid. Seed-hilum slightly prominent. Borneo ..... 451. *F. cereicarpa*.
  2. Figs 12–22 mm. wide, without lateral bracts.
    3. Geocarpic with long stolons. Fig not ridged. Hairs –1.5 mm. long. Seed-hilum prominent. Sumatra ..... 453. *F. gilapong*.
    3. Cauliflorous. Fig ridged towards the apex. Borneo.
      4. Hairs 2–4 mm. long, spreading. Leaf-base narrowed subcordate. Fig 15–22 mm. wide. Female perianth covering the ovary. Seed smooth, the hilum not prominent .... 452. *F. francisci*.
      4. Hairs much shorter, appressed. Leaf-base cuneate. Fig smaller. Female perianth as a very short collar. Seed rough, with prominent hilum ..... 454. *F. virescens*.

Key to the species of subser. *Geocarpicae*

1. Gall- and female flowers with a perianth. Female style hairy. Seed 0.6–0.9 mm. long, not or hardly ridged on the sides. Fig pedunculate, generally with a collar of 3 small basal bracts: lateral bracts few, appressed. Intercostals raised below, rather lax.

2. Lamina glabrous and smooth above, subsymmetric, more or less entire, caudate, base cuneate. Fig 8–11 mm. wide; internal bristles few to abundant. Female perianth covering 1/3 to the whole of the ovary. Hairs generally appressed, short. (subser. *Fulvidulae*) ..... 455. *F. treubii*.
2. Lamina hairy and scabrid above, more or less asymmetric, generally denticulate, acute to acuminate, base not cuneate. Fig without internal bristles.\* Female perianth as a short collar on the ovary-stalk. Hairs generally spreading.
3. Lamina strongly asymmetric at the base, oblong. Hairs on twigs 2–4 mm. long. Fig 14–17 mm. wide, strigose, glabrescent, basal bracts often indistinct from the lateral bracts. Female style very hairy. Seed not keeled ..... 457. *F. geocarpa*.
3. Lamina much less asymmetric at the base to rounded subsymmetric, elliptic. Hairs on twigs 0.5–1.5 mm. long. Fig 9–12 mm. wide, glabrous except the bracts. Style shortly hairy. Seed keeled ..... 456. *F. stolonifera*.
1. Gall- and female flowers without perianth. Female style glabrous. Seed 0.7–1.2 mm. long, often ridged on the sides. Fig pedunculate or sessile, with abundant uncinata lateral bracts (2–9 mm. long), crowded at the base and, mostly, without a distinct collar of basal bracts. Intercostals crowded.
4. Lamina with the upperside thinly appressedly hairy to hispid, generally scabrid: margin denticulate, rarely entire: base generally strongly asymmetric: intercostals raised below, Hairs generally spreading on twigs and petioles.
5. Lamina 40–100 × 14–35 cm., base deeply but unequally cordate. Seed 0.7 mm. long, not ridged ..... 458. *F. megaleia*.
5. Lamina smaller, the base mostly cuneate on one side, cordate on the other. Seed commonly 1–1.2 mm. long, ridged on the sides ..... 459. *F. uncinata*.
4. Lamina with the upperside glabrous, smooth, or subscabrid: margin entire or distally denticulate: base symmetric, slightly asymmetric, or shortly auricled. Hairs appressed or spreading. Seed 0.6–0.9 mm. long.
6. Intercostals not raised below. Upperside of lamina subscabrid, dull. Leaf-apex abruptly acuminate. Fig glabrous. Twigs and petioles appressedly hairy ..... 462. *F. subterranea*.
6. Intercostals raised below. Upperside of lamina smooth, often nitid. Fig strigose-villous.
7. Lamina symmetric or, if slightly asymmetric, not auricled, apex attenuate-caudate or acuminate. Hairs mostly appressed ..... 460. *F. beccarii*.
7. Lamina with a short auricle (–7 mm. long and wide) on one side. Hairs spreading ..... 461. *F. geocharis*.  
(Lamina very large, base deeply unequally cordate ..... 458. *F. megaleia*).

Key to the species of subser. *Tuberculifasciculatae*

1. Figs ridged towards the apex. Female style hairy.
2. Leaves scabrid. Bougainville Isl. .... 463. *F. bougainvillei*.
2. Leaves smooth. Malaysia.
3. Lamina not acuminate. Glabrous or villous with pale spreading hairs. Figs depressed globose, axillary or (Timor Laut, Admiralty Isl., Solomon Isl., New Hebrides) cauliflorous ..... 464. *F. septica*.

\* Fig with internal bristles. Hairs dark brown. See 430. *F. vrieseana*.

3. Lamina acuminate. Figs generally cauliflorous. Thinly appressedly, white to brown hairy.
4. Figs ellipsoid in compact clusters: peduncle 5–30 mm. long: basal bracts 1–2 mm. long. Stipules subpersistent. Burma, Thailand, Malaya ..... 470. *F. scortechinii*.
4. Figs subglobose to depressed globose, axillary and on stolons: peduncle often shorter.
  5. Stipules persistent. Lamina lanceolate, 1–2 cm. wide. Basal bracts 3–4 mm. long. Halmahera .... 472. *F. pleyteana*.
  5. Stipules caducous. Lamina elliptic, wider. Basal bracts 1–3 mm. long.
    6. Lamina 3–6 cm. wide. Peduncles 2–6 mm. long: basal bracts persistent: fig-body strongly ridged, not pedicellate. Ternate, New Guinea ..... 471. *F. ternatana*.
    6. Lamina 5–10 cm. wide. Peduncle 5–20 mm. long: basal bracts caducous: body slightly ridged, distinctly pedicellate. Bougainville Isl. .... 474. *F. macrothyrsa*.
1. Figs not ridged. Female style glabrous to hairy.
  7. Figs on stolons. Leaves lanceolate-elliptic, often serrulate or denticulate.
    8. Glabrous or nearly. Leaves mostly opposite, attenuate, acute. Fig-wall without sclerotic cells. Borneo .... 468. *F. tarennifolia*.
    8. Twigs and petioles thinly appressedly hairy. Leaves laxly spiral to subdistichous, acuminate. Fig-wall with sclerotic cells. Moluccas, New Guinea, Solomon Isl. .... 473. *F. arfakensis*.
  7. Figs axillary or bunched on the stem and branches.
    9. Fig solitary, axillary, 10 mm. wide. Leaf lanceolate, without intercostals. Riverside shrub. Borneo ..... 469. *F. ixoroides*.
    9. Figs on trunk and branches: larger trees.
      10. Twigs, petioles, underside of nerves hispid-villous. Basal nerves often elongate. Sumatra ..... 467. *F. dimorpha*.
      10. Glabrous or thinly hairy.
        11. Figs ripening yellow. Female perianth generally covering part or all of the ovary. India, S. China to Philippines and Flores ..... 465. *F. fistulosa*.
        11. Figs ripening red. Female perianth as a collar round the ovary-stalk. Borneo, ? Philippines .... 466. *F. condensata*.

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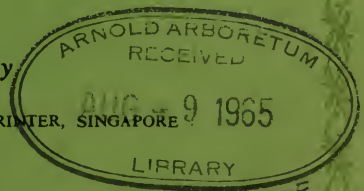
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## Malayan Fern Notes

By BETTY MOLESWORTH ALLEN

FOLLOWING are descriptions of two ferns which previously have not been recorded for Malaya, so far as I am aware. They are from the Cameron Highlands district of Pahang, where I spent my last few weeks in Malaya. I concentrated on a small area which is quite well known botanically, where I found besides these two, another not on the Malayan list (*Dryopteris hirtipes*) and several very rare species. This goes to show how important specialised field work still is, even in places previously collected over for the above mentioned fern, at least, is almost surely a result of Malaya's changing vegetation.

### BLECHNUM Linn.

*B. patersonii* (R. Br.) Mett. in Christ, Farnk. de Erde, 176. Basynym: *Stegania patersoni* R. Br. Habitat in Malaya: (a) on more or less vertical banks of broken rock, covered thinly by earth, growing together with *Thelypteris* sp. (5005)\* and moss; on floor of tall moss-draped forest. Locally common at 6,200 feet (c. 2,700 metres); 4.6.63 (5005). (b) on a vertical rock face in a narrow ravine above a rocky river; very dark wet place under tall trees. Circa 5,800 feet (c. 1,940 metres); 6.6.63, not collected.

Both localities from the slopes of Gunong Batu Brinchang, Cameron Highlands district, Pahang; in the forest above and below the road, near the 46½ mile.

It would appear that *Blechnum patersonii* has not previously been collected in Malaya, which is surprising, for it seems to be common where it does occur here, and is large enough to be easily seen. Of course they do grow in very dark places which, especially if the sun is obscured, are in continual twilight, and so dark green plants merge into the gloom.

Van Alderwerelt van Rosenburgh (14; 1, p. 379) and Miss Crookes (8; p. 280) do include Malaya in their distribution of this species, but it is not in Beddome (2), nor in Holttum (9).

The following description is taken from the Malayan collection. *Rhizome* short creeping, rather flat, with fronds close together, and on large plants the old rhizome often remains on, at a different angle from the newer one, and is beset with old stipe bases about 5-10 mm. long. Rhizome roots covered with medium-brown spreading hairs. Scales on rhizome about 6 mm. long by 3 mm. wide at base, dark brown, thick, shiny, entire and slightly bullate, evenly tapered from a wide base to a narrow apex which has a slightly obtuse tip.

---

\* The numbers refer to my specimens which have been distributed to: Singapore Herbarium, Kew, British Museum, Smithsonian Institution, Chicago Nat. Hist. Museum, Arnold Arboretum, Swedish Museum Nat. Hist. and spores to Dr. Chambers Melbourne.

*Fronds* simple to pinnatifid, all stages seen on a mature plant; on young plants, they are at first simple, entire, about 2.5 cm. wide and often reaching a length of 26 cm. before a lobe is developed. These fronds are lanceolate and tapered to a rather long, acuminate tip, or sometimes abruptly narrowed at the tip, and slightly narrowed at the base or lobe base. Margins are entire and stipes thin, up to 9 cm. long; other juvenile fronds have from one to several well developed lobes. New fronds are deep rose-pink and are very thin in texture. *Adult* fronds have stipes which are glabrous except at the very base where the scales are similar to those on the rhizome, but usually paler and with a very pale base, and slightly larger in size, to about 9 mm. long. Stipes, pinkish, drying stramineous or pinkish; smooth, but channelled above, to about 35 cm. long and winged in the upper part; wing undulate about 5 mm. wide in widest part, gradually becoming auricles which continue, quite widely separated, to within about 7 cm. of stipe base. *Sterile fronds* drooping when living, very dark green and shiny above, paler and dull below; texture thick, brittle, almost fleshy and drying to a rather dull blackish-green above. Lamina to about 50 cm. long often less; rachis and costae glabrous, and on the underside costae are much paler than the lamina. Mature fronds usually pinnatifid, widest about, or just above, the middle, and lobed to within 4 mm. of the rachis wing; up to about 8 pairs of entire lobes (usually less) and a similar apical one. Lobes rather lanceolate each about 14 x 2 cm. on the large fronds, and up to 26 x 2 cm. on the largest. Lobes slightly widest about the middle, tapered to a narrow acuminate tip, and narrowing near the base where it is adnate (which forms the wing to the next lobe), margins entire, pale and narrowly curled under in dried material. Lamina wing uneven, not more than 75 mm. wide from the basioscopic side of the lobe, and tapering to about 2 mm. in width.

*Veins* fairly inconspicuous when dry and raised on the upper side of the lamina; usually free but well developed fronds may show slight anastomosis (as in *B. fraseri*, see M-Allen (13), otherwise single or forked once or twice; forkings uneven, vein-ends almost reaching the lobe margin but often concealed by the reflexed edge (in young fronds which often have flat margins, the veins show clearly ending in hydathodes). *Fertile fronds* much contracted (occasionally fertile lobes on upper half of a sterile frond, or fertile only at lobe-tips). Fronds stiffly erect and thus higher than the sterile, with about 7-9 uneven pairs of narrow pinnae-like lobes, and a similar apical one; largest lobes are about 18 x .5 cm. when living (width less when dry). Sori acrostichoid, elongate along both sides of the costae and covering all except this when mature; margins strongly reflexed when dry. When living, lobes are dark green above, with the sori below, fawn-coloured; sori often continuing along the adnate (or winged) part, and occasionally a few auricles soriferous on the stipe nearest the lamina. Indusium linear, thin almost membranous, light brown, fracturing at intervals and almost concealed when sori is mature.

*General distribution:* From India through to the Pacific including Australia and New Zealand.

It is interesting that another *Blechnum* belonging to the subgenus *Lomaria* has turned up in Malaya; this makes the third species, for the other three belong to *Blechnum* proper. The Malayan habitat of *B. patersonii* seems to be typical but the plants a little larger than those I have seen on Mt. Kinabalu, in Borneo at about 5,500 feet, and with fewer pairs of lobes than recorded by Holttum (5) from this area; closer I think, to the New Zealand plants.

In the Malayan habitat over 25 plants were growing in one area, above and alongside a rocky stream. Fairly recently some large trees had fallen causing a slip on the opposite side so that the *Blechnum* plants were now in the sun and I was able to photograph them without added light. Whether the colony will survive now that it is in such an open place (although the ground was still damp) remains to be seen. The plants were on a steeply sloping bank of broken rock covered with a thin layer of humus, liverworts and mosses. In the loose earth was a species of *Thelypteris* which Dr. Holttum suggests is near *T. herbacea* Holtt. At intervals were tall moss-draped trees, and on the bank near the *Blechnum* were plants typical of this kind of wet forest floor. They included small (young) *Cyathea latebrosa*, *Asplenium unilaterale*, *Trichomanes obscurum*, *Arisaema* sp., *Begonia pavonina*, *Medinella* sp., *Didymocarpus* possibly *albinella* and above, on the more stable, less steep ground were a few fertile plants of *Woodwardia auriculata*, whilst by the streamside were *Athyrium amplissimum*, *A. asperum*, *Cyclosorus ecallosis*. A small waterfall nearby was entirely clothed in many places with *Asplenium unilaterale*, but no *Blechnum patersonii*, which was however, growing on the bank to the left (on the opposite side of the first patch). There were about 15 plants here; these were in deep shade in wet places, and immediately above, where the forest opened out somewhat and was lighter, were many plants of *Blechnum fraseri* var. *philippinense*. Perhaps worth noting here is that none of these was fertile, yet all the *B. patersonii* had fertile fronds at all different stages. In Malaya different species of an acrostichoid genus frequently become fertile at the same time, and often only once a year, but although I looked in the other localities I know of, I found no *B. fraseri* fertile, (but have done so in August), and *B. vestitum*; the other *Lomaria* had only very old fertile fronds.

The second area in which *B. patersonii* was seen, was well below the first, but possibly where the upper rocky stream would eventually run, about half a mile away and fully 500 feet lower. Here a rocky river runs through a deep ravine about 10 feet wide whose rock walls, are almost vertical for about 50 feet. Immediately in front of a narrow tall waterfall (which had little water otherwise it would have been impossible to get at) on rock walls in the perpetual gloom and constant spray, *B. patersonii* was very common indeed. I counted over 40 plants, and with it, but much rarer was

*Monachosorum*, another fern not on the Malayan list, some young gingers, similar to *Achasma* sp., but little else on the bare wet rock. Where the ravine widened and the rock became less steep, there was more vegetation and the *Blechnum* became much rarer, and the *Monachosorum* more common; the plant association here is discussed under the latter fern.

It is probable that *Blechnum patersonii* will be found to occur in many more places along our main range at about 5,000 to 6,500 feet in altitude, for there are many deep gorges and waterfalls which maintain a high humidity together with a cool temperature which is apparently what this fern requires.

MONACHOSORUM Kunze Bot. Zeit. 6. 1848; 119.

**M. subdigitatum** (Bl.) Kuhn. in Christ, Farn. d. Erde, 76 (fig. 199). Basynym: *Aspidium subdigitatum* Blume; Synonyms: *Polypodium subdigitatum* Bl., *Phegopteris subdigitata* (Bl.) Bedd., *Polypodium davallioides* Mett., *Monachosorum davallioides* (Mett.) Kunze, *Anogramma davallioides* (Mett.) Fée, *A. subdigitata* (Bl.) Posth.

Habitat in Malaya: On bare wet rocks or on rocks with shallow covering of earth, in narrow ravine in dark places. In tall forest above and below the road near 46½ mile, on the slopes of Gunong Batu Brinchang, Cameron Highlands district, Pahang. At about 5,800 feet and 6,000 feet; 4 & 6.6.63 (5009). I am grateful to Dr. R. E. Holttum for his identification of this fern, and for his help.

In *Ferns of Malaya* (9) Holttum does not include *Monachosorum*, but there are two sheets at Kew labelled "Malayan Peninsula", and I am indebted to the Director of Kew Gardens for this, and the following information about them. These sheets were collected by Sir William Norris who was in Malaya from 1836 to 1847. The material was cited by Hooker (11) p. 256, under *Polypodium davallioides* and is presumably the basis for the record from the Malayan Peninsula under *P. subdigitatum* in the *Synopsis Filicum*, and under *Phegopteris subdigitata* in Beddome (2).

As Holttum points out (in a letter to me) the only label on the specimens was a general one put on by Kew when Norris's collection was received. So without further evidence that it was actually found in Malaya (and not, for instance, sent to him from another botanist) Holttum quite rightly omitted it from his systematic account. If the fern was from Malaya, then it appears that it was not found again until my collection in 1963.

The description is taken from my material: *Rhizome* short-creeping and shallow rooted, with fronds close together, and long thin brown rootlets radiating from the rhizome amongst the stipe bases, often as long as 30 cm., and branched and sparsely hairy. Rhizome green when living, drying blackish. Very small plants of the same fern, not more than 5 cm. high, often growing on the top of the rhizome and wedged between the stipe bases, rather resembling *aphlebia*. Rhizome hairs similar to those on the stipe bases,

pale, brown, septate and abundant, scales present, but rare, flat (in the living plant, shrivelling somewhat on drying) and very pale, scattered amongst the finer hairs. *Stipes* about 44-100 cm. long on mature fronds. not articulated to the rhizome; in living plants, shiny and rounded below and pubescent above, deep green except at the stipe base which is almost black and covered on both sides with pubescence which becomes sparser towards the stipe apex. *Rachis* deep green when living (pale when dry), shiny to slightly pubescent, grooved above with raised edges, rounded below with scattered pubescence.

*Lamina* finely dissected, lacy, quadri-pinnate to 5 pinnatifid, long deltoid with lowest pinnae the largest. Frond apparently not becoming fertile until the plant is large and the fronds tall. Fertile laminae from about 50-90 cm. long or more, and 60-75 cm. wide at the base. Fronds when living, very deep bluish-green, veins black, texture thin almost membranous; when dry fronds are deep olive green to blackish, and veins pellucid; lamina glabrous except on the veins. *Pinnae* overlapping, about 22 or more subopposite, non-articulated pairs on a lamina of 80 cm. long; basal pinnae 9-11 cm. apart on the same side, others decreasing gradually in spacing and size to the apical portion, where the pinnae are all, very small, less dissected and gradually becoming reduced to single lobes about 2-3 cm. from the apex. The two lowest pairs of pinnae are the largest, the basal being to about 35 cm. long by 23 cm. wide with a stalk up to 2 cm. long; it is widened where it joins the rachis. Primary pinnule of basal pinna, roughly deltoid with pointed apex, and 16 or more alternate pairs to a pinna, sometimes overlapping, the middle pinnules largest (to about 11 x 5 cm.) and with short stalks. Secondary pinnules (on largest primary pinnule) to about 14 alternate, short stalked pairs, the largest being below the middle and about 2.5 x 1 cm. in size; these are again divided into about 5 alternate pairs of pinnules (tertiary) which are up to 6 x 4 cm. and stalked, except in the upper-most which are adnate; they do not overlap the next segment. The basal which are the largest may have up to 5 or 6 lobes, the basal acroscopic lobe (or ultimate segment) being cut nearly, or quite, to the base. Lobes measure up to about 2 x 1 mm. with apices either blunt and rounded or pointed, and are narrowed towards their bases. Each lobe has a simple or forked *vein* which does not reach the margin; veins bear scattered, light-brown hairs below, and to a lesser extent, above. *Sori* round or roundish, exindusiate and solitary or, very rarely, two together, usually placed at the vein ends but sometimes veins can be seen projecting just beyond a sorus. Sporangia cream-coloured when mature, ripening to a pale brown, amongst which are a few hairs.

*General distribution* (of the species): S. China and Formosa; N. E. Himalayas to Siam and Indochina. In Malesia, Philippine Is., Borneo and Java (Sumatra?).

I found the *Monachosorum* with *Blechnum patersonii* (see above) in the lower ravine. Here, near the falls there were only a few plants, and not so high up as the *Blechnum*. Further away from the actual waterfall where the ravine widened somewhat, and the sheer walls gave away to a steep bank, but still very damp, *Monachosorum* became common, especially about 15-20 feet above the stream and here they were fertile. They were growing on rocks, either exposed or with a shallow covering of black sticky earth. Very small plants were on rather bare (not mossy) rocks near the stream level, but none was large nor fertile here, which suggests that they may be periodically swept away. The fertile specimens higher up the bank were intermixed with other ferns and flowering plants, and under very tall trees which made the whole area dark and gloomy. Other ferns included very large specimens of *Microlepia todayense* (stipe nearly 10 feet long and lamina to about 8 feet long); a curious form of *Cyathea latebrosa* looking quite different from the normal species which was here also; large *Cystopteris tenuisecta* was common; a few *Orthiopteris kingii* which is quite high for this fern, and *Asplenium tenerum*, both the latter being within the flood zone. Also, were *Cyclosorus stipellatus*, *C. ecallosis*, *Asplenium unilaterale* and *Microsorium hancockii*, the latter two being common on steep wet rocks. Established on fallen logs were large specimens of *Crypsinus enervis* and *Elaphoglossum callifolium*. In lighter places near the forest edge were *Cyclosorus dicranogramma* and *Woodwardia auriculata* which were in loose earth.

Later I found some more *Monachosorum* in another area which was also a rocky stream, with large slabs of rock lining the banks. These were continually wet yet almost bare, and no small specimens were seen, but as it was late evening these could have been overlooked. *Blechnum patersonii* was not seen either, but it probably occurs as the conditions were favourable, and possibly this stream was yet another tributary of the river below, where both the ferns grew.

*Monachosorum* is a beautiful fern when seen in the field, and with its dark-green lacy fronds and small exindusiate sori looks rather like a large *Todea (Leptopteris) hymenophylloides* from New Zealand. It ought to be worth cultivating if the high humidity it undoubtedly requires could be maintained. Like *Acrophorus blumei*, which is a common fern on this mountain, *Monachosorum* seems to provide fertile fronds only when a large size has been attained. The shallow rhizome with the long thin rootlets is a useful adaptation for clinging to thin substrata or to rock when there is no soil.

I did not see any mucilaginous secretion at the apex of the rhizome (see Copeland, 7.), nor viviparous buds on the laminae (Beddome, 2, p. 296). The sori is not always terminal on the veins but occasionally can be seen quite clearly continuing beyond.



A pinnule from a frond of *Monachosorum subdigitatum* ( $\times \frac{3}{4}$ ) (Bl.) Kuhn.  
Enlargement: A segment showing three sori.

The grooved rachises with raised edges suggest an affinity with *Dryopteris* but there are only two vascular strands at the stipe base\*. It seems to be a fern of uncertain affinities for Christensen (4) places the genus in the subfamily Dryopteridoideae, allied to *Thelypteris*; Bower (3) vol. 3, p. 254, puts it in *genera incertae sedis*, and derived from *Dennstaedtiinae*. Copeland (7) on the other hand puts it in Pteridaceae with a note on its uncertain status, whilst Backer and Posthumus (1) have placed it in Polypodiaceae under the genus *Anogramma*. In the recently published Keys to the genera of the Pteropsida in *Flora Malesiana*, Holttum (10) p. xviii, puts *Monachosorum* into the *Dennstaedtia* group, and this I have followed although he states in a recent letter that he is not at all sure that it should be near this genus.

I am grateful to Dr. Holttum for reading through this account and making some necessary corrections.

\* And, as Dr. Holttum points out, it also differs from *Dryopteris* in having the edges of the leaflets decurrent on the edges of the small rachis which bears them.

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*Photo by B. Molesworth Allen*

A plant of *Blechnum patersonii* (R. Br.) Mett. growing above a stream on the slopes of Mt. Brinchang, Cameron Highlands; Pahang. Other plants can be seen in the upper right hand corner.



## Laportea and Allied Genera (Urticaceae)

By W.-L. CHEW (CHEW Wee-Lek)

*Botanic Gardens, Singapore*

In 1826, Gaudichaud established, amongst many others, the genera *Fleurya* and *Laportea*. Four species were described by him in the first genus but none in the other. From the rather poor descriptions, one can find but three small differences between them as tabulated below:—

Fleurya	Laportea
1. Male flowers with 4 tepals & 4 stamens.	1. Male flowers with 5 tepals & 5 stamens.
2. Tepals of female flowers unequal.	2. Female flowers with 2 large lateral & 2 small dorsiventral tepals.
3. Achenes concave at the sides, tuberculate, surrounded by a narrow wing.	3. Achenes not concave at the sides, subtuberculate, without wings.

The 4-tepalled versus 5-tepalled character does not hold water. *Fleurya aestuans* and *F. lanceolata*, for example, have both 4- and 5-tepalled male flowers, sometimes even on the same plant. The second character does not work either. In both genera, the lateral tepals of the female flowers are always larger than the dorsi-ventral ones. In *F. lanceolata* for instance, the lateral tepals are as long as the achenes, a phenomenon not observed in any species of *Laportea*. The third character is completely defeated by *L. alatipes*. In this species, the achenes, which are slightly tuberculate, are not concave at the sides (i.e. a characteristic of *Laportea*) and surrounded by a narrow wing (a characteristic of *Fleurya*). No wonder it was put into *Laportea* by Hooker f. but into *Fleurya* by Brown!

The next work of major importance after Gaudichaud is the *Monographie de la Famille des Urticees* published by Weddell between 1856 and 1857. Instead of reducing *Fleurya* to *Laportea*, Weddell reduced *Dendrocnide* Miq., a genus of Malesian trees, and *Discocarpus* Liebm. (non Klotzsch), a genus of Central American trees, to sections of *Laportea*. The upshot of Weddell's work is that *Fleurya* still remains hardly distinguishable from the type section of *Laportea*; while the latter genus, now enlarged, defies definition.

Having studied all the species so far described under these genera, I came to two conclusions. Firstly, *Dendrocnide* Miq. and *Discocarpus* Liebm. are as distinct from *Laportea sens. str.* as *Urera* is from it. Their generic status should be re-established: the former to include *Laportea* sect. *Sarcopus* Wedd., and the latter to be given a new generic name, *Discocnide*. Secondly, *Fleurya* and *Laportea* (thus restricted) are congeneric; and the former is to be reduced to a section of the latter. (This observation is also shared by J. Leandri, who stated in 1961 that he found no major difference between *Laportea sens. str.* and *Fleurya*. He has recently reduced *Fleurya* to *Laportea* in his *Flore de Madagascar — Urticacees* but he effected the transfer of one species).

The differences between these three genera (*Laportea*\*, *Dendrocnide* and *Discocnide*) are indeed very great. In *Laportea* the plants are annual herbs with chartaceous dentate leaves; and they generally have that *Urtica*-like look about them. On the other hand, in *Discocnide* and particularly in *Dendrocnide*, they are perennial shrubs or trees, sometimes attaining a height of over a hundred feet, as in the Australian species *D. excelsa* (formerly *L. gigas*). In general appearance, except for a few species, *Dendrocnide* species certainly cannot be mistaken for Nettles. They in fact look more like *Poikilospermum* or *Artocarpus* in having rather coriaceous undulate-margined laminas on fairly long petioles.

On the stipules alone, one can easily distinguish *Laportea* from the other two genera. In this genus, the stipules are not wholly connate, and are therefore bifid at the apices. In *Dendrocnide* and *Discocnide*, these are wholly connate and are therefore not bifid at the apices. In the latter genus, they tend to be rather foliaceous.

The sexuality of the plants is rather characteristic for each of the three genera. In *Laportea*, the plants are mainly monoecious, whereas in *Dendrocnide*, they are mainly dioecious. In *Discocnide*, they may be either monoecious or dioecious; and sometimes flowers of both sexes are found on the same inflorescence.

The three genera do not differ very much from each other in the male flowers. In *Laportea* and *Discocnide*, male flowers with 5 tepals and 5 stamens predominate; and in *Dendrocnide*, they are mainly 4-tepalled with 4 stamens.

It is in the female flowers and the achenes that the distinguishing characteristics of the three genera are found. In *Laportea*, the female flowers are usually borne on winged pedicels which are of two types. In sect. *Laportea*, the pedicels are winged laterally, the two wings being symmetrical; whereas in sect. *Fleurya*, the pedicels are winged dorsi-ventrally with the dorsal one usually larger than the ventral.

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\*Henceforth, *Laportea* is meant to include *Fleurya*.

In *Dendrocnide*, the female flowers are of two types — sessile and pedicellate. Sessile female flowers are found in *D. stimulans*, *D. subclausa*, *D. meyeniana* and others where the flowers are arranged flabellately in one or two rows. Such “flabella” together with the flowers appear rather like the claws of cats. In another group of species, as in *D. amplissima*, the female flowers are arranged in two opposing rows on elongated extremities of inflorescences.

Species possessing pedicellate female flowers can also be divided into two groups. In one group, e.g. *D. sinuata* and *D. luzonensis*, the pedicels are simple, un-modified and often fairly long. In the other, e.g. *D. moroides*, the pedicels are often fleshy and swollen; and it is this group of species that Weddell gave the sectional name *Sarcopus*. In *Discocnide*, the female flowers are shortly pedicellate, the pedicels being simple i.e. neither winged nor fleshy; and as such, it is rather similar to species like *D. luzonensis*.

The achenes, however, clearly distinguish *Discocnide* not only from *Laportea* and *Dendrocnide* but also from the rest of *Urticaeae*. In *Discocnide*, the achenes are very flat, round and disc-like; and the walls are so very thin and papery that the very slender seed is clearly visible through them. In *Dendrocnide*, on the other hand, the achenes are pear-shaped and not flattened, but only slightly compressed; and have very thick almost fleshy walls as in *D. sinuata*. The achenes of *Laportea* are also thick-walled but they are never fleshy.

### Systematic Position.

The genus *Laportea* is very closely related morphologically to *Sceptrocnide* from which it differs on two counts. Firstly, in the male flowers of *Laportea*, the stamens are not adnate to the tepals as is the case in *Sceptrocnide*. Secondly, the stipules of *Sceptrocnide* are free and lateral as opposed to the intra-petiolar and partly connate one of *Laportea*.

*Dendrocnide* and *Discocnide* have their alliances with *Urera* and not *Laportea* as claimed by Weddell. They differ from *Urera* in having non-fleshy tepals and ligulate stigmas.

These three genera are being monographed; and the results will be published in this Bulletin. This paper therefore restricts itself to a formal presentation of the new combinations and names consequent upon my decisions (a) to re-establish the genera so correctly described by Miquel and Liebmann and (b) to reduce *Fleurya* to *Laportea* proper.

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### LAPORTEA, *nom. cons.*

Gaud. in Freyc. Voy. Monde Bot. 498 "1826" (1830).—*Urticasterum* Heist. ex Fabric. En. Pl. Helmst. 204 (1759), *nom. rej.*; O.K. Rev. Gen. Pl. 635 (1891). *p.p.*—*Oblixis* Rafin. Fl. Tell. 3: 49 (1837).—*Laportea* sect. *Sclepsion* Wedd. Arch. Mus. Hist. Nat. Paris 9: 123 (1856) et in DC. Prodr. 16 (1): 78 (1869); B. & H. Gen. Pl. 3 (1): 383 (1880); Durand, Ind. Gen. Phan. 1: 377 (1888); Engl. in E. & P. Pfl. Fam. 3 (1): 106 (1889), *p.p.*

Monoecious annual herbs with irritant hairs. *Leaves* chartaceous, dentate. *Stipules* intra-petiole, connate, bifid at apices. *Male flowers* with 4 or 5 tepals and stamens. *Female flowers* pedicellate; pedicels winged either laterally and symmetrically or dorsi-ventrally and asymmetrically. *Achenes* compressed, ovate, not flattened and papery; seed not visible through the ovary wall.

Lectotype sp.: *L. canadensis* (L.) Wedd.

#### sect. *Laportea*.

*Pedicels* of female flowers winged laterally and symmetrically. *Achenes* articulated on pedicels.

Distribution: Temp. N. America, Africa, Madagascar, China, Manchuria, Japan, Java, New Guinea.

1. ***Laportea alatipes*** Hk. f. J. Linn. Soc. Bot. 7: 215 (1864).—*Urticasterum alatipes* (Hk. f.) O.K. Rev. Gen. Pl. 635 (1891).—*Fleurya urticoides* Engl. Bot. Jahrb. 33: 122 (1904).—*Girardinia marginata* Engl. *loc. cit.* 123 (1904).—*F. urticoides* Engl. var. *glabrata* Rendle in Prain, Fl. Trop. Afr. 6 (2): 247 (1917).—*F. alatipes* (Hk. f.) Brown in Dyer, Fl. Cap. 5 (2): 547 (1925).
2. ***Laportea amberana*** (Baker) Leandri, Ann. Mus. Col. Marseille, ser. 6. 7–8: 18 (1950).—*Urera amberana* Baker, J. Bot. 20: 267 (1882).

3. **Laportea bulbifera** (Sieb. & Zucc.) Wedd. Arch. Mus. Hist. Nat. Paris 9: 139 (1856).—*Urtica evitata* Wall. Cat. n. 4588 (1832), *nom. nud.*—*U. bulbifera* Sieb. & Zucc. Abh. der Math.-Phys. Kl. der. Baier. Akad. 4 (3): 214 (1846).—*Laportea terminalis* Wight, Ic. Pl. Ind. Or. 6: 9. tab. 1972 (1853).—*L. oleracea* Wedd. *loc. cit.* 141 (1856).—*F. bulbifera* (Sieb. & Zucc.) Bl. ex Miq. Ann. Mus. Bot. Lugd. Bat. 3: 132 (1867).—*L. evitata* Wedd. DC. Prodr. 16 (1): 79 (1869).—*Urticastrum evitatum* (Wedd.) O.K. Rev. Gen. Pl. 635 (1891).—*U. bulbiferum* (Sieb. & Zucc.) O.K. *loc. cit.*—*U. oleraceum* (Wedd.) O.K. *loc. cit.*—*L. sinensis* Wright, J. Linn. Soc. Bot. 26: 474 (1899).—*Boehmeria bodinieri* Lev. in Fedde, Repert. 11: 505 (1913).
4. **Laportea canadensis** (L.) Wedd. Ann. Sc. Nat. ser. 4. 1: 181 (1854).—*Urtica canadensis* L. Sp. Pl. 985 (1753).—*U. divaricata* L. *loc. cit.*—*F. canadensis* (L.) Benth. in Hk. Niger. Fl. 517 (1849).—*U. pustulata* Liebm. Vidensk. Selsk. Skr. 5 (2): 294 (1851).—*L. pustulata* (Liebm.) Wedd. Arch. Mus. Hist. Nat. Paris 9: 140 (1856).—*Urticastrum divaricatum* (L.) O.K. *loc. cit.*—*L. divaricata* (L.) Lunell, Am. Midl. Nat. 4 (7): 301 (1916).
5. **Laportea decumana** (Roxb.) Wedd. Arch. Mus. Hist. Nat. Paris 9: 127 (1856).—*Urtica decumana* Roxb. Fl. Ind. 3: 587 (1832).—*U. runghii* Kostel. Allg. Med. Pharm. Fl. 2: 400 (1833).—*Boehmeria macrothyrsa* Miq. in Zoll. Syst. Verz. 100, 103 (1854).—*L. armata* Warb. Bot. Jahrb. 13: 293 (1891).—*Urticastrum decumanum* (Roxb.) O.K. *loc. cit.*—*L. pedunculata* K. Sch. & Laut. Fl. Schutzgeb. 290 (1901).—*L. humilis* Laut. in K. Sch. & Laut. Nachtr. Fl. Schutzgeb. 251 (1905).
6. **Laportea floribunda** (Baker) Leandri *loc. cit.* 24 (1950).—*Pilea floribunda* Baker, Kew Bull. 280 (1897).
7. **Laportea humbertii** Leandri, *loc. cit.* 19 (1950).
8. **Laportea manombensis** Leandri, *loc. cit.* 21 (1950).
9. **Laportea perrieri** Leandri, *loc. cit.* 20 (1950).
10. **Laportea septentrionalis** Leandri, *loc. cit.* 19 (1950).
11. **Laportea violacea** Gagn. Bull. Soc. Bot. Fr. 75: 4 (1928).—*L. vitifolia* Hand.-Mazz. Symb. Sinic. 7: 117 (1929).
12. **Laportea weddellii** Leandri, *loc. cit.* 22 (1950).

**sect. Fleurya** (Gaud.) Chew, **stat. nov.**

*Fleurya* Gaud. in Freyc. Voy. Monde. Bot. 497 "1826" (1830), **basionym.**—*Schychowskia* Endl. Ann. Wien Mus. 1: 187 (1836).—*Fleuryopsis* Opiz, Lotos 3: 240 (1853).

*Pedicels* of female flowers usually winged dorsi-ventrally and asymmetrically. *Achenes* not articulated on pedicels.

Lectotype sp.: *F. spicata* Gaud. [= *L. interrupta* (L.) Chew].

Distribution: Pan-Tropical.

13. **Laportea aestuans** (L.) Chew, **comb. nov.**

*Urtica aestuans* L. Sp. Pl. ed. 2. 1397 (1763), **basionym.**  
—*U. divaricata* Forsk. Fl. Aegypt. Arab. 160 (1775), non L. (1753).—*U. hirsuta* Vahl, Symb. Bot. Pl. 1: 77 (1790).  
—*U. latifolia* Rich. Act. Soc. Hist. Nat. Paris 1: 113 (1792).  
—*U. nemorosa* Kunth in Bonpl. & Humb. Nov. Gen. Sp. Pl. 2: 42 (1817).—*U. divergens* Mey. Prim. Fl. Esseg. 264 (1818).—*U. caravellana* Schrank, Pl. Rar. Hort. Monac. tab. 82 (1819).—*Fleurya cordata* Gaud. loc. cit. 498 "1826" (1830).—*F. petiolata* Decne. Herb. Timor. 162 (1834).—*U. petiolata* (Decne.) Steud. Nom. Bot. ed. 2. 2: 735 (1841).—*U. schimperiana* Hochst. ex Steud. Flora. 33: 259 (1850).—*F. caravellana* (Schrank) Wedd. Ann. Sc. Nat. ser. 3. 18: 204 (1852).—*F. glandulosa* Wedd. loc. cit. 205 (1852).—*F. aestuans* (L.) Miq. in Martius, Fl. Braz. 4 (1): 196 (1853).—*F. ingrata* Miq. in Zoll. Syst. Verz. Ind. 103, 106 (1854).—*U. tuberculata* Anderss. Vet. Akad. Handl. Stockh. 1853: 159 (1855).—*F. lurida* Bl. Mus. Bot. Lugd. Bat. 2: f. 21 (1856).

14. **Laportea bathiei** Leandri, Fl. Madagasc. Urtic. 10 (1965).—*Fleurya perrieri* Leandri, Ann. Mus. Col. Marseille, ser. 6. 7-8: 16 (1950).

15. **Laportea cuneata** (A. Rich.) Chew, **comb. nov.**

*Urtica cuneata* A. Rich. in Ramon de La Sagra, Hist. Isla Cuba, Bot. 11: 224 (1850), **basionym.**—*F. umbellata* Wedd. Ann. Sc. Nat. ser. 3. 18: 204 (1852).—*F. glomerata* Griseb. Cat. Pl. Cuba 58 (1866), non Gaud. (1830).—*F. cuneata* (A. Rich.) Wedd. DC. Prodr. 16 (1): 73 (1869).

16. **Laportea disepala** (Gagn.) Chew, **comb. nov.**

*F. disepala* Gagn. Bull. Soc. Bot. Fr. 75: 556 (1928), **basionym.**

17. **Laportea grossa** (Wedd.) Chew, **comb. nov.**

*F. grossa* Wedd. Ann. Sc. Nat. ser. 4. 1: 183 (1854), **basionym.**

18. **Laportea interrupta** (L.) Chew, **comb. nov.**

*Urtica interrupta* L. Sp. Pl. 985 (1753), **basionym.**—*B. interrupta* (L.) Willd. Sp. Pl. 4 (1): 342 (1805).—*U. javanica* Bl. Bijdr. 503 (1825).—*F. spicata* Gaud. loc. cit. 497 "1826" (1830).—*F. glomerata* Gaud. loc. cit.—*U. sessiliflora* Blco. Fl. Filip. 696 (1837), non Sw. (1785).—*U. gaudichaudii*

Steud. Nom. Bot. ed. 2. 2: 734 (1841).—*U. spicigera* Steud. loc. cit. 736 (1841).—*U. affinis* Hk. & W.-Arn. Bot. Beech. Voy. 69 (1841).—*B. javanica* (Bl.) Hassk. Cat. Bogor. 79 (1844).—*Melochia burmannii* Zoll. et Mor. in Mor. Syst. Verz. 27 (1845), nom. nud.—*U. capitata* Blco. Fl. Filip. ed. 2. 483 (1845), non L. (1753).—*U. lomatacarpa* Hochst. ex Steud. Flora 33: 260 (1850).—*F. interrupta* (L.) R. Wight, Ic. Pl. Ind. Or. 6: 10. tab. 1975 (1853).—*Schychowskia interrupta* (L.) W. F. Wight in Safford, Contr. U.S. Nat. Herb. 9: 371 (1905).

19. **Laportea lanceolata** (Engl.) Chew, **comb. nov.**

*Fleurya lanceolata* Engl. Abh. Preuss. Akad. Wiss. 37 (1894) et Pflanzenw. Ost.-Afr. 100: 163 (1895), **basionym.**

20. **Laportea mooreana** (Hiern) Chew, **comb. nov.**

*F. grossa* Wedd. sensu Hiern, Cat. Afr. Pl. Welw. 1 (4): 989 (1900).—*Adicea mooreana* Hiern, loc. cit. 991 (1900), **basionym.**—*Pilea mooreana* (Hiern) K. Sch. in Just. Jahresber. 28 (1): 463 (1900).—*F. mooreana* (Hiern) Rendle in Prain, Fl. Trop. Afr. 6 (2): 250 (1917).—*F. urophylla* Mildbr. Notizbl. Bot. Gart. Berl. 8: 279 (1923).

21. **Laportea ovalifolia** (Schumach.) Chew, **comb. nov.**

*Haynea ovalifolia* Schumach. Beskr. Guin. Pl. 406 (1827), **basionym.**—*F. podocarpa* Wedd. DC. Prodr. 16 (1): 76 (1869).—*F. ovalifolia* (Schumach.) Dandy in Andrews, Fl. Pl. Angl.-Egypt. Sudan, 2: 277 (1952).

22. **Laportea peduncularis** (Wedd.) Chew, **comb. nov.**

*F. mitis* Wedd. Ann. Sc. Nat. ser. 4. 1: 183 (1854), nom. nud.—*F. capensis* Wedd. Arch. Mus. Hist. Nat. Paris 9: 117. tab. 1. fig. A, 7–8 (1856), *exclu. spec. typ.*; non (Thunb.) Wedd. (1854).—*F. peduncularis* Wedd. DC. Prodr. 16 (1): 75 (1869), **basionym.**

23. **Laportea ruderalis** (Forst. f.) Chew, **comb. nov.**

*Urtica ruderalis* Forst. f. Fl. Ins. Austr. Prodr. 66 (1786), **basionym.**—*F. paniculata* Gaud. loc. cit. 497 “1826” (1830).—*Schychowskia ruderalis* (Forst. f.) Endl. Ann. Wien Mus. 1: 187. tab. 13 (1836).—*F. ruderalis* (Forst. f.) Wedd. Ann. Sc. Nat. ser. 4. 1: 182 (1854).

## DENDROCNIDE

Miq. Pl. Jungh. 29 (1851).—*Laportea* sect. *Dendrocnide* (Miq.) Wedd. Arch. Mus. Hist. Nat. Paris 9: 133 (1856) et DC. Prodr. 16 (1): 85 (1869).—*Laportea* sect. *Sarcopus* Wedd. loc. cit. 129 (1856) et loc. cit. 82 (1869).—*Urticastrum* Heist. ex Fabric. sensu O.K. Rev. Gen. Pl. 634 (1891), *p.p., exclu. typ. sp.*

Dioecious perennial shrubs or trees with irritant hairs. *Leaves* coriaceous, crenulate, undulate to smooth. *Stipules* intra-petiolar, wholly connate. *Male flowers* mainly with 4 tepals and 4 stamens. *Female flowers* sessile or pedicellate; the sessile ones either flabellately or distichously arranged on swollen extremities of peduncles; the pedicellate ones arranged in fascicles; the pedicels either simple or swollen, but never winged. *Achenes* compressed to bloated, ovate, not papery, usually strongly warted.

Lectotype sp.: *D. costata* Miq. = *D. stimulans* (L.f.) Chew.

Distribution: South and South-east Asia, throughout Malasia, Northern Tropical Australia and the Pacific Islands.

1. **Dendrocide amplissima** (Bl.) Chew, **comb. nov.**

*Urtica ovalifolia* Bl. Bijdr. 504 (1825), *non* Stokes (1812).  
—*Urtica amplissima* Bl. Mus. Bot. Lugd. Bat. 2: tab. 22 (1857), **basionym**.—*L. amplissima* (Bl.) Miq. Fl. Ind. Bat. 1 (2); 232 (1859).—*Urticastrum amplissimum* (Bl.) O.K. Rev. Gen. Pl. 635 (1891).

2. **Dendrocide anacardioides** (C.B. Rob.) Chew, **comb. nov.**

*Laportea anacardioides* C.B. Rob. Philip. J. Sc. Bot. 5: 478 (1911), **basionym**.

3. **Dendrocide batanensis** (C.B. Rob.) Chew, **comb. nov.**

*Laportea batanensis* C.B. Rob. *loc. cit.* 481 (1911), **basionym**; Li, Pac. Sc. 7: 182 (1953).—*L. kotoensis* Hay. ex. Yamam. Suppl. Ic. Pl. Formos. 1: 2 (1925).

4. **Dendrocide ? caerulea** (Bl.) Miq. Pl. Jungh. 1: 31 (1851).—

*U. caerulea* Bl. Bijdr. 495 (1825).

5. **Dendrocide chingiana** (Hand.-Mazz.) Chew, **comb. nov.**

*Laportea chingiana* Hand.-Mazz. Sinensia 2 (1): 1 (1931), **basionym**.

6. **Dendrocide contracta** (Bl.) Chew, **comb. nov.**

*Urtica contracta* Bl. Bijdr. 505 (1825), **basionym**.—*L. contracta* (Bl.) Miq. Fl. Ind. Bat. 1 (2); 232 (1859), *pro syn.*—*L. costata* (Miq.) Miq. var. *contracta* (Bl.) Miq. *loc. cit.*—*L. stimulans* (L.f.) Miq. var. *contracta* (Bl.) Miq. Ann. Mus. Bot. Lugd. Bat. 4: 302 (1869).

7. **Dendrocide corallodesme** (Laut.) Chew, **comb. nov.**

*Laportea corallodesme* Laut. in K. Sch. & Laut. Nachtr. Fl. Schutzgeb. 252 (1905), **basionym**.

8. **Dendrocide cordata** (Warb. ex Winkl.) Chew, **comb. nov.**

*Laportea gaudichaudiana* Wedd. *sensu* K. Sch. & Hollr. Fl. Kais. Wilh. Land 38 (1889).—*Laportea cordata* Warb. ex Winkl. Bot. Jahrb. 57: 503 (1922), **basionym**.

9. **Dendrocnide crassifolia** (C.B. Rob.) Chew, **comb. nov.**  
*Laportea crassifolia* C.B. Rob. *loc. cit.* 480 (1911),  
**basionym.**
10. **Dendrocnide densiflora** (C.B. Rob.) Chew, **comb. nov.**  
*Laportea densiflora* C.B. Rob. *loc. cit.* 479 (1911),  
**basionym.**
11. **Dendrocnide diffusa** (C.B. Rob.) Chew, **comb. nov.**  
*Laportea diffusa* C.B. Rob. *loc. cit.* 482 (1911), **basionym.**
12. **Dendrocnide elliptica** (Merr.) Chew, **comb. nov.**  
*L. peltata* auct. non Gaud. ex Decne.: Merr. Univ. Cal.  
Publ. Bot. 15: 50 (1929).—*Laportea elliptica* Merr. J. Arn.  
Arb. 35: 135 (1954), **basionym.**
13. **Dendrocnide excelsa** (Wedd.) Chew, **comb. nov.**  
*Urera excelsa* Wedd. Ann. Sc. Nat. ser. 4. 1: 178 (1854),  
**basionym.**—*U. rotundifolia* Wedd. *loc. cit.* 177 (1854).—  
*L. gigas* Wedd. Arch. Mus. Hist. Nat. Paris 9: 129. tab. 3  
(1856).—*Urticastrum gigas* (Wedd.) O.K. *loc. cit.* (1891).
14. **Dendrocnide gigantea** (Poir.) Chew, **comb. nov.**  
*Urtica gigantea* Poir. in Lam. Encyc. Meth. Bot. Suppl. 4:  
225 (1816), **basionym.**—*Urera commersoniana* Wedd.  
Ann. Sc. Nat. ser. 3. 18: 202 (1852).
15. **Dendrocnide harveyi** (Seem.) Chew, **comb. nov.**  
*Laportea harveyi* Seem. Fl. Vit. 238. tab. 59 (1868),  
**basionym.**—*Urticastrum harveyi* (Seem.) O.K. *loc. cit.*  
(1891).
16. **Dendrocnide kusaiana** (Kaneh.) Chew, **comb. nov.**  
*Laportea kusaiana* Kaneh. Bot. Mag. Tokyo 46: 449  
(1932), **basionym.**
17. **Dendrocnide latifolia** (Gaud.) Chew, **comb. nov.**  
*Laportea latifolia* Gaud. Bot. Voy. Bonite tab. 81 (1844),  
**basionym.**
18. **Dendrocnide longifolia** (Hemsl.) Chew, **comb. nov.**  
*Laportea longifolia* Hemsl. in Hk. Ic. Pl. 26: tab. 2559,  
2560 (1898), **basionym.**
19. **Dendrocnide luzonensis** (Wedd.) Chew, **comb. nov.**  
*Laportea crenulata* Wedd. var. *luzonensis* Wedd. Arch.  
Mus. Hist. Nat. Paris 9: 133 (1856) et DC. Prodr. 16 (1):  
85 (1869), **basionym.**—*L. luzonensis* (Wedd.) Warb. in  
Perk. Fragm. Fl. Philip. 168 (1904).—*L. agusanensis* Elm.  
Leafl. Philip. Bot. 8: 2860 (1915).—*L. latilanceolata* Elm.  
*loc. cit.* 9: 3238 (1934).

20. **Dendrocnide meyeniana** (Walp.) Chew, **comb. nov.**  
*Urtica umbellata* Blco. Fl. Filip. 696 (1837), non Bory (1802).—*Urtica meyeniana* Walp. Nov. Act. Nat. Cur. 19. Suppl. 1: 422 (1843), **basionym.**—*U. ferox* Blco. Fl. Filip. ed. 2. 484 (1845), non Forst. f. (1786).—*L. gaudichaudiana* Wedd. Arch. Mus. Hist. Nat. Paris 9: 137 (1856).—*L. pterostigma* Wedd. DC. Prodr. 16 (1): 87 (1869).—*Urticastrum gaudichaudianum* (Wedd.) O.K. *loc. cit.*—(1891).—*U. pterostigma* (Wedd.) O.K. *loc. cit.*—*L. meyeniana* (Walp.) Warb. in Perk. Fragm. Fl. Philip. 168 (1904).—*L. leytensis* C.B. Rob. *loc. cit.* 484 (1911).
21. **Dendrocnide microstigma** (Gaud. ex Wedd.) Chew, **comb. nov.**  
*Laportea microstigma* Gaud. ex Wedd. Arch. Mus. Hist. Nat. Paris 9: 138 (1856) et DC. Prodr. 16 (1): 85 (1869), **basionym.**—*Urticastrum microstigma* (Gaud. ex Wedd.) O.K. *loc. cit.* (1891).
22. **Dendrocnide milnei** (Seem.) Chew, **comb. nov.**  
*Laportea milnei* Seem. Fl. Vit. 238 (1868), **basionym.**—*Urticastrum milnei* (Seem.) O.K. *loc. cit.* (1891).
23. **Dendrocnide mirabilis** (Rech.) Chew, **comb. nov.**  
*Laportea mirabilis* Rech. in Denkschr. K. Ak. Wiss. M.-N. Kl. Wien 1913. 89: 543. tab. 1. fig. 1b (1914), **basionym.**
24. **Dendrocnide moroides** (Wedd.) Chew, **comb. nov.**  
*Laportea peltata* Gaud. ex Decne. Herb. Timor. 162 (1834), *sensu stricto.*—*L. moroides* Wedd. Arch. Mus. Hist. Nat. Paris 9: 142 (1856), **basionym.**—*Urticastrum moroides* (Wedd.) O.K. *loc. cit.* (1891).—*U. peltatum* (Bl.) O.K. *loc. cit.* (1891), *p.p.*
25. **Dendrocnide nitida** (Winkl.) Chew, **comb. et stat. nov.**  
*Laportea crenulata* Wedd. var. *nitida* Winkl. Bot. Jahrb. 57: 506 (1922), **basionym.**
26. **Dendrocnide oblanceolata** (Merr.) Chew, **comb. nov.**  
*Laportea oblanceolata* Merr. J. Str. Br. R. As. Soc. 85: 167 (1922), **basionym.**
27. **Dendrocnide peltata** (Bl.) Miq. Pl. Jungh. 1: 30 (1851).  
 (a) **subsp. peltata**  
*Urtica peltata* Bl. Bijdr. 496 (1825).—*L. peltata* Gaud. ex Decne. *sensu* Wedd. Arch. Mus. Hist. Nat. Paris 9:

126 (1856) et DC. Prodr. 16 (1): 80 (1869), *exclu. typ.*  
—*L. laxiflora* Wedd. DC. Prodr. 16 (1): 81 (1869).—  
*L. vrieseiana* Wedd. *loc. cit.* (1869).—*Urticastrum laxi-*  
*florum* (Wedd.) O.K. *loc. cit.* (1891).—*U. peltatum*  
(Bl.) O.K. *loc. cit.* (1891).—*U. vrieseanum* (Wedd.)  
O.K. *loc. cit.* (1891).

(b) **subsp. murrayana** (Rendle) Chew, **comb. et stat. nov.**

*Laportea murrayana* Rendle in Andrews, Monog.  
Christ. Isl. 189 (1900), **basionym.**

28. **Dendrocnide photiniphylla** (Kunth) Chew, **comb. nov.**

*Fleurya photiniphylla* Kunth, Ann. Sc. Nat. ser. 3. 7: 183  
(1847), **basionym.**—*Urera leichardiana* Wedd. Ann. Sc.  
Nat. ser. 4. 1: 178 (1854).—*L. photiniphylla* (Kunth)  
Wedd. Arch. Mus. Hist. Nat. Paris 9: 138 (1856).—*Urti-*  
*castrum photiniphylla* (Kunth) O.K. *loc. cit.* (1891).

29. **Dendrocnide platyphylla** (Merr.) Chew, **comb. nov.**

*Laportea platyphylla* Merr. Philip. J. Sc. Bot. 11: 176  
(1916), **basionym.**

30. **Dendrocnide pulus** (Steud.) Chew, **comb. nov.**

*Urtica ardens* Bl. Bijdr. 504 (1825), non Link (1822).—  
*Urtica pulus* Steud. Nom. Bot. ed. 2. 2: 735 (1841),  
**basionym.**—*U. obnoxia* Hassk. Cat. Hort. Bogor. 305  
(1844).—*L. ardens* (Bl.) J. J. Smith in Koord. & Val.  
Bijdr. Booms. Java 12: 684 (1910).

31. **Dendrocnide rechingeri** (Winkl.) Chew, **comb. nov.**

*Laportea rechingeri* Winkl. Bot. Jahrb. 57: 506 (1922),  
**basionym.**

32. **Dendrocnide rigidifolia** (C.B. Rob.) Chew, **comb. nov.**

*Laportea rigidifolia* C.B. Rob. *loc. cit.* 483 (1911),  
**basionym.**

33. **Dendrocnide saipanensis** (Kaneh.) Chew, **comb. nov.**

*Laportea saipanensis* Kaneh. Bot. Mag. Tokyo 45: 277  
(1931), **basionym.**

34. **Dendrocnide salomonensis** (Rech.) Chew, **comb. nov.**

*Laportea salomonensis* Rech. in Fedde, Repert. 11: 182  
(1912), **basionym.**

35. **Dendrocnide schlechteri** (Winkl.) Chew, **comb. nov.**

*Laportea schlechteri* Winkl. Bot. Jahrb. 57: 505 (1922),  
**basionym.**—*L. crenulata* Wedd. var. *nervosa* Winkl. *loc.*  
*cit.* 507 (1922), *p.p.*

36. **Dendrocide sessiliflora** (Warb.) Chew, **comb. nov.**  
*Laportea sessiliflora* Warb. Bot. Jahrb. 13: 292 (1891),  
**basionym**; K.Sch. & Laut. Fl. Schutzgeb. 290 (1901),  
 "sessilifolia".
37. **Dendrocide sinuata** (Bl.) Chew, **comb. nov.**  
*Urtica sinuata* Bl. Bijdr. 505 (1825), **basionym**.—*U. churta*  
 Buch.-Ham. ex Wall. Cat. no. 4608 (1832), **nom. nud.**—  
*U. crenulata* Roxb. Fl. Ind. 3: 591 (1832), non Sev.  
 (1785).—*L. crenulata* Wedd. Arch. Mus. Hist. Nat. Paris  
 9: 133 (1856).—*L. sinuata* (Bl.) Miq. Ann. Mus. Bot.  
 Lugd. Bat. 4: 301 (1869).—*Urticastrum sinuatum* (Bl.) O.K.  
*loc. cit.* (1891).—*L. pustulosa* Ridl. J. Str. Br. R. As. Soc.  
 82: 194 (1920).
38. **Dendrocide stenophylla** (Quis.) Chew, **comb. nov.**  
*Laportea stenophylla* Quis. Philip. J. Sc. 41: 317. tab. 1  
 (1930), **basionym**.
39. **Dendrocide stimulans** (L. f.) Chew, **comb. nov.**  
*Urtica stimulans* L. f. Suppl. 418 (1781), **basionym**.—*U.*  
*stimulans* L. f. var. *obtusa* Bl. Bijdr. 505 (1825).—*D.*  
*costata* Miq. Pl. Jungh. 1: 30 (1851).—*L. stimulans* (L. f.)  
 Miq. in Zoll. Syst. Verz. 103 (1854).—*L. costata* (Miq.)  
 Miq. Fl. Ind. Bat. 1 (2): 231 (1859)—*L. stimulans* (L. f.)  
 Miq. var. *costata* (Miq.) Miq. Ann. Mus. Bot. Lugd. Bat. 4:  
 302 (1869).—*Urticastrum stimulans* (L. f.) O.K. *loc. cit.*  
 (1891).—*U. costatum* (Miq.) O.K. *loc. cit.*—*L. minda-*  
*naensis* Warb. in Perk. Fragm. Fl. Philip. 168 (1904).—*L.*  
*gracilipes* Elm. Leaflet. Philip. Bot. 3: 876 (1910).—*L.*  
*lanaensis* C.B. Rob. *loc. cit.* 483 (1911).—*L. brunnea* Merr.  
 Philip. J. Sc. Bot. 10: 298 (1915).—*L. annamica* Gagn.  
 Bull. Soc. Bot. Fr. 75: 2 (1928).—*L. thorelii* Gagn. *loc. cit.*  
 —*L. hainanensis* Merr. & Metc. Lingn. Sc. J. 16: 189.  
 fig. 4 (1937).—*L. sumatrana* Merr. Pap. Mich. Ac. Sc. 24  
 (1): 65 (1939).
40. **Dendrocide subclausa** (C.B. Rob.) Chew, **comb. nov.**  
*Laportea subclausa* C.B. Rob. *loc. cit.* 486 (1911),  
**basionym**.—*L. pendula* Merr. Philip. J. Sc. Bot. 13: 270  
 (1918).
41. **Dendrocide subglabra** (Hay.) Chew, **comb. nov.**  
*Laportea subglabra* Hay. J. Coll. Sc. Tokyo 30 (1): 278  
 (1911), **basionym**.
42. **Dendrocide subpeltata** (C.B. Rob.) Chew, **comb. nov.**  
*Laportea subpeltata* C.B. Rob. *loc. cit.* 485 (1911),  
**basionym**.

43. **Dendrocide ternatensis** (Miq.) Chew, **comb. nov.**

*Laportea ternatensis* Miq. Ann. Mus. Bot. Lugd. Bat. 4: 302 (1869), **basionym**.—*L. glabra* Ridl. Trans. Linn. Soc. Bot. 9: 150 (1916).—*L. mammosisetosa* Winkl. Bot. Jahrb. 57: 507 (1922).—*L. crenulata* Wedd. var. *nervosa* Winkl. *loc. cit.*, p.p.

44. **Dendrocide torricellensis** (Laut.) Chew, **comb. nov.**

*Laportea torricellensis* Laut. in K. Sch. & Laut. Nachtr. Fl. Schutzgeb. 251 (1905), **basionym**.

45. **Dendrocide urentissima** (Gagn.) Chew, **comb. nov.**

*Laportea urentissima* Gagn. Bull. Soc. Bot. Fr. 75: 3 (1928), **basionym**.

46. **Dendrocide venosa** (Elm.) Chew, **comb. nov.**

*Laportea venosa* Elm. Leaf. Philip. Bot. 3: 878 (1910), **basionym**.—*L. monticola* Merr. Philip. J. Sc. Bot. 10: 299 (1915).—*L. triplinervia* Merr. *loc. cit.* 300 (1915).—*L. con-duplicata* Elm. Leaf. Philip. Bot. 9: 3237 (1934).

47. **Dendrocide vitiensis** (Seem.) Chew, **comb. nov.**

*Laportea vitiensis* Seem. Fl. Vit. 239. tab. 60 (1868), **basionym**.

48. **Dendrocide warburghii** (Winkl.) Chew, **comb. nov.**

*Laportea warburghii* Winkl. Bot. Jahrb. 57: 509 (1922), **basionym**.

**DISCOCNIDE** Chew, **gen. nom. nov.**

*Discocarpus* Liebm. Dansk. Vidensk. Selsk. Skrift. ser. 5. 2: 308 (1851), non Klotzsch (1841), **basionym**.—*Laportea* sect. *Discocarpus* Liebm. Wedd. Arch. Mus. Hist. Nat. Paris 9: 132 (1856) et DC. Prodr. 16 (1): 84 (1869).—*Urticastrum* Heist. ex Fabricius *sensu* O.K. Rev. Gen. Pl. 634 (1891), p.p. *exclu. typ. sp.*

Monoecious perennial shrubs with irritant hairs. *Leaves* chartaceous, dentate. *Stipules* intra-petiolar, wholly connate, often rather foliaceous. *Male flowers* with 5 tepals and 5 stamens. *Female flowers* pedicellate; pedicels simple, neither winged nor fleshy. *Achenes* flattened, almost round discs with very thin papery wall. *Seed* narrow elliptic, on a thin, equally long stalk; visible through achene wall.

Lectotype sp.: *Discocarpus mexicanus* Liebm.

= *Discocnide mexicana* (Liebm.) Chew.

Distribution: Central America.

1. **Discocnide mexicana** (Liebm.) Chew, **comb. nov.**

*Discocarpus mexicanus* Liebm. Dansk. Vidensk. Selsk. Skrift. ser. 5. 2: 309 (1851), **basionym**.—*D. nicaraguensis* Liebm. *loc. cit.*—*Urera platycarpa* Wedd. Ann. Sc. Nat. ser. 3. 18: 202 (1852).—*Laportea platycarpa* (Wedd.) Wedd. Ann. Sc. Nat. ser. 4. 1: 182 (1854).—*L. liebmannii* Wedd. Arch. Mus. Hist. Nat. Paris 9: 133 (1856).—*L. mexicana* (Liebm.) Wedd. DC. Prodr. 16 (1): 84 (1869).—*L. nicaraguensis* (Liebm.) Wedd. *loc. cit.* (1869).—*Urticac-trum mexicanum* (Liebm) O.K. *loc. cit.* (1891).—*U. nicara-guense* (Liebm.) O.K. *loc. cit.* (1891).

## Further notes on the Grasses of the Malay Peninsula II

By H. B. GILLILAND

Department of Botany, University of Singapore

The following additional notes should serve to assist in bringing the list of Malayan grasses up to date. (cf. *Gardens' Bulletin* vol. XX, Pt. IV, p. 313, 1964).

**Coelorachis cancellata** (Ridl.) Bor mss.

*Coelorachis faveolata* (Holtt.) Jansen, *Gilliland l.c.* 153.

*Rottboellia cancellata* Ridl. J.S.B.R.A. Soc. 59, 258, 1920.

**Cynodon parviglumis** Ohwi in Bot. Mag. Tokyo 55, 538, 1941.

*Cynodon arcuatus* Gilliland *l.c.* non *P. esl.*; *C. dactylon* sensu Ridley et al. with reference to Malayan material.

*C. parviglumis* is the Malayan (and East Asiatic) grass. It is more glabrous and flaccid than true *C. dactylon* from which it also differs in the glume, smaller than the lemmas and in the smaller anthers. The most evident difference in the field is the absence of the rhizome.

**Dichanthium mucronulatum** Jansen in Act. Bot. Neerl. 1, 473, 1952.

Ridley 8129 Gira Batu, Malay Penins. Herb. Sing.

**Digitaria microstachya** Henrard in Monogr. Digitaria 454, 1950.

Type is Griffith, Malacca, 1845.

Bor suggests (P. 302) this is *D. microbachne* (Presl.) Henr. in Medeel. Rijks. Herb. 16, 13, 1930. The two are certainly very close.

**Dimeria glabriuscula** F. M. Bailey in Syn. Queensland Fl. Suppl. 3, 83, 1890 *Dimeria glabra* Ridl., *Gilliland l.c.* 157.

The Queensland plant is awned but otherwise hardly distinguishable; both are little more than glabrous forms of *D. ornithopoda* Trin.

**Eragrostis gangetica** (Roxb.) Steud. in Syn. Pl. Glum. 1, 266, 1854 is reported from Malaya but has been confused with *E. atrovirens* (Desf.) Trin. *E. gangetica* is an annual grass.

**Eragrostis montana** Balansa in Morot. Journ. de Bot. 4, 168, 1890.

*Eragrostis malayana* Stapf 1897. cf. *Gilliland, l.c.* 160.

- Eragrostis multicaulis** Steud. in Syn. Pl. Glum. 1, 426, 1855.  
Bahar 47413 from Perak is this grass.
- Eragrostis pubescens** (R. Br.) Steud. in Syn. Pl. Gl. 279, 1854.  
Ridley 14882 from Perlis is this grass.
- Eragrostis viscosa** (Retz.) Trin. in Mem. Acad. Sci. Petersb. ser. 6, 1, 397, 1830; Ridley Fl. Mal. 5, 24, 6, 1925.  
*Poa viscosa* Retz. in Obs. Bot. 4, 20, 1786.  
*E. tenella* var. *viscosa* (Retz.) Stapf. in Flor. Brit. Ind. 7, 316, 1896.  
Recorded from Penang and Province Wellesley.
- Garnotia acutigluma** (Steud.) Ohwi in Bot. Mag. Tokyo 55, 393, 1941.  
*Urachne acutigluma* Steud. in Syn. Pl. Gram. 121, 1854.  
*Garnotia stricta* Brogn. of Gilliland l.c. 161.
- Garnotia patula** (Munro) Benth. in Fl. Hongk. 416, 1861.  
*Borghousia patula* Munro in Proc. Amer. Acad. Art. Sci. 4, 362, 1860.  
Kia 31792 from Sungei Teku, Pahang.
- Hemarthria longiflora** (Hk. f.) A. Camus in Fl. Indo-Chine 7, 380, 1922.  
*H. vaginata* of Gilliland l.c. 163.
- Miscanthus floridulus** (Labill.) Warb. ex K. Schum. & Lanterb. in Fl. Deutsch. Sudsea 166, 1901; Ohwi, l.c. 122, 1962.  
*Saccharum floridulum* Labill. in Sent. Austro-caled. 13, t. 18.  
*M. sinensis* sensu Gilliland, l.c. 168.
- Panicum auritum** Presl. ex Nees in Agrost. Bras. 176, 1829, et Ridley et ceteris, cf. Gilliland l.c. 163.  
*Hymenachne aurita* (Presl.) Backer. Nearer to *Panicum* than *Hymenachne*.  
*Sacciolepis insulicola* (Steudel) Ohwi in Bull. Tokyo Sci. Mus. 18, 3, 1947.  
*Panicum insulicolum* Steudel. based on Cummings 2409 Singapore, 1840.
- Panicum hyatae** A. Camus in Lecomte Not. Syst. 4, 46, 1923.  
Van Steenis, Fraser's Hill 17/1/54;  
*P. costalispiculum* Ohwi in Bull. Tokyo Sci. Mus. 18, 14, 1947, Jansen l.c. 315, 1953.
- Panicum sarmentosum** Roxb. in Fl. Ind. 1, 311, 1820.  
*P. concinnum* Nees. in Journ. Bot. 97, 1850 based on Cummings 2284 ex Malacca is this grass.

**Sporobolus hernandii** Henr. in Fedde Rep. Sp. Nov. 21, 235, 1925.

Robertson from Teratau, Burma. This is *S. pulchellus* of Ridley's Flor. Mal. 5, 244, 1925.

**Stenotaphrum secundatum** (Walt.) Kuntze in Rev. Gen. Pl. ii 194, 1891.

Naturalised, Nassim Road, Singapore.

**Themeda villosa** (Poir.) A. Camus. Gilliland, l.c. 179.

*T. caudata* (Nees) A. Camus l.c. 364.

Following correspondence with Dr. P. Wycherley of the Rubber Research Institute, Kuala Lumpur I have examined this large grass (2-3 m.) in the field especially in South Johore. I accept that "*caudata*" is the mature fully-expanded inflorescence and may occur on the same clump as the younger "*villosa*".

**Thysanolaena maxima** (Roxb.) O. Ktze. Gilliland l.c. 179.

*Thysanochlaena malaccensis* Gandoger in Bull. Soc. Bot. France 66, 303, 1920 based on Curtis, Malacca and Ridley, Penang is this grass.

**Vetiveria nemoralis** (Balansa) A. Camus in Lecomte Fl. Gen. Indo-Chine, 7, 329, 1922.

*Andropogon nemoralis* Balansa in Morot, J. de Bot. 4, 115, 1890.

*Chrysopogon nemoralis* (Balansa) Holttum in Gard. Bull. Sing. 11, 297, 1947.



## Report on an abnormal ovulate strobilus of *Gnetum gnemon* L.

By HSUAN KENG\*

*Department of Botany, University of Singapore.*

*Gnetum gnemon* Linn., the *meninjau* tree, is commonly cultivated near kampongs for the edible seeds. A specimen recently collected by Mr. K. Jumali from Duchess Lane, Singapore, bearing an abnormal ovulate strobilus shows some interesting features.

Normally, a simple, unbranched ovulate strobilus has a pair of amplexous bracts at the base, followed by five to six or more whorls of ovules, usually with four to six ovules in a whorl. Each whorl of ovules is seated in the axil† of an enlarged cup-like structure, or "collar", of the axis of the strobilus. This cup-like structure, morphologically is made up of a series of circular bracts superposed one above the others (Sanwal 1962).

The ovules [or the so-called ("female flowers" as used by Pearson (1929) and others, or "ovulate fertile shoots" as recently proposed by Eames (1952)] possess three layers of envelopes surrounding the nucellus (Fig. 1). The inner one is produced to form the micro-pylar tube, which is a unique character of the Gnetales. Morphological interpretation of these three layers of envelopes has been a subject of controversy. (For a review of the earlier interpretations, see Hagerup 1934.) Some current authors loosely refer to all these three envelopes as three integuments (e.g. Sanwal 1962, p. 251). Others insist that only the inner one can be designated as true "integument", the middle and the outer ones being fused bracteoles and bracts respectively (e.g. Eames 1952, p. 96). Most textbook writers, however, generally follow Pearson (1929) and Chamberlain's (1935) explanation that the inner and middle envelopes represent the inner and outer integuments, and the outer envelope, the "perianth".

The present abnormal ovulate strobilus (Plate 1) shows clearly a young strobilus with several whorls of underdeveloped ovules emerging from the split outer envelope of an otherwise normal ovule. This teratological specimen seems to favour the suggestion that the outer envelope represents a pair of concrescent bracts (similar to the amplexous bracts at nodes lower on the axis of strobilus) as advocated by Eames (1952, p. 96).

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\* The writer would like to express his thanks to Prof. H. B. Gilliland for reading the manuscript of this paper, and for his helpful suggestions.

† The ovules appear to be axillary, however, according to an ontogenetic study of Sanwal (1962), they are actually arise by the meristematic activity of the cells on the abaxial (or lower) surface of the "collar".

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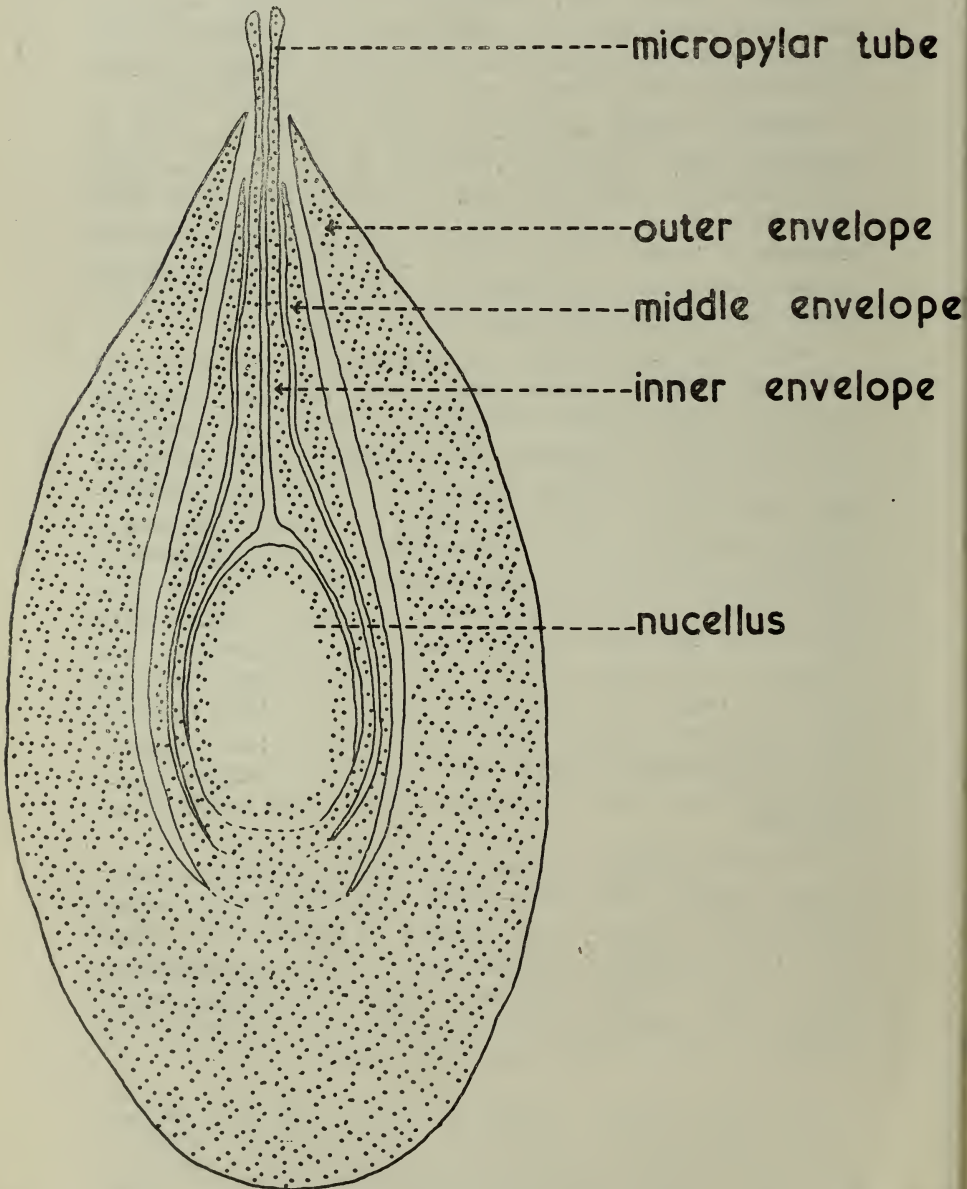


Figure 1. Diagram of the ovule of *Gnetum gnemon* Linn. in longitudinal section, showing the three layers of envelopes surrounding the nucellus. The inner envelope is produced forming the micropylar tube. (Based on a series of microtone sections).



Photo by Mr. D. Teow.

Plate 1. An abnormal ovulate strobilus of *Gnetum gnemon* Linn. From the outer envelope of one of the ovules, a young ovulate strobilus is emerged. Scale: 1 mm. divisions.



## A Revision of *Petraeovitex* (Verbenaceae)

By MUNIR AHMAD ABID

University of Sind, West Pakistan\*

### HISTORY OF THE GENUS

The genus *Petraeovitex* was founded by D. Oliver in 1883 on a specimen collected by Riedel on the island of Buru in the Moluccas, the type specimen being named as *P. riedelii* Oliv. It was then placed under the tribe Viticeae of Verbenaceae with a note that it has "an accrescent calyx resembling that of *Petraea*" (Hook. Ic. Pl. V (1883) 15, t. 1420). Briquet in Engl., Pflanzenfamilien IV. 3a. (1897) 179 removed it from Viticeae and placed it in Caryopteridoideae after *Peronema*, a position accepted by subsequent revisers of the family.

Previous to this, however, a conspecific specimen collected by Christopher Smith on the Honimoa island of the Moluccas in 1797 was named by J. E. Smith as *Petraea multiflora* (in 1814). Hence the correct name of the type species is *Petraeovitex multiflora* (J. E. Smith) Merr. (1917). In 1891 *P. pubescens* Warb. was described on a specimen collected from the Little Kai (Kai Kechil).

For a long time the genus was considered to be endemic between the Moluccas and New Guinea, until 1908 when King and Gamble added two species from Malaya and Borneo. Since then more new species have been described from Malaya, Sumatra, Borneo and the Philippines making the total number of species 10 and two varieties. In 1959 Moldenke, who reviewed these species synonymically, overlooked *P. wolfei* and reduced the remaining nine to seven species and one variety, as follows:— *bambusetorum*, *membranacea*, *multiflora*, *pubescens*, *scortechinii*, *sumatrana* and *trifoliata* and transferred var. *solomonensis* from *P. multiflora* to *P. sumatrana*. He reduced *P. ternata* and its varieties to *P. trifoliata*, a reduction that was partly made by Merrill in En. Philipp. Pl. III (1923) 406.

In the present revision the specimens referred to *P. bambusetorum* in several herbaria have been named as *P. bambusetorum* and its forma *simplicifolia* and *P. membranacea* var. *malesiana*. *P. multiflora* var. *solomonensis* has been found to be identical with the type form with no affinity to *P. sumatrana* to which it had been transferred by Moldenke. *P. pubescens* is made a variety of *P. multiflora*. In addition two new taxa have been established, namely *P. kinaluensis* and its variety *agrestis*.

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\*Colombo Plan Fellow, Botanic Gardens, Singapore, 1964.

## COMPARATIVE MORPHOLOGY

The species of the genus *Petraeovitex* reveal certain morphological affinities among themselves, but these are so distributed that it is hard to classify the species into definite allied groups; for many of these characters are found mixed, present in some and absent in others.

The leaves are always compound. With the exception of *P. sumatrana* and *P. multiflora* which have biternate leaves the rest of the species have ternate leaves. In the ternate leafed group, *P. scortechinii* has always densely pubescent leaves, whereas the other species are glabrous except *P. trifoliata* where the young leaves may be pubescent and adult ones often slightly hairy on the lower surface. In the biternate leafed, the young leaves in *P. multiflora* are also often pubescent notably in the var. *pubescens*.

Moreover, in Winkler No. 231: L, a tendency to produce 4, 5 and 6 leaflets to a leaf is noticed which may be an expression of its latent tendency towards the formation of biternate leaves. In addition the young leaves in *P. multiflora* may be 3-5 foliolate, though later they will divide to become biternate. Leaves in terminal inflorescences of *P. multiflora* are generally not fully developed unless the fruits are not fully mature and so the leaflets may appear sessile, to be mistaken for a form of *P. sumatrana*. (See Table I).

There are two types of inflorescences in the genus; non-specialized and specialized. The non-specialized inflorescences are found in *P. scortechinii* & *P. wolfei*; the axis here is terminal which continues its vegetative growth indefinitely. The flowers are borne on lateral cymes which later develop into vegetative branches. The bracts and bracteoles, which are coloured in these two species, also develop to become normal green leaves. The specialized inflorescences found in the rest of the species, stop at post-anthesis, their vegetative growth, and in consequence eventually die. These may be congested due to very short sub-division of their branches as in *P. trifoliata*, *P. kinabaluensis*, *P. sumatrana* and *P. multiflora* or lax due to longer and fewer sub-divisions of their branches as in *P. membranacea* and *P. bambusetorum*. Moreover, pedicels in the congested inflorescences are shorter, while in the lax, they are longer. In *P. trifoliata* and *P. kinabaluensis* which have ternate leaves, the cymes bear leafy bracts and conspicuous flowers. *P. sumatrana* and *P. multiflora* which have biternate leaves, the flowers and bracts are both smaller and inconspicuous. (See Table II).

Stamens and pistils in different species may be exerted or included. In *P. wolfei*, *P. membranacea*, *P. bambusetorum* and *P. trifoliata* they are included, while in the rest of the species they are exerted. As a rule included stamens are associated with elliptic anther lobes and exerted ones with more or less orbicular anther lobes; but *P. sumatrana* is an exception, in having exerted stamens and elliptic anther lobes. (See Table III).

TABLE I

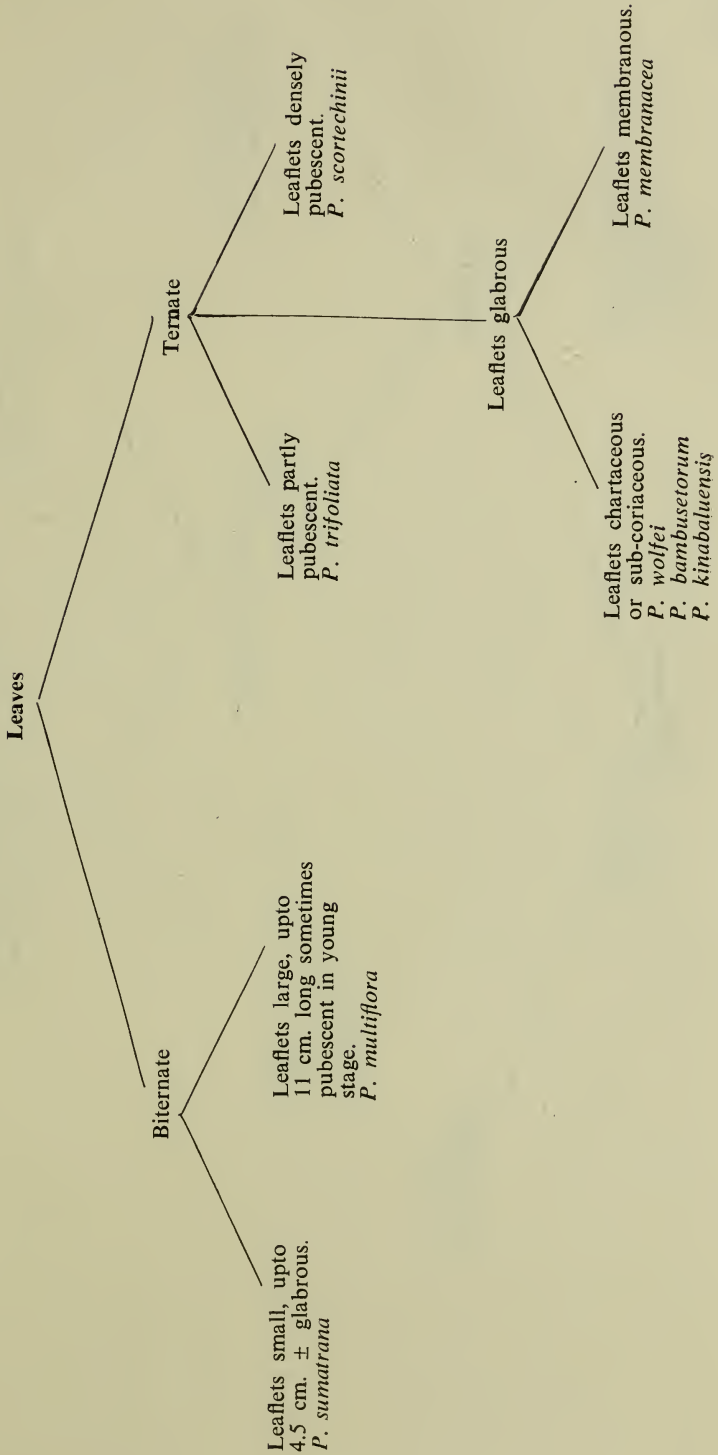
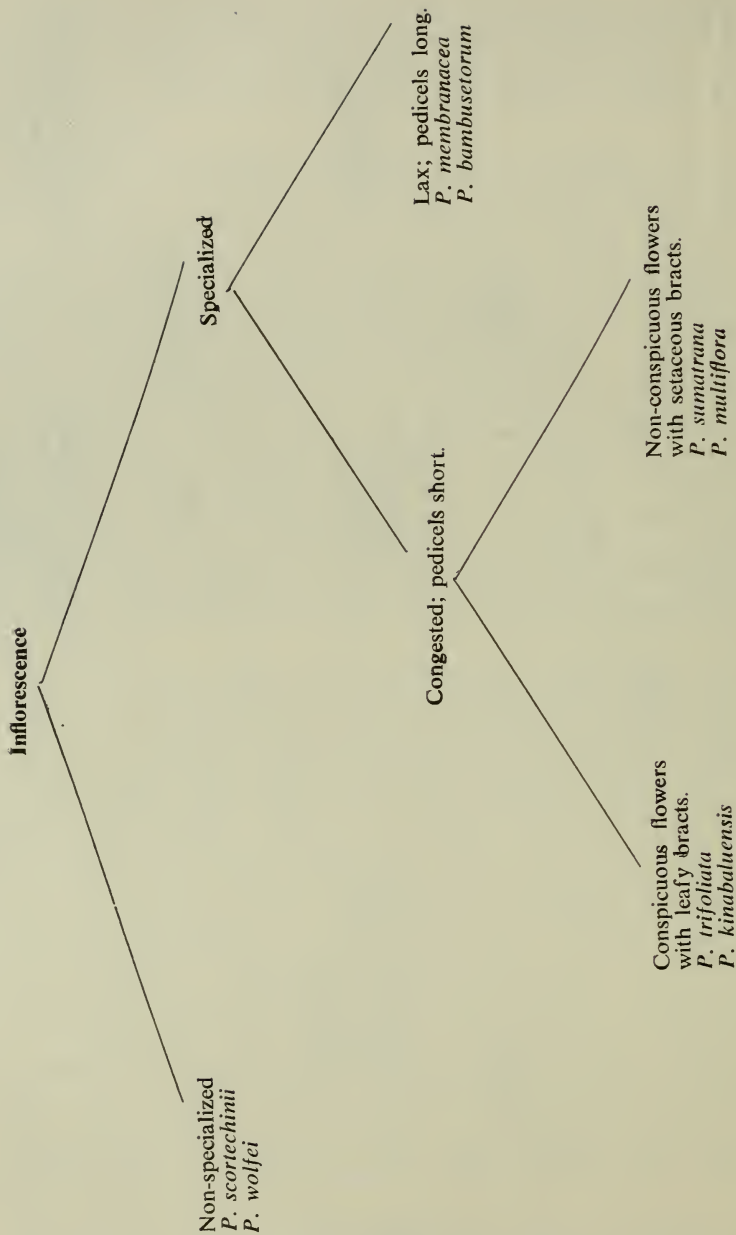
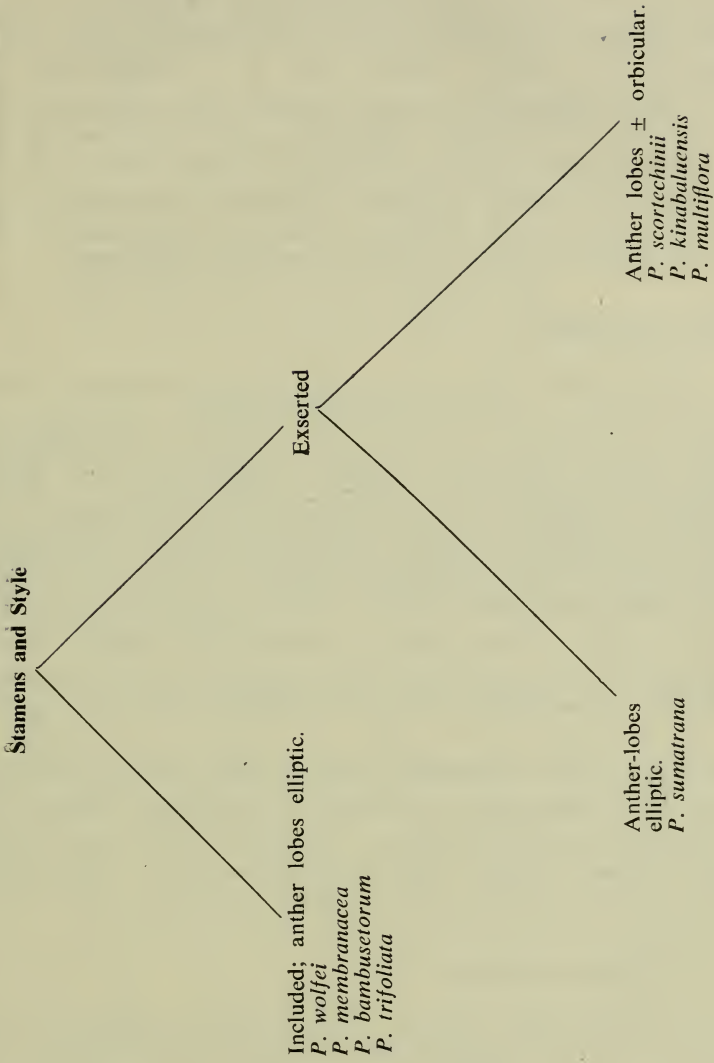


TABLE II





On the shape of fruit, the genus may be divided into two groups; (1) Fruits with conical or elongated apex and (2) Fruits with truncated apex. In *P. membranacea*, *P. bambusetorum* and *P. kinabaluensis* the fruit is with a conical apex. However, in *P. wolfei* the fruit apex is constricted at first and then produced into a short, truncated and faintly 4-lobed apex. In *P. kinabaluensis* var. *kinabaluensis* the apex is much elongated into a long neck. In *P. scortechinii*, *P. trifoliata*, *P. sumatrana* and *P. multiflora* the fruit is truncated. The truncated fruit may be almost cylindrical as in *P. scortechinii* and *P. trifoliata* or they may be four-lobed as in *P. sumatrana* and *P. multiflora*. Fruits are longitudinally striate in all species except *P. bambusetorum*. (See Table IV).

### DISTRIBUTION

Geographically *Petraeovitex* is restricted to hot and moist climate of the tropics, on either side of the equator, in the region comprising what is known as "Malesia" to botanists and of Melanesia. This includes Malaysia, Indonesia, Philippines, New Guinea, Bismark archipelago upto Solomon Islands (see map 1). The trifoliolate species are found in the Malay Peninsula, the Philippines and Borneo. Of the two species which are 9-foliolate, *P. multiflora* is found in the region from the Celebes and the Moluccas eastwards to New Guinea, Bismark archipelago and Solomon Islands; no other species of *Petraeovitex* is known from this region. *P. sumatrana* is restricted to Sumatra and Borneo only (see map 2).

*P. scortechinii* and *P. wolfei* are endemic in the central and northern parts of the Malay Peninsula whereas *P. membranacea* and *P. bambusetorum* are found in the Malay Peninsula and Borneo (see map 3). Similarly, *P. trifoliata* has also been collected from Borneo, Sarawak and the Philippines while *P. kinabaluensis* is so far known only from North Borneo. (See map 4).

### ACKNOWLEDGEMENT

I wish to record here my gratitude to the following: to the Government of Singapore for granting me the Colombo Plan Fellowship which enabled me to undertake this piece of research work; to Mr. H. M. Burkill, Director of Gardens, Singapore, and to Dr. Chew Wee-lek, Keeper of the Herbarium, for putting at my disposal the facilities of the Singapore Botanic Gardens; to Dr. C. X. Furtado, for guidance and assistance in translating Latin and German descriptions and in preparing the diagnoses in Latin of the new taxa; to Dr. H. N. Moldenke for the generous gifts of his valuable literature and to Che Juraimi bin Samsuri for making the drawings published here.

I also wish to thank the Directors and Curators of the following herbaria for the loan of herbarium specimens:

1. Arnold Arboretum, Harvard University, 22 Divinity Avenue, Cambridge 38, Massachusetts, U.S.A. (A).
2. Botanisches Garten und Museum, Berlin-Dahlem, Germany. (B).
3. British Museum of Natural History, London, S.W.7, England. (BM).
4. Botanic Gardens, Brisbane, Queensland, Australia. (BRI).
5. Botanic Gardens, Calcutta, India. (CAL).
6. Royal Botanic Garden, Edinburgh, Scotland. (E).
7. Royal Botanic Gardens, Kew, England. (K).
8. Forest Research Institute, Kepong, Selangor. (KEP).
9. Rijksherbarium, Leiden, Netherland. (L).
10. Forest Herbarium, Lae, New Guinea. (LAE).
11. Forest Herbarium, Sandakan, North Borneo. (SAN).

### PETRAEOVITEX Oliver

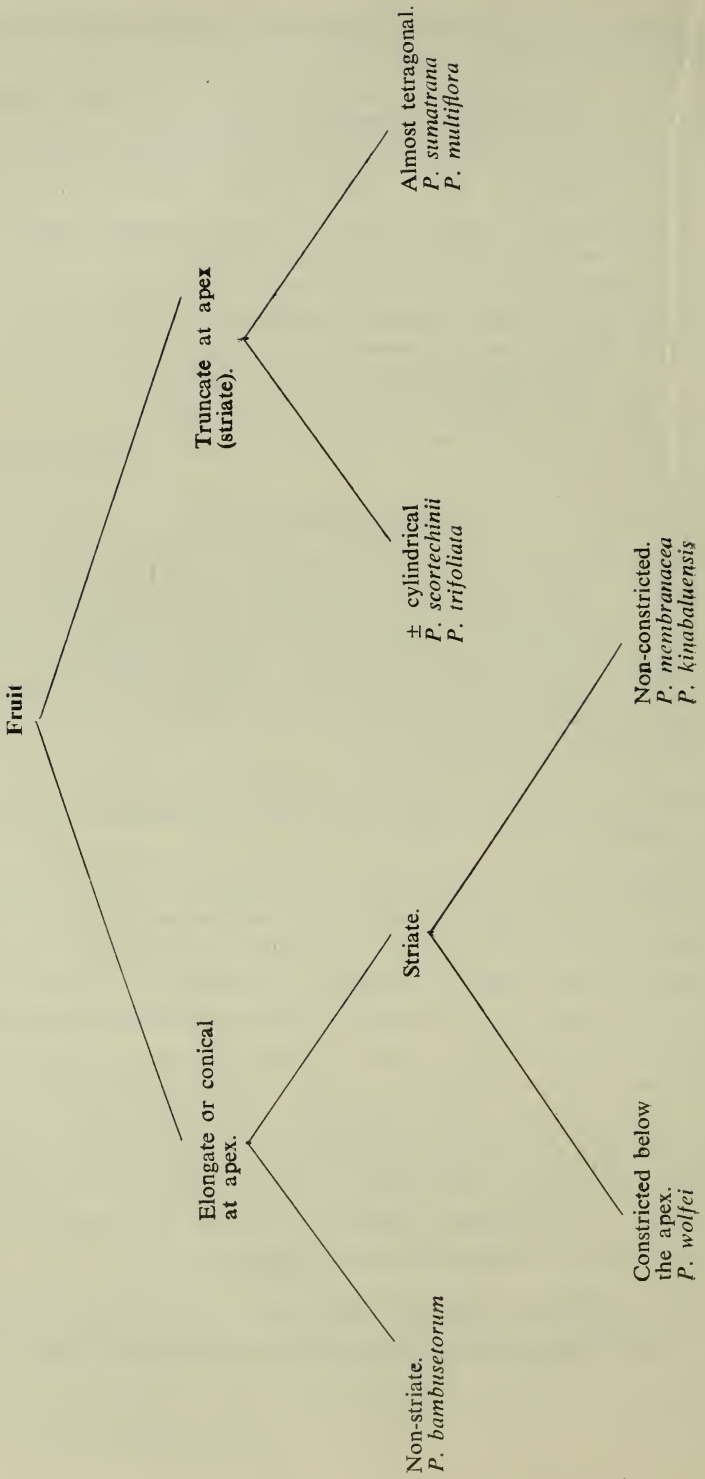
*PETRAEOVITEX* Oliver in Hook., Ic. Pl. 5 (1883) 15, t. 1420; Warb. in Engl., Bot. Jahrb. XIII (1891) 427; Engl. and Prantl, Nat. Pflanzenf. IV. 3a (1897) 179; King and Gamble, Mat. Fl. Malay. Pen. IV (1909) 1068; Hall. f., Med. 's Rijks Herb. Leid., No. 37 (1918) 84; Lam., Malay. Verb. (1919) 323 and Bull. Jard. Bot. Buit. III (1921) 97.

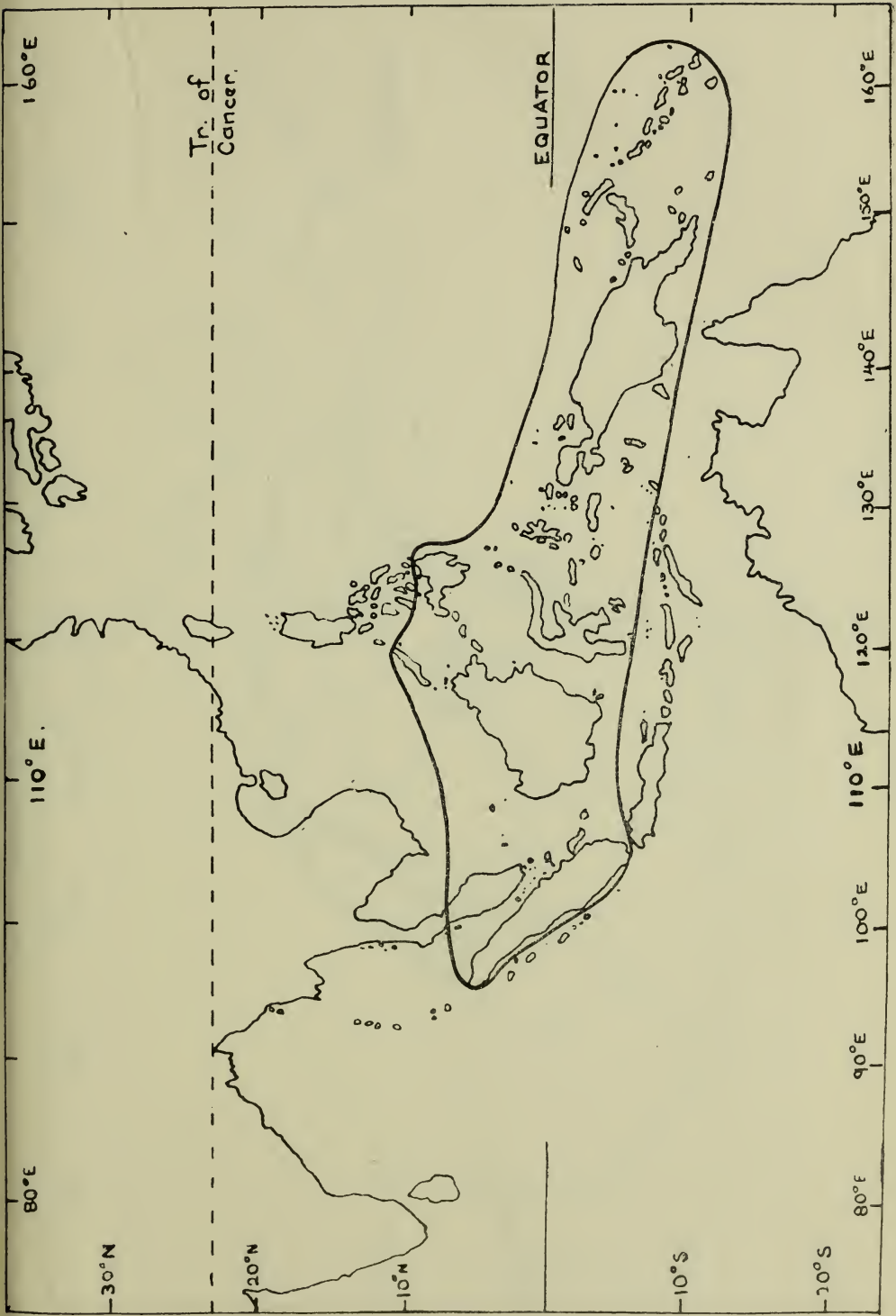
TYPE SPECIES: *P. riedelii* Oliv. (= *P. multiflora* (J. E. Smith) Merr.).

Woody climbers; branches quadrangular. *Leaves* opposite, ternate or biternate, rarely simple. *Inflorescence* terminal or axillary, cymose panicles with spreading branches; bracts leafy, linear or minute. *Flowers* shortly pedicelled. *Calyx* short, 5-toothed, campanulate; lobes much accrescent in fruit, membranous, reticulate. *Corolla* oblique, 2-lipped; lobes 5, subequal. *Stamens* 4, epipetalous, subequal, almost didynamous, exsert or included, alternate with the corolla lobes; anthers dorsifixed, anther lobes elliptic-oblong or orbicular. *Ovary* obovoid, imperfectly 2-celled, cells 2-ovuled; ovules pendulous; style slender; stigma bilobed, lobes equal or unequal. *Fruit* capsular, conical or truncate at apex, narrowed towards the base. *Seeds* 2 or 1, exalbuminous.

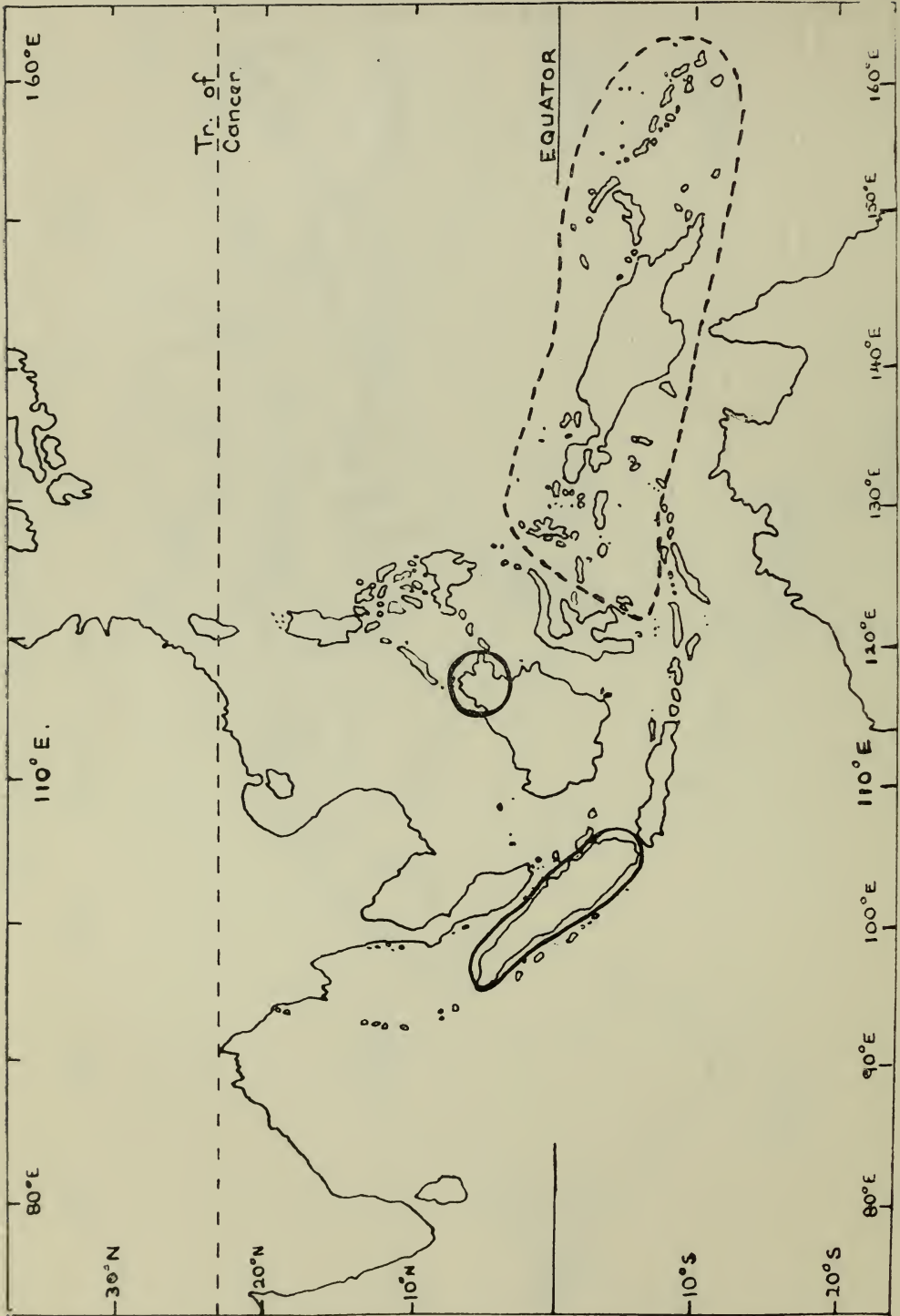
DISTRIBUTION: Malaysia, Philippines, Indonesian Archipelago. New Guinea, Bismark Archipelago and Solomon Islands.

TABLE IV

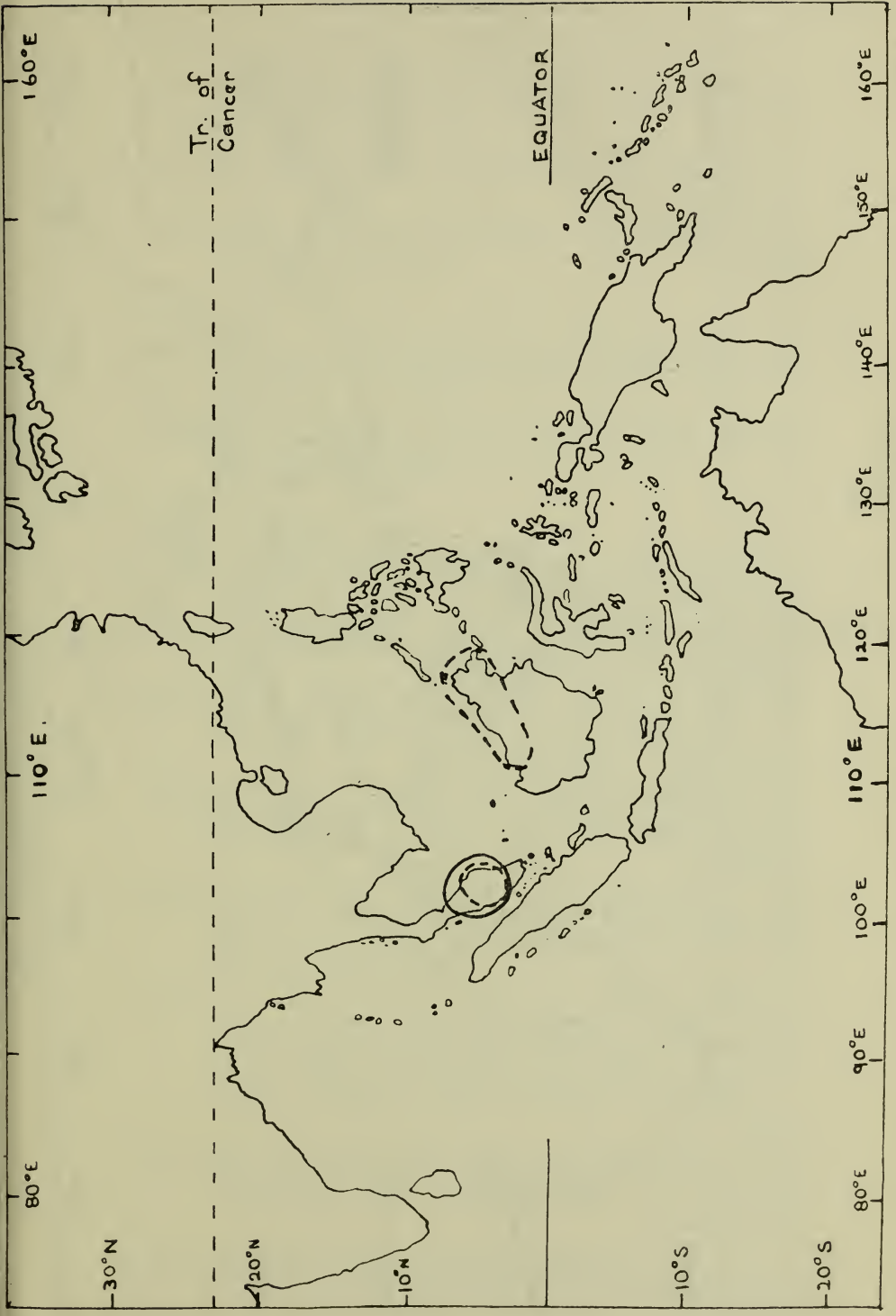




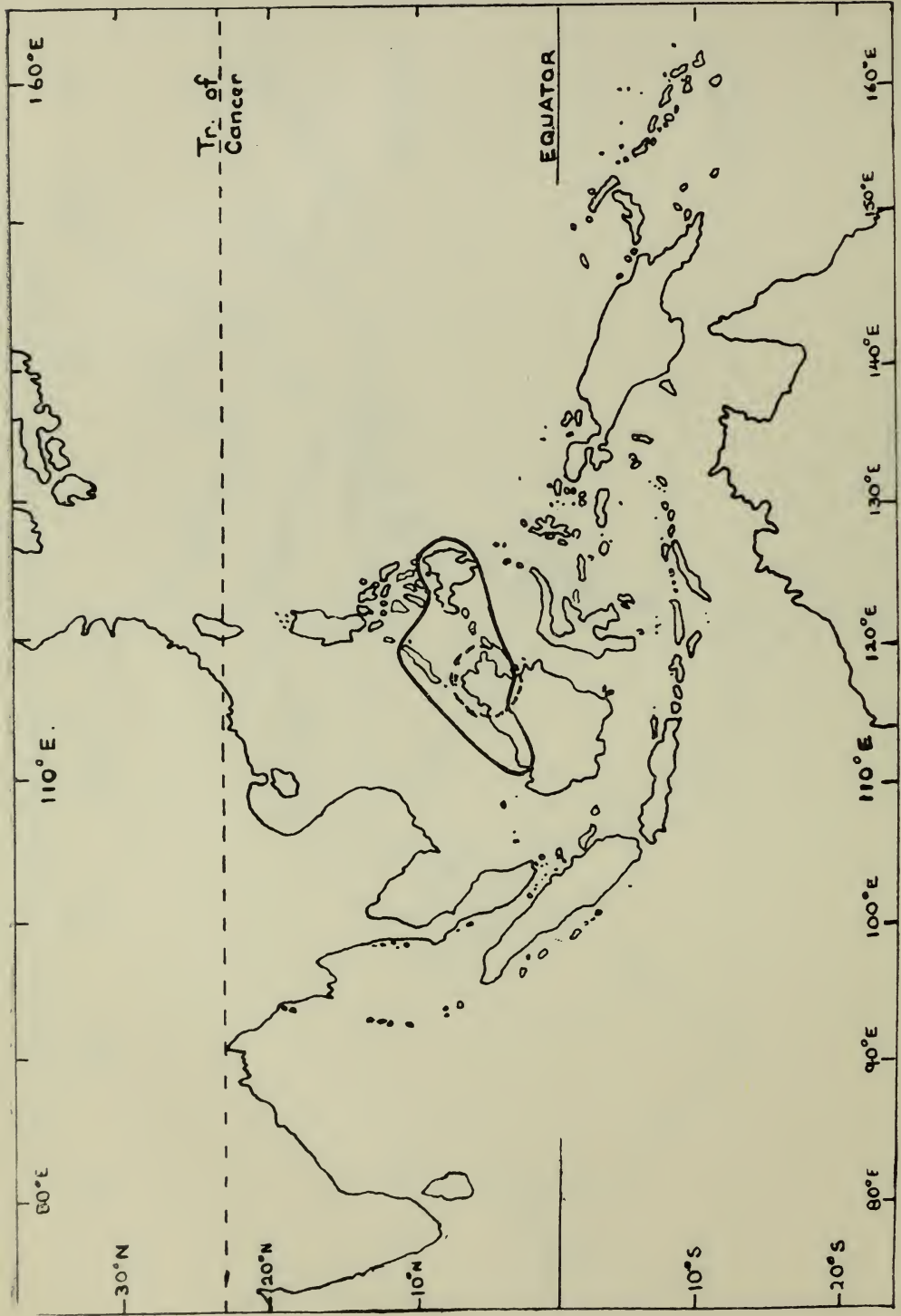
Map 1. Distribution of genus *Petracovitex* Oliver.



Map 2. Distribution of: *P. sumatrana* (—); *P. multiflora* (-----).



Map 3. Distribution of: *P.scortechinii* & *P.wolfei* (—); *P.membranacea* and *P.bambusetorum* (---).



Map 4. Distribution of: *P. trifoliata* (—); *P. kinabaluensis* (-----).

KEY TO THE SPECIES

1. (a) Flowers in cymes, borne on specialized flower-bearing branches or inflorescence with or without green or ash coloured bracts ... 3.  
(b) Flowers in short axillary cymes towards the end of growing non-specialized branches, (leaves 3-foliolate); young axillant leaves and bracts coloured yellowish ..... **P. scortechinii**.
2. (a) Flower: stamens and style exerted; anther lobes  $\pm$  orbicular; fruit striate, slightly enlarged at apex. Leaves densely pubescent  
**P. scortechinii**.  
(b) Flowers: stamens and style included; anther lobes elliptic; fruit striate, constricted above the middle. Leaves glabrous (fruiting calyx largest in the genus) ..... **P. wolfelii**.
3. (a) Leaves biternate ..... 10.  
(b) Leaves 1 or 3-foliolate ..... 4.
4. (a) Inflorescence with many leaf-like bracts and ultimate branchlets with many linear bracteoles even without axillary flowers; pedicels  $\pm$  5 mm. long; flowers many, congested on peduncle or branchlets ..... 8.  
(b) Inflorescence with few or no leaf-like green bracts; branchlets divaricated; flowers diffused, non-congested; pedicels 5-10 mm. long (anther lobes elliptic) ..... 5.
5. (a) Fruit striate ..... 7.  
(b) Fruit non-striate ..... 6.
6. (a) Leaves 3-foliolate; leaflets ovate, main pair of nerves upto 4; fruit with arcuately conical apex; fruiting calyx brownish, hairy or glabrous ..... **P. bambusetorum**.  
(b) Leaves simple, elliptic-ovate, main pair of nerves upto 6; fruit abruptly obtusely acuminate; fruiting calyx green, sparsely puberulous ..... **P. bambusetorum** forma *simplicifolia*.
7. (a) Inflorescence about 12 cm. long; leaflets membranous, dull above, rounded at base; intramarginal nerve obscure; side petiolules upto 7 mm.; pedicels  $\pm$  10 mm. long; fruit glabrous  
**P. membranacea** var. *membranacea*.  
(b) Inflorescence 30-70 cm. long; leaflets chartaceous or subcoriaceous, dull or nitid on both sides, rounded-cuneate at base; intramarginal nerves prominent; side petiolules upto 4 mm.; pedicels  $\pm$  5 mm. long; fruit sparsely puberulous towards apex ... **P. membranacea** var. *malesiana*.
8. (a) Fruit shortly conical at apex or suddenly narrowed into a long neck; style always terminal; stigma equally bilobed; ovary pubescent only in the upper 3rd, non-glandular; stamens and style much exerted (longest in the genus); anther lobes  $\pm$  orbicular. Leaves glabrous ..... 9.  
(b) Fruit rounded at apex when young, later truncate, depressed at summit; style apical when young, excentric at anthesis; stigma unequally bilobed; ovary pubescent and often glandular; stamens and style slightly exerted; anther lobes elliptic. Leaves glabrous or partly puberulous beneath, rarely irregularly dentate and deciduously pubescent beneath (probably in early stage)  
**P. trifoliata**.
9. (a) Leaflets rhomboidally elliptic, shining on both surfaces, generally longer and acuminate in the upper half, cuneate at base or almost so; middle leaflet upto 15 cm. and its petiole upto 3.5 cm. long; fruit suddenly narrowed into a long neck ..... **P. kinabaluensis** var. *kinabaluensis*.  
(b) Leaflets elliptic-ovate, dull, generally rounded at base, sometimes sub-cordulate; middle leaflet upto 11 cm. and its petiolule upto 2.5 cm. long fruit shortly conical at apex ..... **P. kinabaluensis** var. *agrestis*.

10. (a) Calyx lobes tomentose without, glabrous within (except var. pubescens); corolla villous in the throat; stamens and style subequal or nearly so; anther lobes rounded ..... 11.  
 (b) Calyx lobes tomentose on both surfaces; corolla glabrous within; style nearly twice exerted as the stamens; anther lobes oblong or elliptic; (largest leaflet  $\pm$  4-4.5 cm. long) ..... **P. sumatrana.**
11. (a) Leaflets glabrous, entire, (largest leaflets  $\pm$  10-11 cm. long); calyx lobes glabrous within ..... **P. multiflora** var. **multiflora.**  
 (b) Leaflets pubescent on both surfaces, often irregularly dentate; (largest leaflets  $\pm$  4-4.5 cm. long); calyx lobes puberulent within **P. multiflora** var. **pubescens.**

## DESCRIPTION OF SPECIES

**Petraeovitex scortechinii** King & Gamble in Kew Bull. (1908) 113 & Mat. Fl. Malay. Pen. IV No. 21 (1909) 1068; Lam., Malay. Verb. (1919) 329 & in Bull. Jard. Bot. Buit. III (1921) 99; Ridl., Fl. Malay. Pen. II (1923) 637; Mold., Résumé Geogr. Distrib. & Syn. (1959) 180, 332 & 333. **Fig. 1.**

TYPE SPECIMEN: Perak (Scortechini 753 or 1753 — K, not seen).

Among the species that bear yellowish-coloured young leaves, bracts and bracteoles on the flower bearing branches, this species is easily distinguished by its pubescent leaves, exerted stamens and styles, rounded anther lobes, villous ovary in the upper part, and pubescent, non-constricted fruit which is gradually enlarged towards the apex.

A liana; young branchlets pale brown, puberulous; innovations tawny-pubescent. *Leaves* opposite, membranous, trifoliolate; end leaflet ovate, shortly and obtusely acute at apex, rounded or slightly cuneate at base; 5-8 by 2.5-5 cm.; upper surface puberulent, lower grey-pubescent; margins entire or undulate; main nerves 4 pairs, curving sharply upwards; side leaflets similar but rather smaller and somewhat unequally cordate at base; petiole 3.8-6 cm. long, petiolules of end leaflet 1.2-2 cm. long, of side leaflets 0.5-1 cm. long; all fulvous pubescent. *Inflorescence*: flowers in short decussate cymes on young, terminal portion (15-30 cm. long) of the branches or branchlets; cymes dichotomously branched, one in the axil of young coloured or green leaf, 3-5 cm. in length; bracts almost orbicular when young, elliptic or clavate later, 13-19 mm. long; pedicels short. *Calyx* fulvous-pubescent, 4-5 lobed; lobes up to 12 mm. long. *Corolla* 2-lipped, 15-20 mm. long; lobes spatulate, concave, 2-4 mm. long. *Stamens* 4, exerted, the 2 lower ones being longer than the two upper; filaments 6-8 mm. long. *Ovary* cylindrical, villous at apex, hairy lower down, 2-celled, 2 mm. long; style exerted, up to 15 mm. in length; stigma 2-lobed, the lobes spreading. *Fruiting calyx* 19-25 mm., 3-nerved, reticulate. *Fruit* capsular, broader, obtuse and pubescent towards apex, narrowed towards the base, ribbed, 6-7 mm. long.

MALAYA: **Perak** (Scortechini s.n.: CAL). **Selangor**, 16th mile at Ulu Gombak (Symington 44,082: KEP; Mohamed Nur 34,212: SING, L & A; Munir 2: SING). **Negri Sembilan**, Sungei Ujong (Alvins 1,858: SING).

Moldenke (op. cit. p. 170 & 193) includes also Malacca and Borneo in the distribution of this species, but so far no specimens from these two states were found among the specimens examined by me from different herbaria. Lam also includes Malacca.

Inflorescences produced on old wood in the axils of fallen leaves seem to differ somewhat from those described as normal; for the former are apparently specialized, limited branches of about 10–15 cm. long and two or more branches may grow from the same pulvinus. Unfortunately Scortechini s.n. in CAL is in a bad state of preservation to permit a further study. This specimen might be an un-numbered duplicate of the type.

Some young flowers show trilobed stigmata, but in adult stages examined, the latter were always bilobed.

**Petraevitex wolfei** Sinclair in Gard. Bull. Sing. XV (1956) 18; fig. 2; Turrill Curt. Bot. Mag. CLXXIII (1960) Tab. 355. **Fig. 2.**

TYPE SPECIMEN: Kedah (Wolfe & Kadir 21,452 — SING).

Allied very closely to *P. scortechinii* in having yellowish young leaves, bracts and bracteoles in flower-bearing branches, puberulous calyx within and without, ovary puberulent towards apex and longitudinally striate fruit, but is distinguished easily by its glabrous leaves, non-exserted stamens, elliptic anther lobes, unequally bilobed stigma and fruit faintly 4-lobed at the apex and prominently constricted above the middle.

A long woody climber. *Leaves* trifoliolate; leaflets elliptic or elliptic-ovate, shortly acuminate at apex,  $\pm$  rounded or slightly cuneate at the base, 9–17 cm. long, 4–8 cm. broad, membranous, glabrous; nerves 4–6 pairs, prominent in lower surface, reticulate; petioles upto 8 cm. in length; petiolules 5–20 cm. long. *Inflorescence* thyrsoïd, handsome golden yellow in colour, pendulous, old up to 50 cm. long; cymes axillary, opposite, decussate, 2–5 cm. long, with 2–3 flowers; bracts leafy, broad elliptic-oblong, 0.8–3 cm. long; pedicels short,  $\pm$  3 cm. long. *Calyx* 1.8–2.2 cm. long, puberulous without, deeply 5-lobed. *Corolla* falcate, deciduous, pale yellow, 2.2–2.5 cm. long; lobes 5, obtuse, 4–5 mm. long, 3–4 mm. broad. *Stamens* 4, included, two 12–13 mm. long, the other two 10 mm. long; anther 0.8–1 mm. long. *Ovary* ellipsoid-oblong, 3.5 mm. long, slightly constricted and minutely hairy in the upper third; style slender, 2–2.3 cm. long, glabrous; stigma unequally bifid. *Fruiting calyx* 3–4 cm. long, with fairly conspicuous midrib and close reticulate venation. *Fruit* capsular, 8 mm. long, longitudinally ribbed below the constriction, minutely puberulent and faintly 4-lobed towards the apex.

MALAYA: **Kedah**, Sungai Patani, Selambau-Jeniang Road (Wolfe & Kadir 21,452 — Holotype & Isotype: SING; Kiah 35,972 — Paratype: SING, & Paratype E; Wolfe s.n.: SING; Munir 1: SING). **Trengganu**, Dungun — Paka Road, Bukit Bauk (Sinclair 39,901 — Paratype: SING; & Paratype: L). **Kelantan**, Mak Mek Nal (Symington 37,971: KEP). **Singapore**, Cult. Bot. Gard. (Furtado 37,440: SING).

Generally the cyme is dichotomous at the first division, with apical bud developed into flower and fruit; but the subsequent branching is very irregular due to the suppression of flowers and some branches and persistence generally of only one bracteole at each division (Fig. 2-D).

This species bears the largest fruiting calyx in the whole genus.

The figure given by J. Sinclair was drawn from the fresh specimens of the plant cultivated in Singapore Botanic Gardens; this plant does not fruit, and produces leaves which are somewhat different in shape and texture from the ones in its natural habitat.

**Petraeovitex membranacea** Merr. in Journ. Malay. Br. Roy. As. Soc. 1 (1923) 30; Mold., Résumé Geogr. Distrib. & Syn. (1959) 192: var. **membranacea**. Fig. 3.

TYPE SPECIMEN: Borneo, Sabah (Ramos 1,372 — PNH? not seen; Isotype in K & A).

Regarding its peculiar mode of inflorescence associated with striate fruits, this species has no very close allies, but it comes nearer to *P. bambusetorum* in having: lax, dichotomously branched inflorescence, long pedicelled flowers, almost included stamens and style, elliptic anther lobes and glabrous corolla tube.

A slender woody climber. *Leaves* 3-foliolate, membranaceous; petiole 4–6 cm. long; leaflets entire, ovate-oblong to ovate-elliptic, acuminate, usually rounded at base, rarely cuneate, glabrous 4–5 nerved on each side with a faint intramarginal nerve looping from the middle upwards; reticulation faint especially above; middle leaflet largest, 6–11 cm. long, 3–5.5 cm. broad, petiolule 1–2 cm. long; lateral leaflets 5–8 cm. long, 2.5–4.2 cm. broad, petiolule 3–7 mm. long. *Inflorescence* exillary, paniced, bearing lax cymes, 9–12 cm. long, 6–9 cm. broad, puberulent, striate in the rachis; primary branches (in the specimens seen) two on each side of the rachis; the lowest one in Isoholotype 2.5–3.5 cm. long, in Isoparatype  $\pm 5$  cm. long; bracts absent; bracteoles linear, minute upto 1 mm. long. *Flower*: pedicels 8–10 mm. long. *Calyx* 5–6 mm. long, puberulous without, glabrescent within. *Corolla* obscurely 2-lipped; lobes subequal, puberulent on the back and margins, ovate to elliptic-ovate, obtuse, 3.5 mm. long, 2–2.5 mm. broad; tube glabrous within and without, 3.5 mm. long. *Stamens* 4, included, subequal; filaments with very few glandular hairs near the base; anthers ellipsoid, 1.7 mm. long. *Ovary* oblong, later slightly cuneate towards

base, obscurely puberulent in the upper third; style long, non-exserted; stigma unequally 2-lobed. *Fruiting calyx*: tube 8 mm. long, strongly ribbed; lobes oblong, acute, membranous, 3-nerved, reticulate, minutely puberulent on the back and margins, about 15 mm. long, 4 mm. broad. *Fruit* glabrous, broader, in the upper third, longitudinally striate, 8 mm. long.

BORNEO: **Sabah**, Sandakan (Ramos 1,372 Isotype: A & K, & 1,679 — Paratype: L).

Merrill described this species as having a very lax inflorescence, but this is not exclusive in this species, for *P. bambusetorum* has similarly lax inflorescence. He also mentions that this species bears leafy bracts about 1 cm. long, axillant to the lower primary branches of inflorescences, but they are not present in the specimens examined. Moreover the inflorescences are very short,  $\pm$  12 cm. long, never reaching 25 cm. long as originally described. Large inflorescence with leafy bracts are noticed in var. *malesiana*.

**Petraeovitex membranacea** Merr. var. *malesiana* Munir var. nov.

**Fig. 4 & 5** *P. bambusetorum* sensu Lam op. cit. (1919) 328 & (1921) 98 quoad specimen Haviland & Hose 1,913E infra citatum.

TYPE SPECIMEN: Sarawak (Haviland & Hose 1,913B — BM).

*A var. membranacea hęc varietas foliolis crassioribus, magis nervatis, inflorescentia laxiore longioreque, bracteis interdum foliaribus lobis tuboque calycis intus puberulentibus, floribus breviter pedicellatis, ovario fructuque apice puberulentibus differt.*

Differs from *P. membranacea* var. *membranacea* in having: leaflets slightly thicker and with main pairs of nerves up to seven; inflorescence more lax and much longer bearing sometimes leafy bracts in early stages; calyx also puberulent in the lobes and tubes within; pedicels slightly shorter and ovary and fruit puberulent towards apex.

MALAYA: **Pahang**, Sungei Lembing, Kuantan (Symington & Kiah 27,765A: SING, KEP. Petals pale yellow). **Selangor** loc. incert. (Hume 7,877: SING).

BORNEO: **Sarawak**: Mount Singhi (Haviland & Hose 1,913B — Holotype: BM & 1,913E: L).

Selangor specimen bears slightly thicker leaflets and is in fruit, but is devoid of bracts, while the Pahang specimens are in flower with leafy bracts and too thin leaflets. It seems that the latter is collected from young apical branch whereas the former is from older branch. Haviland & Hose 1,913E has been confused with *P. bambusetorum* (Lam l.c.) to which it has great resemblance in general appearance, but from which it differs in having its fruit longitudinally striate.

**Petraeovitex bambusetorum** King & Gamble in Kew Bull. (1908) 113 & Mat. Fl. Malay. Pen. III No. 21 (1909) 1069; Lam, Malay. Verb. (1919) 328 & Bull. Jard. Bot. Buit. III (1921) 98, p.p. excl. Haviland & Hose No. 1,913E; Merr., En. Born. Pl. (1921) 518, p.p. excl. Clemens No. 10,246; Ridl., Fl. Malay Pen. II (1923) 637; Mold., Résumé Geogr. Distr. & Syn. (1959) 180, 192 & 193: forma **bambusetorum**. Fig. 6 & 7.

TYPE SPECIMEN: Perak (kunstler 8,765 Lectotype — K, not seen; Isolectotype — CAL).

### Typification

*P. bambusetourm* was adopted by King and Gamble to show that the species was found in the bamboo forest of Perak in Malaya, but as the flowers of the type were small, the specimen was compared with Bornean specimens and a mixed description was drawn for the species. Though the syntypes are apparently conspecific, there is no certainty that there may not be some differences of infra-specific nature, since there are no mature flowers in the Bornean specimens and there seems to be also some variations in the leaves. Thus Haviland 1,913 (a syntype) has been separated here as a *forma* because of its simple, undivided leaves, and Kunstler 8,765 (in Kew) has been selected as the lectoholotype with isolectotype in Calcutta herbarium.

*P. bambusetorum* in its both forms is similar to *P. membranacea* in having lax and dichotomously branched inflorescences, with long pedicelled flowers, and with stamens and style almost included, but differs in having non-striate fruit.

A lofty woody climber; branchlets smooth, pale brown. *Leaves* 1 or 3-foliolate; leaflets ovate-oblong, acuminate, rounded-cuneate at base, entire, chartaceous, glabrous, 4–6 rarely 7 or 8 nerved; petiole upto 4.5 cm. long; midleaflet 7–10 cm. long, 3–5.8 cm. broad, petiolule 1–2.5 cm. long; lateral leaflets 6–9 cm. long, 2.5–4.3 cm. broad, petiolule 5–10 mm. long. *Inflorescence* axillary and terminal with or without leaves, or in axils of fallen leaves, a cymose panicle, lax, upto 30 cm. long; bracts leafy, lanceolate, long acuminate, deciduous; bracteoles minute, setulose. *Flowers* divaricated, non congested; pedicels of flower buds 4 mm. long, puberulous. *Calyx* 5-lobed,  $\pm$  5 mm. long in bud; tube 3 mm. long, puberulous without, glabrous within; lobes 2 mm. long, puberulous within and without. *Corolla* 5-lobed, about 6 mm. long, glabrous within, 2-lipped, the upper lip 2-lobed, the lower 3-lobed; lobes elliptic-ovate, incurved,  $\pm$  4 mm. long, puberulous in the margins and on midlength without. *Stamens* 4, subequal,  $\pm$  4 mm. long; filaments glabrous; anther lobes elliptic-oblong. *Ovary* orbicular-ellipsoid when young, sparsely puberulent at apex; style long, slightly exserted (in Ridley 9,065); stigma unequally 2-lobed. *Fruiting calyx* 2–2.6 cm. long; tube 6–8 mm. long, faintly ribbed outside; lobes oblong, membranous, 3-nerved, reticulate, sparsely

puberulent, 1.3–1.9 cm. long, 3–5 mm. broad. *Fruit* glabrous, broader in the upper third, cuneate towards base, non-striate,  $\pm$  7 mm. long.

MALAYA: **Perak**, in dense bamboo forest near Ulu Kerling (King's Collector 8,765 Isolectotype: CAL.

BORNEO: **Sabah**, Sandakan (Ridley 9,065 Syntype: SING).  
**Sarawak**, loc. incert. (Ridley s.n.: K).

A careful study of the syntypes of *P. bambusetorum* (exclusive Haviland 1,913) showed that though they are specifically identical, there is some difference in regard to the origin of inflorescences. In syntype Kunstler 8,765 the inflorescences arise from a thick, woody, abbreviated branches or warts formed in the axils of old fallen leaves on stem. These warts seem to become periodically active so that they show the vestiges of old inflorescences that have ceased to exist. Presence of bracts and bracteoles show that these inflorescences have not grown up fully. Such a mode of producing flowers has also been noticed in *P. scortechinii* and is probably confined to old wood only.

In Ridley 9,065 & Haviland 1,913, however, the infructescences are borne on new growth of the year and in Haviland 1,913 are both axillary and terminal, whereas in Ridley 9,065 they are axillary (terminal portion not seen). In Kunstler 8,765, the panicles with leaves may be said in a certain sense to be terminal.

King and Gamble in their protolog of *P. bambusetorum* has described the leaflets with 8 pairs of main nerves and petiolules upto 0.5 inch long, but in the type specimens the main pairs of nerves in the leaflets are 4–6, rarely 7 or 8 pairs, that is if the faint, indistinct nerves toward the apex are included. The maximum length of petiolules in Kunstler 8,765 is the same as in the original description, but mid-petiolules in Ridley 9,065 (two specimens) are double the length, because in the latter the leaves are fully developed. The petiole in the leaves (simple) of Haviland 1,913 is also double the length given. Flowers in Kunstler 8,765 are very young, and so the pedicels were described as "very short"; but in the infructescences of Ridley 9,065 (& Haviland 1,913) the pedicels are up to 1 cm. long. Corolla is sparsely puberulent without and not glabrous as originally described. Calyx in flower is puberulent outside and in the lobes within, a character is retained also in fruiting calyx, though not mentioned in the original description.

**Petraeovitex bambusetorum** K. & G. forma **simplicifolia** Munir f. nov. Fig. 8.

TYPE SPECIMEN: Sarawak (Haviland 1,913 — K).

*A forma typica foliis indivisis, ad 6 usque utrinsecus nervatis differt.*

Differs from *P. bambusetorum* forma *bambusetorum*: in having simple, undivided leaves with mainpairs of nerves (usually) upto

6. Infructescence botryoidal in general appearance and fruit abruptly acuminate, apex obtuse; bracts and bracteoles absent.

BORNEO: **Sarawak** Mt. Po (Haviland 1,913 — Holotype: K, Isotype: CAL).

King and Gamble (Mat. Malay. Fl. 1909) doubted about the Haviland 1,913 as being conspecific with other syntypes, but the presence of identical nerves of fruiting calyx and the apparent similarity of the leaves (simple) to the leaflets of the other syntypes made them to take these specimens as one and the same species. However, Haviland 1,913 differs from other syntypes in having not only simple leaves, but also in more veins to the leaves. Presence of simple leaves seems to be a stable character as there is no sign of their side 'acolytes'. In view of this I have separated it as a *forma*.

**Petraeovitex kinabaluensis** Munir sp. nov. var. **kinabaluensis**.  
Fig. 9.

TYPE SPECIMEN: Borneo, Sabah (Clemens 40,561 — K).

*A P. trifoliata cui affinissima praecipue in bracteis bracteo-  
lisque inflorescentiae folioribus et floribus congestis, haec species  
corolla tubo longiore, staminibus styloque multo exsertis, lobis  
antheri fere orbicularibus, ovario eglanduloso, stylo centrico,  
fructus apice elongato-conico differt.*

Akin to *P. trifoliata* in having inflorescences bearing leafy bracts and bracteoles and closely placed flowers but differs in much longer corolla tube, much exserted stamens and style,  $\pm$  rounded anther lobes, non-glandular ovary and elongated conical apex of the fruit.

A woody climber up to 50 ft. long; branchlets smooth, pale-brown. *Leaves* 3-foliolate; petiole 5–7 cm. long; leaflets elliptic, usually acuminate, cuneate at base, entire, nitid, chartaceous, glabrous; nerves 4–6 on each side, lower ones prominent, slightly concurrent with the midrib, then porrect; intramarginal nerve faint, united above the middle; reticulations prominent beneath; middle leaflet largest, 10–15 cm. long, 3–6 cm. broad, petiolule 2.5–3.5 cm. long; lateral leaflet 8.5–11.5 cm. long; 3–4.5 cm. broad, petiolule 5–10 mm. long. *Inflorescence* axillary, a cymose panicle, 15–25 cm. long, 3.5–6 cm. through, puberulous in the axis, pedunculiform and bare at base; flower bearing branches are shortly and porrectly subdivided; bracts leafy, puberulous, soon glabrous, generally spatulate at first, later elliptic, acuminate; basal ones larger, 3–4 cm. long, the upper ones 1–2.5 cm; bracteoles linear 2–8 mm. long, puberulous. "Flowers pure yellow" (fide notes), pedicels short, puberulous. *Calyx* 5-lobed, puberulous within and without, 4–6 mm. long. *Corolla* 5-lobed, puberulous without, and sparsely so on the lobes within; tube glabrous within, 10–12 mm. long; upper lip 2-lobed, the lower 3-lobed; lobes 4–5 mm. long, 2–3 mm. broad. *Stamens* 4, subequal, much exserted; filaments

seated in the throat, sparsely hairy near the base, 15–18 mm. long; anthers  $\pm$  rounded, about 0.4 mm. long. *Ovary* oblong, later conical towards apex, pubescent in the upper third; style 20–25 mm. long, filiform, glabrous, much exserted; stigma 2-lobed; lobes porrect, equal in length. *Fruiting calyx* tube strongly ribbed; about 8 mm. long; lobes oblong-spathulate, usually rounded at tip, 3-nerved, reticulate, membranous, shining, 15–20 mm. long, 4–5 mm. broad. *Fruit* capsular, broader in the middle, abruptly narrowed into long neck, longitudinally striate, densely puberulous in the upper half,  $\pm$  10 mm. long.

BORNEO: **Sabah**, Mount Kinabalu (Clemens: 40,561 Holotype — K. & duplicates in A & L, flowers pure yellow, 40,772: A & L, flowers lemon yellow, and 50,401: K).

The corolla tube is very long. Similarly stamens and style are most exserted; unlike *P. trifoliata* the style is never excentric.

In Clemens 50,401 the inflorescence is apparently abnormal being without any flowers or with flowers transformed into bracts and bracteoles.

**Petraeovites kinabaluensis** var. **agrestis** Munir var. **nov.** Fig. 10.

TYPE SPECIMEN: Sabah (Gibot 18,600 — SING).

*A var. kinabaluensis foliolis elliptico-ovatis, utrinque opacis, basi plerumque rotundatis, raro subcordulatis; foliolis medianis minoribus, brevioribus petiolulatis; ovario apice leviter constricto, fructu brevioribus apiculato, haec varietas recedit.*

Differs from the type *P. kinabaluensis* var. *kinabaluensis* in having leaflets elliptic-ovate, dull on both sides, generally rounded at base, sometimes subcordulate; middle leaflets up to 11 cm. and its petiolule upto 2.5 cm.; ovary with a slight constriction separating hairy, ridged apex from the non-hairy portions, fruit with shorter conical apex.

BORNEO: **Sabah**, Tawau near swamp forest (Gibot 18,600: Holotype — SING); **Indonesian Borneo**, Nunukun, in sandy soil (Kostermans 8,764: L, flowers greenish yellow; Meijer 2,301: L, flowers yellow).

In Gibot 18,600 the leaflets are  $\pm$  elliptic with sub-cordulate base, whereas in Meijer 2,301 and Kostermans 8,765 the leaflets are ovate with rounded base. In addition there is some difference in the texture and the venation of leaves. However, similar variations are found even in the same species in other cases, and there is no reason to believe that these characters are more than ecological responses. Both the afore-mentioned specimens have the ovary slightly constricted marking the separation of the hairy, ridged apex from the non-hairy, lower portion; and the fruit in both these specimens have a shorter conical apex than those in the type form.

Otherwise the flower here resembles exactly like that in the type form.

**Petraeovitex trifoliata** Merr. in Phil. Journ. Sc. (1907) 425; Lam., Malay. Verb. (1919) 324 & Bull. Jard. Bot. Buit. III (1921) 97; Merr., En. Phil. Pl. III (1923) 406; Mold., Résumé Geogr. Distrib. & Syn. (1959) 184, 332 & 333. **Fig. 11.**

*P. trifolia* Merr. *fide*. Mold. cited (1959) 332.

*P. ternata* Hall. f. in Meded. Rijks. Herb. Leid: 37 (1918) 85; Lam, *op. cit.* (1919) 325 & Bull. *cit.* (1921) 97; Merr., En. Born. Pl. (1921) 518.

*P. ternata* Hall. f. var. *typica* Lam & var. *glabrior* Lam in Bull. Jard. Bot. Buit. III (1921) 97 & 98.

*P. bambusetorum* sec. Merr. *op. cit.* (1921) 518, quoad Clemens No. 10,246.

TYPE SPECIMEN: Palawan (Foxworthy B.S. 708 — PNH? not seen).

This is a peculiar species in that its flower-bearing branchlets are shortly subdivided so as to make flowers appear congested; pedicels very short, calyx and corolla puberulous within and without, mature ovary rounded at apex with excentric style, fruit striate, truncate and depressed at the summit.

A large woody climber with branchlets brown or dirty khaki coloured, pubescent when young later glabrous. *Leaves* 3-foliolate; petiole 3–7.5 cm. long; leaflets subequal, entire or slightly undulate, chartaceous or subcoriaceous, oblique, ovate to oblong-ovate, acuminate, rounded-cordulate or slightly cuneate at base, glabrous, sometimes hairy or plumose on the lower surface along the midrib towards the base; pair of nerves generally 4; middle leaflet 8–14 cm. long, 5–7.8 cm. broad, petiolule 1–2 cm. long; side leaflets upto 12 cm. long, 7.5 cm. broad, petiolule 5–15 mm. long. *Inflorescence* a terminal pyramidal panicle with lower branches axillary and also bearing terminal and lateral cymes; axillant bracts and bracteoles many, leafy, generally deciduous in early stages of the flowers. *Flowers* congested on shortly subdivided branchlets; pedicels very short. *Calyx* 5-lobed, puberulent, 8 mm. long, divided into oblong-lanceolate 4 mm. long lobes. *Corolla* tube 5 mm. long, narrowly funnel shaped, puberulent on both sides, but glabrous within below the insertion of filaments and with a band of glandular hairs near and slightly above the insertion; lobes 3 mm. long, oblong-ovate, rounded. *Stamens* 4, subequal, almost included, 4–5 mm. long; filaments slightly hairy towards base; anthers oblong, often sparsely hairy in the lobes,  $\pm$  1 mm. long. *Ovary* oblong, 3–5 mm. long, glandular, pubescent in the upper third; style 4–6 mm. long, slightly exerted, sparsely hairy towards base, terminal in young stage later excentric; stigma unequally bi-lobed. *Fruiting calyx* lobes 1.5–2 cm. long, oblanceolate-spathulate, obtuse, puberulent, 3-nerved; tube 5–8 mm. long, strongly ribbed. *Fruit*  $\pm$  oblong, slightly narrowed towards base,

rounded at apex when young, later truncate and depressed at the summit, pubescent in the upper fifth, longitudinally striate, 5-7 mm. long.

**BORNEO:** **Sabah**, Gunong Pomatton (Korthals s.n.: L-Syntype of *P. ternata*); Batu Babie (Winkler 2,756: L — Syntype of *P. ternata* var. *typica*); Bukit Mulu (Winkler 446: L); Lahad Datu (Jaibon A3,239: SING; Muin Chai 26,691: SAN, flowers green; Brand 20,086: L, flowers yellow); Bettotan (Kloss 9,581: L); Mount Kinabalu (Clemens 10,246: L & Clemens s.n.; L; Carr 26,658: SING); Sungei Blu-u (Jaheri 512: L — Syntype of *P. ternata* var. *glabrior*); Kinabatangan (Wood A4,622: SING, L); **Sarawak**, at Niah Caves, alt. 500 ft. (Chew 307: SING); P. Laset (Slooten 2,299: L).

**PHILIPPINES:** **Palawan**, Puerto Princesa on Mt. Pulgor (Elmer 12,892\*: A, K, E, CAL, L, BM; Fenix 15,524: K). **Mindanao:** Zamboango, Santa Maria (Reillo 16,410: K), San Ramon (Hall. 4,722: L — Syntype of *P. ternata* L, & 4,613, sterile: L).

A careful examination of types show that *P. ternata* Hall. is conspecific with *P. trifoliata*. Apparently Hallier regarded vegetative characters as to the size and hairiness of leaflets as specifically important and not merely as ecological responses; in fact wide vegetative differences may be found in the specimens of the same plant.

Further it has been seen that the shape and size of ovary and position of style also varies at different stages of growth.

Also Lam used vegetative characters to make his var. *typica* & *glabrior* for *P. ternata*.

In the specimens, Fenix 15,524: K, and Chew 307: SING, the leaflets are pubescent with irregularly dentate margins. But in the adult leaflets, both dentation and hairiness seem to vanish gradually; but, though the pubescence is unusually thick, there is no difference in the floral characters to justify their separation as a permanent forma or variety. Winkler's specimen No. 231: has leaves with 4, 5 and 6 leaflets. These differences perhaps indicate its latent tendency towards the formation of biternate leaves.

**Petraeovitex sumatrana** Lam. in Bull. Jard. Bot. Buit. III (1921) 98; Mold., Résumé Geogr. Distrib. & Syn. (1959) 188, 192, 193 & 332. **Fig. 12.**

*P. elmeri* Merr. in Univ. Calif. Publ. Bot. 15 (1929) 267.

TYPE SPECIMEN: Sumatra (Ajoeb in Exp. Jacobson 183 — BO not seen, Isotype — L).

Allied to *P. multiflora* in having biternate leaves, small congested flowers, exerted stamens and style, but differs in having: calyx lobes almost equal to the tube and conspicuously puberulent

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\*cited by Lam (1919) as of Merrill.

within and without, corolla sparsely glandular at the throat, minutely puberulent in the lobes; anther lobes  $\pm$  elliptic and style longer.

A woody climber; branchlets glabrous, dark green when young, later yellowish brown. *Leaves* biternate; leaflets ovate-elliptic, entire, acuminate, rounded or slightly cuneate at base, often puberulent on the lower surface especially in the ribs, but less so later, chartaceous, 4-7 nerved; common petiole 2-4 cm. long, sparsely puberulous. Secondary terminal petiole 1.5-3 cm. long, puberulous; midleaflet upto 4.5 cm. long, 2.8 cm. broad, petiolule 1.5-2 cm. long, puberulous; lateral leaflet 2-3.8 cm. long, upto 2 cm. broad, petiolule 2-5 mm. long, puberulous. Secondary lateral petioles 5-15 mm. long, puberulous; midleaflet upto 4.3 cm. long, 2.3 cm. broad, petiolule upto 1 cm. long puberulous; lateral leaflets upto 2.8 cm. long, 2 cm. broad, petiolule 2-5 mm. long or less, sometimes sessile. *Inflorescence* axillary or terminal, a cymose panicle, upto 30 cm. long with lateral branches,  $\pm$  15 cm. through; main axis quadrangular, sparsely puberulous; cymes 5-20 mm. long, 2-5 flowered, puberulous; bracts at the base of cymes minute, linear, puberulous,  $\pm$  1 mm. long; bracteoles linear, almost half of bracts. *Flowers* small congested; pedicels 1-1.5 mm. long, puberulous. *Calyx* conspicuously puberulous outside, 2 mm. long; tube infundibuliform, 1 mm. long, glabrous within; lobes 5, almost equal to the tube, narrow, somewhat obtuse, puberulous. *Corolla* 5-lobed, glabrous outside; tube funnel shaped, sparsely glandular at the throat, 2-2.5 mm. long; lobes reflexed, minutely puberulous within in the upper half, subequal,  $\pm$  1 mm. long, obtuse. *Stamens* 4, exserted, seated in the throat or a little below,  $\pm$  2 mm. long; filaments slender, laterally compressed; anthers elliptic-oblong. *Ovary*  $\pm$  oblong, puberulous at apex, faintly 4-lobed; style 5-6 mm. long, filiform, glabrous; stigma bi-lobed, lobes 0.5-1 mm. long. [*Fruiting calyx* glabrous, tube costate, 3-5 mm. long, lobes membranous, spatulate, subtrinnerved, 14-19 mm. long, 3-4 mm. broad. Fruit included in the calyx-tube: — fide Lam].

SUMATRA: **Bengkulen:** Rimbo Pengadang, alt. 1,000 m. (Ajoeb in Exp. Jacobson No. 183 — Isotype: L); Tambang Sawah (Voogd 1,062: L).

BORNEO: **Sabah,** Elphinstone Province, Tawao (Elmer 21,883 — Isotype of *P. elmeri*: SING & L).

Though there are some discrepancies in the description of *P. sumatrana* and *P. elmeri*, there is no material difference between the duplicates of the above quoted types of the species, and so I have no hesitation to treat these taxa as one. Lam described the calyx as "subglabrate" (in key) "glaber vel indistincte pulverulentus" (text), but the last word may have been a misprint for

“puberulentus”, for the calyx is actually hairy all over except in the tube within. Further Lam states that the “corolla is glabrous within and without”, (Key) whereas the corolla is glabrous outside only, and minutely puberulous in the lobes within and sparsely glandular in throat.

In *P. multiflora* the calyx lobes are practically glabrous within, the corolla is villous in the throat, anther lobes rounded and fruit 4-lobed in the top. Fruit in *P. sumatrana* is not available for study, but since its ovary is slightly 4-lobed, it is possible that its fruit may be similar to that of *P. multiflora*.

These four specimens show conclusively that the leaves are comparatively short even on the old stem. In *P. multiflora* small leaves are found only on young apical stems.

I have not seen the fruiting specimens from Bogor to which Lam had access.

**Petraeovitex multiflora** (J. E. Smith) Merr., Int. Rumph. Herb. Amb. (1917) 453; Lam in Bull. Jard. Bot., Buit. III (1921) 98; Bot. Mag. Tokyo 56 (1942) 114; Mold., Résumé Geogr. Distrib. & Syn. (1959) 197, 199, 201, 204, 207 & 332: var. **multiflora**. Fig. 13 & 14.

*P. multiflora* (J. E. Smith) Merr. var. *solomonensis* Bakh. in Journ. Arn. Arb. XVII (1935) 73: **Syn. nov.**

*P. riedelii* Oliv. in Hook. Ic. Pl. V (1883) 15, t. 1420 (type of the genus); Hall. f., (sub. *Petreovitex*) in Med. Rijks. Herb. No. 37 (1918) 84; Lam, Malay. Verb. (1919) 326.

*P. sumatrana* Lam var. *solomonensis* (Bakh.) Mold., Résumé Geogr. Distrib. & Syn. (1959) 332: **Syn. nov.**

*Petrea multiflora* J. E. Smith Rees, Cycl. 27: Art. *Petrea* No. 2 (1814): **basionym**.

TYPE SPECIMEN: Honimoa Island (C. Smith s.n. — Linn., not seen; Isotype — BM).

Akin to *P. sumatrana* in having biternate leaves, small congested flowers on branches of the axillary inflorescences (rarely terminal), exerted stamens & styles, but distinguished easily by its larger leaves and leaflets (occasionally pubescent in juvenile stage), glabrous calyx within, villous throat of the corolla &  $\pm$  rounded anther lobes.

A tall woody climber; branchlets glabrous, dark brown or coffee coloured. *Leaves* biternate; leaflets ovate-elliptic, entire, retusely or obtusely apiculate, cuneate or subtruncate at base, in lateral leaflets sometimes cordulate, pubescent when young especially on

the nerves beneath, later glabrous, chartaceous or subcoriaceous, 6-9 nerved; common petiole 6-10 cm. long in adult leaves, glabrous. Secondary terminal petiole 3-4.8 cm. long, glabrous; mid leaflet 6.5-11 cm. long, 4-6.2 cm. broad, petiolule 1-1.5 cm. long; lateral leaflets 5-10 cm. long, 3-5 cm. broad, petiolule 2-7 mm. long. Secondary lateral petiole 2-3 cm. long; midleaflet 7-10 cm. long, 4-5.5 cm. broad, petiolule  $\pm$  1 cm. long; lateral leaflets 5-7.5 cm. long, 3-4 cm. broad, petiolule 2-4 mm. long, sometimes sessile. *Inflorescence* terminal or axillary, cymose panicle upto 50 cm. long with lateral branches; main axis quadrangular, puberulent; cymes 3-8 mm. long, puberulous; bracts at the base of cymes minute, linear, puberulous, 1-2 mm. long; bracteoles linear, almost half the length of bracts. *Flowers* small, congested, sessile or with very small pedicels. *Calyx* tomentose outside, glabrous within, 1 mm. long; tube funnel shaped; lobes 5, about one-third of the tube, deltoid. *Corolla* 5-lobed, sparsely puberulent without, villous in the throat,  $\pm$  2 mm. long; lobes rounded at apex, slightly curved inside. *Stamens* 4, exserted, subequal, seated in the throat, upto 1.2 mm. long; filaments glabrous; anther lobes  $\pm$  rounded. *Ovary* puberulous at apex, glabrous below; style long, exserted, glabrous; stigma bi-lobed, lobes reflexed. *Fruiting calyx* upto 1.5 cm. long; lobes upto 1.3 cm. long,  $\pm$  3 mm. broad, oblanceolate, 3-nerved, sparsely puberulent; tube 2 mm. long, sparsely puberulent without, strongly ribbed. *Fruit* puberulent, striate,  $\pm$  1.5 mm. long, broad and 4-lobed at apex, cuneate towards base.

**MOLUCCAS:** **Laha** in Amboina (Forsten s.n.: L); Buru (Vriese & Teijsmann s.n.: L; Riedel s.n.: K — holotype of *P. riedelii*); Sula Islands: Mongoli at Kampong Batu (Atje in Hulstyn Exp. No. 45: L); Seram (Rutten 1,870: L); Honimoa (C. Smith in 1797: BM — Isotype of *Petrea multiflora*); Kairatu Gemba, (Kuswata & Soepadmo 59: A).

**LESSER SUNDA ISLANDS:** **Babar** (cultivated in Hort. Bogor: fide Lam, 1921, not seen); wild (fide Moldenke, 1959 p. 197).

**NEW GUINEA:** Sorong district; Remu Swamp Forest (Pleyte 721: L, flowers white & 722: L, Lae & A, flowers light brown); Roefei, along beach, open country (Pleyte 552: L, flowers white). Morobe district: Umi river, Markham valley, (Brass 32,643; L & Lae, flowers white); Bulolo (3,998: A, BRI, L & Lae, flowers pale yellow); Bupu river, (Henty 10,522: BRI, L & Lae); Monum (Millar 9,714: Lae); Lae Bot. Gard., Wild., (Millar 14,406: Lae). Loc. in cert. (Pulle 1,218: L, flowers light green); Sepik (Pullen 1,812: L & Lae); (Ledermann 6,687:

SING); South New Guinea (Versteeg 1,026: L); Nabire at Sennen (Kanehira & Hatusima 12,582: A); Cycloop mountains, (Royen & Sleumer 6,196: L & SING); Lake Sentanai (Royen & Sleumer 5,807: L); Andai (Beccari 586: L); former German New Guinea (Hellwing 387: K; Weinland 261: SING); Papua (Turner s.n.: BRI, flowers brown); New Pommerania (Schlechter 13,737: BM).

BISMARCK ARCHIPELAGO: **Duke of York Island** (Bradtke 346: BRI & A); **New Britain**: Keravat river, alt. 200 ft. (Floyd 6,632: BRI, L, Lae; Mckeel 1,559: Lae); **New Ireland** at Namatanai (Peekel 503: B).

SOLOMON ISLANDS: **Bougainville Island** (Kajewski 1,686: BRI — Holotype of var. *solomonensis*, petals white, A & BM).

The leaves at the base of an inflorescence axis are generally young and not fully developed and often may show 3 to 5 leaflets. When 3, they may be said to be "pseudoleaflets", for each one will form two lateral leaflets and when 5, the two lower ones are "pseudoleaflets" and so will form their lateral "acolytes". Generally the lateral leaflets in young leaves are sessile or almost so even in the type of *P. riedelii* Oliv., though in "pseudoleaflets" petiolules may be slightly longer and in middle leaflets much longer. The lateral petiolules are unusually longer in fully developed leaves from new, non-flowering branches or in fully developed leaves on old stem. Kajewski 1,687 (type of var. *solomonensis*) has leaves only at the base of the inflorescence and these are not fully developed. In addition the calyx lobes are as in the typical *P. multiflora* in shape and size, being one-third of the calyx tube. In *P. sumatrana* to which var. *solomonensis* is said to resemble very closely and has even been reduced as a variety, has a different calyx with its lobes about equal to the tube. In view of this I do not see any reason for maintaining var. *solomonensis* as distinct from the type form.

The inflorescence may not always be terminal as originally described, though among these may be included the short, axillary branches which produce lateral, axillary and non-axillary panicles, but which usually bear some leaves at the base. Such terminal inflorescences probably continue their vegetative growth. Frequently, however, specialized flowering branches arise in the axils of current or fallen leaves on old branches; these bear no leaves whatsoever and must be regarded as lateral inflorescences, since these appear to cease their vegetative growth altogether. Moldenke (op. cit. p. 211) records this from New Zealand.

**Petraeovitex multiflora** (J. E. Sm.) Merr. var. **pubescens** (Warb.)  
Munir stat. nov. Fig. 15.

*P. pubescens* Warb. in Engl., Jahrb. XIII (1891) 427; Lam, Malay. Verb. (1919) 328 & Bull. Jard. Bot. Buit. III (1921) 98; Mold., op. cit. (1959) 199 & 201: **basionym**.

TYPE SPECIMEN: Kai Island (Warburg 21,148 Holotype—BO?, Isotype—A).

*Calyx externe pubescens, intus puberulens in lobis, glaber in tubo.*

Differs from the type of *P. multiflora* var. *multiflora* in having small  $\pm$  rotundate or sub-cordate leaflets, sparsely hairy or sub-glabrous above, pubescent beneath especially on the nerves with usually coarsely and irregularly dentate margins which tend to become entire; calyx is puberulent in the lobes, glabrous in the tube.

MOLUCCAS: **Kai Island** (Warburg 21,148 — Isoholotype: A).

Warburg, in his protolog of this taxon, stated that calyx lobes are glabrous and its tube pubescent (a statement is also repeated by Lam), but actually reverse is the case; for, though the calyx is entirely puberulent outside as in *P. multiflora*, the lobes are hairy within and the tube glabrous. In *P. multiflora* var. *multiflora* the calyx is glabrous inside but in the fruiting calyx the lobes are often puberulent inside.

The dentation and hairiness on the leaves are apparently a mark of juvenility, for later leaves tend to become both entire and almost glabrous on both sides, but so far no adult leaves were seen. These changes are apparently a result of environmental conditions and young age; as such I find no reason to maintain *P. pubescens* as an independent species.

Lam, in his key to the species (1919) 324 & (1921) 97, states "*P. pubescens* has 6 leaflets", but Warburg described the species as having biternate leaves and the isotype in Arnold Arboretum herbarium agrees with the original description. I have not seen any *Petraeovitex* sp. with six leaflets only except in *P. trifoliata* where 4, 5 and 6 leaflets may occur as an abnormality, or in *P. multiflora* var. *multiflora* 3-7 leaflets may be found when the leaves are in the process of development. Probably similar phenomenon also occurs in *P. sumatrana*, but it was not noticed in the specimens examined.

Moldenke (op. cit. p. 201) notes that this taxon is found in the former Dutch New Guinea, but among the specimens from so many herbaria I have not found anything like this; but I was not able to consult the specimens in Bogor herbarium.

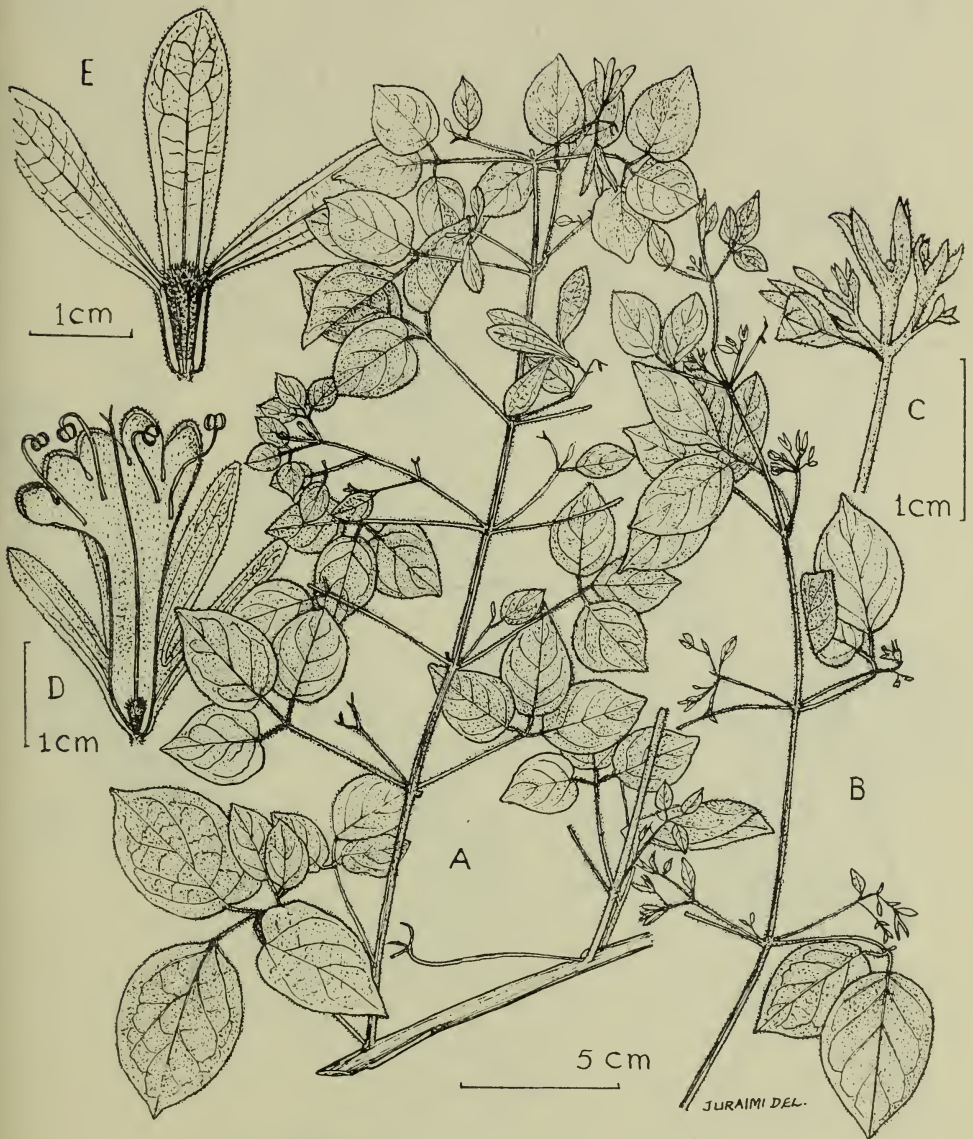


Fig. 1. *Petracovites scortechinii* (A: Nur 34,212; B-E: Symington 44,082).

A, Twig with fruits. B, Twig with flowers. C, Cyme with bracts and bracteoles. D, Flower longitudinally cut open to show stamens and ovary. E, Fruit with calyx.

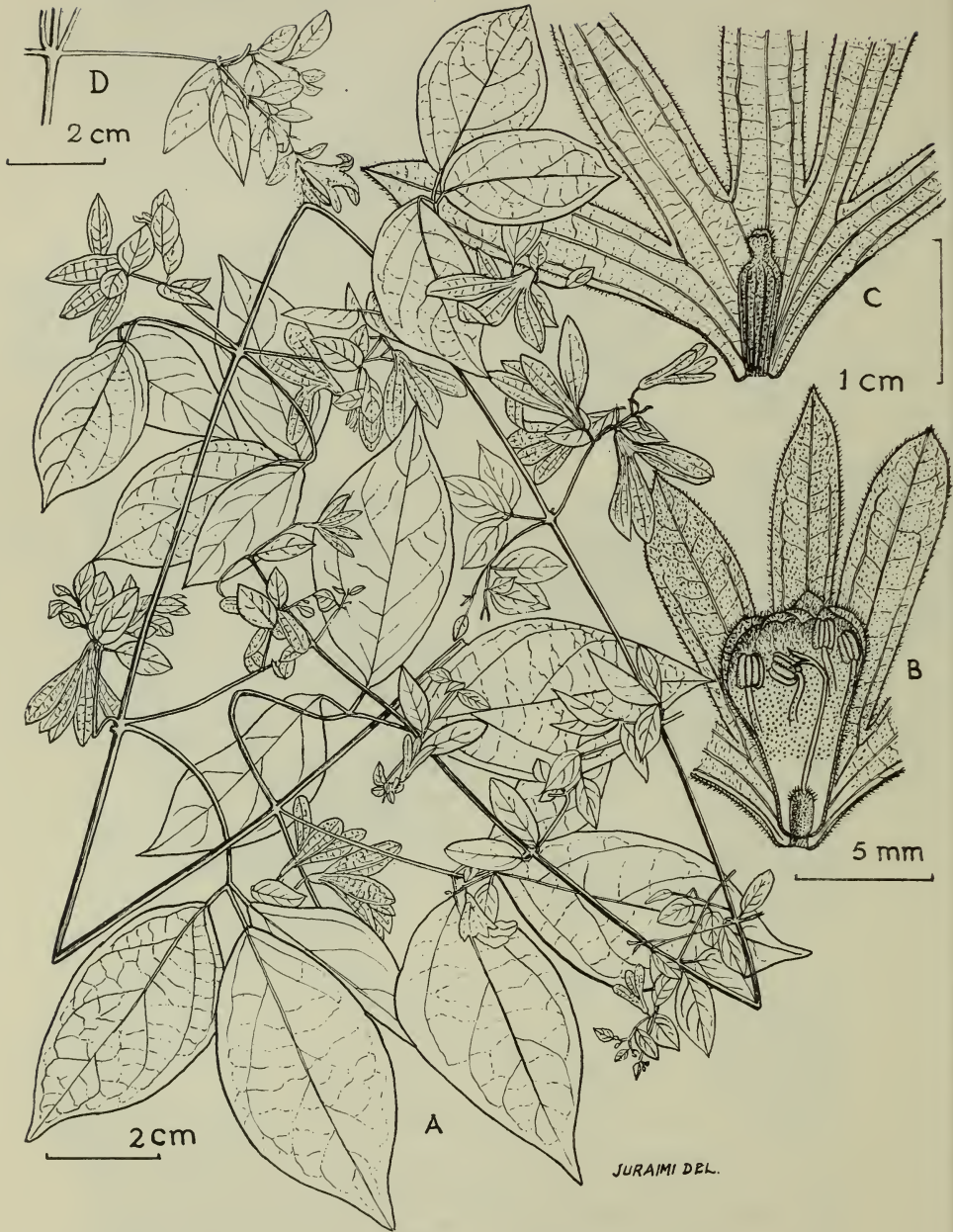


Fig. 2. *Petraeovitex wolfei* (A-C: Wolfe & Kadir 21,452 Holotype; D: Wolfe s.n.).

A, Fertile twig. B, Flower longitudinally cut open to show the inner parts. C, Fruit with the calyx cut open. D, Cyme with bracts and bracteoles.

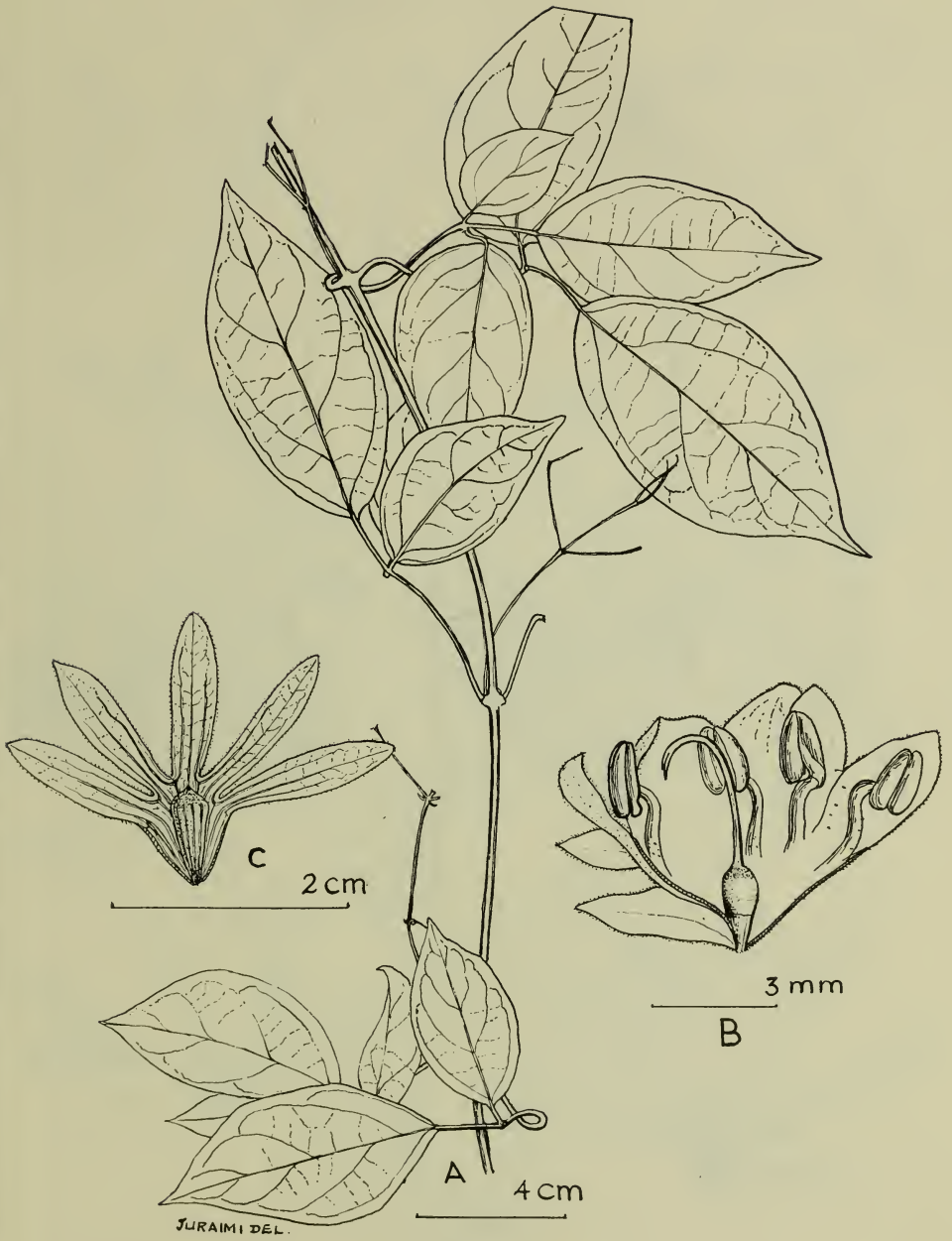


Fig. 3. *Petraeovitex membranacea* (Ramos 1,372 Isotype).

A, Fertile twig with its flowers fallen off. B, Flower longitudinally opened to show stamens and ovary. C, Fruit with its calyx longitudinally opened.

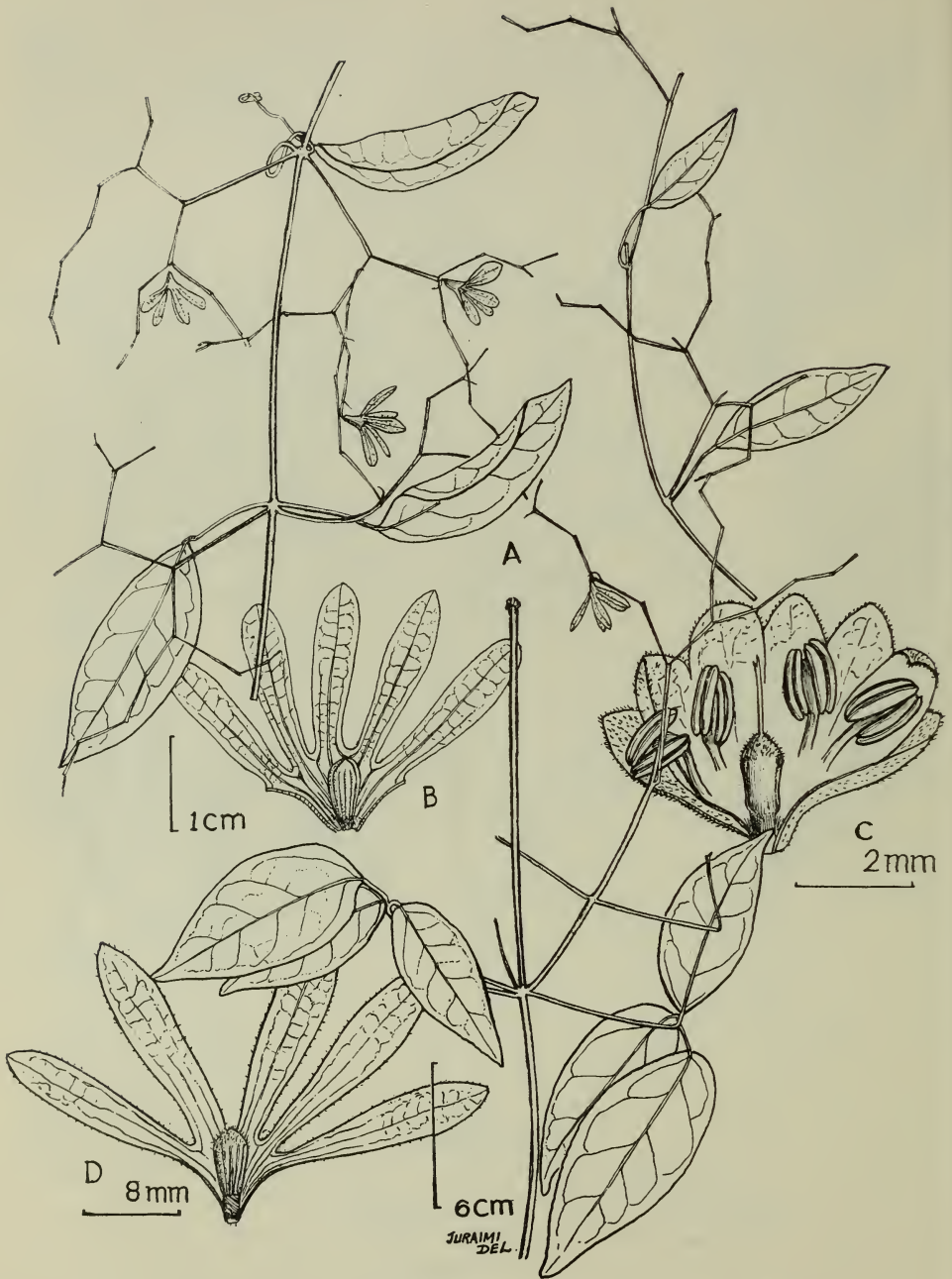


Fig. 4. *Petraeovitex membranacea* var. *malesiana* (A-B: Haviland & Hose 1913E; C-D: 1913B Holotype).

A, Twigs with infructescences. B, Fruit with its calyx. C, Flower cut open to show stamens and ovary. D, Fruit with its calyx.

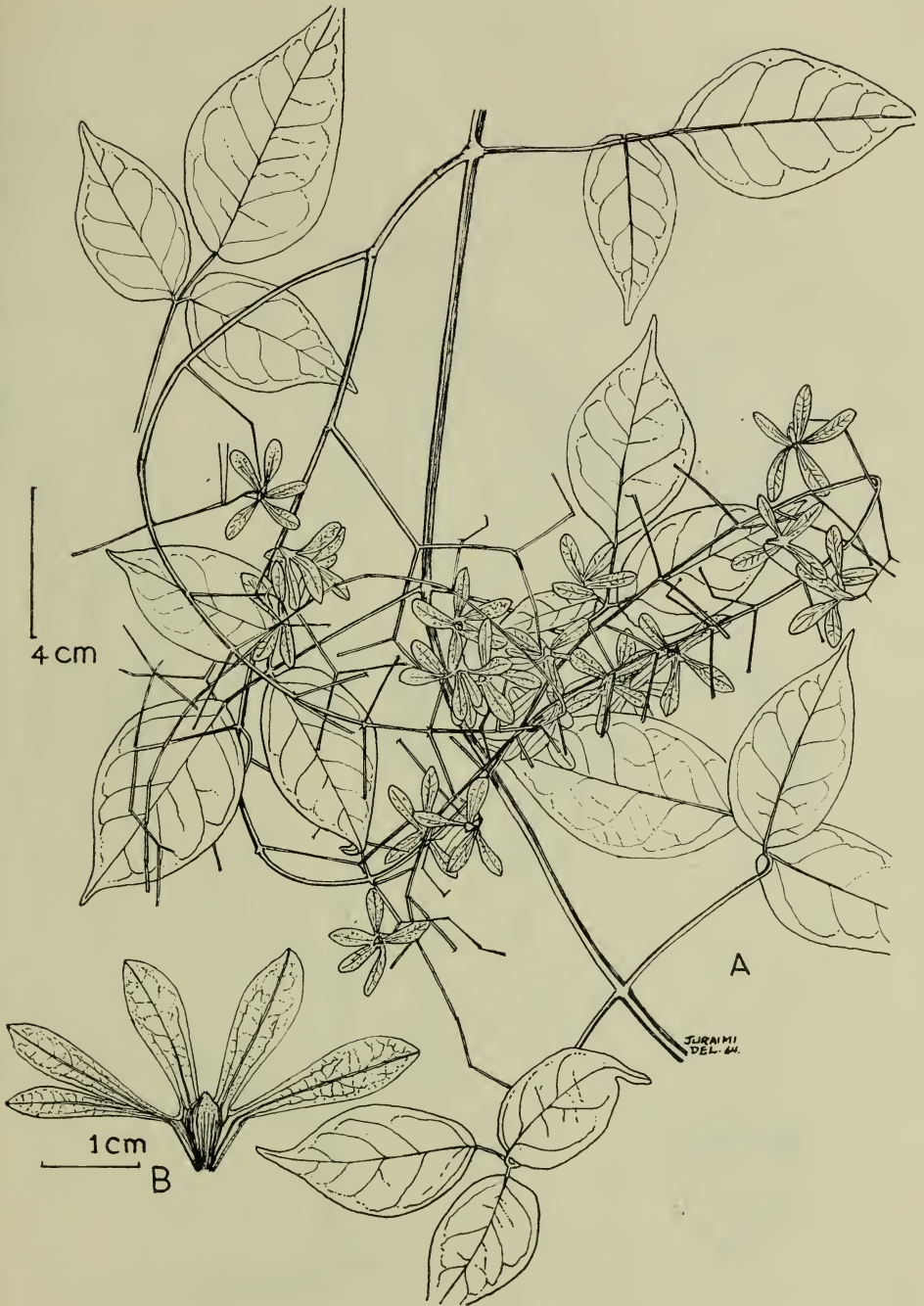


Fig. 5. *Petraeovitex membranacea* var. *malesiana* (Hume 7,877).

A, Twig with an elongate infructescence. B, Fruit with the calyx cut open.

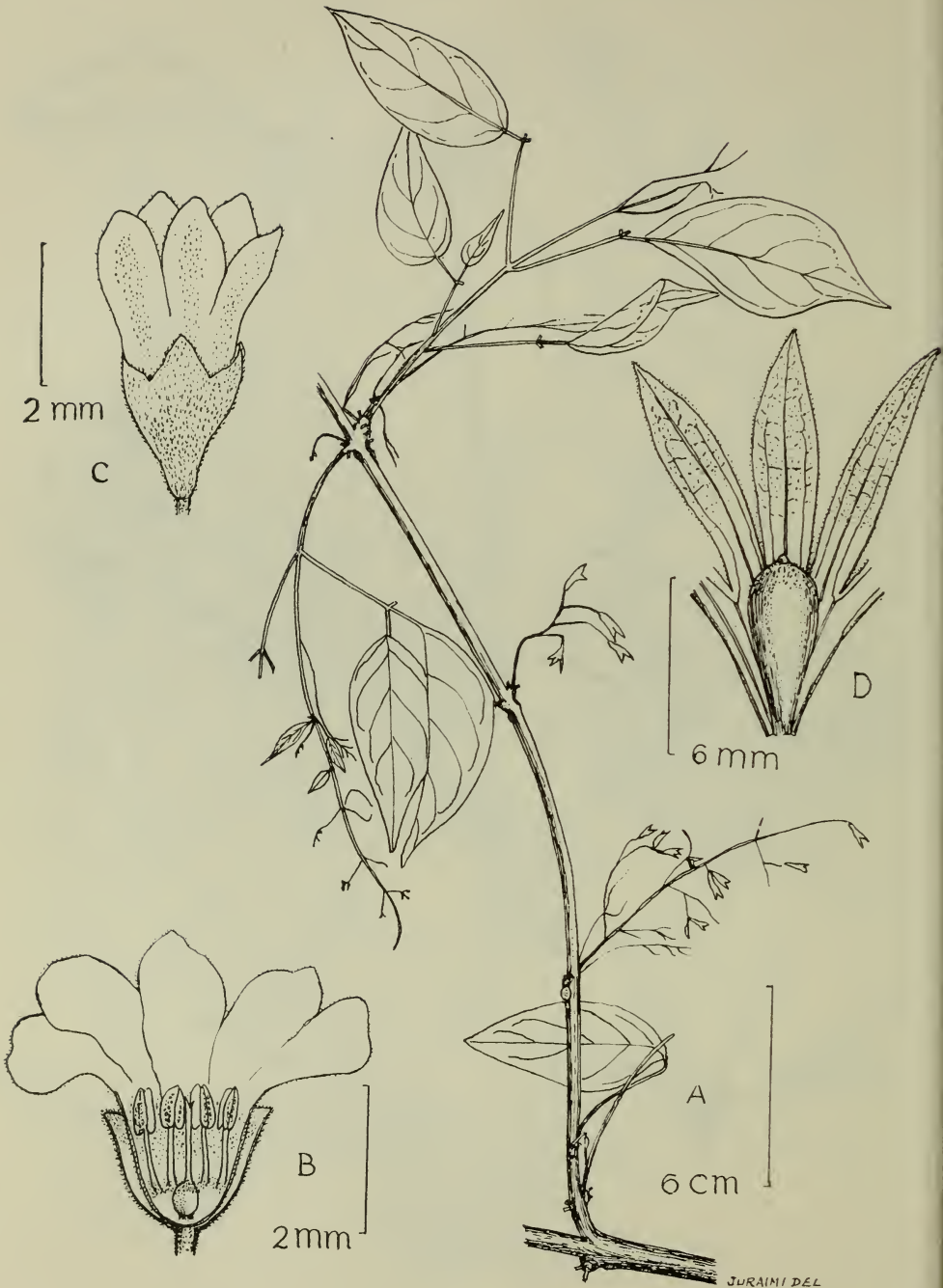


Fig. 6. *Petraeovites bambusetorum* (King's Collector 8,765 Iso-lectotype).

A, Twig with inflorescences growing on warts produced in the axils of old fallen leaves. B, Dissected flower. C, Entire flower. D, Fruit with the calyx cut open.

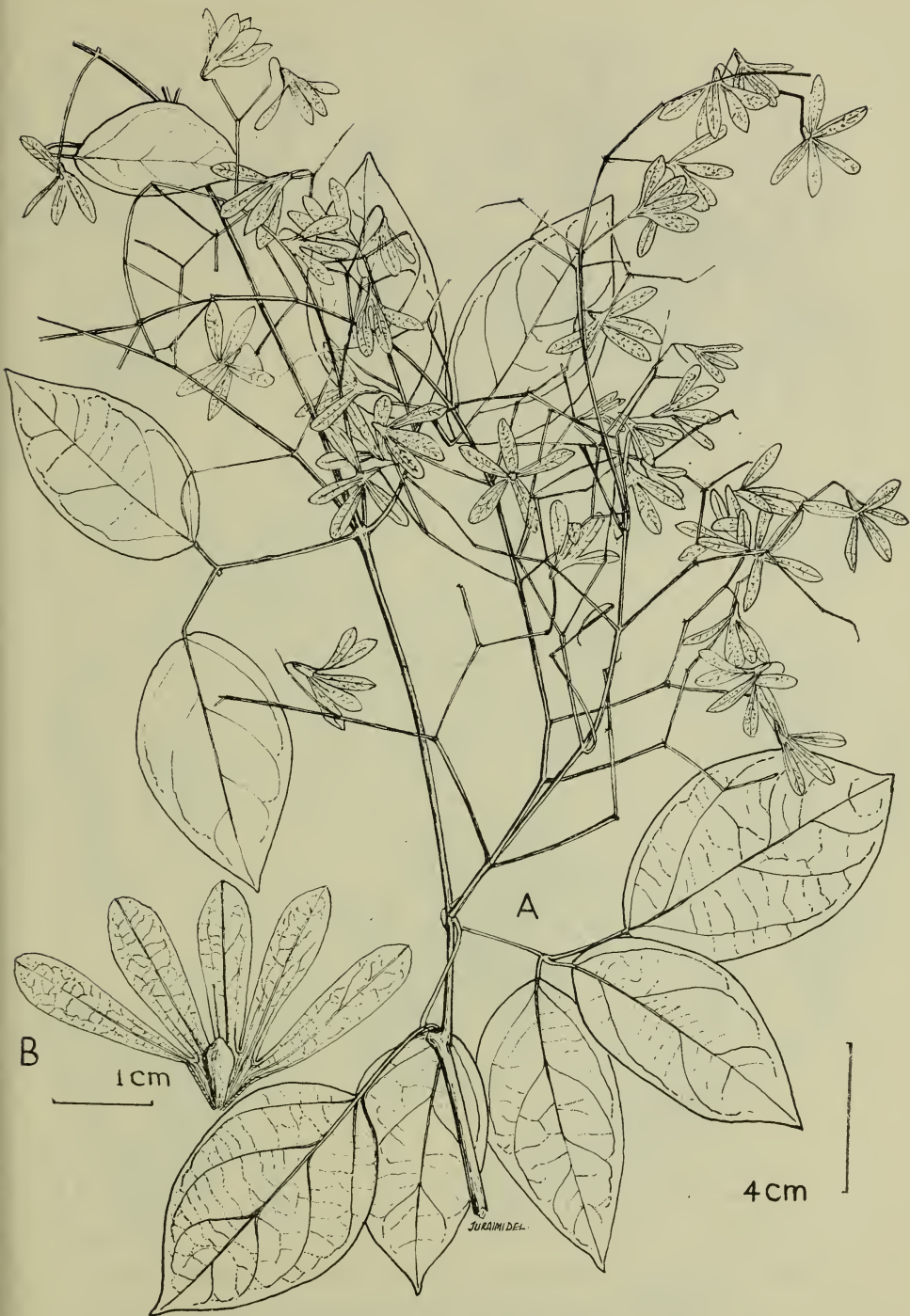


Fig. 7. *Petraeovites bambusetorum* (Ridley 9,065 in SING.).

A, Twig with infructescences in the axils of current leaves. B, Fruit with the calyx cut open.

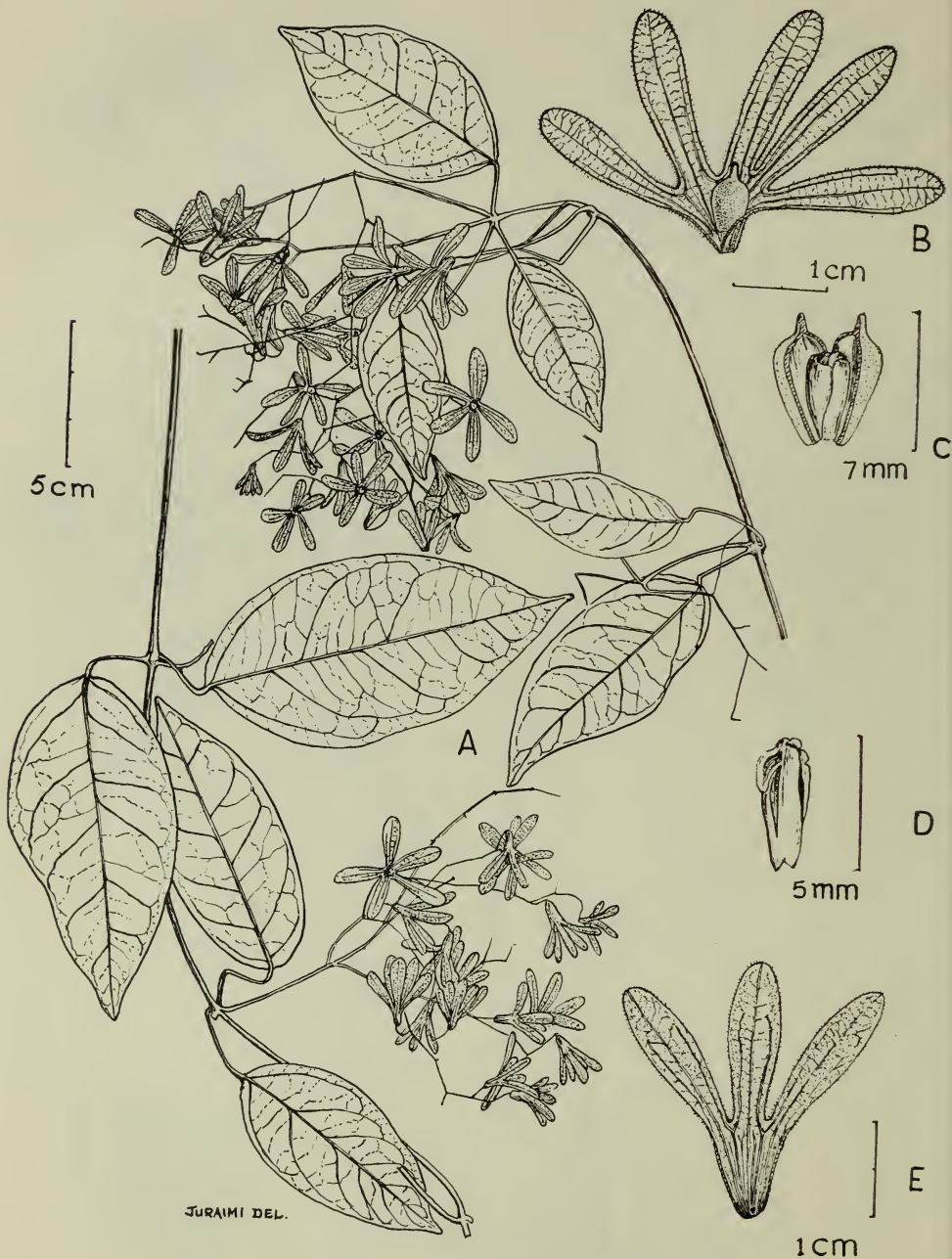


Fig. 8. *Petraeovitex bambusetorum* forma *simplicifolia* (Haviland 1,913 Holotype).

A, Twigs with simple leaves and infructescences. B, Fruit with its calyx cut open. C, Dissected fruit to show the seeds. D, Immature shrunken seed. E, External view of the fruiting calyx.

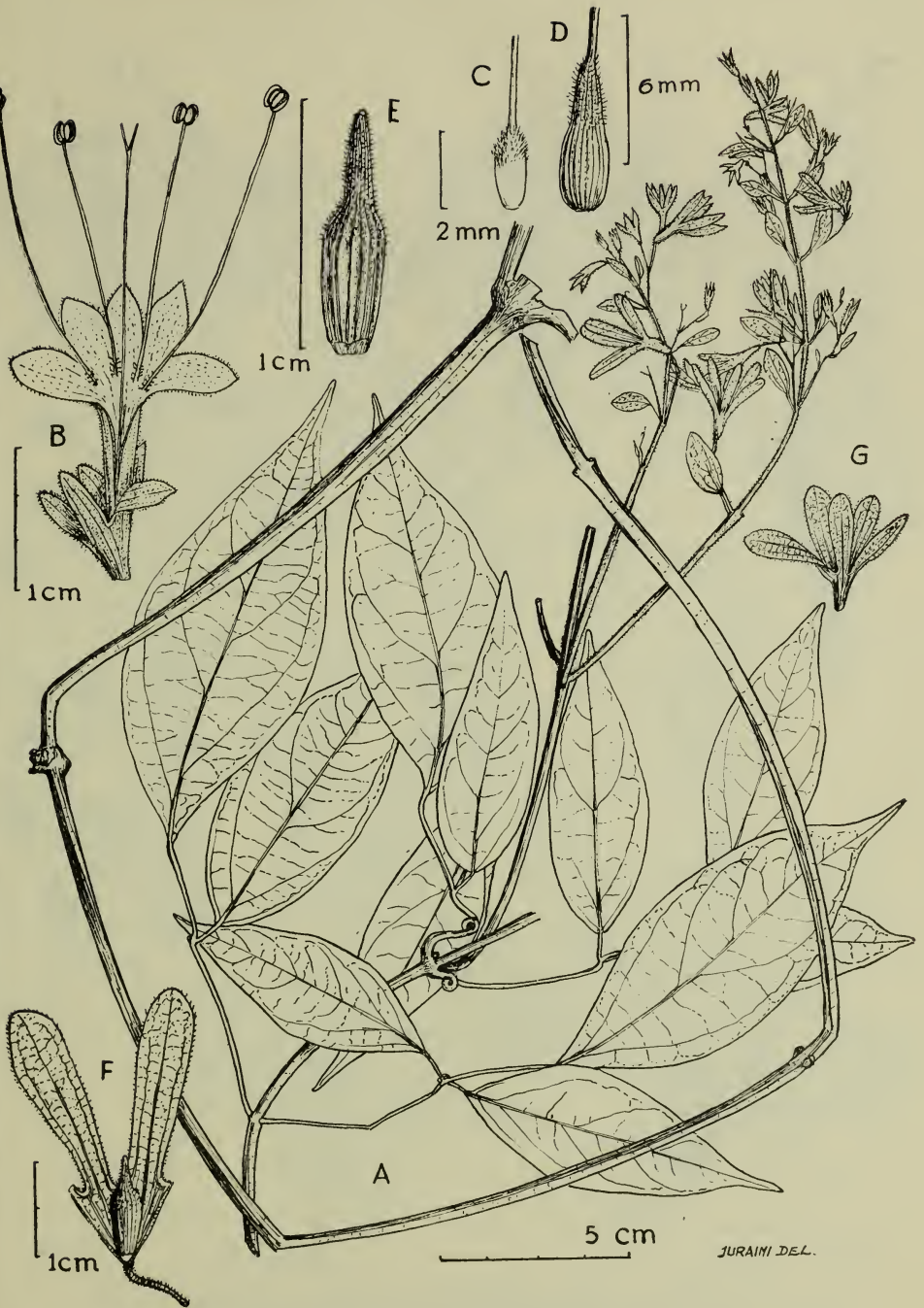


Fig. 9. *Petraeovitex kinabaluensis* (Clemens 40,561 Holotype).

A, Twig with flowers and fruits. B, Flower cut open to show the insertion of stamens. C, Ovary. D, Immature fruit. E, Mature fruit. F, Fruit with a fragment of its calyx. G, Entire fruiting calyx.

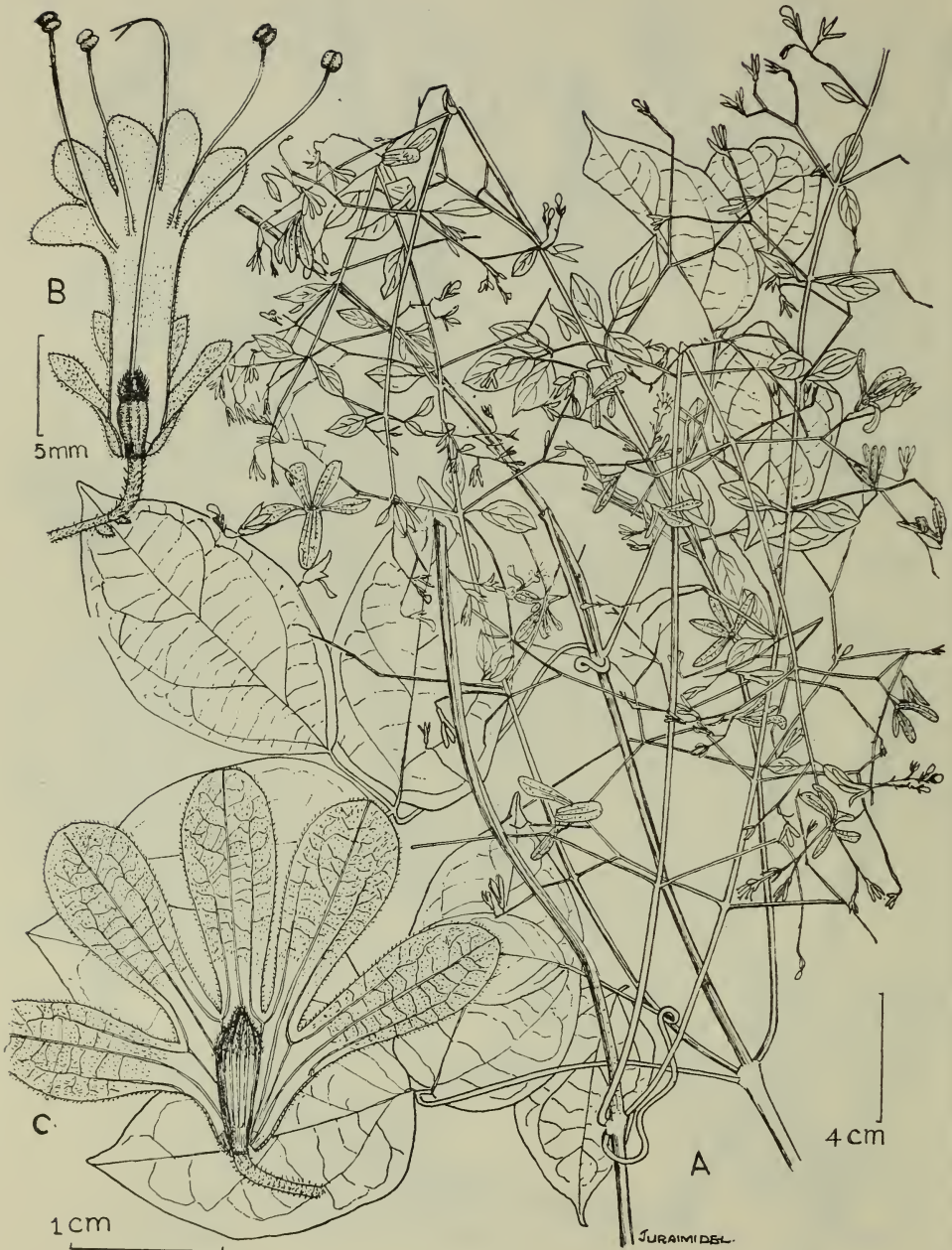


Fig. 10. *Petraeovites kinabaluensis* var. *agrestis* (Gibot 18,600 Holotype).

A, Fertile twigs. B, Flower longitudinally opened to show ovary and stamens. C, Fruiting calyx vertically opened to show the fruit.

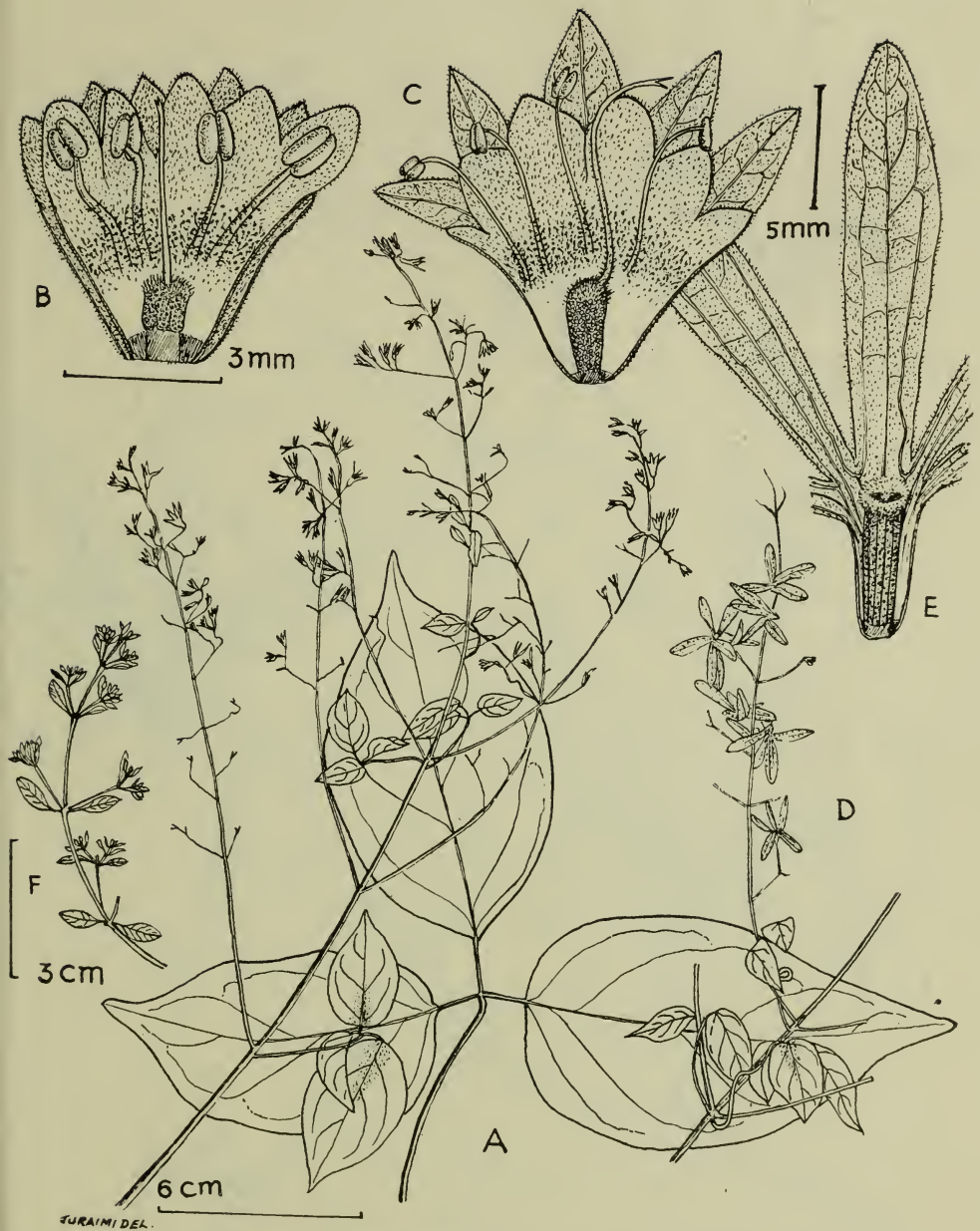


Fig. 11. *Petraeovites trifoliata* (A-E: Hallier 4,722; F: Hallier 446).

A, Leaf and inflorescence. B, Young flower cut open to show ovary and stamens. C, Mature flower with slightly exert stamens and excentric style. D, Inflorescence. E, Fruit with its two calyx lobes. F, Fragment of a young inflorescence to show its bracts and bracteoles.

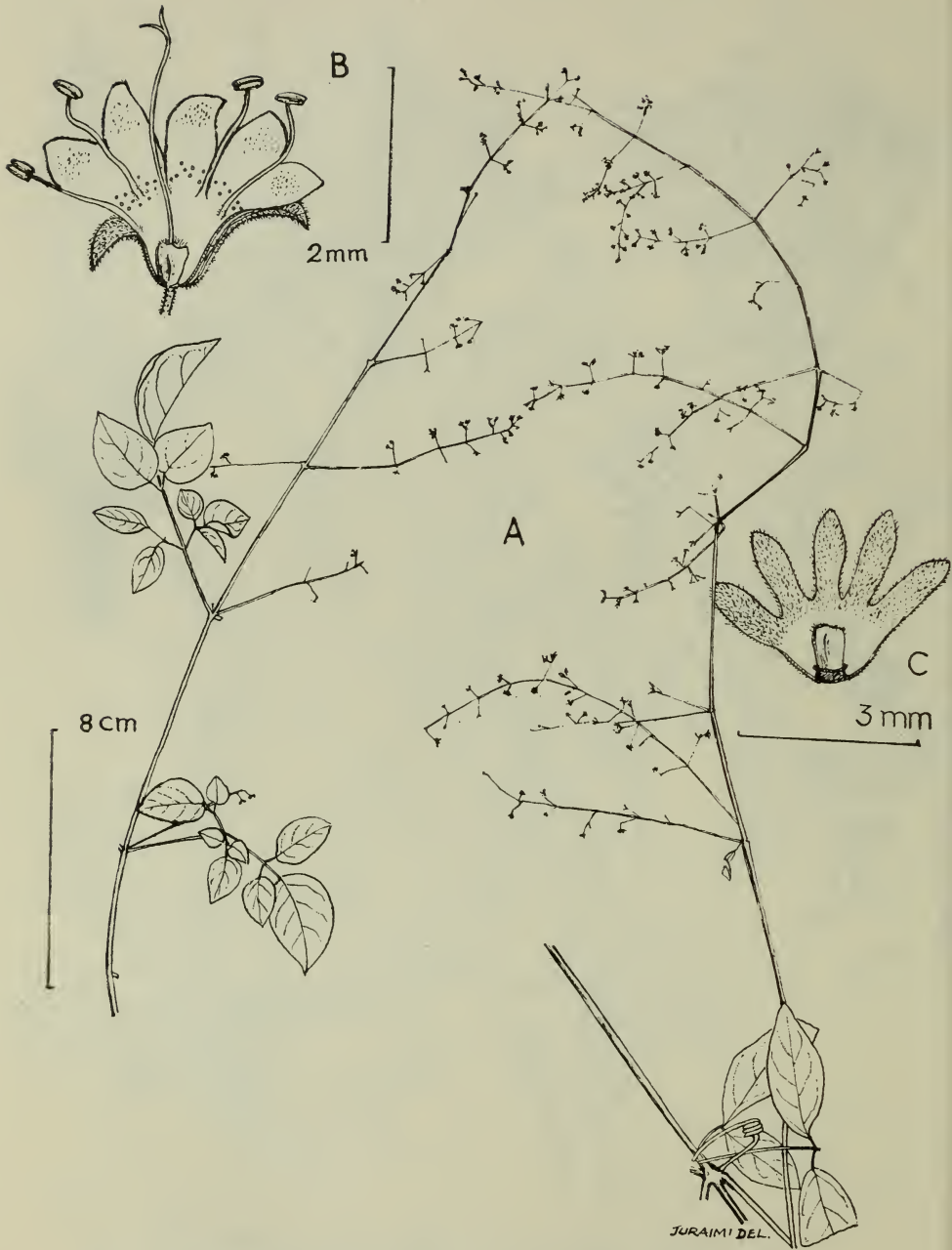


Fig. 12. *Petraeovitex sumatrana* (Ajoeb 183 Isotype).

A, Fruiting twigs. B, Longitudinally dissected flower. C, Calyx tube cut open vertically.

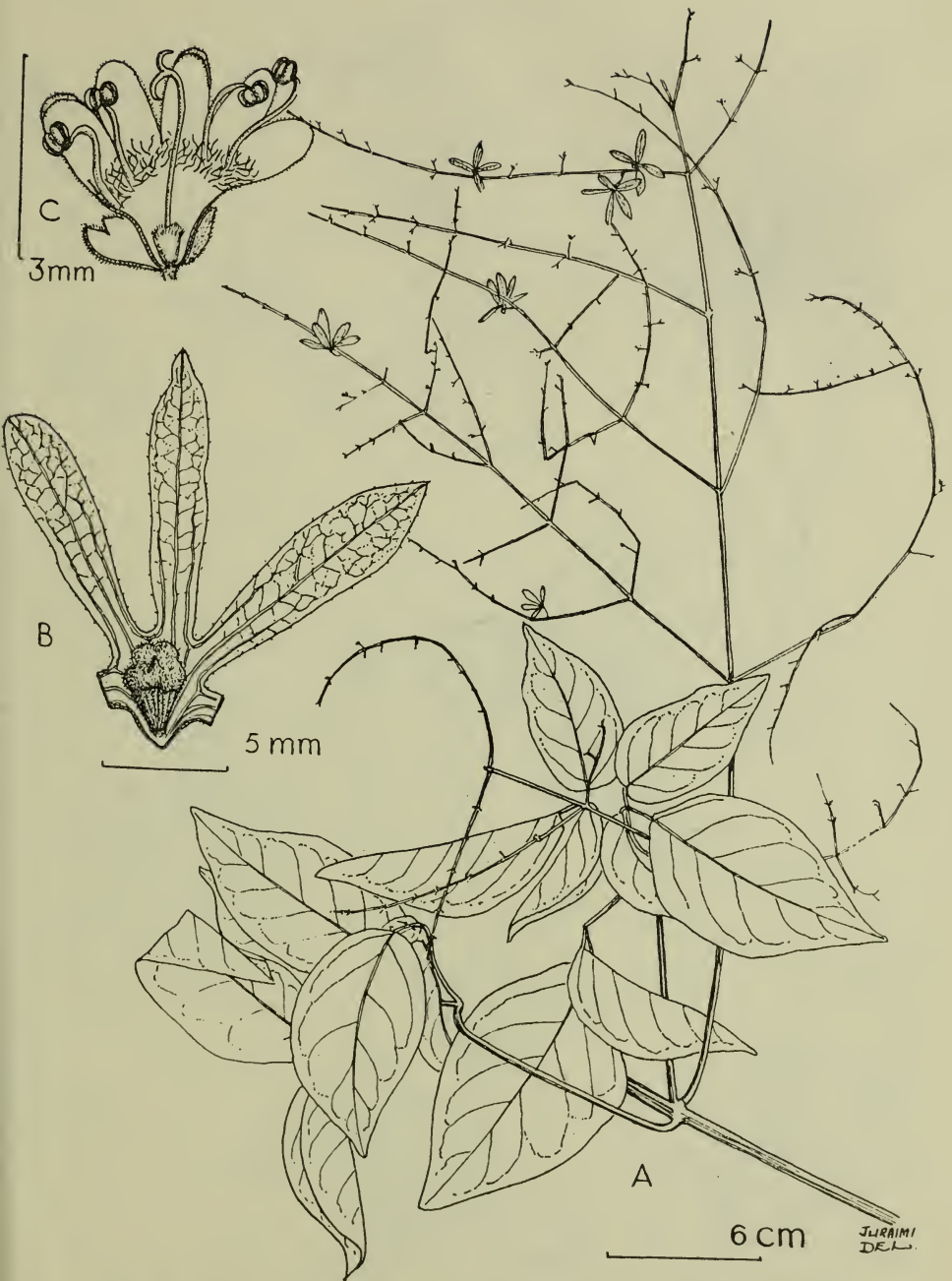


Fig. 13. *Petracovites multiflora* (A-B: Forsten s.n.; C: Kajewski 1,686).

A, Twig with the inflorescence and the axilliant leaf. B, Calyx cut open to show fruit within. C, Flower vertically dissected.



Fig. 14. *Petracovites multiflora* (A: Pulle 1,218; B & C Kajewski 1,686; D: Brass 32,643).

Leaves: A, Earliest stage of leaf division; B-C, Intermediate stage; D, Fully grown leaf.



Fig. 15. *Petraeovitex multiflora* var. *pubescens* (Warburg 21,148 Isotype).  
A, Flowering twig. B, Flower vertically open.





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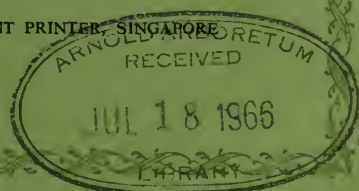
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1966





# A Revision of *Congea* (Verbenaceae)

by

MUNIR AHMAD ABID \*

*University of Sind, Hyderabad, West Pakistan.*

## INTRODUCTION

The genus *Congea* was established by Roxburgh in 1819 with one species *C. tomentosa* of which a coloured plate was published accompanied by a detailed specific description (*Pl. Corom.* III, p. 90, t. 293). The species was stated to be "a native of Chittagong where it blossoms in March."

Apparently Roxburgh had described under this genus three species in manuscript: *pentandra*, *villosa* and *tomentosa*, and the generic name *Congea* was a latin adaptation of the bengali (khasi) name "Kungea" for *Roscoea pentandra* from Silhet; but since in 1819 only *C. tomentosa* Roxb. was published, the remaining two did not acquire any status except much later. This means therefore that as published in 1819, *Congea* must be typified on *C. tomentosa* which was based on a specimen from Chittagong. In describing the "Germ" of this species, there is an implied reference to other manuscript species, thus: "subturbinate, etc. etc. exactly as in the former species"; but since the two "former species" (*pentandra* and *villosa*) were not published in 1819, this reference has to be ignored.

Roxburgh in *Fl. Ind.* III (1832) 54-57, ignored the valid name *Congea* and adopted *Roscoea* with *R. pentandra*, *R. villosa* and *R. tomentosa* as the three species, overlooking the fact that *Roscoea* Roxb., even if it were not a later homonym of *Roscoea* Smith (1804, Zingiberaceae), would have been a later synonym of *Congea*.

It is probable that Roxburgh had from the very beginning adopted the name *Roscoea* and not *Congea* for the genus; but since a long delay in publishing the genera and species submitted by Roxburgh in 1791-1794 for *Plants of Coromandel* III (1819) had made *Roscoea* Roxb. unusable for a verbenaceous plant as it was taken up in 1804 by Smith for a zingiberaceous genus, Sir Joseph Banks or Dryander might have discarded *Roscoea* to create *Congea* which could be legitimately used for Roxburgh's genus. Such a procedure, we learn, was followed in the case of *Roxburghia*. Since the readers were given no clues that the editor had made such a change, severe criticisms were levelled at Roxburgh (then already deceased) for having followed a procedure regarded unethical by botanists in naming a genus after his own self. (De Theis, *Glossaire de Botanique* 1810, p. 407). It is only

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\*Colombo Plan Fellow, Botanic Gardens, Singapore, 1965.

in the rejoinder given that it was revealed that Dryander, under Sir Joseph Banks's direction, had substituted the name *Roxburghia* for Roxburgh's *Stemona* Lour., because the latter was totally a different plant from Indo-China (Wight & Arnott *Prodr. Ind.* I, 1834, pp. XIV–XV).

The latter view seems to be correct since, according to Sealy (*Kew Bull.*, 1956 pp. 324 & 377), Roxburgh's plates of the three species concerned are all named in manuscript as the species of *Roscoea*, even the one that was published in 1819 under the name of *Congea tomentosa* Roxb.

Naturally, Carey who was interested in publishing Roxburgh's *Flora Indica* as written by the author, and who probably was unaware of nomenclatural change made in the genus, retained *Roscoea* unaltered. But whatever may be the reason for adopting *Congea* in 1819, the generic type remains the same, *C. tomentosa* Roxb.

Both the description of *Congea* (1819) and that of *C. tomentosa* (1819) are reprinted in Roxburgh's *Flora Indica* III (1832) 54–57 under *Roscoea* and *R. tomentosa*, with a few minor editorial changes in the specific description; and though it is re-stated that the species is a native of Chittagong "where it blossoms in March", a new paragraph has been added at the end of its description, stating: "a native of Coromandel, where it flowers in the cold season". This additional information being somewhat contrary to the original one which makes the plant a native of Chittagong, must have been misplaced here and may have been intended for the species that follows, i.e. *Clerodendron phlomoides* Willd. which was wild in Coromandel. Clarke who revised *Congea* and the allied genera for Hook. f., *Fl. Br. Ind.* IV (1885) 602–604, makes no mention of any *Congea* specimens from the Coromandel Coast. In fact the entire genus seems to be confined to what may be called the Indo-Malayan region extending from the Khasya Mountains southwards through Burma and Thailand to Malaya and Sumatra and eastwards across the frontiers of Vietnam or Indo-China to the south-western parts of China. It has not been recorded wild so far from Borneo and Java; and it is wholly absent from West Bengal and the Indian Peninsula except as a cultivated plant.

### Confusion over Roxburgh's Species

There is a good deal of confusion over the identity of the two Roxburgh's species *Congea tomentosa* and *Roscoea villosa*; and without clinching their identity, the status of the other species and varieties described during the period of over fifty years following the publication of Roxburgh's *Flora Indica* III (1832) remains uncertain. This confusion may be considered here under three aspects: (1) Objective difficulties, because there are inherent in the plants themselves; (2) the types and plant geography; and (3) early interpretations of the species.

### (1) Objective difficulties

The one inherent difficulty in distinguishing these species is that such characters as the size, shape and indumentum of the leaves as well as the colour and indumentum of the involucre bracts and sometimes also of calyces vary a great deal at different stages of their growth and depend to a certain extent also on the ecological factors of the branches on which these organs grew. Probably it was on account of the descriptions based on such characters that Bentham and Hooker (in *Genera Plantarum* II, 2, 1876 p. 1,159) reduced the 3 or 4 species then admitted by botanists to two only, obviously those originally described by Roxburgh. Previously Schauer (1847) had reduced these two species as two varieties of the same species, *C. tomentosa* Roxb., but Wight (*Icon.* 1849, tt. 1479/1-3) admitted at least three species, leaving out *C. villosa* (Roxb.) of which he could not obtain an authentic specimen. Subsequently Clarke (in Hook. f., *Fl. Br. Ind.* IV, 1885 pp. 602-604) tried to identify these species but again failed to clarify *C. villosa* (Roxb.), retaining this name as printed in Wight's *Icon.* t. 1479/1-B and indicated by him in the text and erratum to be a misprint for *C. velutina* Wight, a species based on two distinct syntypes considered to be identical. However, Clarke included under it also a reference to the unpublished icon of *Roscoea villosa* Roxb. and showed some difference between Wight's and Roxburgh's pictures.

### (2) Types and Geography not considered

Another difficulty in understanding Roxburgh's two species may be considered here in its varied aspects.

(a) Firstly, Roxburgh followed the old practice which attached importance to the descriptions more as taxonomic concepts than as taxa interpreted on nomenclatural types. Hence, though he made coloured drawings of his plants, he did not pay much attention to preserving his holotypes, nor to distributing the duplicates. Often he gave away his holotypes to different botanists or institutions, sometimes without any particulars and dates so that it is extremely difficult now to locate the types even though a search was made in Calcutta, Edinburgh, British Museum, Brussels and Geneva.

(b) Secondly, Roxburgh cultivated these two species in the Botanic Gardens, Calcutta, raised probably from seeds or cuttings obtained from the plants that supplied the holotypes, so that these plants were as good as the types (cf. clonotype or spermatype in Furtado in *Gard. Bull. Str. Settl.* IX, 1937, p. 304). Both these species are found listed in Roxburgh's *Hortus Bengalensis* (1814), yet neither Wallich who succeeded Roxburgh in Calcutta, nor any other botanist tried to locate Roxburgh's plants and obtained from them specimens for herbaria.

(c) On the contrary many specimens collected from the plants grown in the Calcutta Gardens are found named and distributed as *Congea azurea* Wall. Surely there must be among these some specimens from the plant or plants Roxburgh had planted.

### (3) Early Interpretations

Since Roxburgh's holotypes are not available for consultation, one would have expected some attempts made to typify Roxburgh's species by utilising particulars given by him in his descriptions and plates, and by using any subsequent specimens collected from the type localities and also in the Calcutta Gardens. But unfortunately no such attempts were made even by those who were in a position to do so.

Thus, Wallich who succeeded Roxburgh as the director of the Calcutta Gardens and later had also access to Roxburgh's drawings and descriptions even unpublished ones, named *Congea azurea* Wall. ms. in Cat. (1828) No. 1733 in a manner that reveals the lack of consideration of Roxburgh's types and species. He named *C. azurea* Wall. ms. the specimen No. 1733 (1) or (a) collected in Martabania in 1827, and *C. azurea* var. *latifolia* Wall. ms. the specimen No. 1733 (2) or (b) collected by him at Prome in 1826 with a note that the latter might be a new species or any one of the two species of Roxburgh. Since *R. villosa* Roxb. was yet unpublished, Wallich, by listing it with a doubt under his var. *latifolia*, showed that he was acquainted with Roxburgh's species drawn and described in the manuscript. Besides he was working his catalogue in Kew where Roxburgh's drawings were available for consultation.

Walpers (1844), who probably saw Roxburgh's published plate of *Congea tomentosa* Roxb., but not the holotype from Chittagong (for he gives the Coromandel Coast as its native habitat), described *C. azurea* Wall. ms. 1733 (a) as a species distinct from *C. tomentosa* Roxb., and, contrary to the then common procedures, relegated *Roscoea villosa* Roxb. to its synonymy, either because no specimen or plate of Roxburgh's species was available to him or because he had examined only the specimens of the plants Roxburgh had planted in the Calcutta Gardens.

Schauer (1847), who had seen specimens of Wallich's two forms of *C. azurea* Wall. Cat. 1733 (a) & (b), but none of Roxburgh's types, reduced both Wallich's forms as two varieties of *C. tomentosa* Roxb. of which he had seen a published plate. He made *Roscoea villosa* Roxb. and *C. azurea* Wall. synonyms of *C. tomentosa* var. *oblongifolia*.

Wight (1849) expressed surprise at Walpers' unusual step in reducing the older binomial *R. villosa* Roxb. to *C. azurea* Wall. ex Walpers (1844); but since he did not know Roxburgh's species from any authentic specimens and had seen no plate of *R. villosa*, he excluded the latter from the synonymy of *C. azurea* Wall. and gave a new description together with a pen line drawing of a

specimen of *C. azurea*, obtained from the Botanic Gardens, Calcutta, which may have been from type progeny of Roxburgh's species. Since he regarded *C. tomentosa* Roxb. as native of the Coromandel, he redescribed this species somewhat hesitatingly from Griffith's specimen from Mergui, (probably the isotype of Griffith's posthumous species, *C. vestita* Griff., 1854); however, he admitted the possibility that it might not be the true *C. tomentosa* Roxb. Obviously Wight was unaware that Roxburgh had planted representatives of his type species in the Botanic Gardens, Calcutta, though these were listed in Roxburgh's *Hortus Bengalensis* published in 1814. Otherwise he would have probably made an attempt to get specimens from these authentic plants and tried to see how these differed from *C. azurea* Wall.

The next important botanist to deal with this genus was Clarke who revised it for Hook. f., *Fl. Br. Ind.* IV (1885) 602-604. Though he had co-operation of all the British institutions and herbaria in Great Britain and India, it is indeed surprising that he made no attempt to typify Roxburgh's species by utilising Roxburgh's descriptions and plates, the specimens from the plants Roxburgh had planted in the Calcutta Gardens and the specimens from the type localities. On the contrary he reduced *C. azurea* Wall. 1733-2 or (b) to *Sphenodesme pentandra* Jack, apparently without any justification; for, from Schauer who had seen both specimens of Wallich, and who knew well the genus *Sphenodesme*, one gets the impression that there was hardly any external difference between these two except in the size and shape of the leaves (a very variable factor) and the size of the involucre bracts and calyces (often a matter of development).

Clarke employed *C. azurea* Wall. 1733-1 or (a) as a basionym of *C. tomentosa* var. *azurea* (Wall.) Clarke, creating thereby a superfluous name for *C. tomentosa* var. *oblongifolia* Schauer (1847). While Schauer stated that this variety differed in the leaves, involucre bracts and calyces being smaller than those in the type form which according to Schauer included Wall. Cat. 1733 (b), Clarke reserved this varietal name for the specimens having larger dimensions to these organs. As said above, these parts vary a great deal in size and I have found at least one duplicate of Wall. Cat. 1733 (a) in Herb. Edinburgh having these members of both sizes, since a young flowering twig and a well developed one are mounted on the same sheet. Actually the very large involucre bracts and calyces are a result of post-anthesial development and are not a varietal character.

Clarke also included Wight's *lc.* 1479/2 and its description under *C. tomentosa* Roxb. proper without realizing that Wight's *C. tomentosa* is identical with *C. vestita* Griff. Further, Clarke retained *C. villosa* (Roxb.) Wight, *lc.* 1479/1-B, a misprint for *C. velutina* Wight, as a combination validly published by Wight, and so he cited under it Roxburgh's *Roscoea villosa* and its unpublished plate. In the text Clarke explained the discrepancies

between the two figures, overlooking the fact that Wight had also considered that it is a 4-bracteate variation of his 3-bracteate *C. velutina* in Wight  *Ic.* 1479/3.

Hence, though Wight and Clarke had contributed much to our understanding of the genus and the species, the fundamental difficulties were not clarified so that the subsequent revisions reveal the influence of these two botanists and obscure the status and the specific identities of *C. tomentosa* and *C. villosa* (Roxb.) and some allied species.

### Typification of Roxburgh's Species

Roxburgh's types have not been available to me in the present study nor their plates but since the confusion over Roxburgh's two species renders the nomenclature of some other taxa also uncertain, an attempt has been made here to typify the two.

1. *Congea tomentosa* Roxb. (1819) is described as having three involucre bracts which are downy, pink coloured, elliptic, sometimes emarginate, over an inch long and  $\frac{1}{2}$  inch wide. Corolla tube as long as the calyx. Young shoots tomentose (white ?, not brown which is the colour given to the next species). Native habitat, Chittagong.

Now all the specimens collected from Chittagong agree with these characters, though they have been named invariably as *C. azurea* or *C. tomentosa* var. *azurea*. In fact there is only one species that occurs in Assam and East Pakistan as far north as the Khasya Mountains, and it should be named *C. tomentosa* Roxb. Hence both on plant geographical grounds and description this must be taken as the type form of *Congea tomentosa* Roxb. Specimens numbered Wall. Cat. 1733 (a) or (1) in Herb. Edinburgh are also identical with this. I have not seen Wall. Cat. 1733 (b) or (2), which was from Prome; but specimens collected by others from Prome are identical with these. Many collections made in the Botanic Gardens, Calcutta, and named as *C. azurea* also belong here. Some of these may have come from Roxburgh's plants listed as *Roscoea tomentosa* in *Hortus Bengalensis* (1814) (see "Progeny of types" below).

2. *Roscoea villosa* Roxb. (1832) was described as a species with three involucre bracts to each flower head. The bracts themselves are described as oblong, sessile, spreading, often emarginate or retuse, hairy at the upper base like the calyx; flowers white; calyx clothed both sides with soft white hairs; corolla longer than the calyx; young shoots clothed densely with light brown, soft, short pubescence.

Native in "Pegu in the vicinity of Rangoon" where it is "common in hedges".

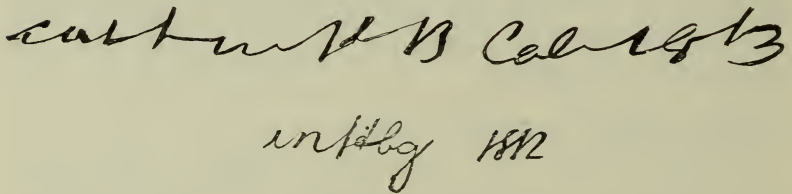
Now the only species that agrees with all these characters is *C. tomentosa* Roxb. which, in young stages, often has, as described by Roxburgh, light brown, soft, short pubescence on young twigs.

Further, many collections made from 1855 onwards in Rangoon, Pegu and in their vicinities all represent one species only, namely *C. tomentosa*. And since F. Carey who supplied the type specimen of *R. villosa*, had found the plant "common in the hedges" in "Pegu in the vicinity of Rangoon", surely such a common plant should have been found at least by one of the many collectors who explored the area botanically. In fact no other species of *Congea* seems to occur so far north in the lower Burma except *C. vestita* Griff. which, though not found in the Rangoon and the Pegu districts, occurs eastwards in the same latitude together with *C. tomentosa* in the Moulmein and the Amherst districts. But Roxburgh described shoots as clothed with light brown soft, short pubescence, a character found in the young shoots of *C. tomentosa*, while *C. vestita* has long brown (hirsute) hairs even on older twigs. Involucral bracts are somewhat oblong and white in young inflorescences, whereas they are always white and broadly ovate-oblong or elliptic-obovate in *C. vestita*. But in this species the corolla tube is shorter than the calyx, while in *C. tomentosa* it is longer as described for *R. villosa* by Roxburgh, though occasionally the corolla tube remains equal to the calyx, as mentioned in the protolog of *C. tomentosa*. Besides, according to the information supplied by Kew, Roxburgh's coloured plate of *R. villosa* shows involucral bracts which are green at the base, pale yellow-green half-way up, becoming pinkish brown towards the apex — a description wholly applicable to the bracts of *C. tomentosa*. In short, *R. villosa* seems to be no more than a variation of *C. tomentosa* which usually produces bifid stigmata described for *R. villosa*, but occasionally also indistinctly bifid ones which could be mistaken for entire as mentioned in the protolog of *C. tomentosa*.

#### Probable progeny of the type plants.

A further support to this conclusion is found on the identity of the specimens of the plants cultivated in the Botanic Gardens, Calcutta, and distributed to several herbaria in the world under the name *C. azurea*. Since Roxburgh recorded in his *Hortus Bengalensis* (1814), that he had both *R. villosa* and *R. tomentosa* growing in the Gardens, it is surprising that all the specimens represent only one species, *C. tomentosa*. Obviously due to the influence of Wallich, all these specimens have been named *C. azurea*. Unfortunately they do not bear the date of collection, but one specimen in herbarium of Arnold Arboretum obtained from Paris Herbarium bears the following information in faint ink: "Cult. in H.B. Cal. 1813". Since this specimen was made when Roxburgh was still in Calcutta and Wallich had not collected or named in manuscript any species of *Congea*, it is of great nomenclatural value and may be a spermatype or clonotype of *R. villosa* or *C. tomentosa*.

In this connection one may note the following particulars found on two *Congea* specimens made from the plants grown in the Botanic Gardens, Calcutta, and incorporated in Wight's Herbarium, but later distributed "Ex Herb. Wight Propr." to the Calcutta Herbarium and Gray Herbarium (Harvard). The information in the distribution labels of both these specimens is written by the same hand. In the Calcutta specimen it reads "Laid in Aug. 1882", while in the other specimen it reads "Lait in Aug. 1882". Since this was a puzzle to me, I submitted my difficulty to Dr. Furtado who stated that the first error to be noticed is "1882," since Wight was already dead ten years earlier (in 1872). Then "Laid" or "Lait" made no sense, but the specimen from the Botanic Gardens, Calcutta, collected in 1813 and now preserved in the herbarium of Arnold Arboretum, furnished a clue to the solution since the word "cult" in that specimen can be easily misread as "Lait". Hence Furtado suspects that the specimens in Wight's Herbarium must have been collected also when Roxburgh was still in Calcutta and that original label written probably in the same hand as the specimen of 1813. If the entire information were written in a continuous handwriting as in the specimen of 1813, so that a word that follows is joined to one that precedes, "1812" written in that fashion could easily be misread for "1882". However "HBC" could not easily be mistaken



cult in H B Cal 1813  
in Hbg 1812

for "Aug.". Perhaps Roxburgh who was preparing his *Hortus Bengalensis*, published in 1814, also wrote on the specimens as "cult in Hbg in 1812", meaning "cult in Horto bengalense in 1812". This would account for "Lait in Aug. in 1882". Furtado suggests that an inquiry be made by consulting Roxburgh's specimens in Paris since the specimens of these are not found in Brussels and Geneva. Wight's specimens together with the other specimen collected in 1813, may represent the two species that were grown in the Gardens.

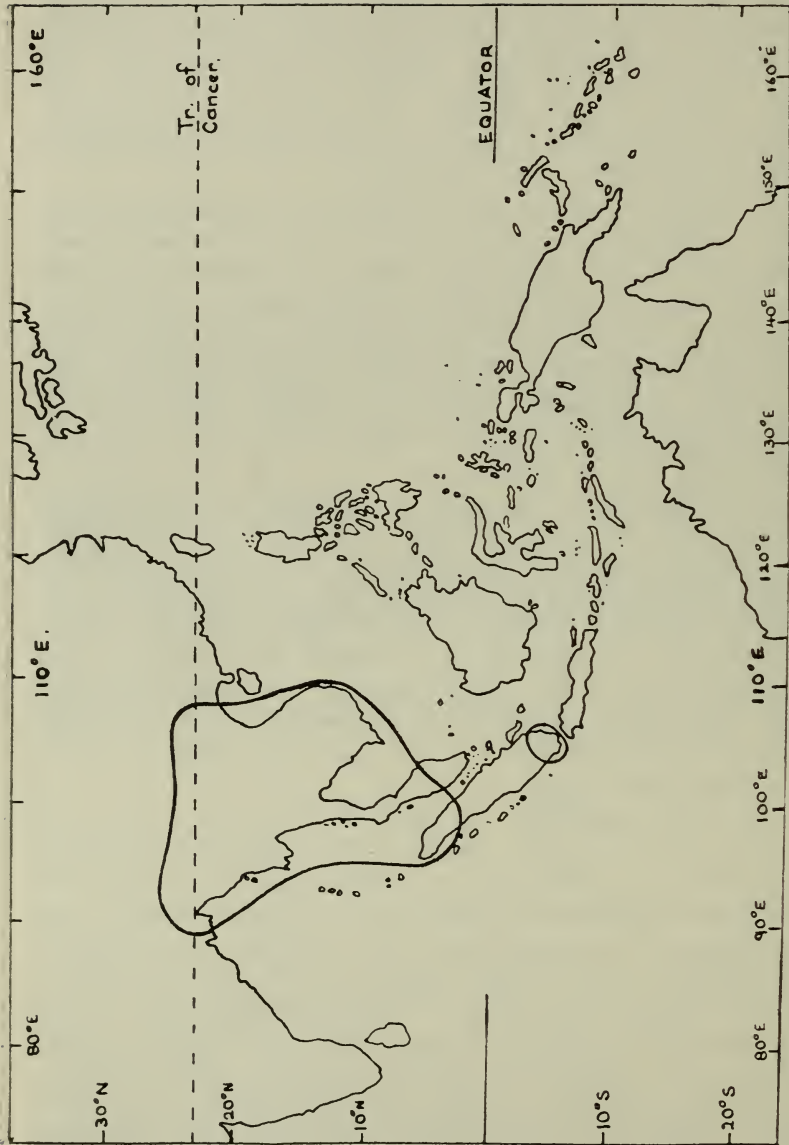
This ingenious explanation by Furtado seems to be very plausible and merits a further inquiry. Since Wight based his drawings and descriptions of *C. azurea* from a specimen obtained from the Calcutta Gardens, this collection of "1812" may be that specimen.

But whatever may be the basis of Schauer's judgement, it is obvious from the circumstantial evidence brought forward in this study that *R. villosa* Roxb. is merely an ecological form of *C. tomentosa* and that Schauer was right in reducing the two of Roxburgh's species to one, though wrong in establishing the varieties. Further since the specimen collected in the Botanic Gardens, Calcutta, in 1813, was distributed to Arnold Arboretum from Paris where Schauer had worked his revision, it seems likely that Schauer who had examined Wallich's 1733 (a) & (b), was able to see also the specimens of the progeny of Roxburgh's types from the Calcutta Gardens. An inquiry in the Paris herbarium might be profitable in this connection.

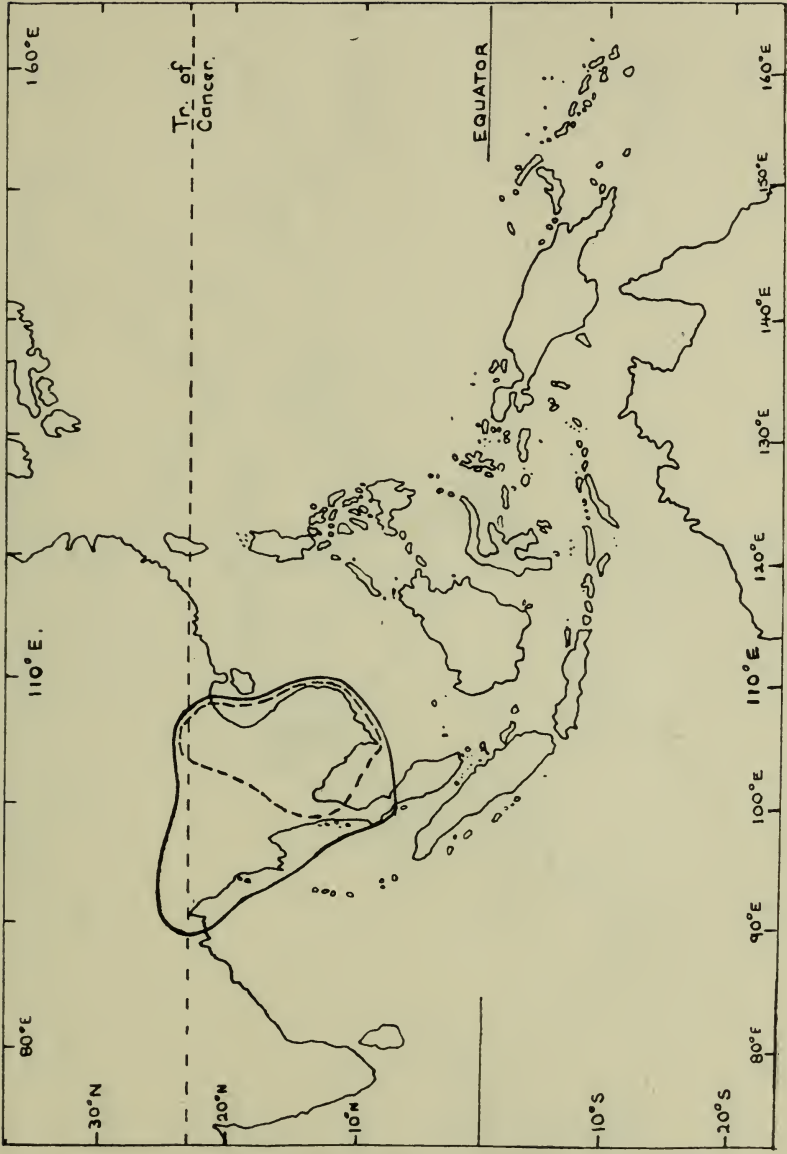
It is obvious therefore that a good deal of confusion that has arisen regarding the identity of these two species has been caused precisely because botanists have ignored the facts that the specimens from two of Roxburgh's species grown in the Calcutta Gardens and those from the type localities of the species, represented only one species; and also because they have tried to give a definite nomenclatural value to *C. azurea* Wall. which is taxonomically superfluous even if the different amendments were nomenclaturally admissible.

**DISTRIBUTION:** The genus is restricted in its distribution between 90°–109° East longitude and 0°–28° North latitude. In fact the entire genus is confined to what may be called the Indo-Malayan and the Indo-Chinese regions, extending from the Khasya Mountains southwards through Burma, Thailand, Malaya and Sumatra; and eastwards up to Vietnam and Yunnan province of China. So far, it has not been recorded wild from the southern part of the Malay Peninsula, Borneo and Java; and it is wholly absent from West Bengal and peninsular India except as a cultivated plant (See Map 1).

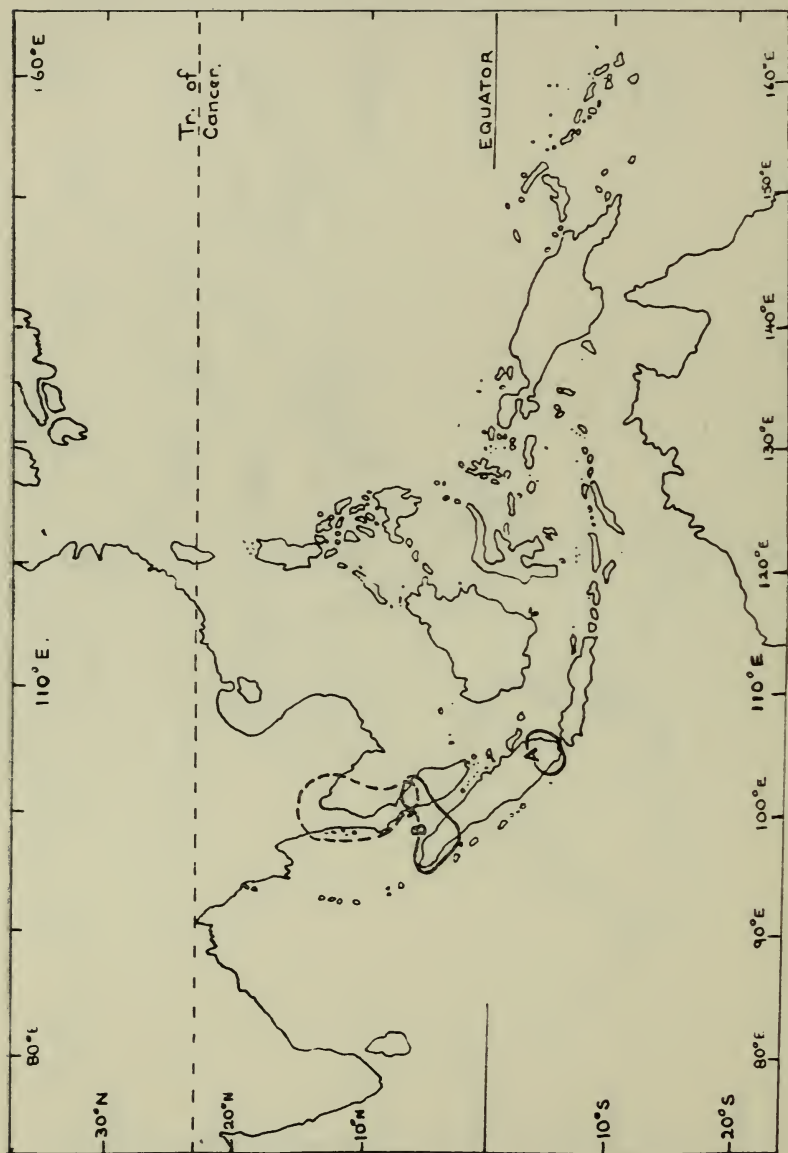
Of all the species of this genus *C. tomentosa* is the most widely distributed species extending from the Khasya Mountains southwards to Thailand and its varietal form (var. *nivea*) from Thailand to Vietnam (See Map 2). *C. forbesii* is the only one that occurs in Sumatra alone and its variety var. *ridleyana* in north Malaya. *C. griffithiana* extends from Mergui to Kedah (in the northern part of the Malay Peninsula) (See Map 3). *C. vestita* is recorded from Martaban and Mergui archipelago in Burma and its var. *subvestita* in South Vietnam. Its allied species *C. pedicellata* is found in Laos and Vietnam (See Map 4). *C. siamensis* and *C. velutina*, two very close allies, are found in the Tenasserim district of Burma and Lower Thailand. *C. chinensis* is found in Yunnan province of China and on the borders of Upper Burma, and its variety *latibracteata* is in the Mandalay district of Burma (See Map 5). *C. connata* and *C. rockii* are endemic in Thailand (See Map 6).



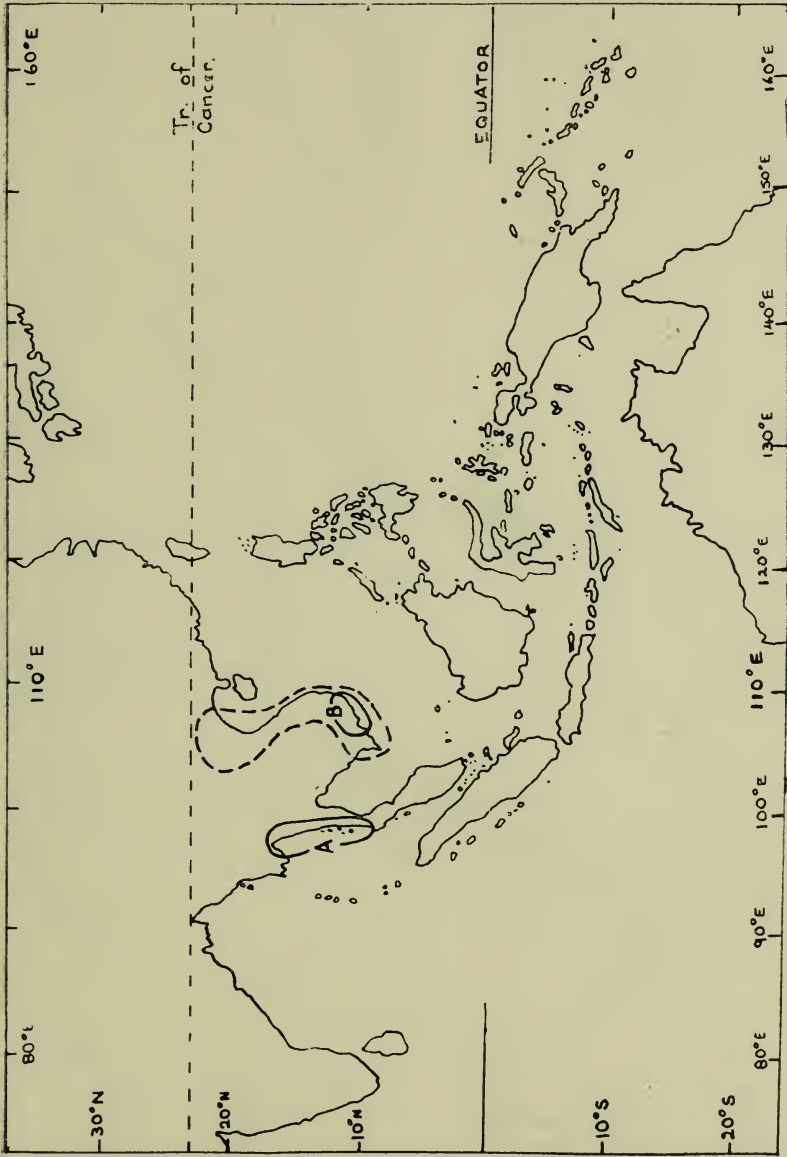
Map I. Distribution of genus *Congea* Roxb ( ——— )



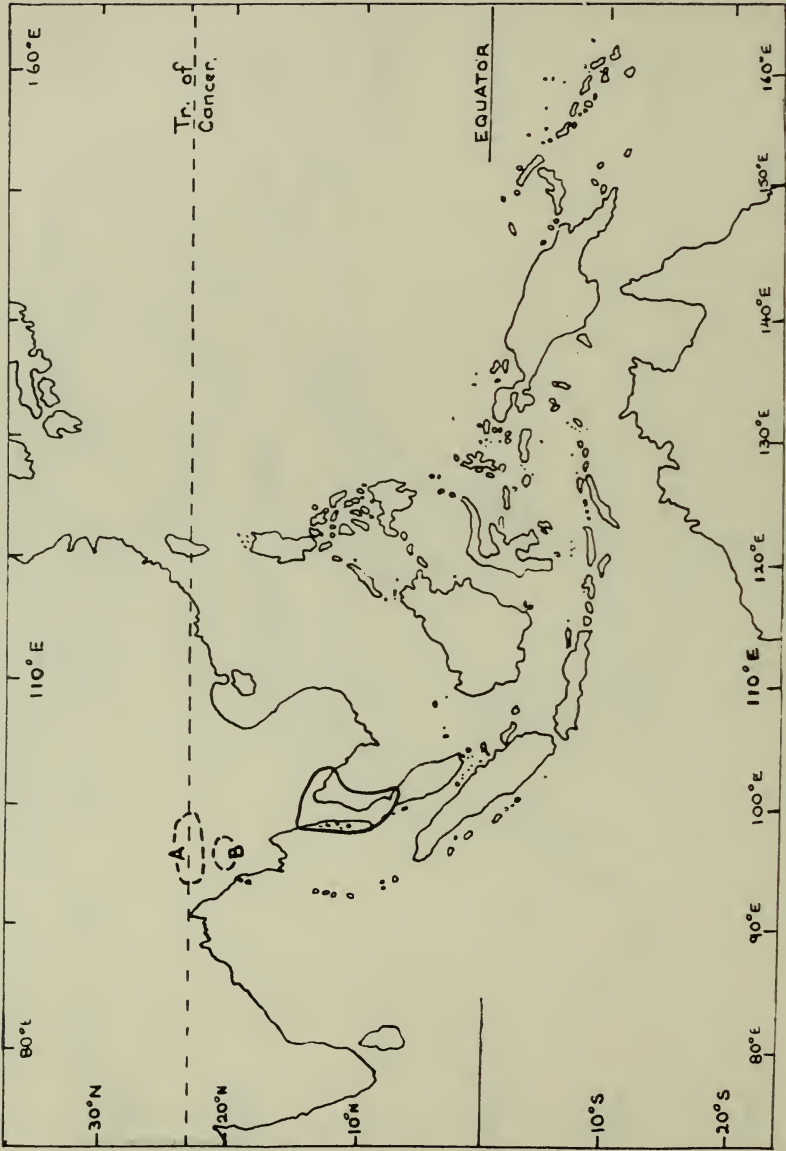
Map 2. Distribution of *C. tomentosa* var. *tomentosa* (————);  
*C. tomentosa* var. *nivea* (-----).



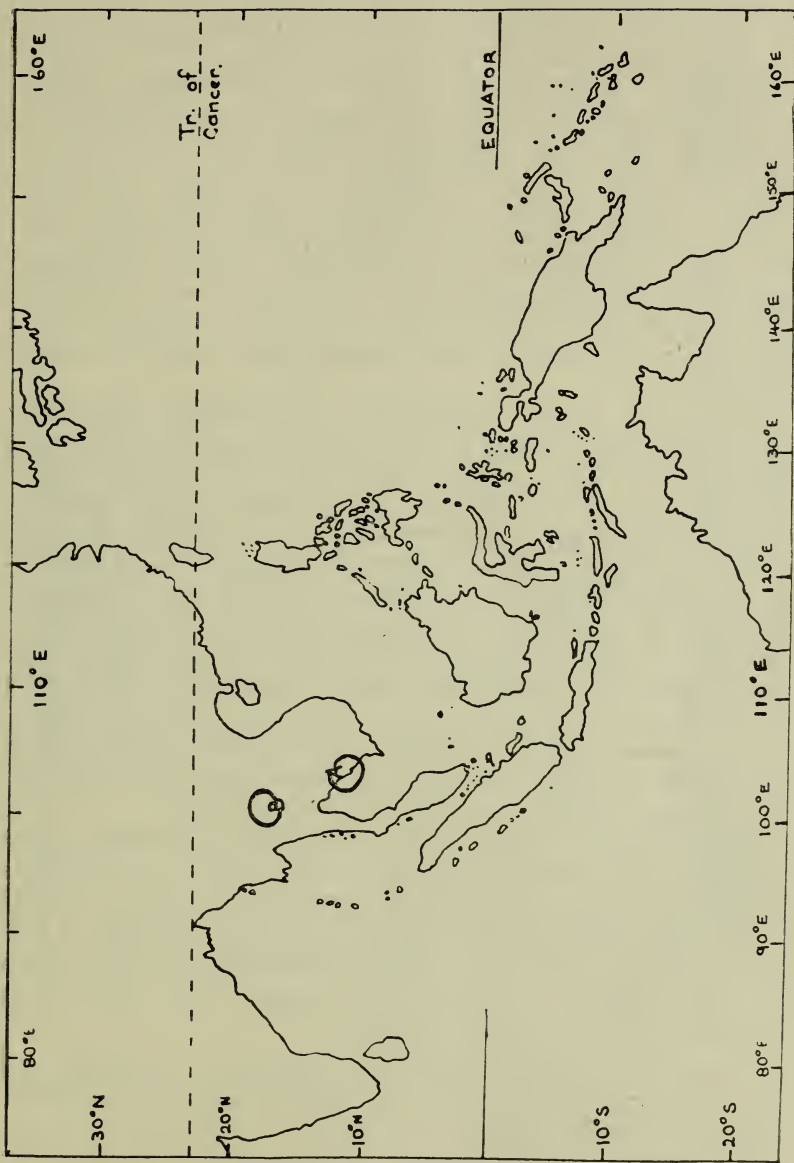
Map 3. Distribution of *C. forbesii* var. *forbesii* (— A —); *C. forbesii* var. *ridleyana* (--- B ---); *C. griffithiana* (.....).



Map 4. Distribution of *C. vestita* var. *vestita* (—A—); *C. vestita* var. *subvestita* (---B---); *C. pedicellata* (.....).



Map 5. Distribution of *C. velutina* & *C. siamensis* (————);  
*C. chinensis* var. *chinensis* (-----A-----); *C. chinensis* var.  
*latibracteata* (-----B-----).



Map 6. Distribution of *C. connata* (——— A ———); *C. rockii* (----- B -----).

## SUMMARY

In this revision of the genus *Congea*, attempts have been made to solve certain problems which, though contributing to a great confusion on the identity of some species, had been neglected in the past. Thus it is shown here that the holotype of *C. tomentosa*, the type species of the genus, was from Chittagong as stated in the protolog and that the additional statement that the species is indigenous in Coromandel, found in the subsequent reprint of the description, was an addition caused by a misplacement of an isolated printed line belonging to another taxon described in the second work. In fact it is shown that no species of *Congea* is found wild in any part of peninsular India. These facts have helped to identify precisely *C. tomentosa* which is the only one that occurs indigenous in the vast region around Chittagong. Hence what invariably passes as *C. tomentosa* var. *oblongifolia* or *C. tomentosa* var. *azurea* has to be called *C. tomentosa* var. *tomentosa* on the basis of both plant-geography and the original description.

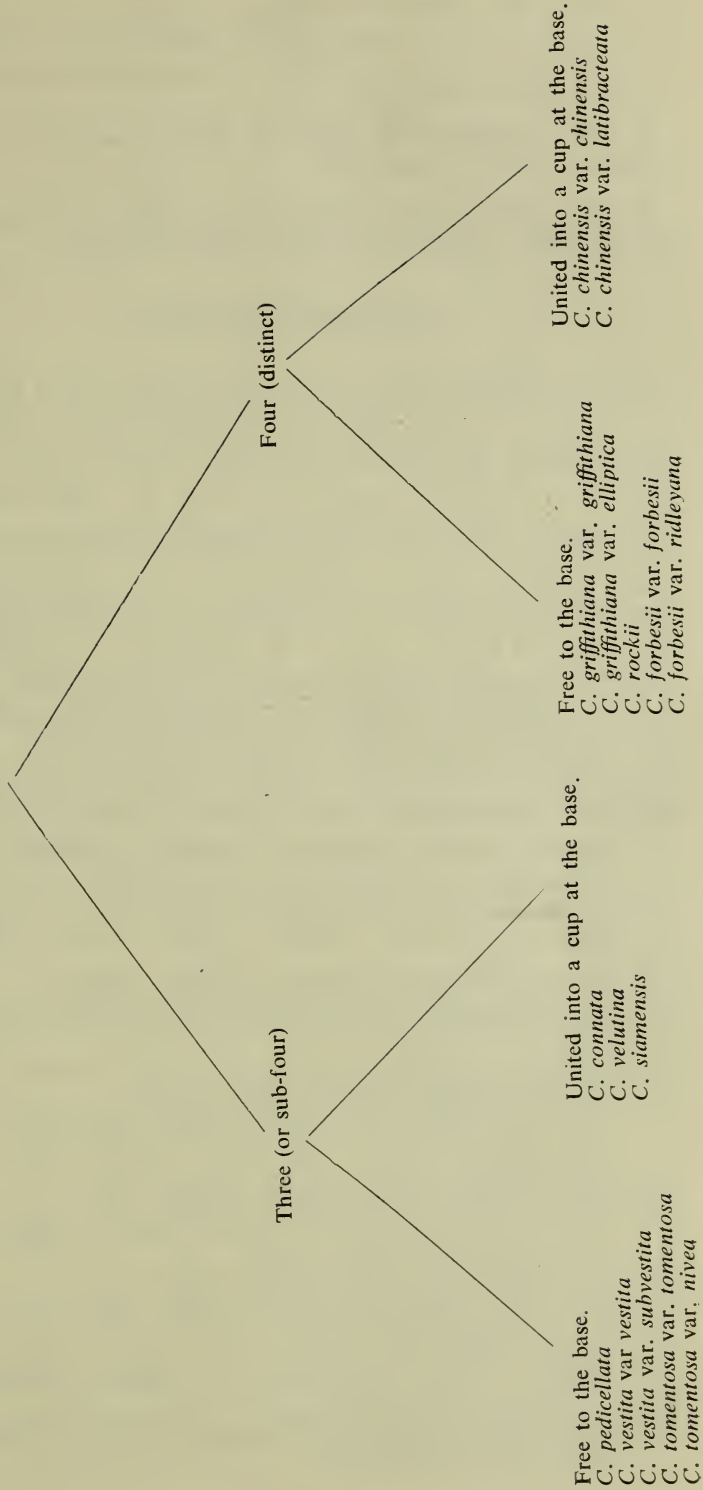
This species extends southwards to the burmese districts of Pegu and Rangoon, where no other species has ever been found wild. This fact and Roxburgh's description have been used to show that *C. villosa* (Roxb.) Clarke (based on the holotype collected in Pegu near Rangoon) is merely an ecological form of *C. tomentosa* var. *tomentosa*. Confirmatory evidence on the identity of these two Roxburgh's taxa is drawn from the many herbarium specimens of the plants in the Botanic Gardens, Calcutta, where Roxburgh had grown progeny obtained from the two type plants; these specimens are distributed under the name of *C. azurea*, the basionym of *C. tomentosa* var. *azurea*, but all represent *C. tomentosa* var. *tomentosa*. Though I was not able to see any type, photographs of their coloured plates made under the direction of Roxburgh confirm the accuracy of my deductions.

By utilizing the characters like the number of bracts to an involucre, the extent of the union of the bracts at the base, presence or absence of a conspicuous pedicel to the calyx, and the length of the corolla tube in relation to the length of calyx, it has been possible to remove the confusion or indefiniteness that existed over the identity or limits of some species. The results thus obtained may be condensed as follows:

1. Species or varieties reduced to synonymy: *C. oblonga*, *C. peteloti*, *C. tomentosa* var. *azurea*, *C. tomentosa* var. *oblongifolia* and *C. villosa*.
2. Taxonomic limits redefined: *C. forbesii*, *C. tomentosa*, *C. velutina* and *C. vestita*.
3. Redescribed from the holotype: *C. rockii* (it bears 4 bracts to an involucre and 5-6 flowers to a cyme, not 3 bracts and 3 flowers as stated in the protolog).

Grouping of *Congea* species and varieties on the basis of

**Involucral Bracts**



4. New taxa established here: *C. chinensis* var. *latibracteata*, *C. forbesii* var. *ridleyana*, *C. griffithiana*, *C. pedicellata*, *C. tomentosa* var. *nivea*, *C. velutina* var. *elliptica* and *C. vestita* var. *subvestita*.
5. The remaining three species not confused so far: *C. chinensis*, *C. connata* and *C. siamensis*.

In short this genus as revised here consists of ten species and five varieties, two species and all varieties being new.

### ACKNOWLEDGEMENTS

It is my pleasant duty to record my gratitude to the following: to the Government of Singapore for extending my Fellowship which enabled me to continue the research in the genera of the Symphoremeeae group of Verbenaceae; to Mr. H. M. Burkill, Director of Gardens, Singapore, and to Dr. Chew Wee-Lek, Keeper of the Herbarium, for putting at my disposal the facilities of the Singapore Botanic Gardens; to Dr. C. X. Furtado, for his general guidance, for the translation of the Latin, French and German texts consulted by me and for putting the diagnoses of new taxa into Latin; to Dr. H. N. Moldenke of New York for providing me with information regarding his taxa included here; to Che Juraimi bin Samsuri for making the drawings published here; to the typist who patiently typed the manuscript.

My thanks are also due to the Directors and Curators of the institutions mentioned below for the loan of herbarium specimens:

1. Arnold Arboretum, Harvard University, 22 Divinity Avenue, Cambridge 38, Massachusetts, U.S.A. (A).
2. Botanisches Garten und Museum, Berlin-Dahlem, Germany. (B).
3. Forest Herbarium, Bangkok, Thailand. (BKF).
4. British Museum of Natural History, London, S.W.7, England. (BM).
5. Botanic Gardens, Calcutta, India. (CAL).
6. Forest Research Institute, Dehra Dun, India. (DD).
7. Royal Botanic Garden, Edinburgh, Scotland. (E).
8. Royal Botanic Gardens, Kew, England. (K).
9. Forest Research Institute, Kepong, Selangor. (KEP).
10. Rijksherbarium, Leiden, Holland. (L).
11. New York Botanical Garden, Bronx Park, New York, U.S.A. (NY).
12. National Herbarium and Museum, Manila, Philippines. (PNH).
13. Herbarium, Department of Botany, University of California, Berkeley 4, U.S.A. (UC).

### Congea

**Congea** Roxb., Pl. Corom. III (1819) 90, t. 293; Endlicher, Gen. Pl. (1836) 638, No. 3715 p.p.; Meissner, Gen. Pl. Vascul. I (1836) 292 & II Comment. (1843) 200 p.p.; Walp., Repert. Bot. IV (1844) 116 p.p.; Schauer in DC., Prodr. XI (1847) 623; Wight, Ic. Ind. Or. IV, part 3 (1849) 14; Miquel, Fl. Ind. Bat. II (1858) 911; Benth. & Hook., Gen. Pl. II, Part 2 (1876) 1159; Kurz, For. Fl. Burm. II (1877) 256; Clarke in Hook. f., Fl. Br. Ind. IV (1885) 602; Briq. in Engl. U Prantl, Pflanzenfam. IV, 3a (1897) 181; King & Gamble in Journ. As. Soc. Beng. LXXIV, II (1908) 864; Lam, Malay. Verb. (1919) 336; Bakh. in Bull. Jard. Bot. Buitenz. III (1921) 100; Ridl., Fl. Mal. Pen. II (1923) 640; Dop in Fl. Gén. Indoch. IV (1936) 908.

*Roscoea* Roxb. Fl. Ind. III (1832) 54 pro parte, (altera parte *Sphenodesme*).

*Calochlamys* Presl, Bot. Bemerk. (1844) 148; Walp., Repert. Bot. VI (1846) 691.

TYPE SPECIES: *C. tomentosa* Roxb. from Chittagong (not Coromandel).

Large climbing shrubs; branches almost cylindric, usually tomentose with mixed simple and stellate hairs. *Leaves* simple, opposite, entire, reticulate unicostate. *Inflorescence* in axillary and terminal panicles. *Cymes* capitate, pedunculate, 3-9 flowered; involucre bracts 3 or 4 free or united at base, violet or white tomentose, elliptic or oblong or spatulate. *Flowers* often sessile, sometimes long pedicelliform or pedicellate (i.e. *C. vestita* and *C. pedicellata*); *calyx* tubular or infundibuliform, 5-toothed, slightly accrescent. *Corolla* bilabiate, oblique; tube cylindric, glabrous except a villous band in throat; upper lip erect, 2-lobed, the lower of 3-lobes. *Stamens* 4, exserted, didynamous, epipetalous, inserted in the throat of the corolla; anthers almost orbicular. *Ovary* obovoid, glabrous, glandular at apex, imperfectly 2-celled, each cell 2-ovuled; style as long as the stamens or more, filiform; stigma shortly bifid. *Drupe* obovoid, nearly dry, 1-seeded.

DISTRIBUTION: Assam in India, East Pakistan, Burma, Thailand, Malaya, Sumatra, Cambodia, Laos, Vietnam and South-western China.

This genus together with the allied genera are regarded to form a distinct group, the systematic status of which is not yet clearly defined. Some botanists have considered the group as a tribe or subtribe (Symphoremeeae) of Verbenaceae, others as its subfamily (Symphoremoideae) or even as a distinct family (Symphoremaceae). I hope to get some details on this after studying the genus *Symphorema*.

## KEY TO THE SPECIES\*

1. (a) Involucral bracts 3 or sub-4 ..... 8.  
 (b) Involucral bracts 4 ..... 2.
2. (a) Involucral bracts free to the base ..... 4.  
 (b) Involucral bracts united into a distinct cup at the base ..... 3.
3. (a) Leaves narrowly elliptic; inflorescence axis canescent; involucral bracts oblanceolate to oblong, narrowed towards the base, uniformly hoary in the upper surface, often sericeous along midrib above; cup  $\pm$  6 mm. long; calyx densely albosericeous without. (Panicle — internodes and peduncles and the axillant bracts longer)  
**C. chinensis var. chinensis**
- (b) Leaves broadly elliptic; inflorescence axis flavido-pubescent; involucral bracts oblong, violet, tomentose, with long canescent hairs at the base above; cup  $\pm$  4 mm. long; calyx densely hirsute outside. (Panicle internodes; peduncles and the axillant bracts smaller)  
**C. chinensis var. latibracteata var. nov.**
4. (a) Involucre with an additional pair of short, linear-setaceous bracteoles. (Corolla much exserted) ..... 7.  
 (b) Involucre without any additional bracteoles. (Corolla not much exserted) ..... 5.
5. (a) Branchlets and inflorescence axis covered with dense, long, fulvous tomentum; leaves oblong-lanceolate, sub-cordulate or rounded at the base; involucral bracts narrowly elliptic, densely white tomentose above; flowers pedicelliform. (Leaves brunescent all over on drying; cymes 5-6 flowered) ..... **C. rockii**
- (b) Branchlets and inflorescence with short, tawny tomentum; leaves elliptic, cuneate towards base; involucral bracts oblanceolate to spatulate, sometimes elliptic, often densely violet above; flowers sessile. (Leaves generally almost nigrescent on drying; cymes 5-flowered) ..... 6.
6. (a) Involucral bracts oblanceolate to spatulate, rounded at apex; peduncles shorter and more slender.  
**C. griffithiana sp. nov. var. griffithiana**
- (b) Involucral bracts elliptic, acute at apex; peduncles longer and thicker ..... **C. griffithiana var. elliptica var. nov.**
7. (a) Leaves oblong-lanceolate; involucral bracts narrowly elliptic-lanceolate, grey tomentose above with no longer hairs at the base; calyx slightly pedicelliform. (Young inflorescence axis hoary; cymes 3-4 flowered) ..... **C. forbesii var. forbesii**
- (b) Leaves elliptic; involucral bracts broadly elliptic or oblong-elliptic, thickly grey tomentose above, provided at the base with long canescent hairs; calyx sessile. (Young inflorescence axis fulvous tomentose mixed with distinctly long hairs; cymes 5-flowered)  
**C. forbesii var. ridleyana var. nov.**
8. (a) Involucral bracts free to the base; flowers sessile or pedicellate ..... 11.  
 (b) Involucral bracts united into a cup at the base; flower always sessile ..... 9.

\* It is not possible to present a key purely on vegetative characters, as almost all the species of this genus are extremely alike in these characters.

9. (a) Involucral bracts 3, narrowly elliptic-oblong, albo-canescens above; cup  $\pm$  6 mm. long. (Calyx teeth almost  $\frac{1}{4}$ th or less of the tube)  
**C. connata**
- (b) Involucral bracts 3, occasionally sub-4, spathulate or elliptic-obovate, violet, tomentose above; cup 3-4 mm. long ..... 10.
10. (a) Leaves elliptic, cuneate towards base; involucral bracts always 3, spathulate to oblanceolate; cup  $\pm$  3 mm. long. (Calyx teeth almost  $\frac{1}{4}$ th of the tube) ..... **C. velutina**
- (b) Leaves elliptic to ovate, cordulate at base; involucral bracts usually 3, occasionally sub-4, oblong-elliptic to obovate; cup  $\pm$  4 mm. long. (Calyx teeth almost one-third the length of its tube)  
**C. siamensis**
11. (a) Flowers sessile; involucral bracts elliptic-oblong or elliptic-obovate, violet or white tomentose; corolla tube longer than the calyx ... 14.
- (b) Flowers pedicellate; involucral bracts broadly elliptic or obovate, light cream coloured or greyish-white; corolla tube shorter than the calyx ..... 12.
12. (a) Branchlets and inflorescence axis cinereo-pubescent; leaves elliptic, usually rounded at base, rarely cordulate, chartaceous, scabridulous above, grey-pubescent beneath; involucral bracts elliptic to obovate, greyish-white; flower pedicel very long; calyx sericeo-pubescent without ..... **C. pedicellata sp. nov.**
- (b) Branchlets and inflorescence axis ferruginous hirsute, or faintly yellowish pubescent; leaves ovate or elliptic, cordulate at base, coriaceous, scabrid above, fulvidous-hirsute or faintly yellowish pubescent beneath; involucral bracts most broadly elliptic (2-4 by 1-2 cm.), light cream coloured, flower pedicel shorter; calyx hirsute outside ..... 13.
13. (a) Branchlets, inflorescence axis and underside of leaves ferruginous to fulvous-hirsute ..... **C. vestita var. vestita**
- (b) Branchlets, inflorescence axis and underside of leaves faintly yellowish-pubescent ..... **C. vestita var. subvestita var. nov.**
14. (a) Branchlets and inflorescence axis tomentose, flavescent when young, later canescent; involucral bracts elliptic to oblong, violet, tomentose, provided at the base above with long and thick canescent hairs; calyx densely sericeo-hirsute without; lobes (at anthesis) almost half the length of calyx tube, pointed, each usually provided at the tip with a linear accessory tooth; corolla with a narrow, almost fugacious villous band in throat.  
**C. tomentosa var. tomentosa**
- (b) Branchlets and inflorescence axis cinereo-tomentose; involucral bracts ovate or broadly elliptic, white tomentose; calyx cinereo-pubescent without, lobes almost one-third the length of calyx tube or shorter without any accessory teeth; corolla with a broad villous band in throat ..... **C. tomentosa var. nivea var. nov.**

## DESCRIPTION OF SPECIES

**1. *Congea chinensis* Mold., Phytologia II (1947) 311 & Résumé Geogr. distr. & Syn. (1959) 169. var. *chinensis* — Fig 1.**

Among all the species with four involucre bracts, *C. chinensis* is easily distinguished by its involucre bracts being united into a cup (up to 6 mm. long) at the base.

Branchlets cylindrical, cinereo-tomentose. *Leaves* chartaceous, narrowly elliptic, acuminate towards apex, almost rounded or cordulate at base, excepting the puberulous midrib glabrous above, pubescent below, up to 14.5 cm. long, 6 cm. broad; main lateral nerves 5–6 pairs, more conspicuous and more densely hairy beneath; intramarginal nerve prominent on the underside; petiole up to 7 mm. long, densely hairy. *Inflorescence* in axillary and terminal panicles, 15–25 cm. long, canescent. *Cymes* 5-flowered; involucre bracts 4, united into a cup at the base, oblong-oblongate, narrowed towards the base, uniformly hoary in the upper surface, often sericeous along midrib above, 2.5–3 cm. long, 5–8 mm. broad; cup  $\pm$  6 mm. long; peduncles 1–1.8 cm. long, canescent. *Calyx* almost campanulate, 5-lobed, albo-sericeous without, appressedly hairy within, up to 7–8 mm. long; lobes acute, almost crispate. *Corolla* exserted, bilabiate; tube cylindrical,  $\pm$  7 mm. long, glabrous but with a broad villous band in the throat. *Stamens* 4, much exserted; filaments filiform; anther lobes almost orbicular. *Ovary* obovoid, glabrous, glandular towards apex,  $\pm$  2 mm. long; style filiform.

CHINA: Yunnan (Tsai 25,611: SING, isotype).

BURMA: **Kachin Hills**, north of Myitkyina on road to Kanpti Long (Toppin s.n.: E, 4,225: CAL); Tankhu, alt. 1,500–2,500 ft. (Kingdon-Ward 20,514: A, BM & E; 9,049: BM).

**1a. *Congea chinensis* Mold. var. *latibracteata* Munir var. nov. — Fig. 1a.**

*A forma typica foliis late ellipticis, inflorescentiae axi flavido pubescente, bracteis involucrelibus oblongis, violaceis, tomentosis, basi longe albo pilosis, cupulo involucri brevioris (circa 4 mm. longis), calycibus externe hirsutis (inflorescentiae internodis, bracteis foliaribus axillantibus et pedunculis brevioribus) haec varietas facile distinguenda.*

This variety is easily distinguished from the type form, in its leaves being broadly elliptic; inflorescence axis flavido-pubescent; involucre bracts oblong, violet, tomentose with long canescent hairs at the base above; cup shorter ( $\pm$  4 mm. long); calyx densely hirsute outside (panicles internodes, peduncle and the axillant bracts smaller).

BURMA: **Maymyo**, alt. 3,500 ft. (Lace 6,146: E, holotype & isotype).

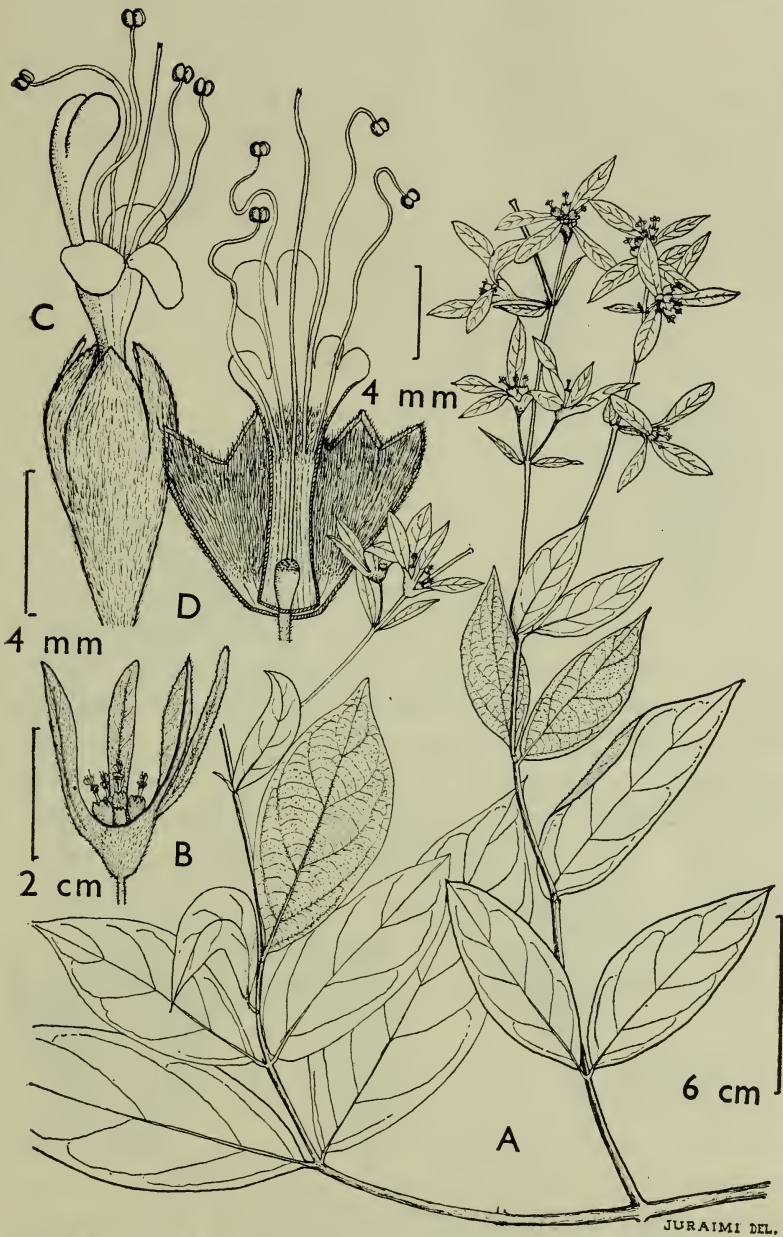


Fig. 1. *Congea chinensis* var. *chinensis* (Tsai 52,611 in SING).  
A, Fertile twig. B, Cyme to show involucre cup. C, Flower. D, Flower longitudinally cut open to show its internal structure.

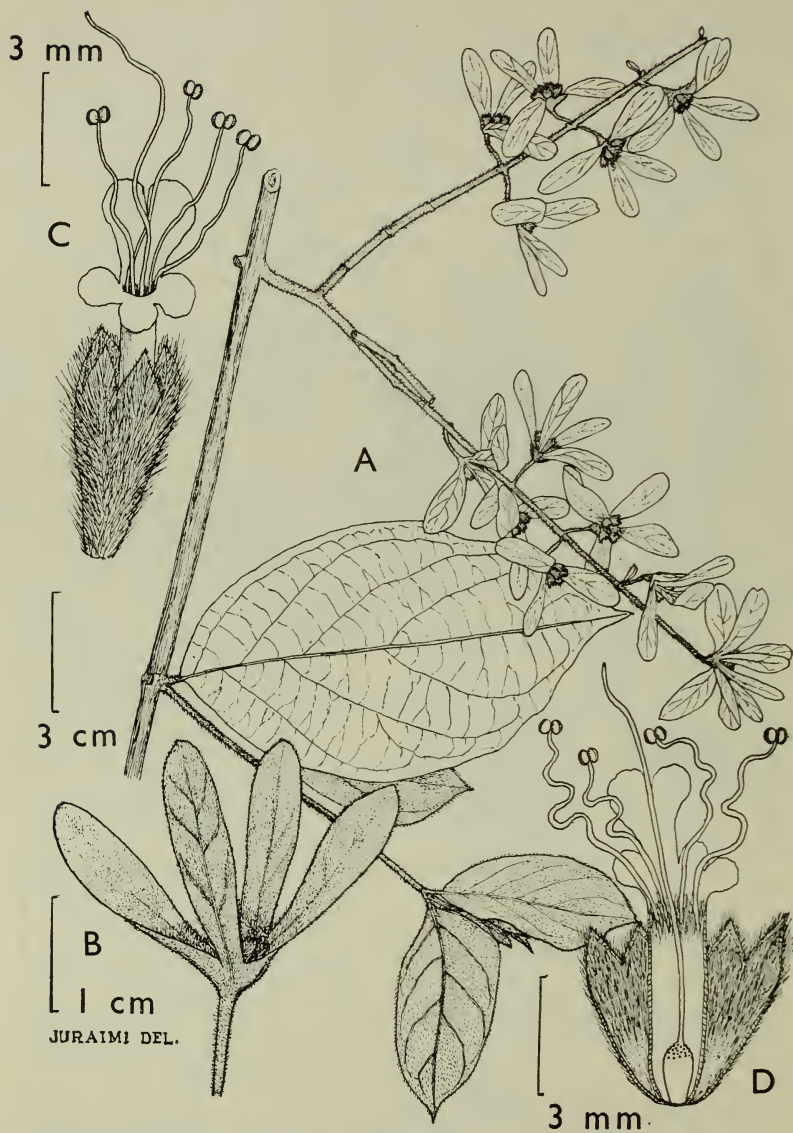


Fig. 1a. *Congea chinensis* var. *latibracteata* (Lace 6,146 in E).

A, Flowering twig. B, Involucre with flowers. C, Flower. D, Flower vertically cut open.

2. *Congea rockii* Mold., in Phytologia VIII (1961) 14 — Fig. 2.

This species is closely allied to *C. forbesii* in having oblong-lanceolate leaves, four involucre bracts free to the base and pedicelliform flowers, but is easily distinguished by its brownish, very long, forward pointing and conspicuous hairs on branchlets and inflorescence; involucre without any additional pair of bracteoles and (young) cymes 5–6 flowered.

Stem slender, almost cylindrical, densely fulvous-tomentose, interspersed with long hairs. *Leaves* chartaceous, oblong-lanceolate, acuminate at apex, almost rounded or cordulate at base, nitid and glabrous above, but pilose in margins and puberulous in midrib above, densely fulvous-pubescent beneath, brunnescent when dry, 5.5–12.5 cm. long, 2–3.5 cm. broad; main lateral nerves 5–7; petioles 5–7 mm. long, densely fulvous-hirsute. *Inflorescence* in axillary and terminal panicles, lax, up to 30 cm. long, with long, dense, fulvous tomentum; cymes 5–6 flowered (only young available); involucre bracts 4, free to the base, narrowly elliptic, densely white tomentose above, very densely fulvous hairy beneath, young 10–14 mm. long,  $\pm$  4 mm. broad; peduncles 5 mm. long (young). *Calyx* pedicelliform, campanulate, densely fulvous-tomentose with long porrect and conspicuous hairs without, appressedly hairy within. *Corolla* (undeveloped) bilabiate, glabrous with a villous ring at the throat. *Stamens* 4; filaments short, undeveloped; anthers  $\pm$  orbicular. *Ovary* almost obovoid, glabrous, glandular towards apex; stigma and style short.

THAILAND: **Chiengmai**, between Ta Kaw and Meh Soi (Rock 1,677: UC, **holotype**; A, isotype).

Both the specimens studied here are too young, but the species is quite distinct.

In protolog the author described the species as having 3-flowered sessile cymes with only 3 involucre bracts; but even in the holotype specimen the heads (cymes) are actually pedunculate, bearing 5–6 flowers, and their involucre bracts are always 4. However, the inflorescence is young and the peduncle and other parts are not fully developed; and the two opposite cymes becomes so congested in the axils of the foliar bracts that the examination of the cyme is not easy. The long hairs also interfere in the counting of flowers. Hence, unless a cyme is detached it is difficult to make a proper analysis.

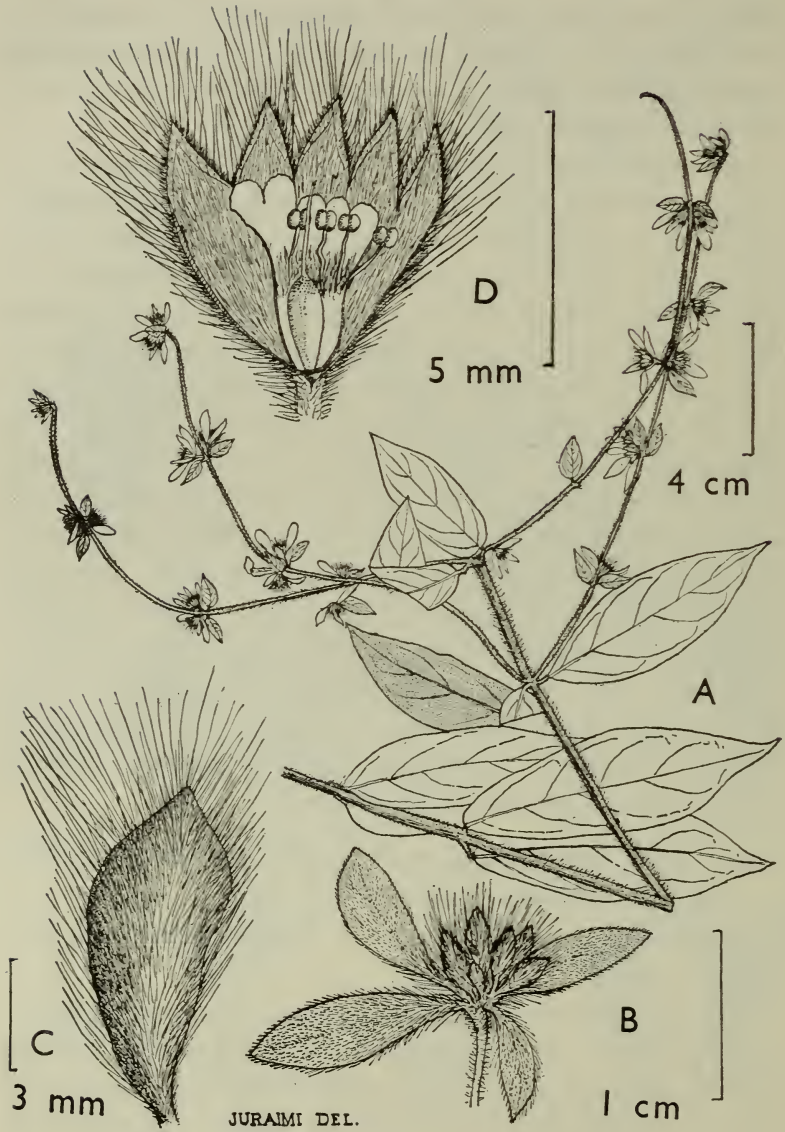


Fig. 2. *Congea rockii* (Rock 1,677 in UC).

A, Twig with immature inflorescence. B, Young cyme to show the number of bracts and flower buds. C, Flower bud. D, Dissected flower bud.

**3. *Congea griffithiana* Munir sp. nov. var. *griffithiana* — Fig. 3.**

*C. velutina* Wight, Ic. IV, 3 (1849) 15 quoad t. 1479/B tantum (sphalmate *C. villosa*); Bakh. in Bull. Jard. Bot. Buitenz. III, Ser. 3 (1921) 101 p.p.; Mold., Résumé Geogr. distr. & Syn. (1959) 165, 179 & 275 p.p.

“*C. villosa* (Roxb.) Wight” sec. Clarke in Hook. f., Fl. Br. Ind. IV (1885) 603 p.p.; Briq. in Engl. & Prantl, Pflanzenfam. IV, 3a (1897) 181; Bakh. in Bull. Jard. Bot. Buitenz. III, Ser. 3 (1921) 100 p.p.; Mold., Résumé Geogr. distr. & Syn. (1959) 165, 177, 179 & 275, non *Roscoea villosa* Roxb.

*C. villosa* Wight sec. Fletcher in Kew Bull. (1938) 440.

*C. tomentosa* Roxb. sensu King & Gamble in Journ. As. Soc. Beng. LXXIV, II (1908) 866; Hallier in Meded. Rijks' Herb. Leiden 37 (1918) 86 p.p. Ridl., Fl. Mal. Penin. II (1923) 640 p.p.

*Haec species involucris 4-bracteatis liberis, bracteis azureis spathulatis basin versus cuneatissimis inter omnes distinctissima.*

This remarkable species often confused with *C. velutina* and *C. villosa* (Roxb.) is readily distinguished by its 4 involucrel bracts which are quite free to the base and violet in colour and spathulate much narrowed towards the base. The two other species, *C. rockii* and *C. forbesii*, also with 4 bracteate involucrel and no cup at the base, have elliptic to oblanceolate and more densely hoary whitish bracts.

Branchlets cylindrical, tawny tomentose. *Leaves* sub-coriaceous to chartaceous, elliptic, acuminate at apex, cuneate towards base, glabrous above, fuscous pubescent beneath, up to 12 cm. long, 6 cm. broad; main lateral nerves 4 pairs; petioles 5–10 mm. long, pubescent. *Inflorescence* in axillary and terminal panicles, tawny tomentose in axis; panicles up to 45 cm. long. *Cymes* 5-flowered; involucrel bracts 4, free to the base, spathulate to oblanceolate, much narrowed towards base, violet, thickly tomentose above, pubescent below, up to 3 cm. long, 1.3 cm. broad; peduncles almost 1 cm. long, pubescent. *Calyx* campanulate, 5-lobed, 4–5 mm. long, densely canescent hairy without, appressedly hairy within; lobes acute, crispate in margins, almost 1 mm. long. *Corolla* exserted; tube slightly longer than calyx, glabrous with a villous band in the throat; lobes almost rounded. *Stamens* 4, exsert; filaments long, up to 1 cm. long or more; anthers almost orbicular. *Ovary* ± obovoid, glabrous, glandular at apex; style longer than the filaments; stigma indistinctly bilobed.

BURMA: **Lower Burma**, Rangoon, in brushwoods and hedges, (Smith 55: A). [an escape from cultivation?]; Mergui (Griffith, known from Ic. 1479/B and K.d. No. 6012/1: K).

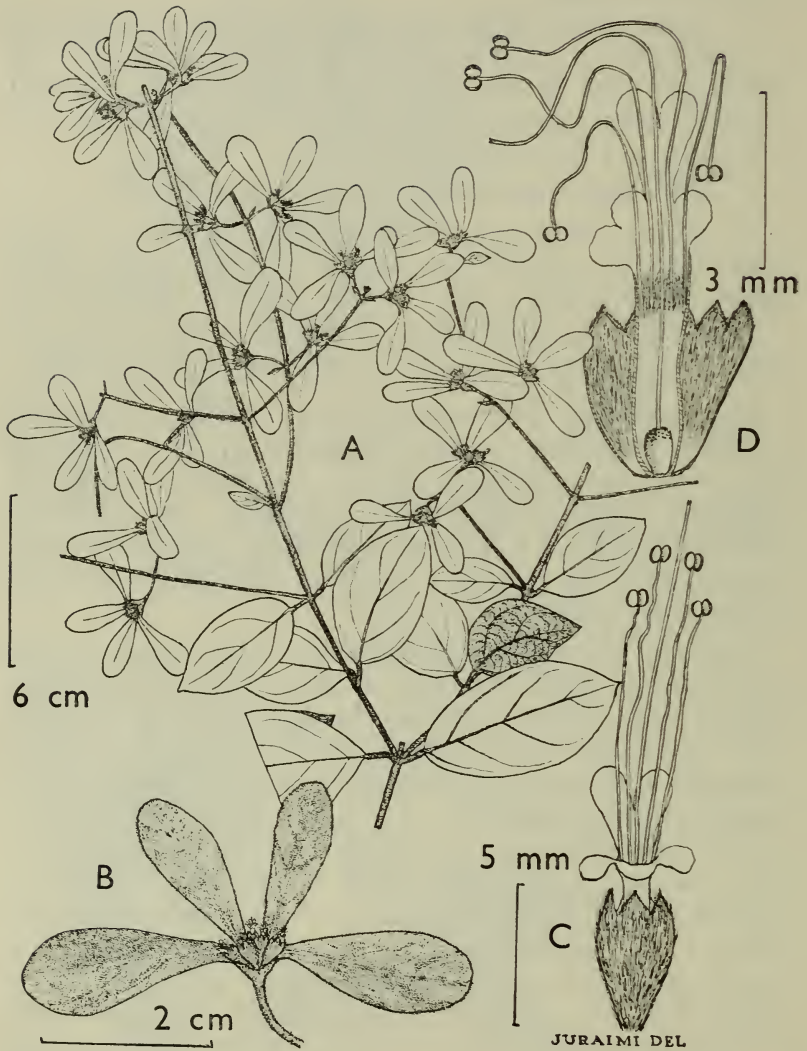


Fig. 3. *Congea griffithiana* var. *griffithiana* (Curtis 2,962 in SING, holotype).

A, Inflorescence. B, Cyme with its bracts and flowers. C, Flower. D, Dissected flower showing the disposition of the internal organs.

THAILAND: **Surat**, Kao Meo in bamboo forest (Kerr 12,470: BM & E). **Puket**, Ranawng, Kaw Banghen, in evergreen forest (Kerr 16,656: BM & E); **Katu** (Kerr 17,466: BM, E & K). **Kopah** (Haniff 3,858: SING). **Nakhon Si Thammarat**, Songkla, **Wang Yai** (Kerr 14,762: BM & E); Kao Ram, near stream (Smith 650: BM & E); Ban Pak Phanang? (Collins s.n.: BM); Chawang (Snan 99 & 913: BKF); Thung Song (Snan s.n.: K). **Poongah**, near the village (Curtis 2,903: CAL; 2962 SING, **holotype**; CAL, isotype).

MALAYA: **Kedah**, Gurun, 33½ mile Jeniang Road (Kadir SFN. 35,802: A, KEP & SING); Ulu Patani Mulik (Sow 34,622: KEP).

CULTIVATED: MALAYA, **Selangor**, Kuala Lumpur public gardens (Jaamat & Kasim 15,225: KEP & SING). **Johore**, Kota Tinggi, Nam Heng (Teruya 544: SING). **Singapore**, Botanic Gardens (Furtado s.n.: SING & UC; Noor s.n.: SING; Hallier 247: L; Munir 3: SING). INDONESIA: **Sumatra**, Sibolangit Garden (Lorzing 11,949: L & SING). **Java**, Batavia, Bogor Gardens (Visser C 90,401: L; Baker 36,411: L; Durand 7,204: L); Plant XV E. 71 (Leg.?: L & NY; Dilmy, L); Plant XV E. 3 XII. B. IX. 53 (Leg.?: NY); Tjidadap Tjibelier ± 1,000 M (Bakhuizen 285: CAL, L, SING). **Borneo**, Bandjermasin (Djimat Tatong 2,000: L). PHILIPPINE: **Luzon**, Laguna Province, at Los Banos (Steiner 22,801 & 22,931: PNH); Mt. Makiling (Canicosa 9,636: PNH; Esben 34,293: PNH; Rivera 33,460: PNH; Sulit 8,313: PNH). **Cebu**, Camp 7, Minglanilla (Cabiluna PNH No. 92,025: PNH). BELGIAN CONGO: loc. incert. (Goosens 4,511: NY).

This species was included as the paratype of *C. velutina* Wight. King & Gamble, however, described this species as *C. tomentosa* Roxb. though they quoted under it Roxburgh's plate (type) and Wight t. 1479/2 (= *C. vestita*). Fletcher's *C. villosa* is entirely this species, though he has regarded it as a new species of Wight.

The specimens collected by Bakhuizen from Preanger in Java (No. 285) and those collected by Djimat Tatong from Bandjermasin in Borneo are apparently from cultivated plants, though the collectors do not state so. The vernacular name in Borneo specimens is stated to be "Rongea" which might be a mis-copying of the name "Kongea". This species is not found wild so far south and on mountains. Similarly Smith 55 from Rangoon may be an escape from a cultivated plant; it has never been collected before so far north, the northernmost region hitherto known is Mergui where Griffith had collected the first specimen of the species which formed the basis of Wight *l.c.* t. 1479/B.

## Nomenclature

The nomenclature of this species presents certain problems which must be understood before the procedure followed here can be appreciated. Clarke (1885) adopted "*C. villosa* (Roxb.) Wight" as validly published in Wight *Ic. t.* 1479/B (1849) for *R. villosa* Roxb. which he quoted in the synonymy. However, Clarke also noted the difference between the 3-bracteate involucred *R. villosa* as represented in Roxburgh's unpublished coloured plate in Kew and the 4-bracteate involucred cymes in Wight's figure. Most of the subsequent botanists have followed Clarke and accepted Wight as the author of the new combination based on *R. villosa* Roxb. But Fletcher (1938), noticing that Wight's plant is specifically different from Roxburgh's, concluded that Wight had not published a new combination but only a new species, *C. villosa* Wight. Hence he excluded from it all reference to Roxburgh or to *R. villosa* Roxb., though he failed to account for Roxburgh's species based on a type from Burma. Moldenke (1959) has apparently accepted both *C. villosa* Wight and *C. villosa* (Roxb.) Wight as validly published binomials, though the former he reduced as the synonym of the latter.

Now, did Wight actually publish any of these binomials? If not, who are their authors? May any of these names be used as the correct one for the present species?

In the first place (*Ic. IV*, 3, 1849, p. 14) in discussing Schauer's monographic revision (1847), expressed doubts on the correctness of reducing *C. villosa* Roxb. (sic) and *C. azurea* Wall. to *C. tomentosa* Roxb., but since he had not seen any authentic specimen of Roxburgh's *villosa*, he left this species out of consideration. In addition he stated under *C. azurea* Wall. that he did not know Roxburgh's species (*villosa*), but questioned the propriety of Walpers in reducing the old *R. villosa* Roxb. as a synonym of the new species, *C. azurea* Wall. ex Walpers (1844), obviously because under the then current procedures Walpers should have made *R. villosa* Roxb. the basionym of the new isonym under *Congea* with *C. azurea* Wall. as a synonym. Besides he argued that had *C. azurea* and *C. villosa* been identical as Walpers maintained, Wallich would not have created a new binomial *C. azurea*. In other words, Wight treated as if Roxburgh himself had created *C. villosa* Roxb. and so he did not refer to *R. villosa* Roxb. at all. But since he was anxious to refrain from expressing any opinion on Roxburgh's *villosa* and left it out of his consideration, this casual reference to Roxburgh's species as *C. villosa* Roxb. and not *R. villosa* Roxb., cannot be taken as the formal publication by Wight of the new combination under *Congea* for *R. villosa* Roxb. and it could never be associated with Wight *Ic. t.* 1479/B.

As stated in my introductory remarks, the other "*C. villosa* (Roxb.)" in the legend of Wight *l.c.* t. 1479/B was a misprint for *C. velutina* Wight and this fact was stated by Wight himself both in the text and "erratum", the latter inserted as a separate line at the end of *C. azurea* Wall.

This means that Wight did not validate *C. villosa* either as a new binomial or as a new combination. However, Clarke, overlooking that "*C. villosa* (Roxb.)" was a misprint for *C. velutina* (Wight), [Wight quoted authors' names in brackets] adopted it as the correct name of a species and cited *R. villosa* Roxb. as its basionym. Therefore, it was Clarke who, unconsciously though it may be, made the combination valid; and so it may be cited as *C. villosa* (Roxb.) Wight ex Clarke. Hence *C. villosa* Wight ex Fletcher (1938), even if regarded as validly published, can be accepted only as a later homonym.

It is obvious, therefore, that, though *C. villosa* (Roxb.) Clarke has been relegated here merely as a synonym of *C. tomentosa* Roxb. and Fletcher intended to restrict the use of "*C. villosa* Wight" entirely to the present species, a new name had to be created for this taxon apparently not adequately described before. This lacuna has now been filled by establishing *C. griffithiana* as a new species.

**3a. *Congea griffithiana* Munir var. *elliptica* Munir var. nov. —  
Fig. 3a.**

*A former typica bracteis involucri ellipticis apice acutis, pedunculis longioribus crassioribusque haec varietas sat distincta.*

This variety can be easily distinguished from the type form, by its involucre bracts being elliptic, acute at apex, and peduncles longer and thicker.

BURMA: Tenasserim, Mergui Island (Proudlock 36: CAL, **holotype**).

**4. *Congea forbesii* King & Gamble in Kew Bull. (1908) 114 & Journ. As. Soc. Beng. LXXIV, II (1908) 866; Lam., Malay. Verb. (1919) 337; Mold., Résumé Geogr. Distr. & Syn. (1959) 188. var. *forbesii* — Fig. 4.**

*C. velutina* sensu Bakh. Bull. Jard. Bot. Buitz. III (1921) 101; Dop in Fl. Gén. Indoch. IV (1936) 908; pro parte.

Among all the species of *Congea* with four involucre bracts free to the base, *C. forbesii* K. & G. is easily distinguished by its (grey-tomentose) narrowly oblong or oblanceolate involucre bracts accompanied by an additional pair of short, linear, setaceous bracteoles.



Fig. 3a. *Congea griffithiana* var. *elliptica* (Proudlock 36 in CAL).  
A, Fertile twig. B, cyme to show the shape of its bracts.

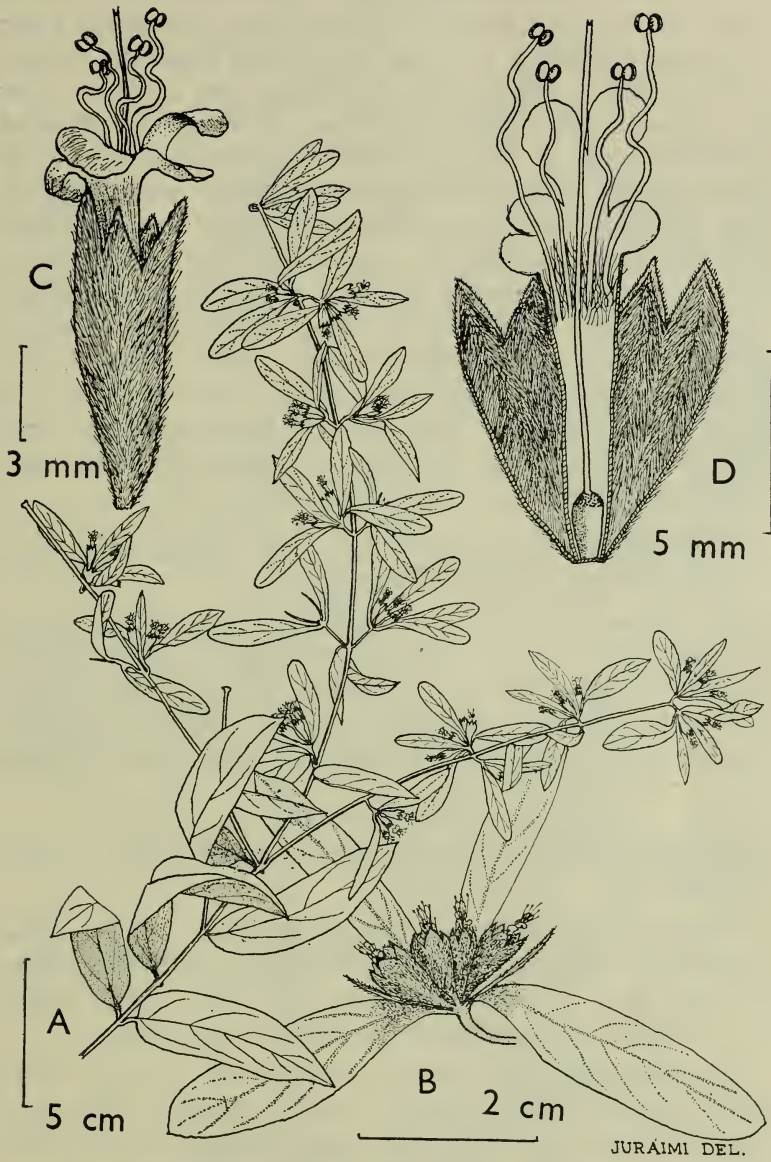


Fig. 4. *Congea forbesii* var. *forbesii* (Forbes 1,567 in SING).

A, Inflorescence. B, Cyme to show the two additional bracteoles. C, Flower. D, Ibid. longitudinally cut open to show the internal organs.

Branchlets slender, hairy tomentose. *Leaves* chartaceous, oblong or oblong-lanceolate, shortly acuminate at apex, rounded or slightly cordulate at base, nitid and excepting the puberulous nerves glabrous above, shortly tawny pubescent below, brownish when dry, 7–13 cm. long, 2.5–4 cm. broad; main lateral nerves 5–6 pairs; petioles up to 5 mm. long, tawny pubescent. *Inflorescence* in axillary and terminal panicles, lax, up to 30 cm. long, 15 cm. wide, tawny-pubescent. *Cymes* decussate, 3–4 flowered; involucre bracts 4, with two additional bracteoles, free to the base, narrowly oblong or oblanceolate, grey-tomentose, 2–4 cm. long, 0.4–1 cm. broad; bracteoles shorter, linear, setaceous, about 6–13 mm. long; peduncles 5–7 mm. long. *Calyx* pedicelliform at base, tubular, funnel shaped, 5-toothed, densely tomentose without, appressedly hairy within, 7–8 mm. long; lobes crispate, triangular, acute, 2–3 mm. long. *Corolla* much exserted, 2-lipped; tube cylindric, slender,  $\pm$  7 mm. long, glabrous except the villous ring at the throat. *Stamens* 4, much exserted; filaments filiform almost orbicular. *Ovary*  $\pm$  obovoid, glabrous, glandular towards apex; style slender, much exserted,  $\pm$  8 mm. long.

SUMATRA: In deep forests in Lampongs (Forbes 1,567: CAL, **holotype**; A, K, L & SING isotypes).

The presence of two linear-setaceous bracteoles between flower and involucre bracts is a special and distinct character found in no other species in the genus. Lam (1919, Key & text) described the number of these bracteoles as four, a number I have not found in any species. King & Gamble also mention two bracteoles only.

**4a. *Congea forbesii* King & Gamble var. *ridleyana* Munir var. nov.**  
— **Fig. 4a.**

*C. vestita* Griff. in King & Gamble in Journ. As. Soc. Beng. LXXIV, II (1908) 865; Lam, Malay. Verb. (1919) 338; Ridley, Fl. Mal. Penin; II (1923) 640; Dop in Fl. Gén. Indoch. (1936) 911: Omnino quoad specimen Ridleyanum infra citatum.

*A forma typica foliis ellipticis, inflorescentiis juventute dense fulvo-tomentosis saepe conspicuis pilis longioribus intermixtis; bracteis involucri late ellipticis vel oblongo-ellipticis, dense griseo-tomentosis, basi longis pilis canescentibus praeditis.*

This variety differs from the type form, in its leaves being elliptic; young inflorescence densely fulvous-tomentose usually mixed with longer and conspicuous hairs; involucre bracts broadly elliptic or oblong-elliptic, thickly grey tomentose above, with long canescent hairs at the base above.

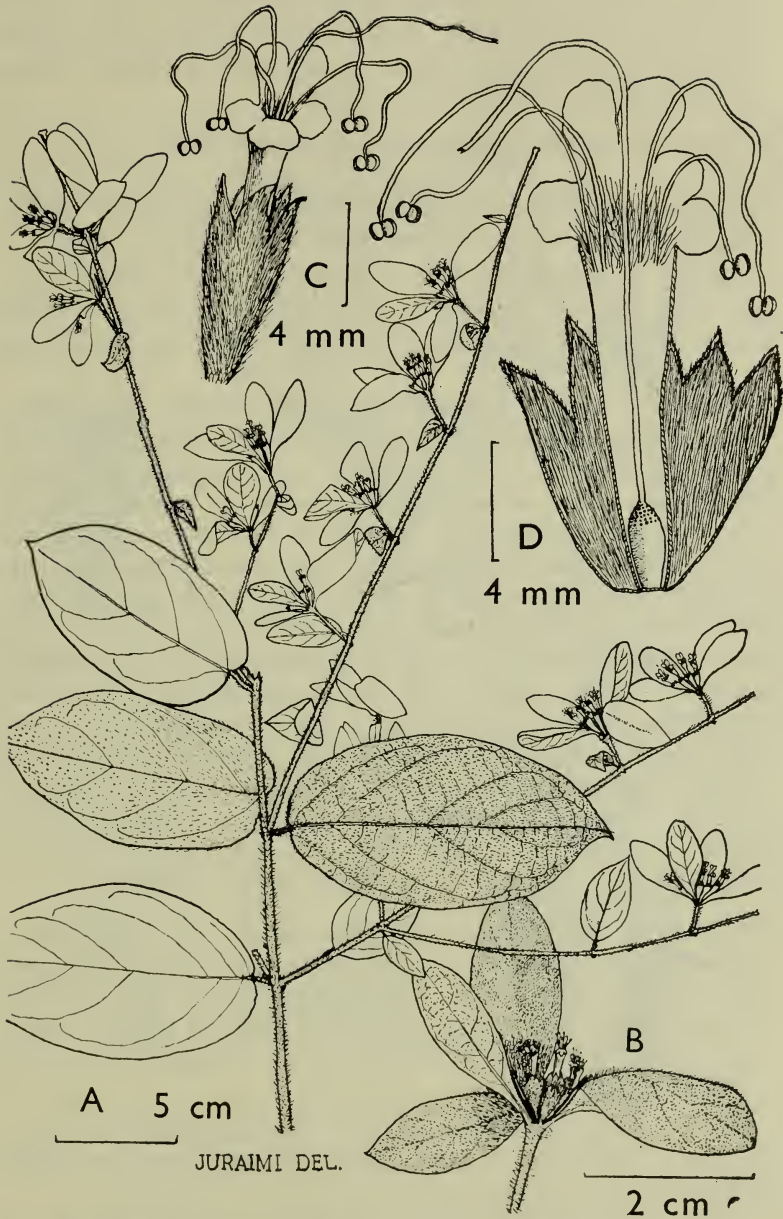


Fig. 4a. *Congea forbesii* var. *ridleyana* (Ridley 6,993 in SING).

A, Flowering twig. B, Cyme to show the additional pair of bracteoles and the shape of bracts. C, Flower. D, Flower vertically cut open.

MALAYA: **Province Wellesley**, Arakuda Woods (Ridley 6,993: SING, **holotype**; CAL, isotype). **Kedah**, Bukit Selambau, 100 ft. (Spare 37,314: A & SING); Jeniang-Selambau Road (Kadir SF. 35,803: SING; Wolfe & Kadir SF. 21,455: BM, KEP & SING); Sungei Batang (Dolman 21,509: KEP & SING); Baling, Kúpang Estate (Padaicher s.n.: SING).

SUMATRA: **Atjeh**, Bampoe-Serba (Pool s.n.: SING).

**5. *Congea connata*** Fletcher in Kew Bull. (1938) 208 & 440; Mold., Résumé Geogr. distr. & Syn (1959) 177 — Fig. 5.

Among all the species with 3-involucral bracts united into a cup at the base, *C. connata* is easily distinguished by its oblong leaves, narrowly elliptic-oblong involucral bracts, and longer cup ( $\pm 6$  mm.) at the base.

Branchlets almost cylindrical, canescent. *Leaves* chartaceous, oblong, acute towards apex, cordulate at base, nitid and glabrous above, pilose on the veins beneath, 7–16 cm. long, 2–4.5 cm. broad; main lateral nerves 4–5 pairs, prominent beneath; margins ciliate; petioles about 5 mm. long, pilose. *Inflorescence* in axillary and terminal panicles, canescent, 20–30 cm. long. *Cymes* 5-flowered; involucral bracts 3, united into a cup at the base, albo-canescens above, brownish below, narrowly elliptic-oblong, 2–3 cm. long, 0.5–1 cm. broad; cup  $\pm 6$  mm. long; peduncles 0.7–1.2 cm. long, canescent. *Calyx* tubular, 5-lobed, hirsute outside, appressedly hairy within; lobes  $\pm 1.5$  mm. long, pointed, crispate; tube 6–7 mm. long. *Corolla* protruding outside the calyx, 2-lipped, glabrous with a villous ring in throat; tube 8–9 mm. long; lobes rounded at apices. *Stamens* 4, inserted in corolla throat; filaments long, filiform, about 14 mm. long. *Ovary* oblong-obovoid,  $\pm 1$  mm. long; style upto 18.5 mm. long; stigma faintly two-lobed.

THAILAND: loc. incert. (Smitinand BKF No. 14,087:BKF).

**Chanthaburi**, Krat, Kao Saming (Kerr 17,913: E, **holotype**; BM, isotype); Kaw Chang, Klawng Mayom (Kerr 6,810: BM & E, paratypes); Koh Chang Island, east coast on the high banks of streams (Collins 569: BM, E & K, paratypes; Smith 306: BM & E, paratypes).

The author described the ovary as shortly pubescent at apex, though it is glandular at apex. Ovaries in this genus are always glabrous.

***C. connata*** Fletcher (X ? *C. chinensis* Mold.)

The species proper is restricted to Thailand. But Alleizette s.n. (L) collected at Phan Rang in Annam (Vietnam), has 3–4 distinct bracts which are white above as in *C. connata*. In fact this appears to be a hybrid between *C. connata* and *C. chinensis*.

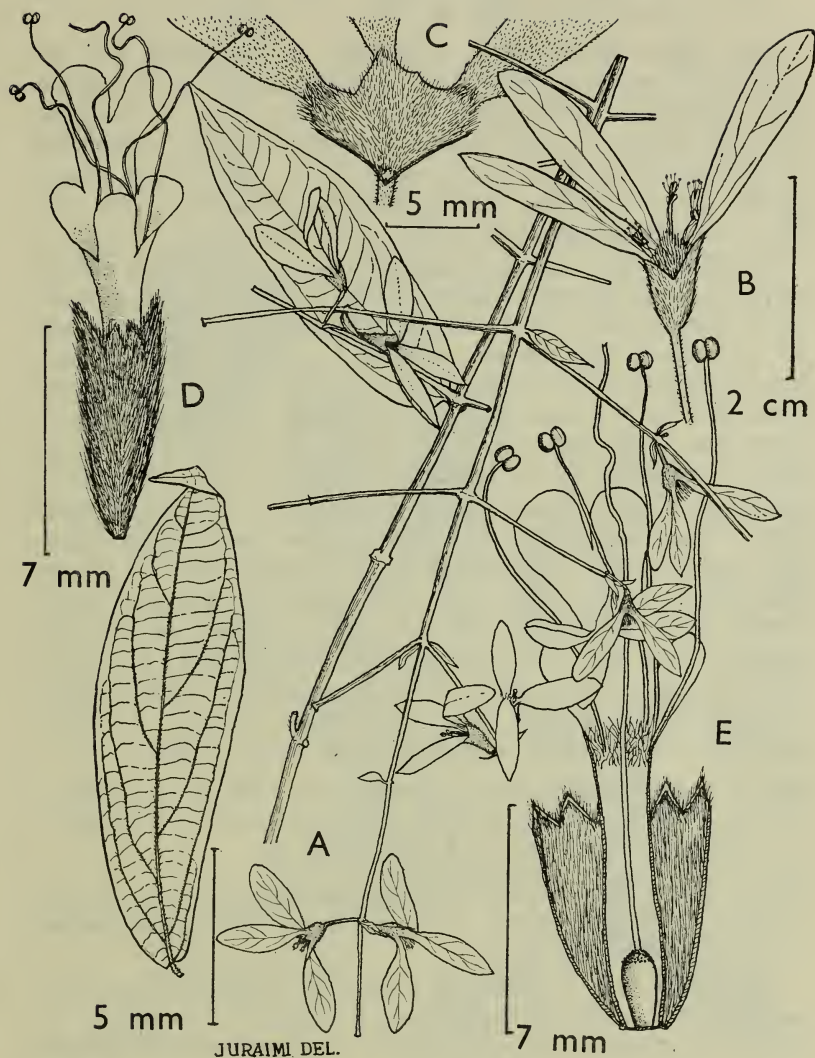


Fig. 5. *Congea connata* (Kerr 17,913 in E).

A, Inflorescence. B, Cyme showing the union of bracts at the base. C, Involucral cup cut open to show the angle between the bracts. D, Flower. E, Vertical section of the flower.

6. *Congea velutina* Wight, Ic. Ind. Or. III (1849) 15, t. 1479/3 or 1566 exclud. t. 1479/B; Clarke in Hook. f., Fl. Br. Ind. IV (1885) 603 & Fl. Koh Chang VIII (1904) 174; Briq. in Engl. & Prantl, Pflanzenfam. IV, 3a (1897) 181; Bakh. in Bull. Bot. Buitenz. III, Ser. 3 (1921) 161 *p.p.*; Dop in Fl. Gén. Indoch. IV (1936) 908 *p.p.*; Mold., Résumé Geogr. distr. & Syn (1959) 165, 179 & 275 *p.p.* — **Fig. 6.**

This species resembles *C. tomentosa* in the colour and the number of involucre bracts, but is distinguished by the bracts being spatulate and uniting into a distinct cup at the base. From *C. siamensis*, which also has 3-involucre bracts united into a cup at the base, *C. velutina* differs in its leaves being always cuneate towards the base; involucre bracts spatulate or oblanceolate, never emarginate; cup smaller ( $\pm 3$  mm. long).

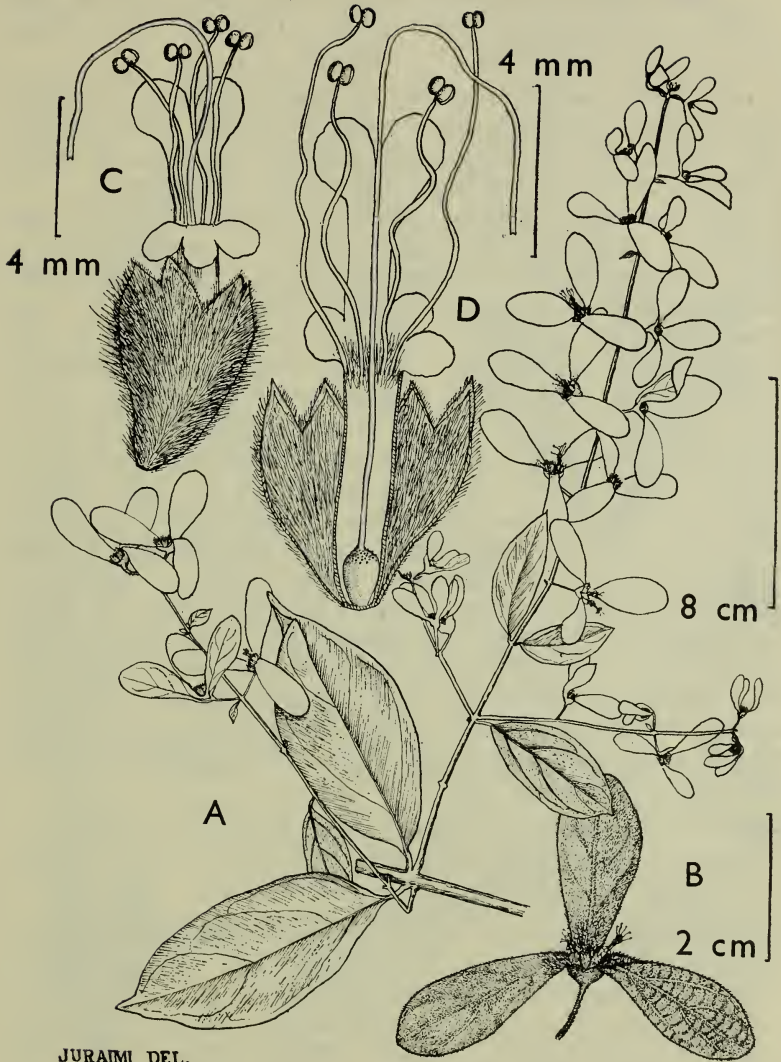
Branchlets terete, shortly pubescent. *Leaves* chartaceous, elliptic, acute-acuminate at apex, cuneate towards base, nitid and glabrous above, shortly pilose on the nerves beneath, up to 10.5 cm. long, 4.5 cm. broad; main lateral nerves 4–5 pairs; petioles 5–8 mm. long, pubescent. *Inflorescence* lax; panicles up to 30 cm. long, puberulous in the axis. *Cymes* 5-flowered; involucre bracts 3, united into a cup at the base, spatulate or oblanceolate, violet, thickly tomentose above, pubescent below, 2–3 cm. long, 1–1.5 cm. broad; Cup  $\pm 3$  mm. long; peduncles 1–1.5 cm. long, densely hairy. *Calyx* campanulate, 5-lobed,  $\pm 5$  mm. long, densely canescent hirsute outside, appressedly hairy within; lobes 1–1.5 mm. long, almost  $\frac{1}{4}$  the way down, crispate in the margins, acute. *Corolla* exsert; tube longer than the calyx,  $\pm 6$  mm. long, glabrous except a villous band in the throat; upper lip very long ( $\pm 4$  mm.); lobes rounded. *Stamens* 4, exsert; filaments filiform; anthers almost orbicular. *Ovary* obovoid, glabrous, glandular at apex,  $\pm 1$  mm. long; style filiform, long, exserted; stigma faintly bilobed.

BURMA: **Mergui** at Theinkun (Parker 2,579: DD & UC). [Moulmein], (Helfer K.d. No. 6,012: K); Ye Me near Tavoy (Helfer ? — mounted with Helfer K.d. No. 6,012: K).

THAILAND: West Coast, **Ranong**, Pakchang river at Mamoh (Kloss 6,703: K; Hamid 3,769: KEP & SING). **Bangtaphan** (Keith 2: SING).

This species was described as a *mixtum compositum* based on two Griffith's specimens from Mergui, depicted in Wight *Ic.* tt. 1479/3 and 1479/B. The lectotype is the specimen that formed the basis of Wight's t. 1479/3 which may be Griffith's 838 or its duplicate in Herb. Wight. I have seen neither. Wight t. 1479/B regarded by many as *C. tomentosa*, *C. velutina* or *C. villosa*, represents a distinct species having 4-involucre bracts which are free at base. It is described here as *C. griffithiana*.

This is the first species to be described as having a 3-bracteate involucre united into a distinct cup at the base. The bracts moreover are always spatulate or oblanceolate, never emarginate as



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Fig. 6. *Congea velutina* (Parker 2,579 in UC).

A, Flowering twig. B, Cyme showing shape of its bracts and the cup at the base. C, Flower. D, Flower vertically cut open.

in *C. siamensis*. Clarke described the corolla of *C. velutina* as smaller and its tube shorter than the calyx. Actually, as described by Wight and shown in t. 1479/3, the corolla is much exerted and its tube is always longer than the calyx.

7. *Congea siamensis* Fletcher in Kew Bull. (1938) 209 & 440; Mold., Résumé Geogr. distr. & Syn. (1959) 177 & in Dansk Bot. Arkiv. 23, I (1963) 85 — **Fig 7.**

This species resembles closely *C. tomentosa* in its involucre bracts being 3, sometimes sub-4 which are densely tomentose and violet above, but is distinguished easily by the union of bracts forming a cup at the base and by the smaller calyx teeth.

Branchlets terete, densely canescent tomentose. *Leaves* subcoriaceous, elliptic or oblong-elliptic, acute or sub-acuminate at apex, cordulate or almost rotundate at base, glabrous above with puberulent midrib, pubescent beneath, 8–17 cm. long, 3–7 cm. broad; main lateral nerves 5–6 pairs, prominent beneath; intramarginal nerve thin; petiole 0.5–1 cm. long, densely tomentose. *Inflorescence* in axillary and terminal panicles, canescent, up to 28 cm. long. *Cymes* up to 7-flowered or more; involucre bracts 3, occasionally sub-4, united into a cup at the base, obovate or broadly oblong-elliptic, often densely hoary in the upper surface, 2–3 cm. long, 0.7–1 cm. broad; cup  $\pm$  4 mm. long; peduncles 1–1.7 cm. long; densely hoary. *Calyx* campanulate, 5-lobed, densely hirsute outside, appressedly hairy within;  $\pm$  6 mm. long; lobes 1–1.5 mm. long, acute, crispate; tube almost 4.5 mm. long. *Corolla* exerted, bilabiate; tube cylindric,  $\pm$  7 mm. long or more, glabrous with a villous band in the throat. *Stamens* 4, inserted in the corolla throat; filaments much exerted, filiform, 13–25 mm. long; anthers almost orbicular. *Ovary* obovoid, glabrous, glandular towards apex, up to 2 mm. long; style very long, filiform; stigma indistinctly 2-lobed.

BURMA: **Tenasserim**, loc. incert. (Bot. Survey No. 379: CAL).

**Tavoy**, Zinba Chaung alt. 200 ft. (Ba Pe 804: CAL); Myitta (Parker 2,393: UC); Maungmagon (Parker 2,161: A & DD).

THAILAND: loc. incert. (Smith 314: A). **Prachinburi**, Krabin, Ban Keng (Kerr 19,792: E, **holotype**: BM, isotype; Marcan 2,529: E). **Rachaburi**, Kanburi, Siswat (Kerr 10,166: BM, E & K, paratypes; Boonkrong 7: BKF & K; Sangkhachand 757, BKF & K; Phengkhlai 175: BKF); Kawae Menam Noi, at Sai Yok (Larsen 8,723: A; 9,167: E).

This species is often confused with *C. tomentosa* because of the resemblance in the number and colour of their involucre bracts; but the inflorescence axis of *C. siamensis* is less tomentose, involucre bracts and the calyx teeth shorter and has a conspicuous involucre cup. *C. connata* is very close to this in having an involucre cup, but the cup itself is much longer (16 mm.) and the involucre bracts are always 3 and whitish.

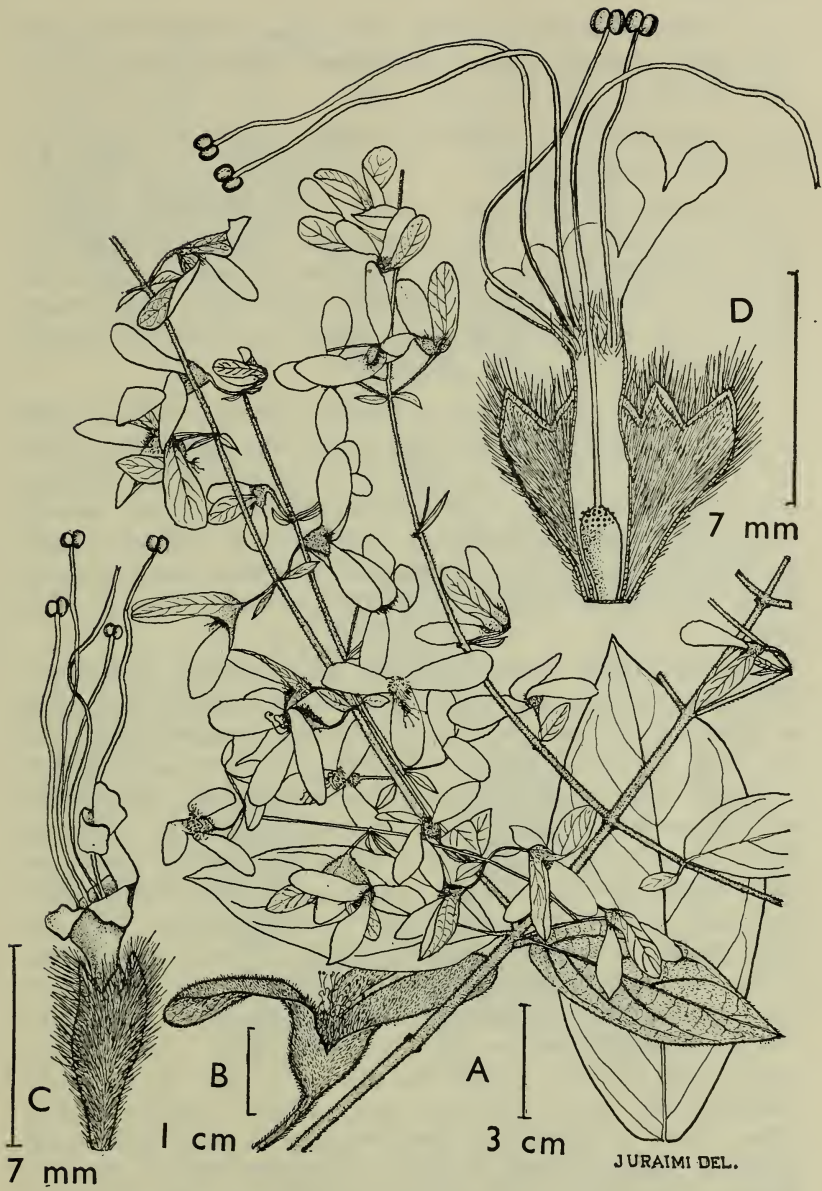


Fig. 7. *Congea siamensis* (Kerr 19,792 in E).

A, Inflorescence twig. B, Cyme to show the bractal cup. C, Flower. D, Flower longitudinally cut open.

**8. *Congea pedicellata* Munir sp. nov. — Fig. 8.**

*C. peteloti* Mold., Résumé Geogr. distr. & Syn. (1959) 175 p.p., non typicala.

*C. tomentosa* Roxb. sec. Dop in Fl. Génér. Indoch. IV (1936) 913, quoad specimen Poilanei Laosianum; Mold., Résumé Geogr. distr. & Syn. (1959) 175 p.p.

*C. vestita* Griff. sec. Dop in Fl. Génér. Indoch. IV (1936) 911 excl. parte typicala.

*A C. vestita cui affinisissima, rumulis foliferis floriferisque minute cinereo pubescentibus; foliis ellipticis basi plerumque rotundatis, raro cordulatis, chartaceis, superne scabridulis inferne pubescentibus (non hirsutis); bracteis involucri elliptico-obovatis, griseo-albidis; floris pedicello longiore; calycibus externe minute cinereo-pubescentibus haec species differt.*

Akin closely to *C. vestita* in having 3-involucral bracts free to the base, flowers pedicellate and corolla-tube shorter than calyx, but it can be distinguished easily by its branchlets and inflorescence axis being finely cinereo-pubescent; leaves elliptic, usually rounded at base (rarely cordulate), chartaceous, scabridulous above, grey-pubescent beneath; involucral bracts elliptic-obovate, greyish-white; flower-pedicels longer; calyx finely cinereo-pubescent without.

Branchlets terete, cinereo-pubescent. *Leaves* elliptic, chartaceous, acute-acuminate at apex, usually rounded but sometimes cordulate at base, scabridulous above, grey-pubescent beneath, up to 14.5 cm. long, 6 cm. broad; main lateral nerves 4–6 pairs; petiole 5–7 mm. long, cinereo-pubescent. *Inflorescence* in axillary and terminal panicles; axis cinereo-pubescent; panicles up to 25 cm. long. *Cymes* 7-flowered; involucral bracts 3 (or sub-4), free to the base, elliptic-obovate, densely covered with fine greyish white tomentum, up to 3 cm. long, 1.5 cm. broad; peduncles 1–2.5 cm. long, greyish pubescent. *Flowers* pedicellate. *Calyx* campanulate, 5-lobed, up to 8 mm. long, cinereo-pubescent without, appressedly hairy within; lobes almost one-third the length of the calyx tube, acute, crispate in the margins, 1.5–2 mm. long; tube cylindrical when young, later broader towards apex, 6–6.5 mm. long. *Corolla* bilabiate; tube shorter than the calyx, cylindrical, glabrous with a villous band in the throat; lobes rounded at apex. *Stamens* 4, exserted; filaments long; anthers  $\pm$  orbicular. *Ovary* obovoid, glabrous, glandular at apex,  $\pm$  1.5 mm. long; style long, exserted; stigma faintly bilobed.

LAOS: **Bassin du Se-Moun**, at Khone (Harmand 139: A). **Bassac á ubon** (Thorel 2,639: A); Ban Tha Ngon Road (Talbot 103: BM & SING); Prov. de Savannakhet (Poilane 13,683: A).

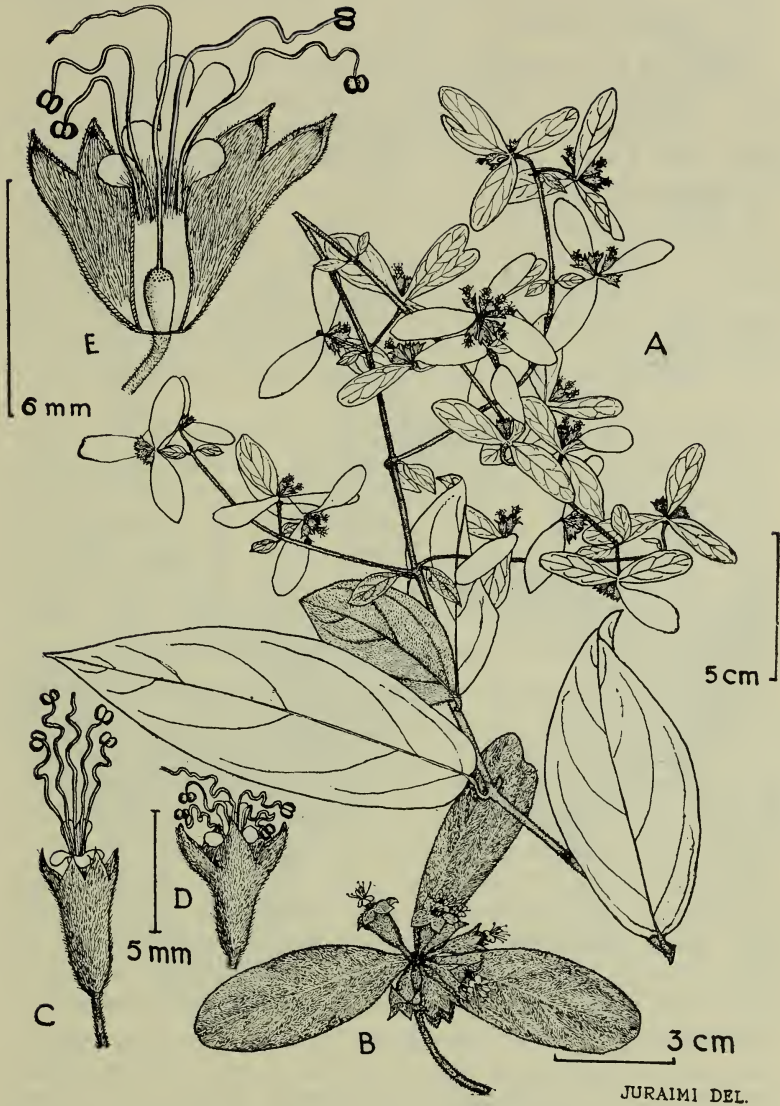


Fig. 8. *Congea pedicellata* (Pierre s.n. in B, holotypus).

A, Fertile twig. B, Cyme showing its bracts and flowers. C, Flower to show its distinct pedicel. D, Flower with a shorter pedicel but with longer calyx teeth from the same cyme. E, Vertically cut open flower shows corolla-tube in its relation to the length of calyx.

VIETNAM: loc. incert. (Poilane 11,674: A & B). **Cochinchine**, loc. incert. (Pierre s.n.: B, SING & UC); Dong nai (Pierre s.n.: B, **holotype**; A. B & SING isotypes); Baria (Pierre s.n.: UC); Bien Hoa (Thorel 648: A, B & UC; Alleizette 5,723: L); Saigon-Djiring, alt. 600 M. (Smitinand & Abbe 6,371: K). **Tonkin**, Ninh Binh (Alleizette s.n.: L).

Almost all the specimens of this species have been quoted by Dop (1936) under *C. vestita*, while Moldenke has annotated some of the specimens as *C. tomentosa* Roxb. and some as *C. peteloti* Mold. with a note that they have been "cited by him in his Monograph of the genus".

True *C. peteloti* Mold. is a form of *C. tomentosa* var. *nivea* which has sessile flowers and a corolla tube longer than the calyx. From *C. vestita* this species differs in its fine, very short, whitish indumentum on the branchlets, inflorescence axis, peduncles and calyces; the leaves are chartaceous cinereo-pubescent; involucre bracts much narrowed to the base, and flower pedicels longer.

9. *Congea vestita* Griff., Notul. IV (1854) 174 & Ic. Pl. As. t. 458, fig. 21; Clarke in Hook. f., Fl. Br. Ind. IV (1885) 603; Briq. in Engl. & Prantl, Pflanzenfam. IV, 3a (1897) 181; King & Gamble in Journ. As. Soc. Beng. LXXIV, II (1908) 865 pro parte typica; Lam, Malay. Verb. (1919) 338 p.p.; Ridl., Fl. Mal. Penin. II (1923) 640 pro parte typica; Dop in Fl. Génér. Indoch. IV (1936) 911 p.p.; Mold., Résumé Geogr. distr. & Syn. (1959) 165, 177 & 179 p.p. var. **vestita** — **Fig. 9.**

*C. tomentosa* Roxb. sec. Wight, Ic. IV, 3 (1849) 15 t. 1479/2 or 1565; et Miq., Fl. Ind. Batav. II (1858) 911; Clarke in Hook. f., Fl. Br. Ind. IV (1885) 603; King & Gamble in Journ. As. Soc. Beng. LXXIV, II (1908) 866; Bakh., in Bull. Jard. Bot. Buitenz. III, Ser. 3 (1921) 100; Dop in Fl. Génér. Indoch. IV (1936) 911; omnino quoad Iconem Wightianam supra citatam.

Allied closely to *C. tomentosa* in having 3 to sub-4 involucre bracts free to the base, but is readily distinguished by its flowers being long pedicelliform; involucre bracts broadly-elliptic or elliptic obovate, light cream coloured, more densely tomentose; corolla-tube shorter than calyx; and ferruginous hirsute twigs.

Branchlets cylindrical, ferruginous hirsute. *Leaves* coriaceous ovate, acute-acuminate at apex, cordulate at base, scabrid-pubescent above, ferruginous tomentose beneath; up to 16 cm. long, 7.5 cm. broad; main lateral nerves 5-6 pairs; petiole 5-7 mm. long, ferruginous hirsute. *Inflorescence* in axillary and terminal panicles, ferruginous hirsute in the axis; panicles up to 30 cm. long. *Cymes* (mature) 7-flowered; involucre bracts 3 (or sub-4), free to the base, broadly elliptic, not attenuate towards base, light cream coloured, densely tomentose, 2-4 cm. long, 1-2 cm. broad; peduncles up to 2.5 cm. long, patently ferruginous hirsute. *Flowers* pedicelliform; pedicels up to 2 mm. long. *Calyx* almost funnel

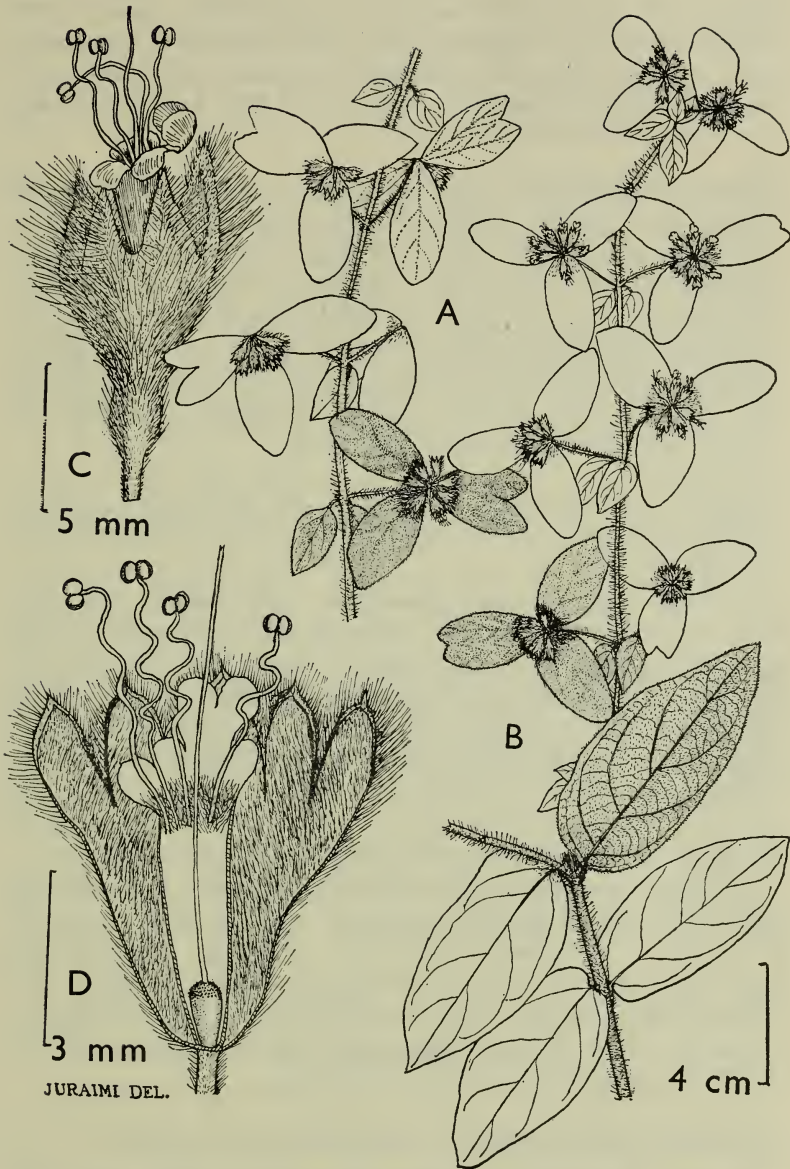


Fig. 9. *Congea vestita* (A. Griffith 898 in E; B-D, Beddome 6,530 in BM).

A & B, Parts of inflorescence show the hirsute axis. C, Flower showing short pedicel and long calyx-lobes. D, Flower dissected to show size of corolla-tube in its relation to calyx.

shaped, 5-lobed, up to 7 mm. long, densely hirsute within and without; lobes almost  $\frac{1}{2}$  the length of the calyx-tube, ovate-lanceolate, up to 3 mm. long, crispate in the margins; tube 4-5 mm. long. *Corolla* tube shorter than the calyx, cylindrical, glabrous with a villous band in the throat; lobes rounded, glabrous. *Stamens* 4, exsert; filaments thread like; anther lobes almost orbicular. *Ovary* obovoid, glabrous, glandular at apex  $\pm$  1 mm. long; style long, exsert; stigma indistinctly 2-lobed.

BURMA: **Martabania**, Papun (Meebold ? 16,999: CAL); Donat range, alt. 1,500 ft. (Beddome 6,530: BM); Amherst, Puye to Thagahta (Lace 5,591: CAL, E & DD; s. loc. [Prob. Moulmein] (Helfer K.d. No. 6,014: A). **Tenasserim**, Mergui (Griffith 898: E, **holotype**; K.d. No. 6,014: K, isotype; Meebold 14,078: CAL & NY); Crown Rubber Estate (Rogers 406: CAL; s. loc. [Prob. Griffith's coll. from Mergui] (Wight K.d. No. 2,305: K); Sanawut (Lace 4,802: CAL, E & K); Island of Mergui (Proudlock 44: CAL); loc. incert. (Pachman 116: BM).

CULTIVATED: **Java**, Hort. Bot. Bogor, XV. E. 70 (Leg. ? NY). **U.S.A.**, Botanical Garden, Bronx Park, New York (Moldenke 9,454: NY).

Misled by the erroneously placed line in Roxburgh's *Flora* that made the holotype specimen also from the Coromandel, Wight described this species as *C. tomentosa* Roxb. However, both his description and the plate were based on Griffith's collection which may be duplicate from the type collection of *C. vestita* and which probably represented by the specimen distributed from Herb. Wight under Kew No. 2,305 or by K.d. No. 6,014 in Kew. There are two "K.d. No. 6,014 in Kew"; one is Helfer's specimen in Arnold Arboretum and the other Griffith's from Mergui in Kew.

As shown in my revision of *Sphenodesme*, under *S. involucrata* (Presl) Rob. (*Gard. Bull. Sing.* Vol. 21, in press), Helfer collected in Moulmein (Martabania) and in the Andamans; but since this species does not occur in the Andamans, Helfer's specimen distributed under Kew No. 6,014 was probably also from Moulmein.

Specimen from Donat Range attributed by Clarke (1885) to Griffith is probably an error for Beddome.

#### 9a. *Congea vestita* Griffith var. *subvestita* Munir var. nov.

*A forma typica ramulis foliferis floriferisque paginis foliorum inferioribus flavido-pubescentibus, haud hirsutis, haec varietas facile distinguitur.*

This variety can be readily distinguished from the type form by its branchlets, inflorescence axis and underside of leaves being faintly yellowish pubescent, not hirsute.

VIETNAM: **Phan Rang**, Daban, alt. 650 ft. (Kloss s.n.: BM, **holotype**).

This variety differs from the type form only in the shorter indumentum, a character that might represent either a pure form or a modification through hybridisation. The species most likely to effect such a change in the progeny of *C. vestita* is by its being crossed with *C. pedicellata* or *C. tomentosa* var. *nivea*.

**10. *Congea tomentosa*** Roxb., Pl. Corom. III (1819) 90, t. 293; Walp., Repert. IV (1844) 117; Schauer in DC. Prodr. XI (1847) 623; Wight, Ic. Ind. Or. IV, 3 (1849) 15 excl. Ic. 1479/2 et descript.; Miq., Fl. Ind. Batav. II (1858) 911 p.p.; Kurz, For. Fl. Burma (1877) 256; Clarke in Hook. f., Fl. Br. Ind. IV (1885) 603 p.p.; Briq. in Engl. & Prantl, Pflanzenfam IV, 3a (1897) 181; King & Gamble in Journ. As. Soc. Beng. LXXIV, II (1908) 866 quoad protologum tantum; Craib in Kew Bull. (1911) 445 p.p.; Hall. f. in Meded. 's Rijks Herb. Leiden No. 37 (1918) 86 p.p.; Lam, Malay. Verb. (1919) 338 p.p.; Bakh. in Bull. Jard. Bot. Buitenz. III, Ser. 3 (1921) 100 p.p.; Boynton in Addisonia Vol. 13 (1928) 19 t. 426; Dop in Fl. Génér. Indoch. IV (1936) 911 p.p.; Fletcher in Kew Bull. (1938) 440 pro parte typica; Mold., Résumé Geogr. distr. & Syn. (1959) 159, 165, 175, 177, 179, & 275 p.p. and in Dansk Bot. Ark. 23, I (1963) 85: var. **tomentosa** — **Fig. 10**.

*C. tomentosa* Roxb. var. *azurea* (Wall. ex Walp.) Clarke in Hook. f., Fl. Br. Ind. IV (1885) 604; Dop in Fl. Génér. Indoch. IV (1936) 913; Fletcher in Kew Bull. (1938) 440; Bor & Raizada, Ind. Clim. & Shrubs (1954) 140, fig. 89; Mold., Résumé Geogr. distr. & Syn. (1959) 161, 165, 177, 179 & 275: (**nom. superfluum**) **Syn. nov.**

*C. tomentosa* Roxb. var. *caerulea* (Wall.) Clarke sec. Briq. in Engl. & Prantl, Pflanzenfam. IV, 3a (1897) 181. **nom nudum.**

*C. tomentosa* Roxb. var. *oblongifolia* Schauer in DC. Prodr. XI (1847) 624. **syn. nov.**

*C. azurea* Wall. Cat. (1828) 1733 1 & 2: nom. nud.; ex Walpers, Repert. IV (1844) 116; Wight, Ic. Ind. Or. IV, 3 (1849) 15, t. 1479/1, fig. A: (**nom superfluum**). **syn. nov.**

“*C. villosa* (Roxb.) Wight” ex Clarke in Hook. f., Fl. Br. Ind. IV (1885) 603; Briq. in Engl. & Prantl, Pflanzenfam. IV, 3a (1897) 181; Bakh. in Bull. Jard. Bot. Buitenz. III, Ser. 3 (1921) 100; Mold., Résumé Geogr. distr. & Syn. (1959) 165, 175, 177, 179 & 275: Omnino pro parte typica. **syn. nov.**

*Calochlamys capitata* Presl, Bot. Bemerk. (1844) 149; Walp., Repert. VI (1846) 691.

*Roscoea tomentosa* Roxb., Fl. Ind. III (1832) 56 & ed. Clarke (1874) 477: **typonym tantum.**

*R. villosa* Roxb. Fl. Ind. III (1832) 55 & ed. Clarke (1874) 477. **syn. nov.**

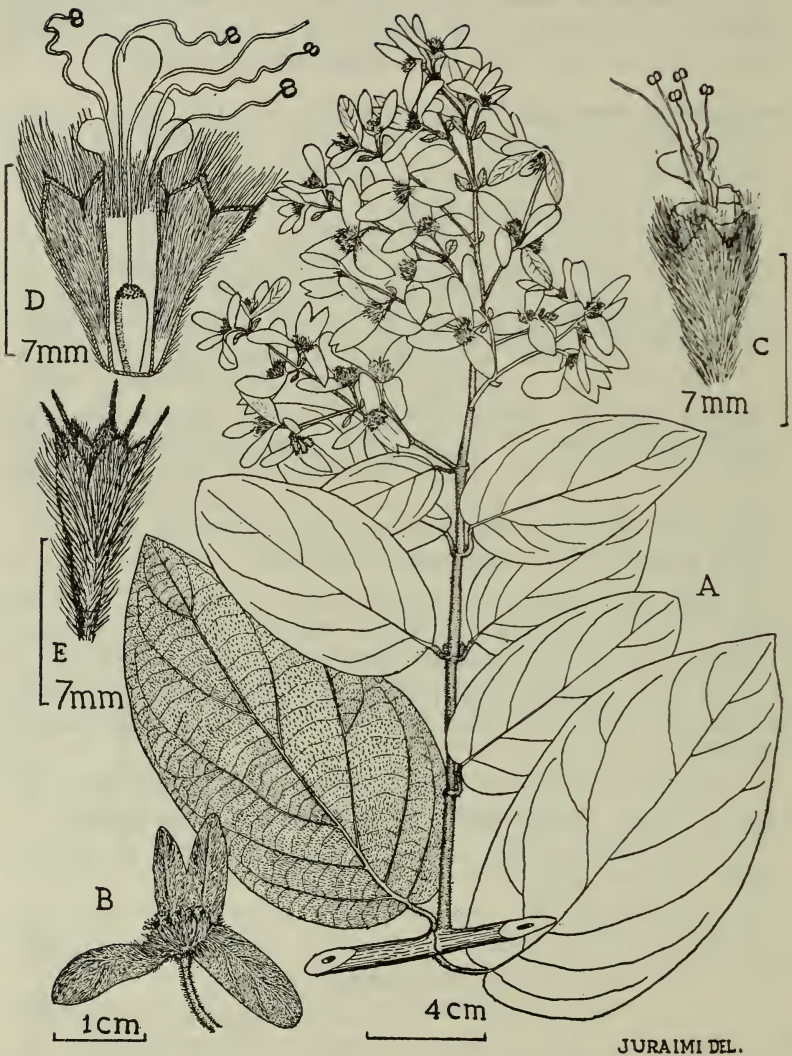


Fig. 10. *Congea tomentosa* var. *tomentosa* (A-D, Lace 2,176 in E; E, Hodge 3,654 in A).

A, Flowering twig. B, Cyme with one of its bracts deeply emarginate. C, Flower at pre-anthesis stage without accessory-teeth on calyx lobes. D, Flower longitudinally cut open. E, Calyx at post-anthesis stage, with accessory teeth on the lobes (corolla removed).

Among all the species having 3 (or sub-4) free bracts to an involucre, *C. tomentosa* can be easily distinguished by its adult bracts being violet; flowers sessile; calyx lobes (at anthesis) are provided with fine, long accessory teeth, and corolla-tube is longer than the calyx.

Branchlets almost cylindrical, fulvescent tomentose when young, later canescent. *Leaves* elliptic-ovate, usually acuminate at apex, (rarely obtuse), cordulate at base, puberulent above when young, later glabrous, thickly pubescent beneath, up to 18.5 cm. long, 9.5 cm. broad; main lateral nerves 5-6 pairs; intramarginal nerve prominent; petiole 5-13 mm. long, deeply striate dorsally, pubescent. *Inflorescence* in axillary and terminal panicles; axis fulvescent tomentose; panicles 12-30 cm. long. *Cymes* usually 7-flowered, (rarely 5 or 9-flowered); involucre bracts 3, occasionally sub-4, free to the base, 2-3 cm. long, 8-12 mm. broad; elliptic-oblong, violet, tomentose, provided at the base above with long, canescent hairs, peduncles 1-1.8 cm. long, densely pubescent. *Flowers* sessile. *Calyx* infundibuliform, 5-lobed, densely sericeo-hirsute outside, appressedly hairy within, 5-7 mm. long; accrescent lobes well developed, almost half the length of calyx tube, 1-2.5 mm. long, acute, often bearing a linear setaceous accessory tooth at the tip; tube 4-5 mm. long. *Corolla* tube longer than the calyx, cylindrical, glabrous except a narrow (almost fugacious) villous band in the throat. *Stamens* 4; filaments much exerted, filiform; anthers almost orbicular. *Ovary* obovoid, glabrous, glandular at apex,  $\pm$  2 mm. long; style long, exerted; stigma faintly bilobed.

EAST PAKISTAN: **Chittagong Hill Tracts** (Lace 2,176: CAL & E; Lister 89: CAL; Cowan 244, 802, 1,679, 1,899, 2,377 & s.n.: E).

INDIA: **Assam**, Lushai Hills, at Che Raun (Parry 609: K). **Manipur**, at foot of Kabsome, alt. 3,500-4,000 ft. (Watt 5,105: CAL & K); on the eastern frontier of India (Watt 5,055: CAL & E).

BURMA: **Upper & Central Burma**, loc. incert. (King s.n.: CAL; Collet 48: CAL); Taipinho valley, on the slopes (Forrest 1,144: A, BM & E; 9,586: E); Pintta (Prazer 36: CAL); Ruby mines (Abdul Huk 208: CAL); Madoe Hills (Mundul 86: CAL); Kachin Hills (Mokim 25: CAL & L; s.n.: CAL); Myitkyina (Pottinger s.n.: CAL); loc. incert. (Huk s.n.: CAL & L; Candler s.n.: CAL); Bilakatgyi [Shan State] (Watt 16: E; Maunders s.n.: CAL); Mangsath (Fulton sub Watt No. 10,770: CAL & E); Taung-gyi, alt.  $\pm$  5,500 ft. (MacGregor 1,120: CAL & E); Ta Kaw and Meh Soi (Rock 1,691: A); between Ban Meh Huak & Pang mah Ki Hat (Rock 1,923: A & UC); Bhamo (McMillen 201: UC; Anderson in 1868, s.n.: CAL); Katha, Kadu (Haines 5,776: K); Hsipaw, alt. 760 m. (McKee 5,986: K); Maymyo, Singaung Kyaing, alt. 3,000 ft. (Mg Kan 260: CAL); Magwe, Yabe Reserve, alt. 500 ft. (Rogers 597: CAL, DD & E); Minbu, Nwamadaung Hills (Aubert & Gage s.n.: CAL; Parkinson

15,700: DD); Victoria range, Chauktu, alt. 1,300 ft. (Kingdon-Ward 21,729: BM). **Prome & Karenni**, Prome (Toppin 2,557: E; Leg. ? s.n.: E); Nwezat, Taungbzank (Lace 2,724: CAL, E & K); Toungoo, Thandaung, alt. 1,500 ft. (Chin 4,366: CAL); Myaungmya (Dickason 6,927: A). **Pegu** (McLelland s.n.: A & CAL; Kurz 1,039 & 2,398: CAL; Brandis 878: DD; 880: CAL; Leg. ? 429: CAL). **Insein**, Maukhlaing Reserve, alt. 100 ft. (Khant 82: A & DD); Wanetchaung (Mg Kan 270: CAL). **Rangoon**, Rangoon (Parkinson 13,930: A; Weiste No. X.P.L.I.: BM; Dickason 3,142 & 5,662: A; Meebold 14,047: CAL; McLelland s.n.: E; Leg. ? 104 & s.n.: CAL). **Martabania**, Moulmein, [probably Amherst] (Wallich 1,733 a/: K; 1,733 (1): E); Amherst (Wallich 1,733: CAL; Dickason 6,869: A; Falconer 2: CAL); Moulmein (Beddome 6,531 & 6,533: BM; s.n.: SING; Loble s.n.: K; Helfer: K.d. No. 6,013: K; Prague Bot. Mus. No. 28: A, B, BM, E, L, NY & Bohemiae Herb. No. 53: CAL, probably isotypes of *Calochlamys capitata* Presl). **Tenasserim**, Mingatown (Gallatly 13: BM & CAL); Mergui (Griffith, sub Kew distr. No. 6,013: A).

**THAILAND**: loc. incert. (Vanpruk 163: K); Jampang (Kerr s.n.: BM). **Chiengmai**, alt. 1,000 ft. (Kerr 533: BM & K; Hosseus 370: BM, E & L); Doi Sutep (Native 3,810: A); Loei Wang Saphung, Sithan (Nakkarn 82: K; Bunpheng 472: BKF). **Kamphaeng Phet**, 50 km. towards East (Larsen & Hansen 6,636: BM). **Pitsanulok**, Petchabun, alt. 50 m. (Kerr 6,368: BM & E). **Rachaburi**, Kwai Noi River Basin Expedition (Kasin 162: A, K & L); Prachuap, Kan Kradi (Put 2,283: BM & E). **Prachinburi**, Sriracha (Collins 359: K).

**LAOS**: **Muong You** (Spire 749: B; s.n.: A); Trannih (Petelot 1,539: A & UC).

**VIETNAM**: **Annam**, Vinh, Cua Rao (Poilane 19,977: A).

**CHINA**: **Yunnan**, Salwin valley, Shweli, alt. 5,000 ft. (Forrest 29,388: BM & E); loc. incert. (Anderson in 1875 s.n.: CAL); Chen-Kang Hsien, alt. 2,000 m. (Wang 72,678: A).

**CULTIVATED**: Parks or Botanic Gardens: **India**, Calcutta (s.n.: CAL, E & L; Leg. in 1813: A; on 16/1/28: CAL; Ex Herb. Wight Prop. in 1882?: A & CAL); Sibpur (Raizada in 1953: DD); Dehra Dun (Raizada in 1941 & in 1942 and Balapure in 1956: DD); Travancore at Trivandrum (Erlanson 5,368: NY); Serampore (Griffith 9,331: BM). **Burma**, Rangoon (Bernard X.P.L.I.: BM). **Singapore** (Deshmukh on May 4th 1930 & 14/9/21: SING; Furtado on Nov. 15th 1927: SING & UC; Noor on September 23rd 1918: SING). **Indonesia**, Bogor XV: E. 70 (Leg. s.n.: NY). **West Indies**, Dominica at Roseau (Hodge 3,654: A). **Hispaniola**, at Haiti (Ekman 9,963: NY). **Cuba**, Soledad (Eames on March 7th, 1948: UC); Santa Clara, Cienfeugos (Jack 8,486: SING). **U.S.A.**, Florida, Miami, Kwekerij Wilson (Boom 38,552: L); Champan field, Coconut Grove (Moore 6,007:

BM); New York, Bronx Park (Moldenke 9,454: BM & NY); Porto Rico (Britton and Boynton 8,165: NY).

Fletcher (1938) was unaware that Walpers (1844) had validated *C. azurea* Wall. which was later amended by Wight (1849) to exclude *Roscoea villosa* Roxb. from its synonymy. Otherwise he would have seen that *C. tomentosa* var. *azurea* (Wall. ex Wight) Clarke is an erroneous expression for the variety. All specimens Fletcher cited under var. *azurea* belong to the type form of *C. tomentosa*.

*C. azurea* Wall. from Martabania 1827 is numbered in Herb. Hookerianum (now in Kew) as 1733-a/; while its duplicate in Herb. Edinburgh is numbered 1733 (1), and bears a name in pencil "= *Sphenodesme azurea*". The same secondary determination is found on McLelland's sheet from Rangoon district in Herb. Edinburgh. This may be the basis for Clarke's quoting "Wall. 1733 partly" under *Sphenodesme pentandra* Jack.

Wight (1849) described the corolla tube of *C. azurea* (text & Ic.) being shorter than the calyx and glabrous within. But the corolla tube in this species is longer than the calyx and is provided with a narrow, almost fugacious villous band in the throat.

In many mountainous specimens the involucre bracts usually become broad elliptic and almost free to the base, being slightly united at the base; but sometimes as in Lister 89 from Chittagong Hill tracts and in many from the lowland specimens, the bracts are narrow-oblong and quite free to the base. The calyx lobes of both these forms develop fine, aristate-like accessory teeth. In all cultivated specimens obtained from different parts of the world, the bracts are always narrow and free at the base. Is this an ecological response?

Prague Mus. no. 28 and Bohemiae Herb. no. 53 are distributed from Czechoslovakia as specimens from "India orientalis, in Bengalia circa Calcuttam", where this species never occurs wild. But as shown in my notes under *Sphenodesme involucreta* in *Gard. Bull. Sing.* (Vol. 21 in press), these specimens must be from Moulmein where Helfer had collected, since in the Andamans (the other place where Helfer had botanized), no species of *Congea* is found. As suggested in my previous notes, Helfer who was also from Prague, probably corresponded with Presl who was on the staff of the Prague University and so presumably these specimens of Helfer's bearing different numbers are from the collection which supplied the holotype of *Calochlamys capitata* Presl. Hence one seems justified to regard these specimens as isotypes of the species.

All the definitely known specimens of *Congea* collected by Griffith were from Mergui where he botanized. Therefore, the great probability is that Griffith's specimen distributed under Kew distr. No. 6,013 is also from Mergui. There are two specimens bearing K.d. No. 6,013; one is Helfer's in Kew and the other is of Griffith in Arnold Arboretum.

Wallich in his Catalogue listed his *Congea azurea* 1733 (1) as from Martabania while the other 1733 (2) was from Prome, much to the north of Martabania. However, in Herbarium Calcutta, there is a specimen collected by Wallich and numbered 1733 labelled as being from Amherst. This suggests that all his Martabania plants bearing No. 1733 are from this Amherst collection.

Since Roxburgh had grown in the Botanic Gardens, Calcutta, a progeny of the holotype plants of *C. tomentosa* and *C. villosa* (cf. Hortus Bengalensis, 1814), great importance has to be given to these specimens in interpreting Roxburgh's species, especially those that were collected during Roxburgh's time or soon after his death (cf. introduction). As to the specimens obtained from the Calcutta Gardens and distributed "Ex Herb. Wight," see the introduction in this paper under "Progeny of the Types".

As to the status of the combination "*C. villosa* (Roxb.) Wight" and "*C. villosa* Wight", see the nomenclatural note on *C. griffithiana*.

**10a. *Congea tomentosa* Roxb. var. *nivea* Munir var. nov. — Fig. 10a.**

*C. oblonga* Dop in Bull. Soc. Bot. France, LXI (1914) 320 & in Fl. Génér. Indoch. IV (1936) 910: Mold., Résumé Geogr. distr. & Syn. (1959) 175. **syn. nov.**

*C. peteloti* Mold., Phytologia III (1951) 409; & Résumé Geogr. distr. & Syn. (1959) 175 p.p. **syn. nov.**

*C. tomentosa* Roxb. sec. Fletcher in Kew Bull. (1938) 440, quoad specimen citata.

*C. velutina* Wight sec. Dop in Fl. Génér. Indoch. IV (1936) 909, quoad specimen Evrardianum infra citatum.

*C. vestita* Griffith sec. Dop in Fl. Génér. Indoch. IV (1936) 911 p.p.

*A forma typica ramulis foliferis floriferisque etiam juventute cinereo tomentosis, bracteis involucri obovatis vel late ellipticis, albo tomentosis, vivo interdum paulo violascentibus, calycibus externe cinereo-pubescentibus, lobis ejusdem tres unciae longis vel brevioribus, episepala non ferentibus; corollis in fauce latius villosa haec varietas sat distincta.*

From the type form this variety can be distinguished by its branchlets and inflorescence axis being cinereo-tomentose even when young; involucre bracts obovate or broadly elliptic, white tomentose, sometimes tinged mauve when fresh. Calyx cinereo-pubescent without, lobes one-third the length of calyx-tube or shorter with no accessory teeth; corolla with a broader villous band in the throat.

THAILAND: **Nakawn Sawan**, Takli (Put 2,101: BM & E; Marcan 1,072: BM & E). **Rachasima**, Pak Chawng (Marcan 1,550: BM & E). **Chantaburi**, Chantabun, Makam (Lakshnakara 491: BM

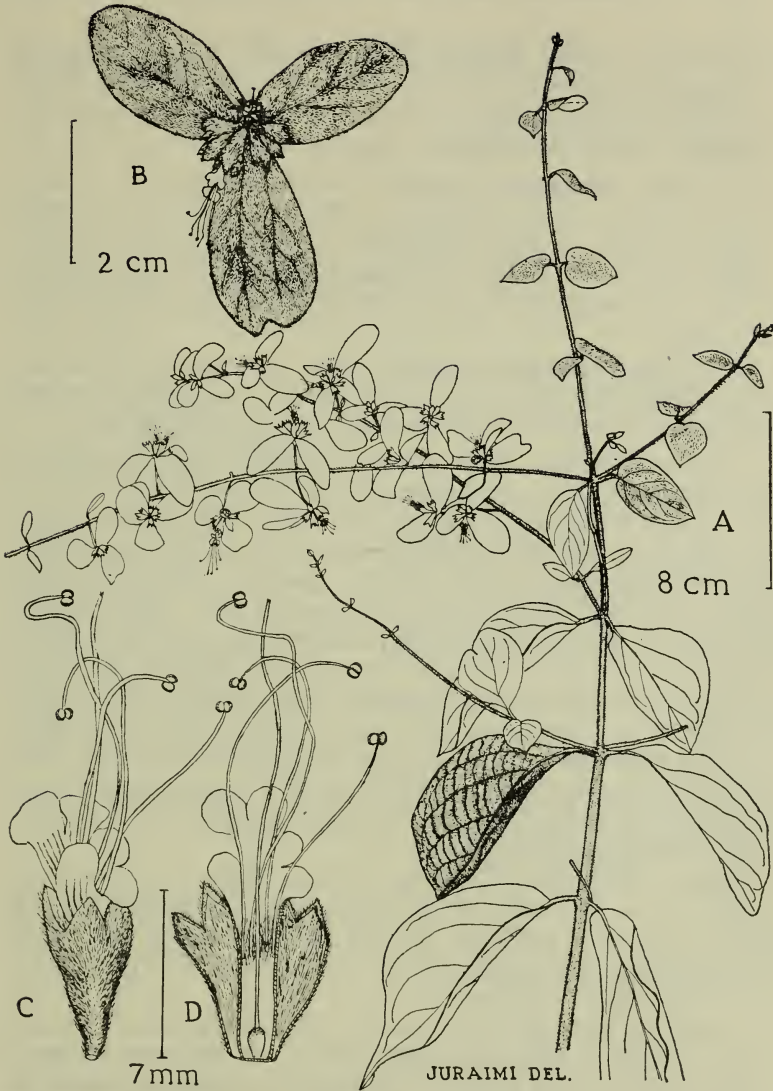


Fig. 10a. *Congea tomentosa* var. *nivea* (Noor & Munir 5 in SING holotypus).

A, Fertile twig, B, Cyme to show the shape of the involucre bracts. C, Flower. D, Flower vertically cut open to show its internal structure.

& E); Korat, Baw Rai, (Kerr 9,516: BM, E & K); South-eastern Chanturi, Fong Nam Raw, Kradak (Bunpheng 1,126: BKF). **Prachinburi**, near Sriracha (Collins 2,073: BM & E).

LAOS: **Cammon Province**, Thom (Petelot 3,852: A); Thok (Petelot 3,853: A). **Bassin du Se-Moun**, (Joseph in herb. Alleizette s.n.: L).

CAMBODIA: **Nord Kampot** (Poilane 14,639: A); montagne de l'Elephant, (Poilane 23,271: A). loc. incert. Evrard 2,459: SING).

VIETNAM: **Cochinchine**, Tra Vinh (Poilane 2,413: A & B). **Annam**, quang Tri (Poilane 11,695: B & UC).

CULTIVATED: **Singapore**, Botanic Gardens (Furtado s.n.: Intro. no. 119/1938: SING; Munir 4: SING; Holttum s.n.: SING; Noor & Munir 5: SING, **holotype** & A, B, C, E, G, K, L, LAE, MEL, PNH, NY, UC & US). **Indonesia**, Bogor Botanic Gardens, X.G. 62 (Soepadmo 1: L & SING); XV.E. 78 & 78a (Dilmy s.n.: L).

This variety sometimes produces violet colour on the underside of the involucre bracts or even above in young stage, but this colour does not persist or become obscure in dry specimens.

*C. oblonga* in Herb. Paris was not available to me. However, a specimen (in Herb. A) of Poilane 23,271, distributed from Paris as "*C. oblonga* Pierre *nom. nudum*" and quoted by Dop (1936) himself as identical with the species, agrees with the original description. Obviously the holotype consisted of a specimen with undeveloped flowers, a reason why Dop did not describe the corolla. Further the species is described as bearing 3-flowers to a cyme, a condition I have found only in the adult stages of *C. forbesii*. In young stages of many species the cymes may be 3-flowered or the smaller buds might be overlooked. However, in Poilane 23,271 (in Herb. A) shows 5-flowered cymes. The only difference one can find is the very narrow leaves, much narrower than in *C. tomentosa* var. *nivea* which may be a result of the ecological position of the branch, whether hanging or not.

Poilane 14,639 from Cambodge at Nord Kampot (in Herb. A) appears to be the same form, and through the undersurface of leaves it seems to link with the type of *C. tomentosa* var. *nivea*. This specimen is practically of the same locality as Pierre 5,229, the holotype of *C. oblonga*.

I have not been able to examine the holotype of *C. peteloti* (Petelot 3,852-a). However, Petelot 3,852 — a specimen collected on the same date and place and identified by Moldenke himself as the species, leaves no doubt as to the identity of the taxon. It is described correctly as having sessile flowers though Moldenke does not state whether the corolla tube is longer than the calyx or not.

Fletcher (1938) adopted the binomial *C. tomentosa* Roxb. (type var.) to designate almost exclusively the specimens of var. *nivea*, while the specimens cited under var. *azurea* are all typical *C. tomentosa* Roxb. Dop referred the specimens of this variety and of *C. pedicellata* to *C. vestita*.

### Index to Collectors' numbers

Collectors' names are in alphabetical order and their collections are in numerical order. The number in brackets refers to the number given to each taxon.

- ABDUL HUK 208 & s.n. (10).  
ALLEIZETTE 5723 & s.n. (8);  
s.n. (5); s.n. (10a).  
ANDERSON s.n. in 1868 and  
s.n. in 1875 (10).  
AUBRET & GAGE s.n. (10).  
BAKER 36,411 (3).  
BAKHUIZEN 285 (3).  
BALAPURE s.n. in 1956 (10).  
BA PE 804 (7).  
BEDDOME 6,530 (9); 6,531, 6,533  
& s.n. (10).  
BERNARD X.P.L.I. (10).  
BOOM 38,552 (10).  
BRANDIS 878 & 880 (10).  
BRITTON & BOYNTON 8,165 (10).  
BUNPHENG 472 (10); 1,126 (10a).  
CABILUNA 92,025 (3).  
CANDLER s.n. (10).  
CANICOSA 9,636 (3).  
CHIN 4,366 (10).  
COLLET 48 (10).  
COLLINS 359 (10); 569 (5);  
2,073 (10a); s.n. (3).  
COWAN 244, 802, 1,679, 1,899,  
2,377 & s.n. (10).  
CURTIS 2,903 & 2,962 (3).  
DESHMUKH s.n. (10).  
DICKASON 3,142, 5,662, 6,869 &  
6,927 (10).  
DILMY s.n. (3); s.n. (10a).  
DJIMAT Tatong 2,000 (3).  
DOLMAN 21,509 (4a).  
DUGUE 1,595 (10).  
DURAND 7,204 (3).  
EAMES in 1948 (10).  
EKMAN 9,963 (10).  
ERLANSON 5,368 (10).  
ESBEN 34,293 (3).  
EVRARD 2,459 (10a).  
FALCONER 2 (10).  
FORBES 1,567 (4).  
FORREST 1,144, 9,586, 29,388 &  
s.n. (10).  
FULTON sub WATT No. 10,770 (10).  
FURTADO s.n. in 1927 (3) & (10) &  
in 1938 (10a).  
GALLATLY 13 (10).  
GOOSSENS 4,511 (3).  
GRIFFITH 898 (9); K.d. No. 6,012/1  
(3); sub-K.d. No. 6,013 (10);  
6,014 (9); 9,331 (10).  
HAINES 5,776 (10).  
HALLIER 247 (3).  
HAMID 3,769 (6).  
HANIFF 3,858 (3).  
HARMAND 139 (8).  
HELPER sub-Prague Bot. Mus.  
No. 28 & Bohemiae Herb.  
No. 53 (10); sub-Kd.. No. 6,013  
(10); K.d. 6,014(9).  
HODGE 3,654 (10).  
HOLTUM s.n. (10a).  
HOSSEUS 370 (10).  
INDIAN BOT. SURVEY No. 379 (7).  
JAAMAT & KASIM 15,225 (3).  
JACK 8,486 (10).  
KADIR 35,802 (3); 38,803 (4a).  
KASIN 162 (10).  
KEITH 2 (6).  
KERR 533 & 6,368 (10); 6,810 (5);  
9,516 (10a); 10,166 (7); 12,470,  
14,762, 16,656 & 17,466 (3);  
17,913 (5); 19,792 (7).  
KHANT 82 (10).  
KING s.n. (10).  
KINGDON-WARD 9,049 & 20,514 (1);  
21,729 (10).  
KLOSS 6,703 (6); s.n. (9a).  
KURZ 1,039 & 2,398 (10).  
LACE 2,176 & 2,724 (10); 4,802 (9);  
6,146 (1a); 5,591 (9).  
LAKSHNAKARA 491 (10).  
LARSEN 8,723 & 9,167 (7).  
LARSEN & HANSEN 6,636 (10).  
LISTER 89 (10).  
LOBLE s.n. (10).  
LORZING 11,949 (3).

- MACGREGOR 1,120 (10).  
 MARCAN 1,550 (10a); 2,529 (7).  
 MAUNDERS s.n. (10).  
 MCKEE 5,986 (10).  
 McLELLAND s.n. (10).  
 McMILLEN 201 (10).  
 MEEBOLD 14,047(10); 14,078 & 16,999 (9).  
 MG KAN 260 & 270 (10).  
 MOKIM 25 & s.n. (10).  
 MOLDENKE 9,454 (9) & (10)  
 [The two mounted on one sheet.]  
 MOORE 6,007 (107).  
 MUNDUL 86 (10).  
 MUNIR 3 (3); 4 & 5 (10a).  
 NAKKARAN 82 (10).  
 NATIVE 3,810 (10).  
 NOOR in 1918 (10).  
 NOOR & MUNIR 5 (10a).  
 PACHMAN 116 (9).  
 PADAICHER s.n. (4a).  
 PARKER 2,161 & 2,393 (7); 2,579 (6).  
 PARKINSON 13,930 & 15,700 (10).  
 PARRY 609 (10).  
 PETELOT 1,539 (10); 3,852 & 3,853 (10a).  
 PHENGKHLAI 175 (7).  
 PIERRE s.n. (8).  
 POILANE 2,413 (10a); 11,674 (8); 11,695 (10a); 13,683 (8); 14,693 (10a); 19,977 (10); 23,271 (10a).  
 POOLL s.n. (4a).  
 POTTINGER s.n. (10).  
 PRAIZER 36 (10).  
 PROUDLOCK 36 (3a); 44 (9).  
 PUT 2,101 (10a); 2,283 (10).  
 RAIZADA s.n. in 1941, s.n. in 1942 & s.n. in 1953 (10).  
 RIDDLEY 6,993 (4a).  
 RIVERA 33,460 (3).  
 ROCK 1,677 (2); 1,691 & 1,923 (10).  
 ROGERS 406 (9); 597 (10).  
 SANGKHACHAND 757 (7).  
 SMITH 55 (3); 306 (5); 314 (7); 650 (3).  
 SMITINAND 14,087 (5).  
 SMITINAND & ABBE 6,371 (8).  
 SNAN 99, 913 & s.n. (3).  
 SOEPADMO 1 (10a).  
 SOW 34,622 (3).  
 SPARE 37,314 (4a).  
 SPIRE 749 (10).  
 STEINER 22,801 & 22,931 (3).  
 SULIT 8,313 (3).  
 TALBOT 103 & 648 (8).  
 TERUYA 544 (3).  
 THOREL 2,639 (8).  
 TOPPIN 2,557 (10); 4,225 & s.n. (1).  
 TSAI 25,611 (1).  
 VANPRUK 163 (10).  
 VISSER C90,401 (3).  
 WALLICH 1,733, 1,733a/ & 1,733 1/ (10).  
 WANG 72,678 (10).  
 WATT 16, 5,055, 5,105 & Herb. No. 10,770 (10).  
 WEISTE X.P.L.I. (10).  
 WIGHT sub-K.d. No. 2,305 (9); in 1,882 (10).  
 WOLFE & KADIR 21,455 (4a).

# A revision of *Sphenodesme* (Verbenaceae)

by

MUNIR AHMAD ABID

University of Sind, Hyderabad, West Pakistan.\*

## INTRODUCTION

The genus *Sphenodesme* was established by Jack in 1820 with one species, *S. pentandra*, the type specimen of which was collected by him in Penang and now preserved in the Herbarium at Edinburgh. Apparently Wallich, with whom Jack corresponded (Burkill in Journ. Roy. Asiat. Soc. Str. Br. 73, 1916, pp. 184 & 261), determined Jack's plant to be identical with the Sylhet species cultivated in the Botanic Gardens, Calcutta, and listed by Roxburgh without any description as *Roscoea pentandra* in his Cat. Hort. Bengalensis (1814) 64. In his protolog Jack referred to Roxburgh's invalid binomial but since that generic name was preoccupied, he adopted a new one.

Under the present Nomenclatural Code, Jack was quite right in giving this genus a new name as Roxburgh's binomial is not valid and therefore cannot claim priority. Hence the holotype of *Sphenodesme pentandra* Jack is Jack's specimen collected from Penang.

However, a good deal of confusion exists on the use of the name of *Sphenodesme pentandra*, because early botanists, following the old, now outdated, practice, gave priority to manuscript names attached to the plants cultivated in Gardens or to the specimens preserved in or distributed to, one herbarium or more. Under the present Code such names are discarded as *nomina invalida* or *nuda*. In this category will come the binomial *Roscoea pentandra* Roxb. or *Congea pentandra* Wall., adopted without any valid description for plants before the publication of Jack's monotypic genus. Hence Jack's species must be regarded, not as *Sphenodesme pentandra* (Roxb.) Jack, as many modern botanists have done, but merely as *Sphenodesme pentandra* Jack.

The earliest valid publication of *Roscoea pentandra* was in Roxburgh's *Flora Indica* III (1832) 54, which is antedated by Jack's publication by twelve years. Similarly, *Congea jackiana* Wall (1828 & 1830) which Schauer combined to *S. jackiana* (Wall.) Schauer is a superfluous name for Jack's species. *Roscoea pentandra* Roxb. with its isonym *S. pentandra* (Roxb.) Griff. is synonymous with *S. wallichiana* Schauer which is reduced here as a variety of *S. pentandra* Jack.

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\* Colombo Plan Fellow, Botanic Gardens, Singapore, 1965.

## Affinities

The genus was originally placed in the tribe Viticeae of Verbenaceae with a note that, "the genus is distinct from *Congea* of Roxburgh by the leaves of the involucre being all distinct; the nearly regular corolla, and the five nearly equal stamina" (Jack in Malay Misc. I, 1820, p. 19). Meissner (*Plantarum Vascularum Genera* Vol. I, 1836, p. 292 & II, *Commentarius* 1843, p. 200) who, like Wallich, considered the genus *Sphenodesme* synonymous with *Congea*, transferred it to his new tribe *Symphoremeae*, with *Symphorema* as the type. Schauer (1847) accepted *Symphoremeae* as a sub-tribe of *Viticeae* and kept *Sphenodesme* as a distinct genus. Bentham & Hooker (*Gen. Plant.* II, 1876 p. 1159) reinstated *Symphoremeae* as a tribe and also retained the genus *Sphenodesme* as a sub-tribe of *Viticeae* and kept *Sphenodesme* as a distinct genus. Bentham & Hooker (*Gen. Plant.* II, 1876 p. 1159) reinstated *Symphoremeae* as a tribe and also retained the genus *Sphenodesme*. In this they were generally followed by subsequent revisers. However, Briquet in *Engl. & Prantl, Pflanzenf.* IV 3a (1897) 179, raised the status of *Symphoremeae* to a sub-family SYMPHOREMOIDEAE. Moldenke in 1959 raised this again to a status of family "SYMPHOREMACEAE". In the present revision, however, I have not been able to make any evaluation of these views.

The genus is closely allied morphologically to *Congea* and *Symphorema* with which it has often been confused in the past. However, it can be easily distinguished from the other two by its involucre bracts being always 6, and stamens 5 rarely 6. In *Congea* the involucre bracts are 3-4 and the stamens 4 only, while in *Symphorema* the involucre bracts are 6, and stamens 6-18.

## Inflorescence

The inflorescence is a terminal or lateral panicle consisting of decussate cymes. The cyme is generally twice dichotomous, with a single flower at each fork (see **fig. 1**). In a fully developed cyme, there is a flower at each of the fork and at the end of each of the four secondary lateral branches, so that such a cyme is 7-flowered as in *S. pentandra* and *S. triflora* var. *montana*. The flower in the primary fork is not bracteate, but other flowers are axillary to bracts. Hence the involucre bracts are in two groups of 3+ 3. In *S. triflora* and *S. mekongensis*, the flowers on the secondary lateral branches do not develop, and so produce 3-flowered cymes. In *S. triflora* var. *riparia* and *S. sarawakensis*, one flower on each of the secondary branches are suppressed to make the cymes 5-flowered. Some botanists have described 4 or 6 flowered cymes, a number that seems unusual in this genus, and may have occurred due to an abnormal suppression or development of flowers. In the numerous specimens examined by me I have not found a single cyme that had an even number of flowers.

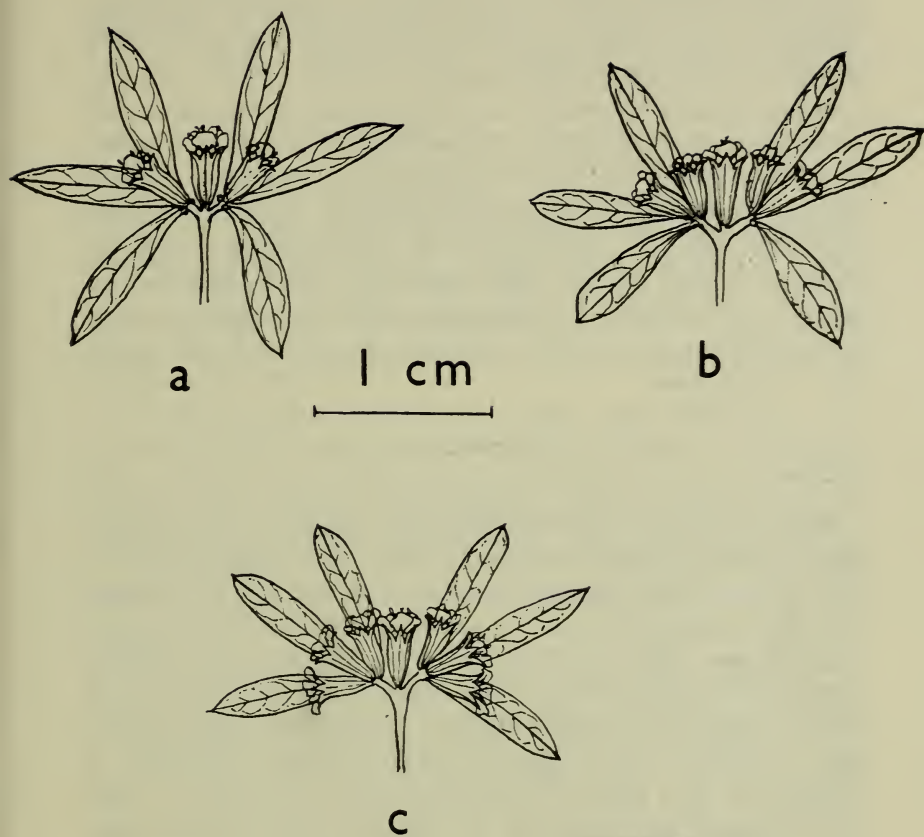


Fig. 1. Different types of cymes in the genus *Sphenodesme*.

- (a) 3-flowered cyme, showing suppressed flowers on the secondary lateral branches.
- (b) 5-flowered cyme, showing suppression of one flower on each of the secondary branches.
- (c) 7-flowered cyme.

## Calyx and Epicalyx

The calyx in the genus is either 5-ribbed or 10-ribbed. It is five ribbed where it has five lobes, and ten ribbed where it has in addition 5 accessory teeth. Some authors like Clarke (Fl. Br. Ind. IV, 1885 p. 602) considered these teeth as post-anthesial development and so regarded *S. pentandra* and its var. *wallichiana* as exact synonyms; but these teeth are noticed even in the early stages of the flower. In fact the accessory teeth represent congenitally fused epicalyx, so that technically they may be called epispals.

In the section BRACHYNEMA the calyx is five ribbed and has no accessory teeth. The calyx in the section SPHENODESME is either five or ten ribbed, the latter accompanied, as said above, with 5 accessory-teeth. The accessory-teeth generally alternate with the calyx-lobes, but in *S. racemosa* and its variety *sabahensis* they are opposite. Among the ten ribbed species the calyx-lobes may be entire as in *S. pierrei*, *S. mekongensis* and *S. pentandra*, or they may be bifid at apex as in *S. racemosa*, *S. sarawakensis*, *S. mollis* and *S. griffithiana*.

## Sections

Briquet retained the section BRACHYNEMA (Griff.) Clarke for the species having included stamens and style, the former seated on short filaments and the latter provided with a minute style. However, following Clarke, he retained *S. eryciboides* in the section SPHENODESME proper, but created for it a new sub-section ERYCIBODEAE on the basis of the length of involucre bracts, for this is the only species in the genus that has its involucre bracts shorter than the calyx. If this character were of special importance it should have been used as a sectional basis in the genus, or sub-sectional basis under the section BRACHYNEMA. But, it seems certain that neither Clarke nor Briquet had examined the inner structure of the flower of this species; nor even Moldenke (1959) who retained the sectional sub-divisions made by Briquet. Both the stamens and the style in *S. eryciboides* are not exerted as in the species of section BRACHYNEMA, the only difference being that its stamens with short filaments are seated at the corolla throat and not deep in the tube. Hence I have transferred sub-section ERYCIBODEAE to become a sub-section of BRACHYNEMA.

However, there are good reasons to sub-divide section SPHENODESME into two sub-sections on the presence of accessory teeth (Epicalyx) — SPHENODESME sensu stricto (= Decadontia Griff.), or their absence, PENTADONTIA.

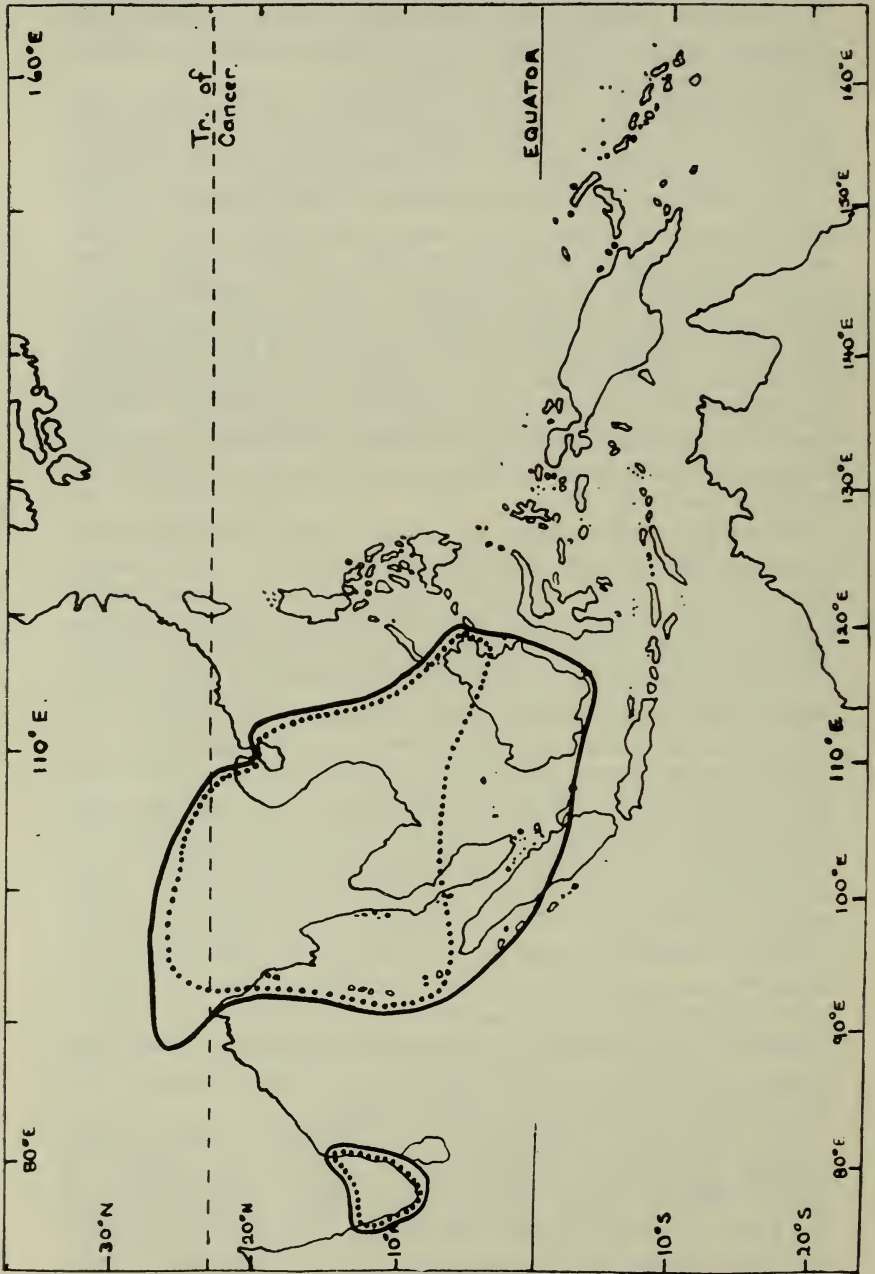
## Distribution

The genus in its distribution is restricted in the tropics of Asia, lying between 0–25° north latitude and 75–120° east longitude. This includes southern and north-eastern parts of India, East Pakistan, Burma, Thailand, Laos, Vietnam, South East China, Malaya, Sumatra and Borneo (See Map 1).

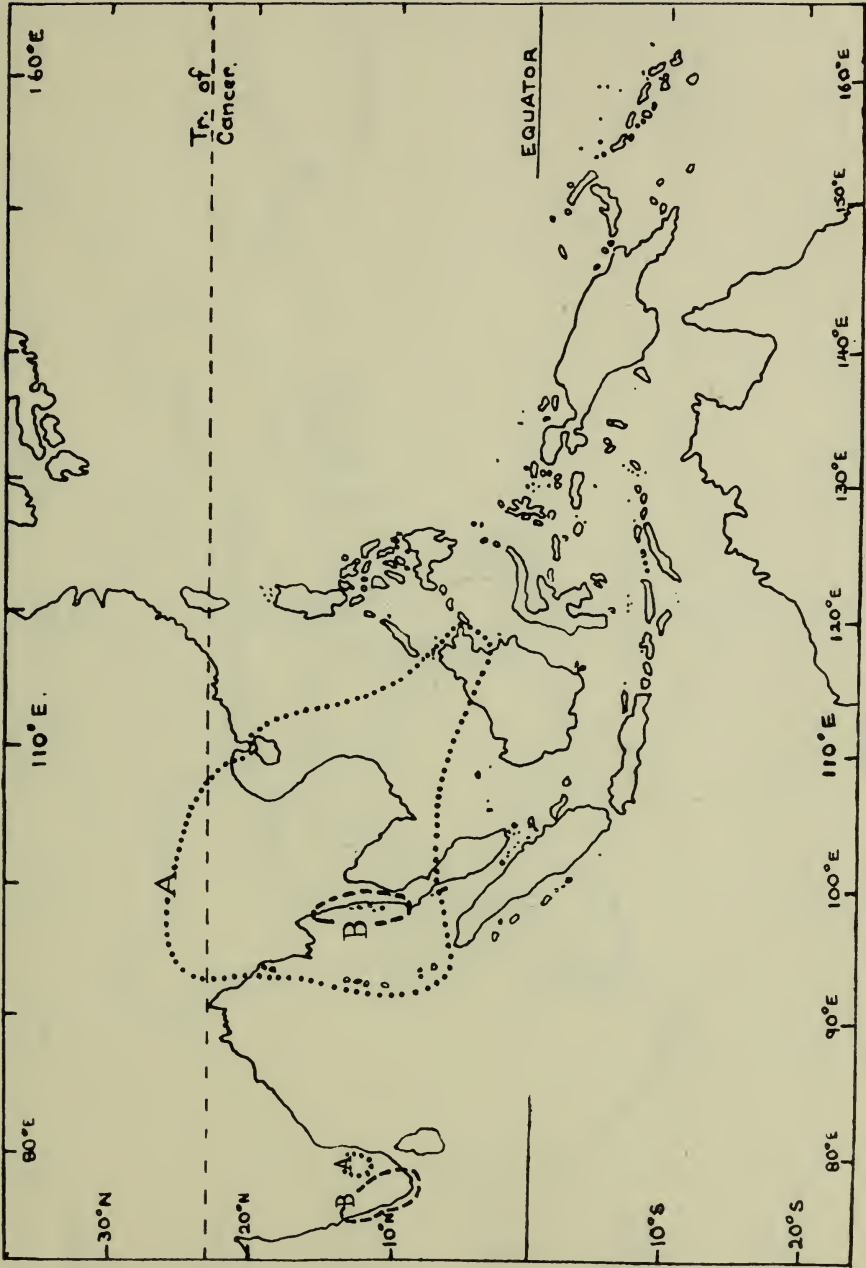
The members of the section BRACHYNEMA are recorded from South and North-East India, Burma, Thailand, Laos, Vietnam, Hainan and Borneo, but so far not from Malaya and Sumatra. *S. involucrata* var. *involucrata* is the most widely distributed species of the section, the only one that occurs also in regions like eastern parts of South India, North-Eastern India (Manipur), Hainan and Borneo. Further, its variety *paniculata* occurs in western parts of South India where no other member of the genus has been found and also in Tenasserim in Burma, this last record being apparently exceptional (see Map 1 & 2). *S. ferruginea* is common in Burma and Thailand, and to a less extent found also in Laos and Vietnam. *S. eryciboides* of the monotypic subsection ERYCIBOIDEAE is found in Bassein and Tenasserim in Lower Burma and at Kanburi in Thailand (see Map 3).

The section SPHENODESME has a much wider distribution than the section BRACHYNEMA, being found also in Malaya and Sumatra. The members of the sub-section SPHENODESME are found in N. Eastern India, Nicobars, East Pakistan, Burma, Thailand, Malaya, Sumatra, Borneo, Laos, Vietnam and S. East China (see Map 4). Of these species, *S. racemosa* is restricted to Malaya, Sumatra and Borneo, while its variety *sabahensis* is endemic in Sabah (Borneo). The two varieties of *S. pentandra* together occur in all the countries included in the generic distribution except S. India and Sumatra; but *S. pentandra* var. *pentandra* is represented in the southern parts of the region, (especially in Thailand, Malaya and Borneo) while *S. pentandra* var. *wallichiana* is its northern representative (being found especially in N. East India (Assam), East Pakistan, Upper Burma and Hainan), but these varietal forms meet in Malaya, Laos and Vietnam (see Map. 4). Similarly, *S. sarawakensis* and *S. pierrei* are respectively endemic in Sarawak and S. Vietnam (Cochinchine). The other three species of the sub-section SPHENODESME are non Malesian. *S. mekongensis* occurs in Thailand and Laos, *S. griffithiana* in Lower Burma and Vietnam and *S. mollis* in Thailand, Vietnam and Yunnan (China).

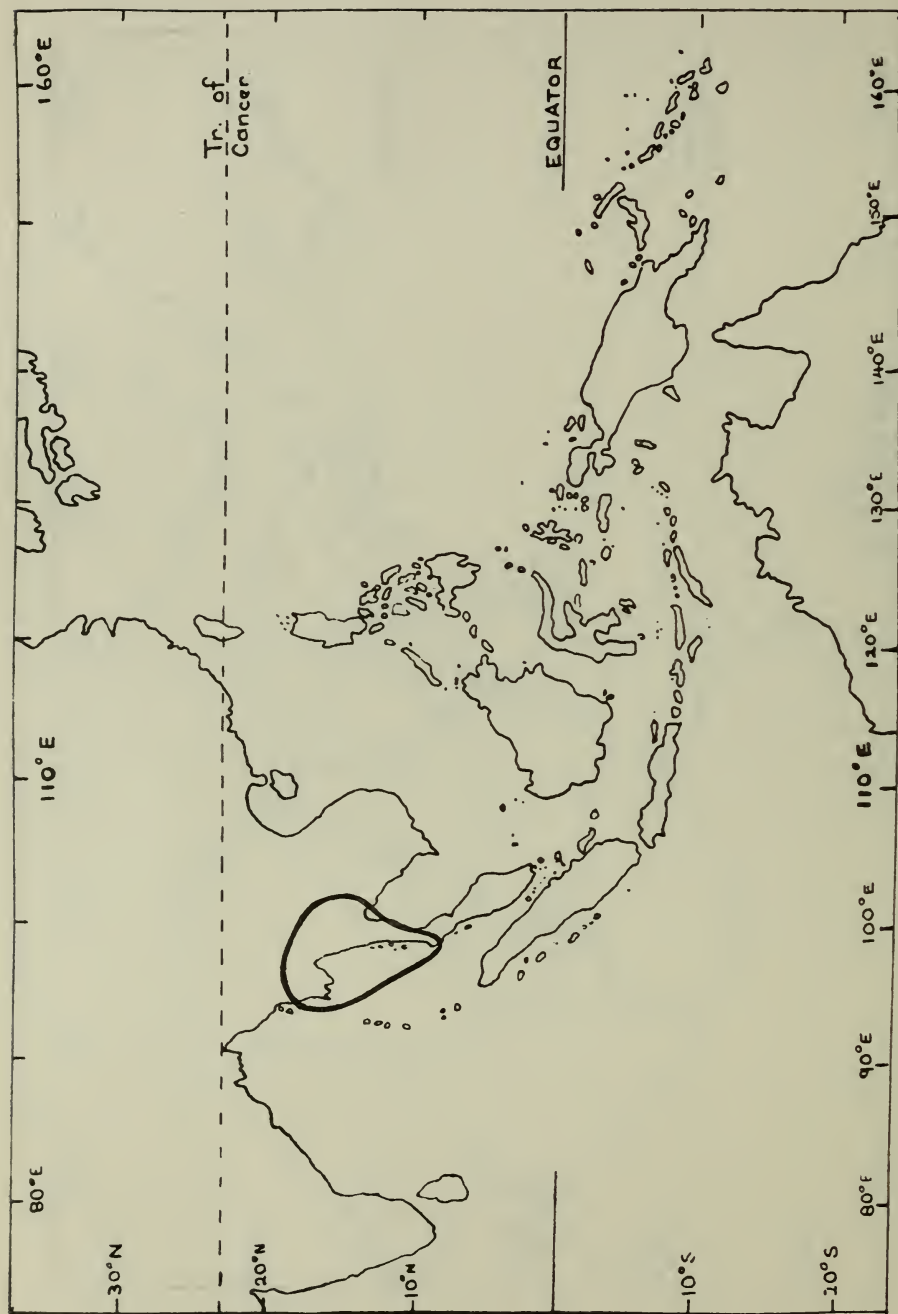
The sub-section PENTADONTIA is represented from Malaya, Sumatra, Borneo and Vietnam. But *S. triflora* sensu stricto is a purely Malesian species, being found in Malaya, Sumatra, Borneo and Lower Thailand (Betong) (see Map 5). The other two varieties of *S. triflora*, that is, var. *riparia* and var. *montana*, are endemic in Sabah (Borneo). Of the three remaining species of this sub-section, *S. thorelii* and *S. amethystina* are endemic in Vietnam, and *S. stellata* in Sabah (Borneo).



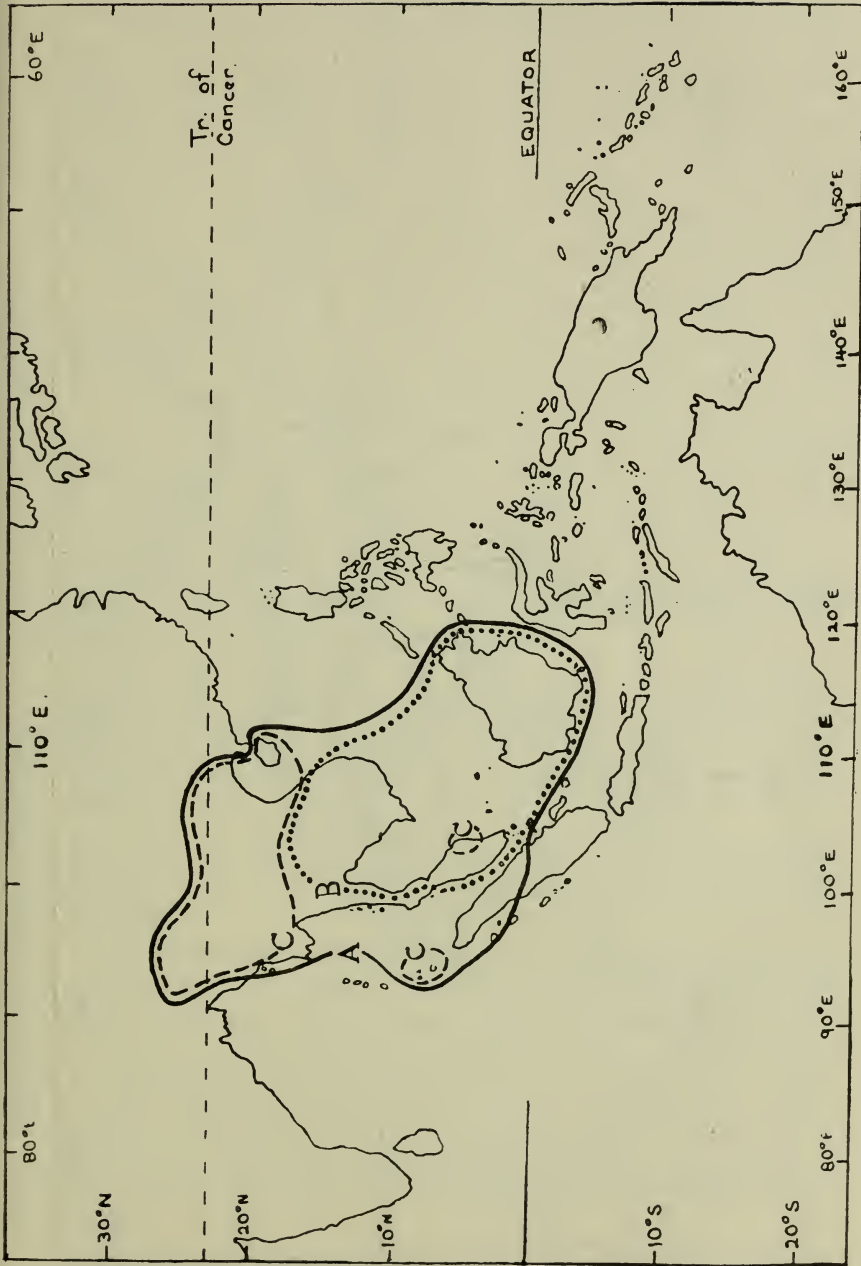
Map 1. Distribution of genus *Sphenodesme* Jack ( — ); Sub-section *BRACHYNEMA* ( ..... ).



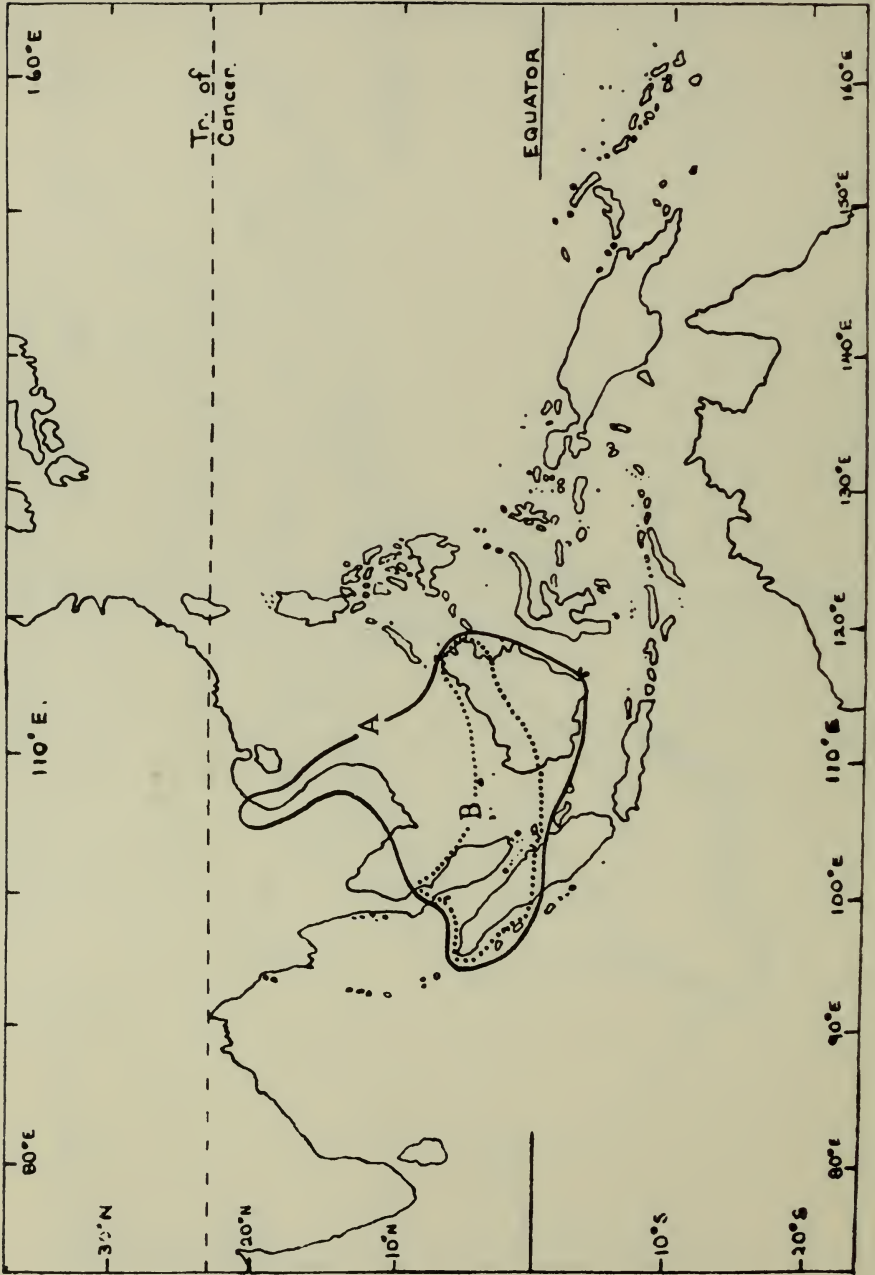
Map 2. Distribution of: *S. involucrata* (..... A .....); var. *paniculata* (---- B ----).



Map 3. Distribution of: Sub-section ERYCIBOIDEAE ( ——— ).



Map 4. Distribution of: Sub-section SPHENODESME (——— A ———);  
*S. pentandra* (..... B .....); var. *wallichiana* (---- C ----).



Map 5. Distribution of: Sub-section *Pentadontia* (——— A ——); *S. triflora* Wight (..... B .....

## SUMMARY

The genus, instated as monotypic by Jack (1820), was reduced to *Congea* by Wallich (1828), Meissner (1836 & 1843) & others; but Schauer (1847) and Wight (1850) restored its status and added new species to it. In 1885, Clarke who revised the genus, described eight species, of which two were new. Since then new species were added to the genus so that Moldenke's revisions (1959, 1962 and 1963) included in the genus twenty-two species and two varieties. Of these the following are reduced as synonyms: *S. annamitica* Dop (1932) (= *S. mollis* Craib, 1912), *S. borneensis* Merr. (1917) (= *S. racemosa* (Presl) Mold., 1956), *S. clemensorum* Mold. (1953) (= *S. triflora* Wight, 1850), *S. jackiana* (Wall) Schauer (1847) (= *S. pentandra* Jack, 1820), *S. microstylis* Clarke (1885) (= *S. ferruginea* (Griff.) Briq., 1897), *S. odorata* Fletcher (1938) (= *S. involucrata* (Presl) Robinson, 1916), *S. orbicularis* Fletcher (1938) (= *S. ferruginea* (Griff.) Briq., 1897), *S. paniculata* Clarke (1885) (= *S. involucrata* var. *paniculata* (Clarke) Munir), *S. pentandra* (Roxb.) Griff. (= *S. pentandra* var. *wallichiana* (Schau.) Munir), *S. robinsonii* Dop (1914) (= *S. griffithiana* Wight, 1850), *S. smitinandi* Mold. (1962) (= *S. mollis* Craib, 1912). The var. *cordifolia* ("cordata") Dop (1914) of *S. thorelii* and var. *pubescens* Mold. (1963) of *S. involucrata* have not been maintained as these represent mere variations of the type forms.

With these reductions the accepted taxa are as follows: **amethystina**, **eryciboides**, **ferruginea**, **griffithiana**, **involucrata** and its var. **paniculata**, **mekongensis**, **mollis**, **pentandra** and its var. **wallichiana pierrei**, **racemosa**, **sarawakensis**, **stellata**, **thorelli** and **triflora**.

In addition the following new varieties have been created: *S. racemosa* var. **sabahensis**, *S. triflora* var. **montana** and *S. triflora* var. **riparia**.

The reasons for rejecting the typification of *S. pentandra* Jack (1820) followed by Wallich (1830) and others including Moldenke (1959) have been explained under the introduction. Thus typified *S. jackiana* becomes its synonym, and *S. pentandra* (Roxb.) Griff., its later homonym. Generally *S. ferruginea* (Griff.) Briq. (1897) has been rejected as a later homonym of *S. ferruginea* Wight (1850), but since the latter was published as a synonym of *S. barbata*, it has no status and so cannot render Briquet's combination illegitimate.

The sectional and sub-sectional divisions have been revised so that sub-section ERYCIBOIDEAE has been transferred to section BRACHYNEMA and a new sub-section PENTADONTIA has been added to the section SPHENODESME.

## ACKNOWLEDGEMENT

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3. Forest Herbarium, Bangkok, Thailand. (BKF).
4. British Museum of Natural History, London, S.W.7, England. (BM).
5. Botanic Gardens, Brisbane, Queensland, Australia (BRI).
6. Botanical Museum & Herbarium, Gothersgade 130, Copenhagen K, Denmark. (C).
7. Botanic Gardens, Calcutta, India. (CAL).
8. Forest Research Institute, Dehra Dun, India. (DD).
9. Royal Botanic Garden, Edinburgh, Scotland. (E).
10. Royal Botanic Gardens, Kew, England. (K).
11. Forest Research Institute, Kepong, Selangor. (KEP).
12. Rijksherbarium, Leiden, Holland. (L).
13. The New York Botanical Garden, Bronx Park, New York 58, New York, U.S.A. (NY).
14. National Herbarium & Museum, Manila, Philippines. (PNH).
15. Trailside Nature & Science Center, Mountainside, New Jersey, U.S.A. (Herb. H.N. Moldenke).

## SPHENODESME JACK

**Sphenodesme** Jack in Malay Misc. I, 1 (1820) 19 & in Cal. Journ. Nat. Hist. IV, 13 (1843) 43; Hook., Bot. Misc. I (1830) 258; Wight, Ic. Pl. Ind. Or. IV, part 3 (1850) 13; Schauer in DC. Prodr. XI (1847) 622; Griff., Notul. Pl. As. (1854) 181; Miq., Fl. Ind. Bat. II (1858) 909; Benth. & Hook., Gen. Pl. II, 2 (1876) 1,159; Clarke in Hook. f., Fl. Br. Ind. IV (1885) 600; Briq. in Engl. & Prantl, Nat. Pflanzenfam. IV 3a (1897) 180; Post & Kunze, Lexic. Gen. Phan. (1904) 528; King and Gamble in Journ. As. Soc. Beng. LXXIV, 4 (1909) 860; Lam, Verb. Malay. (1919) 331 & in Bull. Jard. Bot. Buit. III (1921) 99; Ridl., Fl. Mal. Penin. II (1923) 637; Gamble, Fl. Madras, II (1924) 1,104; P. Dop in Fl. Gén. Indoch. IV (1936) 898; Fletcher in Kew Bull. (1938) 441; Kanjilal & Das in De, Fl. Assam (1939) 495; Mold., Résumé Geogr. distr. & Syn. (1959) 345.

*Brachynema* Griff., Notul. IV (1854) 176.

*Decadontia* Griff., Notul. IV (1854) 175.

*Roscoea* Roxb., Fl. Ind. III (1932) 54, p.p.

*Viticastrum* Presl, Bot. Bemerk. (1844) 147; Walp., Repert. Bot. Syst. VI (1847) 691.

*Congea* Roxb. sensu Wall. Cat. (1828) 1735; Hook., Bot. Misc. I (1830) 285; Meiss., Plant. Vascular, 11, Comment. (1843) 200: p.p.

TYPE SPECIES: ***S. pentandra*** Jack.

Woody climber; branchlets quadrangular. *Leaves* opposite, decussate, simple, entire. *Inflorescence* paniculate, axillary and terminal; cymes capitate, opposite, in the axils of leafy bracts, 3, 5 or 7-flowered; involucrel bracts 6, accrescent, much longer than flowers except in *S. eryciboides*. *Calyx* shortly campanulate or tubular, 5- (rarely 6-) toothed, accrescent. *Corolla* longer than calyx, sub-regular; tube short, cylindric, as long as the calyx, villous in throat; lobes 5 (rarely 6), sub-equal, imbricate in bud. *Stamens* 5 (rarely 6 or 7), inserted in the corolla below the throat, included or exsert; anther-lobes parallel, oblong. *Ovary* 2-celled, with 2-ovules in each cell; ovules pendulous from the apex of the placentiferous axis; style long, filiform or minute; stigma 2-lobed. *Drupe* globular or obovoid, included in the capsule formed by the accrescent calyx; seed 1 (rarely 2), exalbuminous.

**Distribution:** Southern & Eastern India, East Pakistan, Burma, Thailand, Laos, Southern & Eastern China, Vietnam, Cambodia, Malaya, Sumatra and Borneo.

This genus was published originally as *Sphenodesme*, but the ending was "corrected" to *A* by Schauer (1847) & Griffith (1854), and this spelling was adopted by some authors like Clarke, Miquel, Briquet, Post & Kunze and Dop. But in this treatment, the original spelling, being correct and classical, is retained.

## KEY TO THE SPECIES

1. (A) Corolla lobes oblong-ovate; stamens exsert; style filiform, long. (Calyx with or without accessory teeth) .....  
SECTION SPHENODESME 4.
- (B) Corolla lobes oblong-obovoid, or narrowly lanceolate; stamens included; style minute or none; (calyx with no accessory teeth) .....  
SECTION BRACHYNEMA (Griff.) Clarke 2.
2. (A) Involucral bracts shorter than calyx; stamens always 5, seated in the corolla throat and alternating with the lobes, (leaves obovate to ovate, cuneate towards base) ..... Sub-section ERYCIBOIDEAE (Briq.) Munir  
**S. eryciboides**
- (B) Involucral bracts much longer than the calyx; stamens usually 6, sometimes 5 or 7, seated much below the corolla throat, (leaves usually elliptic-ovate, rarely obovoid, almost always rounded at base) .....  
..... Sub-section BRACHYNEMA 3.
3. (A) Calyx two lipped; corolla lobes narrow lanceolate; ovary glabrous, non-glandular; (leaves ferruginous-tomentose beneath) ..... **S. ferruginea.**
- (B) Calyx 6-lobed or with 3 bifid lobes; corolla lobes oblong or obovoid; ovary glabrous below, glandular or minutely hairy towards apex; (leaves fulvous-pubescent beneath when young, later almost glabrous) ..... **S. involucrata.**
- B (a) Calyx with 6 large lobes; corolla lobes obovoid; ovary glandular towards apex .....  
..... **var. involucrata.**
- B (b) Calyx with 3 large lobes, each of which is shortly bifid at apex; corolla lobes oblong; ovary setulose towards apex .....  
..... **var. paniculata.**
4. (A) Calyx 5-lobed, 10-ribbed and with 5 accessory teeth .....  
..... Sub-section SPHENODESME 8.
- (B) Calyx 5-lobed, 5-ribbed and with no accessory teeth .....  
..... Sub-section PENTADONTIA Munir 5.
5. (A) Corolla with a narrow villous band in throat; ovary glabrous; (leaves cuneate at base) ..... 7.
- (B) Corolla with a broad and dense villous band in throat; ovary stellate-hairy in the upper half or wholly setose; (leaves more or less cordulate at base) ..... 6.

6. (A) Calyx densely hirsute, lobes acute; corolla glabrous outside, mid-lobe slightly longer and villous towards its base; ovary entirely setose. (Cymes 5-flowered) ..... **S. thorelii.**
- (B) Calyx stellately hairy without, long silky white hairs within; corolla lobes equal, puberulous outside at the apex; ovary provided with stellate hairs from the middle above; (cymes 3-4-5-flowered) ..... **S. amethystina** (not seen).
7. (A) Calyx densely stellate hairy without; corolla lobes puberulous on outside; (branchlets and inflorescence tawny, covered with dense stellate hairs; leaves fulvous hairy on the veins underneath; cymes 7-flowered) ..... **S. stellata.**
- (B) Calyx velutinous-pubescent without; corolla lobes almost glabrous on outside; (branchlets dark-brown, glabrous; inflorescence glabrous or grey-pubescent in rachis; leaves entirely glabrous) ..... **S. triflora.**
- B (a) Cymes strictly 3-flowered; stem dark brown, glabrous and lenticellate ..... var. **triflora.**
- B (b) Cymes 5-flowered; stem dark brown, glabrous, without lenticels; leaves chartaceous, elliptic-lanceolate, glabrous on both the sides (sometimes grey-puberulent beneath) ..... var. **riparia.**
- B (c) Cymes 7-flowered; stem cineraceous-brown, puberulous, lenticellate; leaves sub-coriaceous, elliptic-oblong, puberulous on the nerves beneath ..... var. **montana.**
8. (A) Calyx lobes entire ..... 12.
- (B) Calyx lobes bifid ..... 9.
9. (A) Calyx lobes deeply 2-fid, inflexed; accessory teeth long, linear, caudate; ovary setulose all over or thickly setose in the upper half and glabrous in the lower; (cymes 5 or 7-flowered) ..... 11.
- (B) Calyx densely hirsute or appressedly hairy without; accessory teeth minute; ovary densely setose all over; (cymes always 7-flowered) ..... 10.
10. (A) Calyx hirsute without; corolla throat with a narrow villous ring; (leaves glabrous underneath) ..... **S. griffithiana.**
- (B) Calyx sericeous without; corolla throat with a broad villous ring; (leaves densely pubescent underneath) ... **S. mollis.**

11. (A) Calyx obscurely pubescent without; accessory teeth alternating with the calyx lobes; ovary setulose all over; (branchlets, leaves and involucre bracts glabrous; cymes 5-flowered) ..... **S. sarawakensis.**
- (B) Calyx densely hirsute or appressedly hairy without; accessory teeth opposite to calyx-lobes; ovary densely setose in the upper half; glabrous in the lower; (branchlets, leaves and involucre bracts ferruginous-tomentose; cymes 7-flowered) ..... **S. racemosa.**
- B (a) Calyx hirsute on outside, puberulous within; corolla with a broad villous band in the throat ..... var. **racemosa.**
- B (b) Calyx with densely appressed hairs on both sides; corolla with a much narrower villous ring in the throat ..... var. **sabahensis.**
12. (A) Cymes strictly 3-flowered; calyx tube glabrous within; ovary setulose above, glabrous in the lower 4th; (leaves with 1-2 pairs of main lateral nerves) ... **S. mekongensis.**
- (B) Cymes 7-flowered; calyx-tube partially or wholly hairy within; ovary densely setose all over; (leaves with 2 pairs or more of main lateral nerves) ..... 13.
13. (A) Involucre bracts elliptic-obovate, ciliate towards the base; calyx hirsute on the outside, hispidly tomentose within. (Leaves with 2-3 pairs of main lateral nerves) ..... **S. pierrei.**
- (B) Involucre bracts elliptic-oblong, glabrous; calyx glabrous or sparsely hairy without, glabrous within except for a narrow band of appressed hairs towards base. (Leaves with 4-6 pairs of main lateral nerves) ..... **S. pentandra.**
- B (a) Calyx sparsely hairy without, conspicuously lobed at apex; accessory teeth well developed, aristate ..... var. **pentandra.**
- B (b) Calyx glabrous without, shortly lobed or almost truncate at apex; accessory teeth minute or short even after anthesis ... var. **wallichiana.**

## Section BRACHYNEMA (Griff.) Clarke

In Hook. f., Fl. Br. Ind. IV (1885) 600; Briq. in Engl. & Prantl, Pflanzenf. IV 3a (1897) 181; Mold., Résumé Geogr. distr. & Syn. (1959) 403.

*Brachynema* Griff., Notul. IV (1854) 176. **Basionym.**

Stamens included with short filaments seated in the corolla tube or at the throat; style minute or none; (calyx with no accessory teeth; corolla-lobes oblong-obovoid, or narrowly lanceolate).

Subsection BRACHYNEMA

Involucral bracts much longer than calyx; flowers 6-merous (rarely 5-merous); stamens seated in the corolla tube or below the throat.

TYPE: *Brachynema ferruginea* Griff. = *S. ferruginea* (Griff.) Briq.

DESCRIPTION OF SPECIES

1. *Sphenodesme ferruginea* (Griff.) Briq. in Engl.  $\frac{1}{3}$  Prantl, Nat. Pflanzf. IV 3a (1897) 181; King & Gamble in Journ. As. Soc. Beng. LXXIV, 4 (1909) 861; Dop in Fl. Gén. Indoch. IV (1936) 899. **Plate 1.**

*S. astylis* Clarke op. cit. 601 in observ. sub. *S. unguiculata* Schauer, (lapsus calami for *S. microstylis?*): nom. nud.

*S. microstylis* Clarke in Hook. f., Fl. Br. Ind. IV (1885) 600; Ridl., Fl. Mal. Pen. II (1923) 638; Fletcher in Kew Bull. (1938) 442; Mold., Résumé Geogr. distr. & Syn. (1959) 345.

*S. orbicularis* Fletcher in Kew Bull. (1938) 208 & 442. **Syn. nov.**

*Brachynema ferruginea* Griff. in Notul. IV (1854) 176. **Basionym.**

*Symphorema microstylis* Bedd. in Clarke op. cit. pro synonym nom. nud.

TYPE SPECIMEN: Mergui, Burma (Griffith 938).

This species is easily distinguished from the others of the subsection "Brachynema", in having a non-glandular ovary, short and irregularly seated stamens, linear lanceolate corolla lobes, bi-lipped calyx, and in more dense tomentum on branchlets, inflorescence and the underside of the leaves.

Branchlets rusty stellate-tomentose, obscurely quadrangular. *Leaves* ovate or elliptic-ovate, acute to mucronulate at apex, almost rounded at base, chartaceous, sparsely hispid-pubescent especially on the nerves above, later glabrous, densely ferruginous-tomentose underneath, upto 20 cm. long, 11.5 cm. broad; main lateral nerves 5-6 pairs, the lowest pair close to the base; reticulation distinct; petiole 8-15 mm. long. *Inflorescence* rusty, stellate-tomentose; panicles axillary and terminal, spreading, 30 cm. or more long, densely covered with tawny-yellow tomentum; cymes 7-flowered with a peduncle 3-8 cm. long; involucral bracts elliptic-obovate, ferruginous-tomentose, distinctly reticulated, upto 3.5 cm. long, 1.5 cm. broad; flowers sessile. *Calyx* tubular, with no accessory teeth, 8 mm. long, densely stellate-tomentose without, appressedly hairy within, 2-lipped, usually the upper lip 2-, the lower 3-lobed; lobes minute. *Corolla* funnel shaped, 9-14 mm. long; tube pubescent without, densely villous within, 6-10 mm. long; lobes usually 6, rarely 5 or 7, linear lanceolate, acute, imbricate, pubescent on

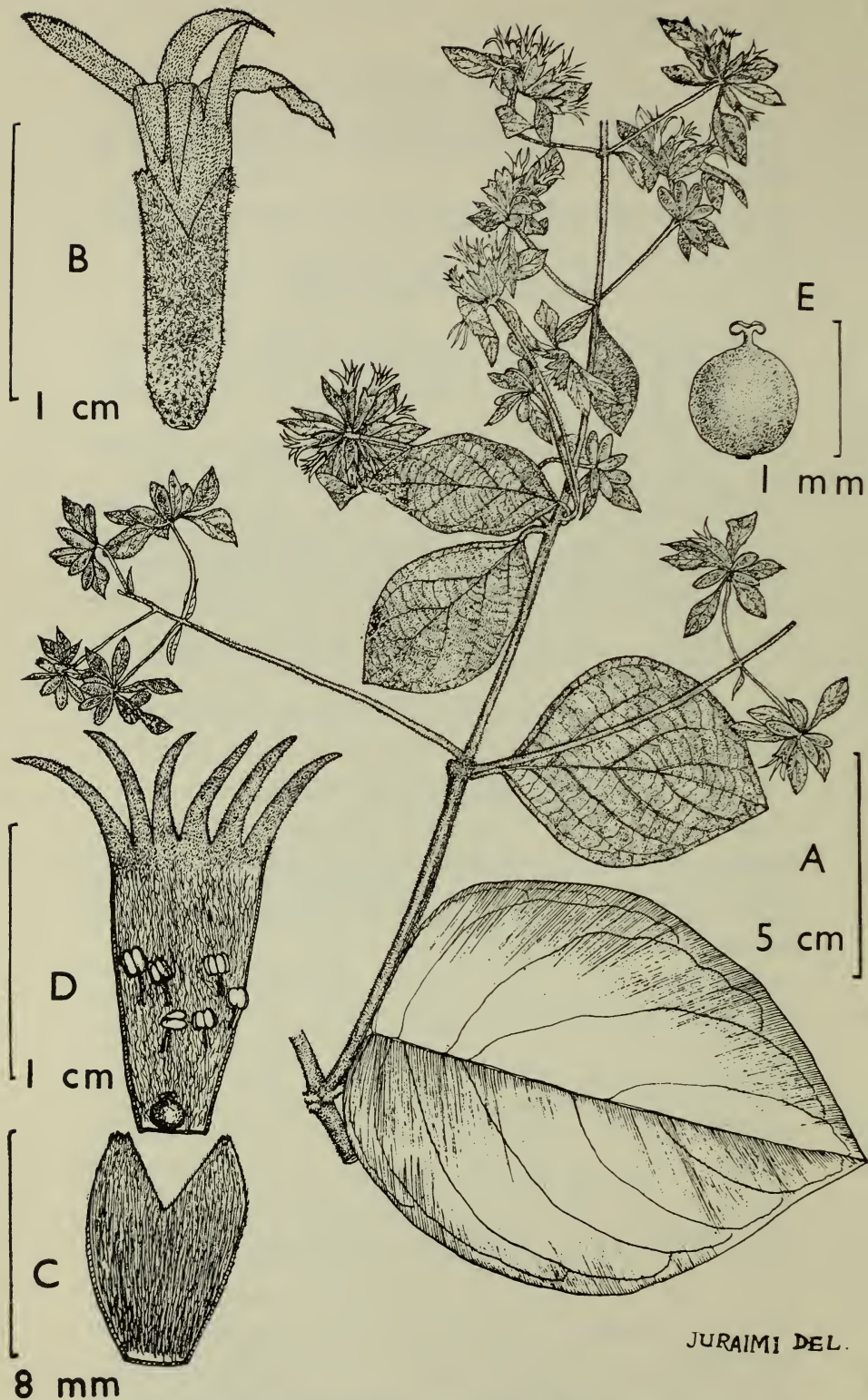


Plate 1. *Sephenodesme ferruginea* (Griff.) Briq. (Kerr 16,411 in Edin.) A, Fertile twig. B, flower. C, Calyx vertically cut open. D, Corolla cut open to show stamens and ovary. E, Ovary.

both sides, 3–5 mm. long. *Stamens* 6, or as many as the lobes, short, unequal, included, seated at different levels in the lower half of the corolla tube; filaments slender, 2–3 mm. long; anther-lobes almost oblong. *Ovary* globular to sub-columnar, glabrous, non-glandular; style minute; stigma bifid, sub-capitate.

BURMA: **Insein**, Pyinmadaw Res. (Parkinson 7: CAL). **Tenasserim**, at Tenasserim between Kankerat & Danat (Beddome's s.n.: BM, syntype of *S. microstylis*); Tavoy, (Parish s.n.: K, syntype of *S. microstylis*); Kaleinaung Res. (Ba-Pe 803: DD); Nabule (Mokim 178: BM & CAL); Mergui (Griffith, sub Kew No. 6007/1: K, syntype of *S. microstylis* and prob. isotype of *S. ferruginea*).

THAILAND: **Kopah**, Bangsak, (Haniff & Nur 2,937: SING); Pungah, (Curtis 2,963: SING); Sriracha, (Collin 329: PNH & 585: E); Ban Don, Purat, (Seidenfaden 2,180: SING); Lamlieng, Ranaung, (Kerr 16,411: E, Holotype of *S. orbicularis*, BM, C & K); Trat, Koh Chang (Smitinand 2,237: A & BKF); Wangka, Kanburi, 200 m. (Kerr 10,305: E); Ubon, Kemarat, 100 m. (Kerr 8,376: C & E); Klawn Mayom near sea (Kerr 6,866: E); Surat, Koa Wang, 100 m. (Kerr 18,271: C & E); Nakawn Sritamarat, Ban Natawn, under 50 m. (Kerr 15,633: C & E); Koh Chang (Marcan 1,281: E; Schmidt 474 & 862: C); Salak Kaw, Kaw Chang (Rabil 28: E).

LAOS: **Vientiane**, Paksan Road, Km. 12, (Talbot 136: SING); Ban Tha Ngon Road (Talbot 98: BM & SING).

VIETNAM **Bien Hoa**, Mt. Lu, (Pierre s.n.: A & B); loc. incert. (Thorel 653: A & B); **Annam**, Dalat, (Squires 855: A, BM & SING).

*Sphenodesme ferruginea* (Griff.) Briq. (1897) based on *Brachynema ferruginea* Griff., Notul. IV (1854) 176 is often rejected as a later homonym of *S. ferruginea* Wight Ic. IV, part. III (1850) 13, tab. 1474, but as shown by Wight himself (Ic. p. 13, under *Congea* and again under the text of tab. 1474, p. 13), *S. ferruginea* was issued as a synonym of *S. barbata*, though he was not able to change the legend of tab. 1474 prepared earlier to be issued with the text. Since *S. ferruginea* Wight was published as a synonym, it must be regarded as not validly published (Art. 34 of 1961) and not effective in making *S. ferruginea* (Griff.) Briq. a later homonym. Hence *S. microstylis* Clarke (1885) as circumscribed in the protolog, becomes a superfluous name.

The type was from Mergui (Burma), collected by Griffith in January 1835 under No. 938 (cf. Notulae). Apparently duplicates of this collection were distributed from Kew under No. 6007/1 (Kew distr. No. 6007 = *Symphorema polyandrum*).

Beddome's specimen in British Museum bears Beddome's manuscript name "*Symphorema microstylis* Bedd.", which was given priority by Clarke in transferring the species to *Sphenodesme*.

2. **Sphenodesme involocrata** (Presl.) Robinson in Proc. Am. Acad. 51 (1916) 531; Fletcher in Kew Bull. (1938) 441; Mold., Résumé Geogr. distr. & Syn. (1959) 345 & 384, var. **involocrata**. Plate 2.
- S. involocrata* (Presl) Robinson var. *pubescens* Mold. in Dansk Bot. Ark. 23, I (1963) 86. **Syn. nov.**
- S. odorata* Fletcher in Kew Bull. (1938) 207. **Syn. nov.**
- S. paniculata* Clarke sensu Gamble, Fl. Madras II, part 6 (1924) 1,104 quoad specimina Perrottet infra citata.
- S. unguiculata* Schauer in DC., Prodr. XI (1847) 623 pro parte (excl. syn. *Congea paniculata* Wall. Cat. 1739); Miq., Fl. Ind. Bat II (1858) 910; Clarke in Hook. f., Fl. Br. Ind. IV (1885) 601; Parkinson, For. Fl. Andam. Isl. (1923) 220; Dop in Fl. gén. Indoch. IV (1936) 900; Kanjilal & Das in De, Fl. Assam (1939) 495.
- Congea ferruginea* Wall. Cat. (1828) No. 1737. **nom. nud.**
- C. unguiculata* Wall. Cat. (1828) No. 1736 ex Walp. Rep. IV (1848) 117.
- Symphorema unguiculatum* Kurz, For. Fl. Burma II (1877) 255.
- Vitex involocratus* Presl. Bot. Bemerk. (1844) 148. **Basionym.**

TYPE SPECIMEN: Moulmein, Burma (Helfer, in Herb. DC).

Akin to *S. ferruginea* (Griff.) Briq. from which this species differs in having its calyx with distinct, acute, equal lobes, corolla with spatulate or obovoid lobes and ovary glandular towards apex. (This var. *involocrata* is distinguished from the variety *paniculata*, by its calyx being distinctly 6-lobed and its ovary glabrous).

Branchlets rusty, stellate-tomentose, obscurely quadrangular. *Leaves* chartaceous to sub-coriaceous, elliptic-oblong, acuminate, acute at apex, cuneate or rounded towards base, stellately fulvous-hairy when young, later glabrous or sparsely stellately hairy on the underside, 7.5–8 cm. long, 4–8 cm. broad; lateral nerves 5–7 pairs, stellate hairy beneath; petiole 5–15 mm. long, hairy. *Inflorescence* axillary and terminal, rusty hairy; panicles usually 15–25 cm. long, sometimes longer; cymes 7-flowered; peduncle 2–3.5 cm. long, ferruginous, stellate tomentose; involucre bracts much enlarged in fruit, elliptic-oblong or spatulate, membranous, prominently veined, 1.5–4 cm. long, 5–13 mm. broad. *Calyx* 6-lobed (rarely 5-lobed), without any accessory teeth, campanulate, 4–6 mm. long, stellate-tomentose without; tube appressedly hairy within; lobes acute pubescent on the innerside. *Corolla* 6-lobed (rarely 5-lobed), pale yellow, 6–9 mm. long; lobes obovate, puberulous on both sides; tube puberulous without, villous within. *Stamens* 6, included, seated in corolla throat; filaments very short; anther lobes oblong. *Ovary* obovoid, glabrous, glandular in the upper third; style minute; stigma bifid. *Fruit* capsular, included in the accrescent calyx, globular, upto 8 mm. in diameter.

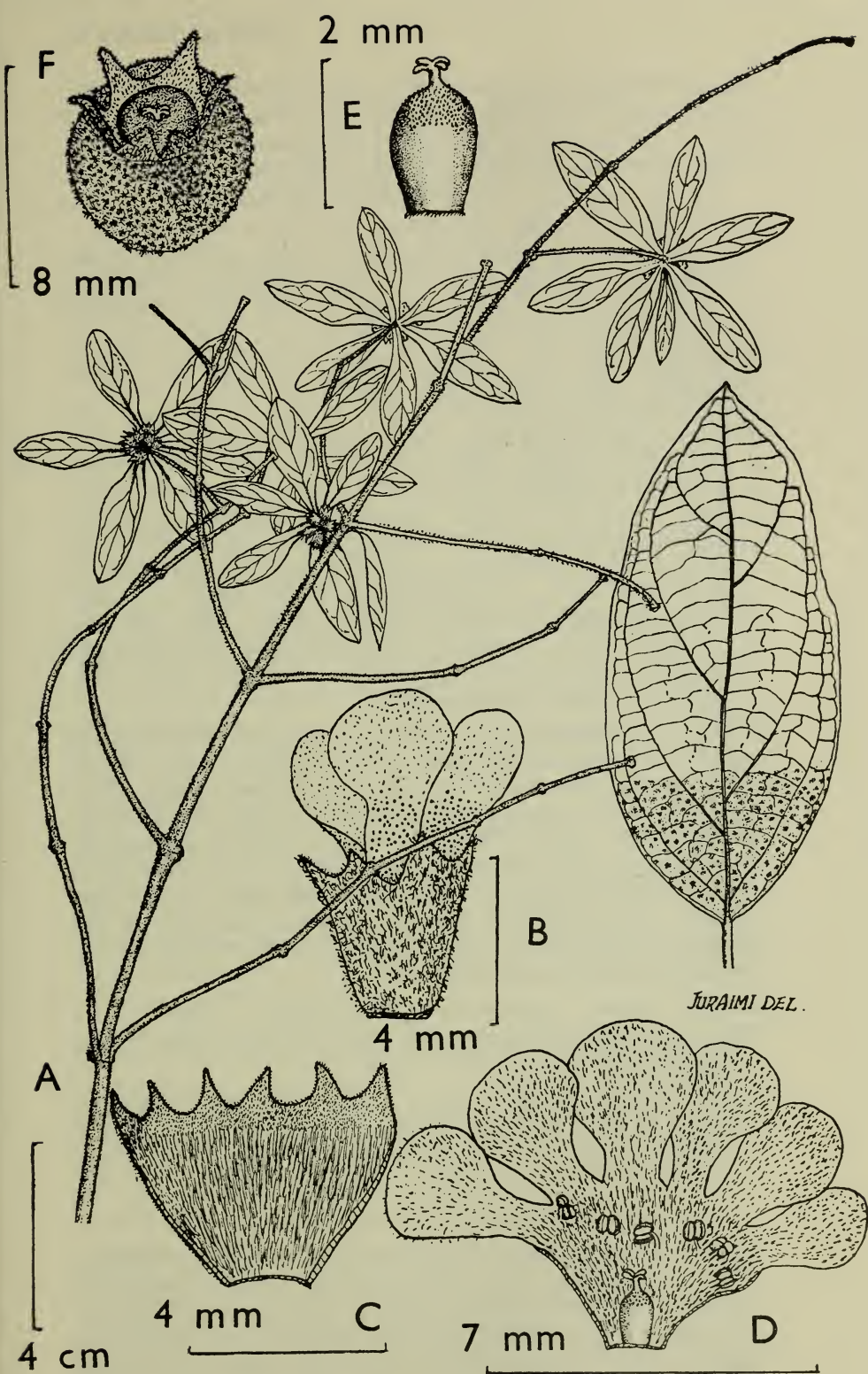


Plate 2. *Sphenodesme involucrata* (Presl) Rob. (A-E Helfer 42 in Edin.; F Lace 2,796 in Edin.).

A, Portion of inflorescence. B, Flower. C, 6-lobed Calyx vertically cut open. D, Corolla cut open to show stamens and ovary. E, Ovary glandular in the upper third. F, Capsular fruit.

- INDIA: **Manipur**, Kanglatongbi alt. 3,000–3,500 ft. (Bullock 868: L, 811: A & L); **Khasia Hills**, (Hook. f. & Thomson s.n.: A, BM & L; Simon s.n.: L); loc. incert. (McLelland s.n.: E); Pundua (De Silva sub. Wall. Cat. No. 1736: BM, E & K, syntype of *Congea unguiculata*); **Madras**, Eastern Ghats, Shiveroy Hills (Perrottet 101 & 160: CAL).
- ANDAMANS: Long Island (Kirat Ram 3,640: A & E); South Andaman (Heining s.n.: A & L); Chiriatapu (Parkinson 16,396: A); loc. incert. (Prain s.n. A); Hill Jungleat Anikhet (King's Collector s.n.: CAL).
- NICOBARS: loc. incert. (King's Collector s.n.: BM & E; Kamphovener sub Calcutta 3,121: A & C).
- BURMA: **Pyinmana** (Rogers 308: CAL & DD); **Insein** (Kau 273: CAL; Ba-Pe 10,529: DD); **Pegu** (Kurz ? 6,525: SING; Lace 6,072: E & SING); Prome (Lace 2,736: E; Beddome 6,528: BM); Tharrawddy region (Lace 2,796: DD & E); Thaunyin (Maung 12,931: A); Salween (Chin 6,044: DD); Durat range (Kurz ? 6,527: SING); loc. incert. (Falconer 496: L); Rangoon (Parkinson 11,283: A; Beddome 6,526: BM; Meebold 14,054: CAL); **Tenasserim**. Moulmein (Helfer sub Bot. Mus. Prag. No. 42: BM, E & L, Isotypes & Herb. Bohemiae No. 54: CAL, Isotype ? - vide observ. infra; Wall. Cat. No. 1,737: BM, Syntype of *Congea ferruginea*).
- THAILAND: **Chiengdao**, Me Pa Tang, alt. 440 m. (Garrett 1,210: E & L); **Lampang**, Me Salop alt. 190 m. (Winit 1,264: E); Me Luang, alt. 260 m. (Winit 1,586: E); Udawan, Sitan (Kerr 20,030: BM, C & E); **Parachimburi**, Krabin, Tungpo (Kerr 9,812: BM, C & E); **Puket**, Ranawng, Kao Talu (Kerr 1,185: E, Holotype of *S. odorata*; C & K, Isotypes); Nakawn Sawan near Kamphaengphet, alt. 100 m. (Hansen 6,629: C, holotype of *S. involucrata* var. *pubescens*); **Loei**, Wang Sapung, Pha Daeng (Suvarnakoses 1,321: BKF); N. Rachasima, National Park (Phengkhlai 574: BKF).
- BORNEO: **Sabah**, Tawau, Tanjong (Pereira 43,691: SING).
- VIETNAM: **Annam**, Hue (Clemens 4,143: A, BM & PNH); Nhatrang (Poilane 4,984: A).
- CHINA: **Hainan**, (McClure 8,331: A, BM & E; Wang 36,301: A & E; Lau 3,113 & 28,317: A; How 73,729 & 73,733: A & BM; Chun & Tso 44,281: A & 44,669: A & B; Tang 483: A; Liang 64,243 :A; Henry s.n.: BM).
- CULTIVATED: Hort. Bog. X.F. 26 & XII. B. 206; Hort. Bot. Cal. s.n.

Dr. J. W. (or F.) Helfer, a physician from Prague in Czechoslovakia, collected plants in Tenasserim and the Andamans from 1832 onwards until his murder in 1840 in the Andamans (Backer, Verklarend Woordenboek, 1936). His collection from Tenasserim, generally referred in old books as Martabania, seems to have been made between 1832-1838. Hence the specimens distributed in

1937 by the National Museum of Botany. Prague, as having been "in Bengalia Circa Calcuttam" seem to be erroneously labelled as to the locality, as the two instances given here will show, though Helfer himself might have used "Bengalia" indifferently to denote any country in the Bay of Bengal.

Thus Helfer's specimen named by Clarke as *Sphenodesma griffithiana* Wight (Kew distr. No. 6,008) was collected at Tavoy in January 1838. What appear to be the duplicates of this Helfer's collection, have been determined by K. Biswas as *Sphenodesma pentandra* Jack and distributed from Prague under No. 43 as coming from "Bengalia Circa Calcuttam". The type of the species was from Mergui, Tenasserim, collected by Griffith, and though the species has been recorded from the regions east of Tenasserim (e.g. Indochina), it has never been recorded from anywhere north of Burma, much less from Calcutta or Bengal. Similarly K. B. Presl, a science professor at Prague (cf. Baker op. cit.) based his *Vitex involucratus* (Bot. Bemerk., 1844 p. 148) on a specimen from "Moulmein in Martabania". Obviously the same specimen in Herb. DC. was seen and quoted by J. C. Schauer in De Cand., Prodr. XI (1847) 623, as "Moalmine Martabaniae (Helfer!)" under his *Sphenodesma unguiculata* to which he had reduced Presl's species (which he had apparently seen in De Candolle's herbarium). Now, what appear to be the duplicates of this type collection have been distributed first as Reliquae Helferianae from Herbarium Musei Regni Bohemiae bearing a No. 54 and again in 1937 as from Section Botanica Musei Nationalis Pragae with a printed No. 42, both determined by Eiswas as *Sphenodesma unguiculata* Schauer and both as coming from "Bengalia Circa Calcuttam," though this species has never been recorded from anywhere near Calcutta, nor even from Bengal, and though it is not recorded that Helfer collected in Bengal. In view of the evidence given above, it seems reasonable to regard the last named collections distributed from Bohemia or Prague as the duplicates or isotypes of the holotype of *Vitex involucratus* Presl, which was collected at Moulmein in Tenasserim.

B. L. Robinson seems to have made the combination under *Sphenodesme* because Presl's binomial has the priority right over *S. unguiculata*, under which Presl's species was cited; there is no indication that he had tried to locate or identify Presl's holotype.

An unusual distribution for this species is indicated by Perrottet's specimens collected on Shiveroy Hills in the Eastern Ghats (S. E. India), referred by Gamble to *S. paniculata*.

According to a note in Flora Malesiana I (1950) 136 & 137, Galathea Expedition Numbers 3,001-3,134 come from Buitenzorg, but Kamphovener collections quoted above are stated to be Calcutta numbers. I have no means of deciding whether these numbers are the same. If identical, then Kamphovener 3,121 quoted as from Nicobar must have been from Buitenzorg (Bogor), in which case it must have been from a cultivated plant.

2a. *Sphenodesme involucrata* (Presl) Robinson var. **paniculata** (Clarke) Munir stat. nov. Plate 3.

*S. paniculata* Clarke in Hook. f., Fl. Br. Ind. IV (1885) 600; Gamble, Fl. Madras II, part 6 (1924) 1,104, pro parte; Mold., Résumé Geogr. distr. & Syn. (1959) 164. **Basionym.**

*Congea paniculata* Wall. Cat. (1828) No. 1,739. Herb. Heyne, and No. 1,739B Herb. Wight: nomen nudum.

This variety is easily mistaken with the type form, but differs in having its calyx with 3 large rounded lobes, each of which bearing a small slit at the apex; corolla with elongate-oblong lobes and ovary setulose towards the apex.

TYPE SPECIMENS: Malabar, S. India (Heyne sub Wall. Cat. No. 1,739-K, lectotype).

INDIA: **Malabar**, Cochin (Johnstone s.n.: K, syntype, A); Koorg (Heyne, Wall. Cat. No. 1,739: K, lectotype; Rottler's Herb. - K, syntype); Travancore (Bourdillon 126: CAL). **South India**, loc. incert. (Wight 910: E, & Wall. Cat. No. 1,739B: BM, E & K).

BURMA: **Tenasserim**, Tharapau (Meebold 14,407: CAL).

Meebold's collection from Tenasserim in Burma gives this variety an unusual distribution, since all the other collections are from the western parts of South-West India. Could there have been an exchange of labels with Perrottet's collection from the Shiveroy Hills in South-East India, which gives an unusual distribution to the type form (var. *involucrata*) of the species?

Externally the specimens of var. *involucrata* & var. *paniculata* look very alike, and those who go by geography, have named all South Indian specimens of these two groups as *paniculata* and the Tenasserim specimens as *involucrata*, while others who were not able to recognize any difference between the two forms, have assigned the specimen of var. *paniculata* to var. *involucrata*. Unfortunately all the available descriptions are insufficient to distinguish between those two taxa. But a careful examination has revealed that these varieties can be easily distinguished by the division and shape of the calyx-lobes, by the size and shape of corolla lobes and the absence or presence of indumentum on the ovary.

The syntypes of *Sphenodesme paniculata* Clarke are cited as "Kurg, Rottler" and "Cochin, Johnstone". But Clarke also quoted "*Congea paniculata* Wall. Cat. 1739" in the synonymy of the species, and Wallich in his Catalogue noted that the specimen thus named was from Heyne's herbarium. Hence the question arises: Were there three syntypes to Clarke's species? If so, why the third one is not mentioned by Clarke in the citations or by any subsequent botanist?

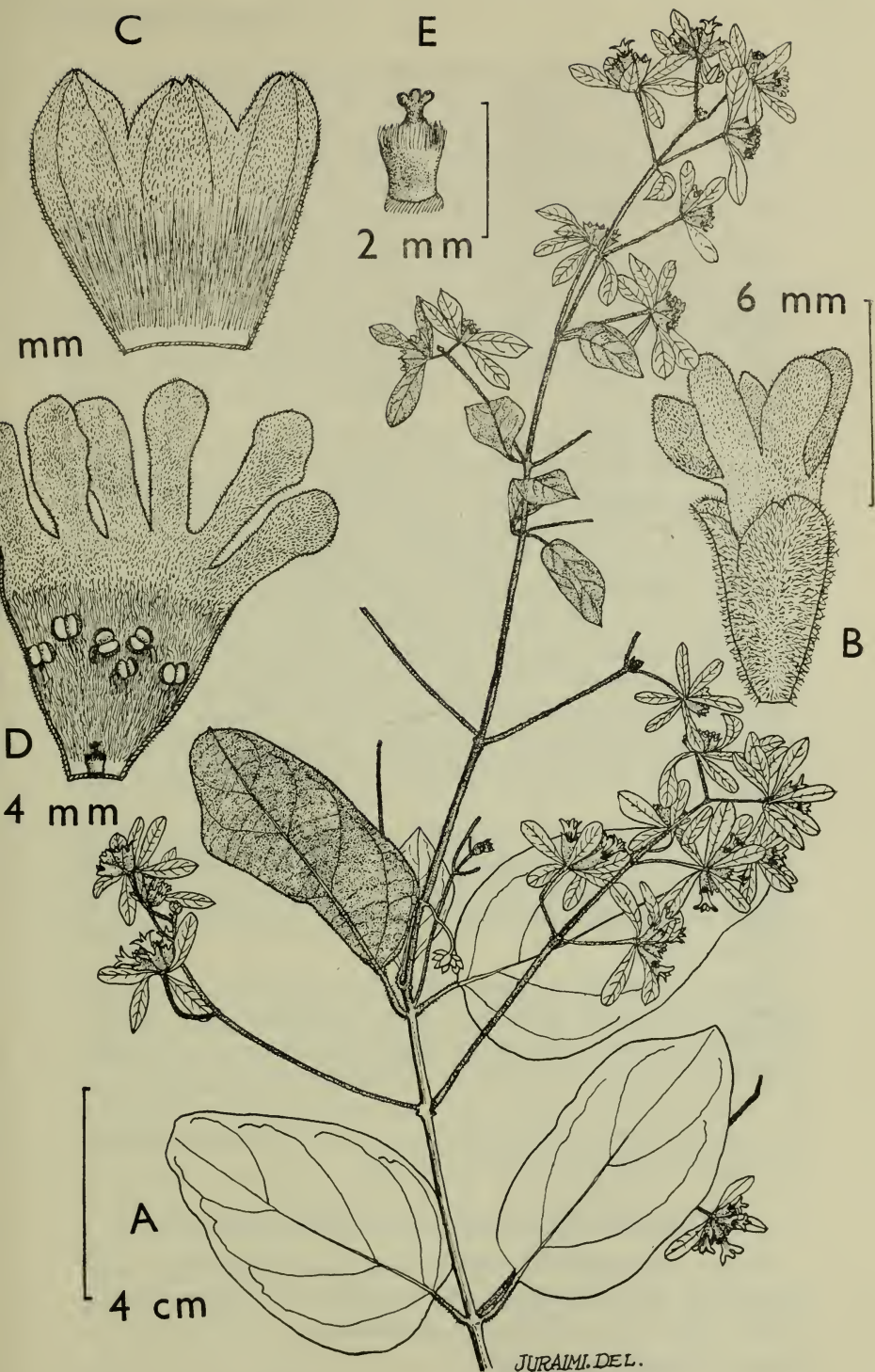


Plate 3. *S. involucrata* var. *paniculata* (Clarke) Munir (Johnstone s.n. in Arn. Arboretum).

A, Inflorescence. B, Flower. C, 3-lobed calyx cut open longitudinally. D, Corolla opened out to show the disposition of the stamens and ovary. E, Ovary showing setulae towards apex.

In trying to solve this problem, the remarks of Wight & Arnott in Prodr. Fl. Pen. Ind. or. I (1834) XII & XXXV are of value. According to them, Heyne's collections from "Mysore & southern provinces" of India were named by Rottler (p. XIII), while "Herb. Rottler" was an abbreviation adopted to indicate specimens that were either found thus named in Rottler herbarium or so named by him from another herbarium (p. XXXV.) Since Wallich is quite definite that his No. 1739/1 had come from Heyne's Collection it seems obvious that the specimen in Rottler's Herb. may be regarded as also from Heyne's Collection. One of the Kew specimens is definitely indicated by Wallich as from Heyne's Herb., but the other, also in Kew, is from Rottler's Herb. with Coorg as its collection locality.

From the Royal Botanic Garden, Edinburgh, two specimens were received from Wight's Herb. both of which were originally named "Symphorema". One of them was later named "*Congea paniculata* ? an prob. *Symphorema* n. sp. Wall. Cat. 1739," which in the Herbarium of Glasgow University is associated with "Arnott," either as the collector or the annotator of the specimen. Obviously this is the specimen included under *Congea paniculata* in Wallich's Cat. Suppl. p. 86 as "1739B Herb. Wight." The second is numbered "910". The precise localities of both these specimens are not known. However, most of Wight's collections were from Courtallum in Tinnevelly (Tirunelveli) district, South India, though he had also collected in the Nilgiris and at Cape Comorin.

Actually there is no fundamental difference between these specimens and their duplicates. But as Heyne's specimen had formed the basis of *C. paniculata* from which Clarke took his specific epithet, the latter specimen is to be preferred if a lectotype is to be selected.

Since "Symphorema Heyne Herb." was quoted by Wallich under his *Congea paniculata*, some botanists (e.g. Walpers, Moldenke, Schauer) have taken to mean that Heyne had actually validly or invalidly published the "*Symphorema paniculata*", but no such binomial seems to have been ever published; though it was used on Heyne's Herb. Collections. There is no need therefore to load the synonymy with this biverbal.

#### Sub-section ERYCIBOIDEAE (Briq.) Munir **comb. nov**

Section *Eusphenodesma* Clarke, sub-section *Eryciboideae* Briq. in Engl. & Prant, Pflanzenf. IV 3a (1897) 181; Mold., Résumé Geogr. distr. & Syn. (1959) 403. **Basionym.**

**TYPE: *S. eryciboides* Kurz**

Involucral bracts shorter than calyx; flowers 5-merous; stamens seated at the corolla throat.

3. **Sphenodesme eryciboides** Kurz in Journ. Asiat. Soc. Beng. XL, part II, (1871) 76 (= Fl. Burma (1871) 345); Clarke in Hook. f., Fl. Br. Ind. IV (1885) 601; Mold., Résumé Geogr. distr. & Syn. (1959) 166 & 345. **Plate 4.**

*Symphorema grossum* Kurz in For. Fl. Burma, II (1877) 254.

TYPE SPECIMEN: Pegu, Burma (Brandis 879-K).

Among the species having included stamens and minute style, this is readily distinguished by its involucre bracts being shorter than the calyx, leaves obovate to ovate, and stamens always five and seated in the corolla throat.

Branchlets rusty villous or sub-tomentose. *Leaves* obovate to oval-oblong, rounded at apex, cuneate towards the base, chartaceous, glabrous above, pubescent or tomentose beneath, upto 15.5 cm. long, 8.5 cm. broad; lateral nerves 6-7 pairs, prominent beneath; reticulation distinct; petiole 1-1.5 cm. long, more or less thickly pubescent. *Inflorescence* axillary and terminal; panicles tomentose, 5-10 cm. long; rachis longitudinally grooved in the internodes; cymes 7-flowered, yellowish white, with a peduncle 1-2 mm. long; involucre bracts shorter than the calyx, unequal, oblong-spathulate, pubescent, 2-3.5 mm. long; flowers sessile. *Calyx* about 5 mm. long with lobes 5, rarely 6, without any accessory teeth; lobes acute, tomentose; tube tomentose without, appressedly hairy within. *Corolla* white, 6-10 mm. long, narrowly funnel-shaped, 5-lobed, puberulous without, villous in throat, glabrous below; lobes obovate to oblong, puberulous on both the sides. *Stamens* 5, included; filaments minute; anther lobes almost orbicular. *Ovary* glabrous, glandular in the upper third; style minute or none; stigma 2-lobed.

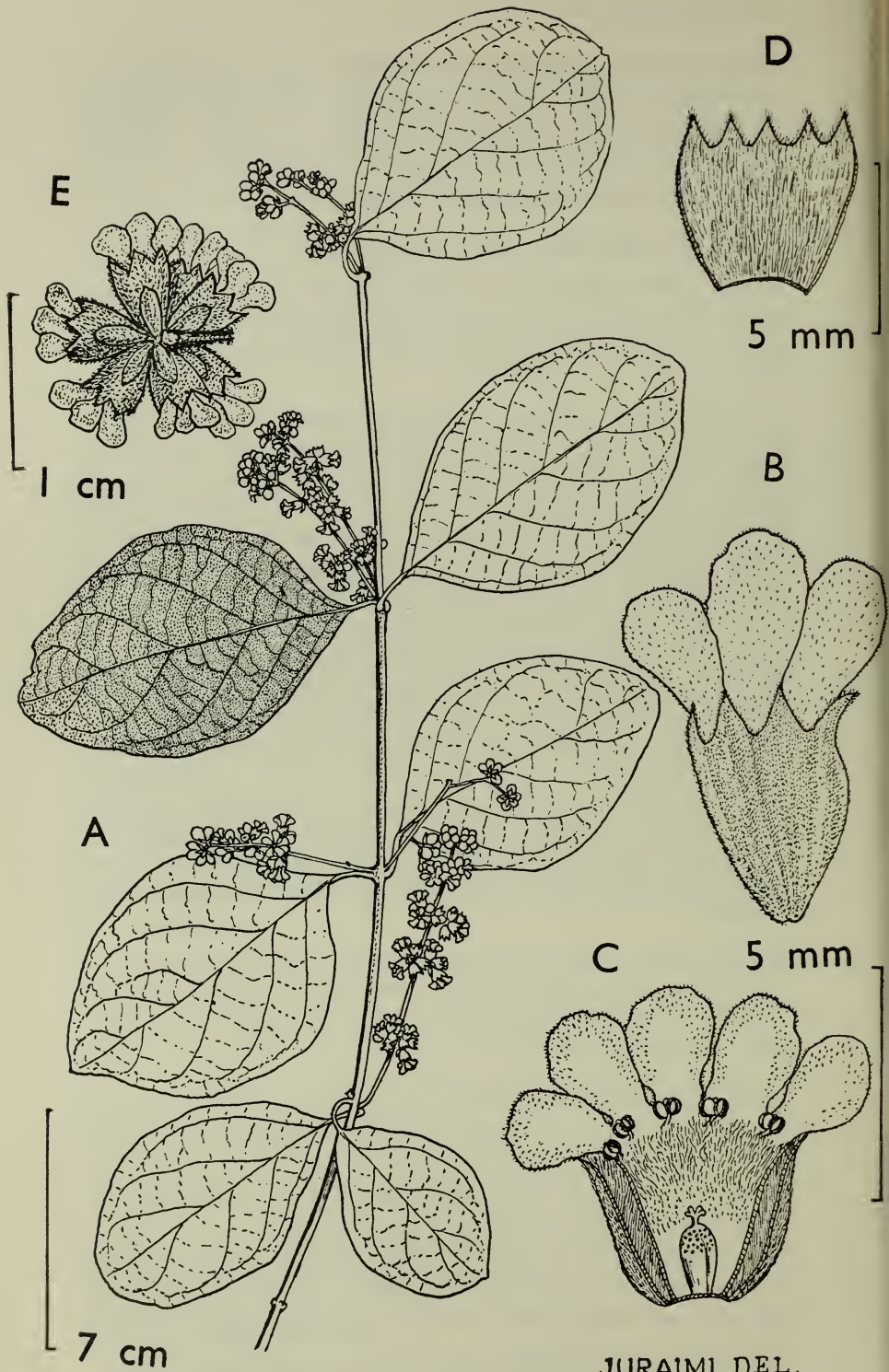
BURMA: **Pegu**, Bassein, Chaungtha Chaung (Lace 3,037: DD, E & SING); Salween Distr. (Chin 6,834: DD); loc. incert. (Brandis 879: K, holotype); **Tenasserim** (Helfer, Kew distr. No. 6,011: A; Gallatly 577: CAL).

THAILAND: **Kanburi** (Kerr 10,563: A, E & L).

Apparently the holotype (Brandis 879 from Pegu) was preserved in Calcutta where Kurz had kept his herbarium. Later this specimen or its part was sent by Dr. King to Clarke in Kew where it is preserved. I have seen its photograph.

Moldenke op. cit. (1959) 166, regards this species as an endemic in Upper Burma, though Clarke had quoted it also from Tenasserim in Lower Burma. More recently the species has been collected at Kanburi in Thailand.

The species is peculiar in the genus in its involucre bracts being shorter than the calyx.



JURAIMI DEL.

Plate 4. *Sphenodesme eryciboides* Kurz (Lace 3,037 in Edin.).

A, Fertile twig. B, Flower. C, Ibid, cut open to show the disposition of stamens and ovary. D, Calyx vertically cut open. E, Cymes to show the length of the involucre bracts.

Section SPHENODESME

*Eusphenodesma* Clarke in Hook. f., Fl. Br. Ind. IV (1885) 601; Briq. in Engl. & Prantl Pflanzenf. IV 3a (1897) 181; Mold., Résumé Geogr. distr. & Syn. (1959) 403.

Sub-section *Bracteosae* Briq. in Engl. & Prantl Pflanzenf. IV 3a (1897) 181; Mold., op. cit. (1959) 403. **syn. nov.**

Stamens and style long, exsert; (calyx with or without accessory teeth; corolla-lobes oblong-ovate).

Sub-section SPHENODESME

*Decadontia* Griffith, Notul. IV, (1854) 175.

TYPE: *S. pentandra* Jack.

Calyx 10-ribbed, with 5 entire or bifid lobes and with 5-accessory teeth.

4. *Sphenodesme griffithiana* Wight, Ic. IV, 3 (1850) 14 t. 1477; Clarke in Hook. f., Fl. Br. Ind. IV (1885) 602; Lam, Verb. Malay. Pen. (1919) 334 & in Bull. Jard. Bot. Buit III (1921) 99; Dop in Fl. gén. Indoch. (1936) 906; Mold., Résumé Geogr. distr. & Syn. (1959) 166 & 345 **Plate 5**.

*S. jackiana* (Wall.) Wight, Ic. (1850) quoad t. 1477 tantum.

*S. robinsonii* Dop in Bull. Soc. Bot. France LXI (1914) 318 & Fl. gén Indoch. (1936) 903; Mold., Résumé Geogr. distr. & Syn. (1959) 177 et suppl. IV, p. 8, & in Dansk Bot. Ark. 23, I (1963) 86, **Syn. nov.**

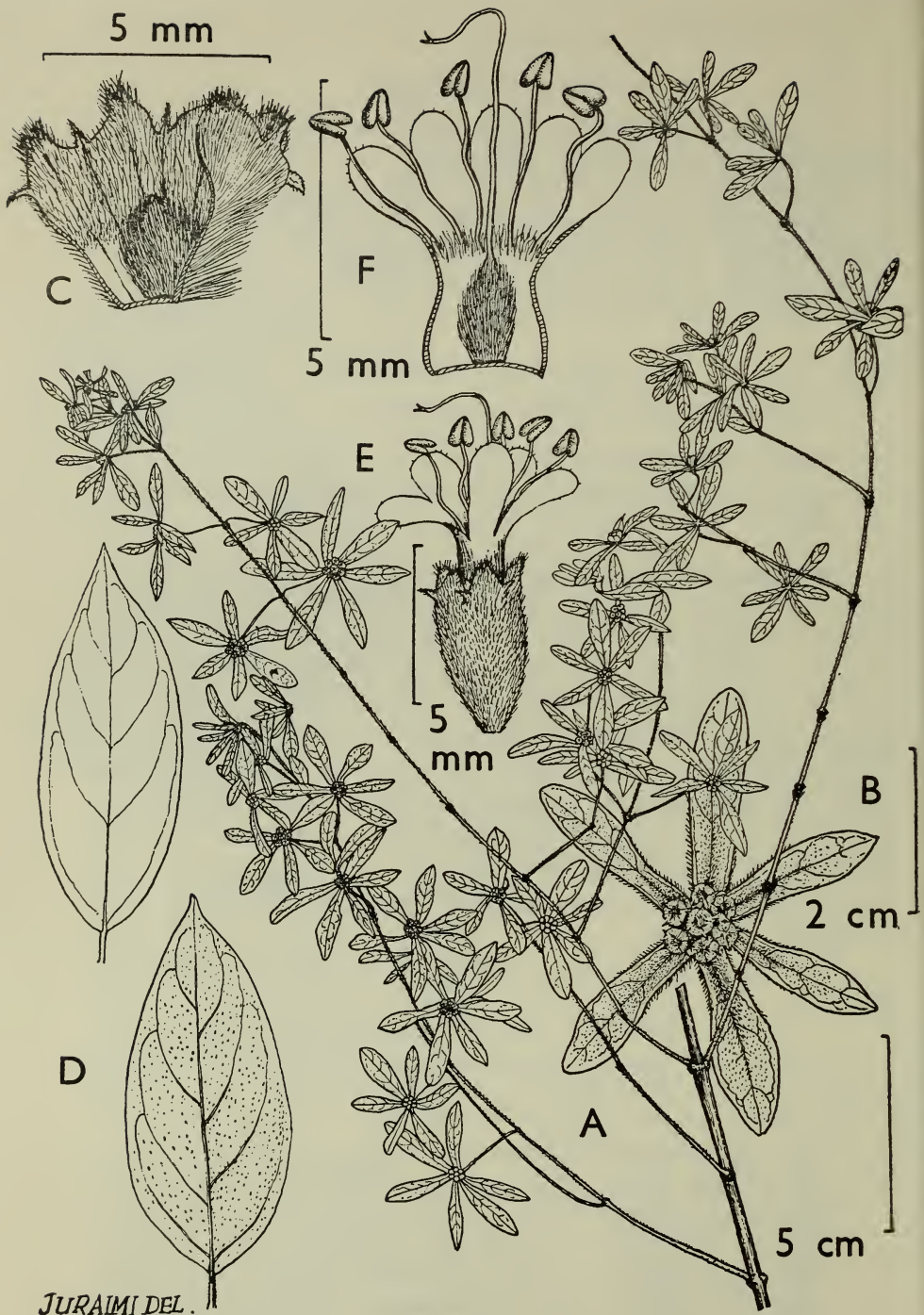
*Decadontia coerulescens* Griff., Notul. IV (1854) 175, **Typonym.**

*Symphorema pentandrum* Kurz, For Fl. Burma, II (1877) 255.

TYPE SPECIMEN: Mergui, Burma (Griffith 903-E).

This species is easily distinguished from its closest ally *S. mollis*, by its leaves being glabrous, calyx densely hirsute outside and corolla-throat with a narrow villous ring.

A scandent shrub; branchlets quadrangular, glabrous, lenticellate. *Leaves* ovate-oblong, acute-acuminate at apex, somewhat rounded at base, almost nitid above, dull below, glabrous, chartaceous to subcoriaceous, upto 10.5 cm. long, 5 cm. broad; petiole 5–8 mm. long; lateral nerves 4–6 pairs. *Inflorescence* axillary and terminal, lax, 12–30 cm. long; rachis tetra-angular, puberulent when young later glabrous, densely ciliate at nodes; cymes 7-flowered, peduncle pubescent, upto 2.5 cm. long; involucrel bracts oblong-obovate, obscurely mucronate at apex, puberulous, pilose in the margins and the mid-vein on the basal half, 15–23 mm. long, 4–7 mm. broad. *Calyx* with 5-lobes and 5 accessory teeth, about 4 mm.



JURAIMI DEL.

**Plate 5.** *Sphenodesme griffithiana* Wight (A-C Griffith 903 in Edin.; D-F Robinson 1,464 in Arn. Arboretum).

A, Portion of an inflorescence. B, Cyme after anthesis. C, Calyx cut open to show ovary. D, Leaves. E, Flower. F, Flower cut open to show ovary and stamens.

long, hirsute all over except at the base of the tube; lobes 2-fid, hirsute; accessory teeth situated below the sinuses, hirsute. *Corolla* infundibuliform, 5-lobed, 5 mm. long, glabrous, with a narrow, villous band in the throat at the insertion of stamens and obscurely fimbriate in the margins of the lobes. *Stamens* 5, exsert; filaments slender; anther-lobes oblong. *Ovary* densely setose, glandular; style exsert, filiform; stigma shortly bifid.

BURMA: **Tenasserim**, Mergui (Griffith 903: E, holotype of the species and of *D. coerulescens* & K, Isotype; Meebold 14,150: CAL; Proudlock 45: CAL); Tavoy (Helfer: Kew distr. No. 6,008: K, & Bot. Mus. Nat. Prag. No. 43: BM, E & L); loc. incert. (Packman 67: BM; Parkinson 1,940: DD).

VIETNAM: **Annam**, Nhatrang (Robinson 1,464: A, Isotype of *S. robinsonii*; Poilane 3,232: A. paratype); Phan-rang (Alleizette s.n.: L).

Apparently Dop based his *S. robinsonii* on a variation of the species differing in the shape and size of calyx-lobes and the accessory teeth; but an examination of duplicates of the types shows no material differences from *S. griffithiana*, to which it is here reduced.

As to the status of Helfer's specimens distributed from the National Museum of Prague in 1937, see remarks under *S. involucrata*.

5. **Sphenodesme mollis** Craib in Kew Bull. (1912) 154; Dop in Fl. gén. Indoch. (1936) 904; Fletcher in Kew Bull. (1938) 443; Mold., Résumé Geogr. distr. & Syn. (1959) 178. **Plate 6.**

*S. annamitica* Dop in Bull. Soc. Hist. Nat. Toulouse LXIV, (1932) 573 & Fl. gén. Indoch. (1936) 907; Mold., Résumé Geogr. distr. & Syn. (1959) 176. **Syn. nov.**

*S. smitinandi* Mold., Phytologia VIII, No. 8 (1962) 393. **Syn. nov.**

TYPE SPECIMEN: Sriracha, Thailand (Kerr 2,075-K).

This species is allied to *S. griffithiana* from which it is easily distinguished by its leaves being densely pubescent underneath, calyx sericeous without and corolla densely villous in the throat.

Branchlets tomentose to pubescent, later glabrous; bark lenticellate. Leaves elliptic-oblong, acute-acuminate at apex, cuneate towards base, chartaceous-subcoriaceous, pilose on the upper surface, softly pubescent or tomentose beneath, 4-12 cm. long, upto 8.5 cm. broad; lateral nerves 5-6 pairs, more prominent beneath; petiole upto 12 mm. long, tomentose. *Inflorescence* in axillary and terminal panicles, tomentose; cymes 7-flowered; involucre bracts spatulate to oblanceolate-spatulate, obscurely apiculate, pubescent-tomentose, distinctly ribbed, 2.5 cm. long, 6

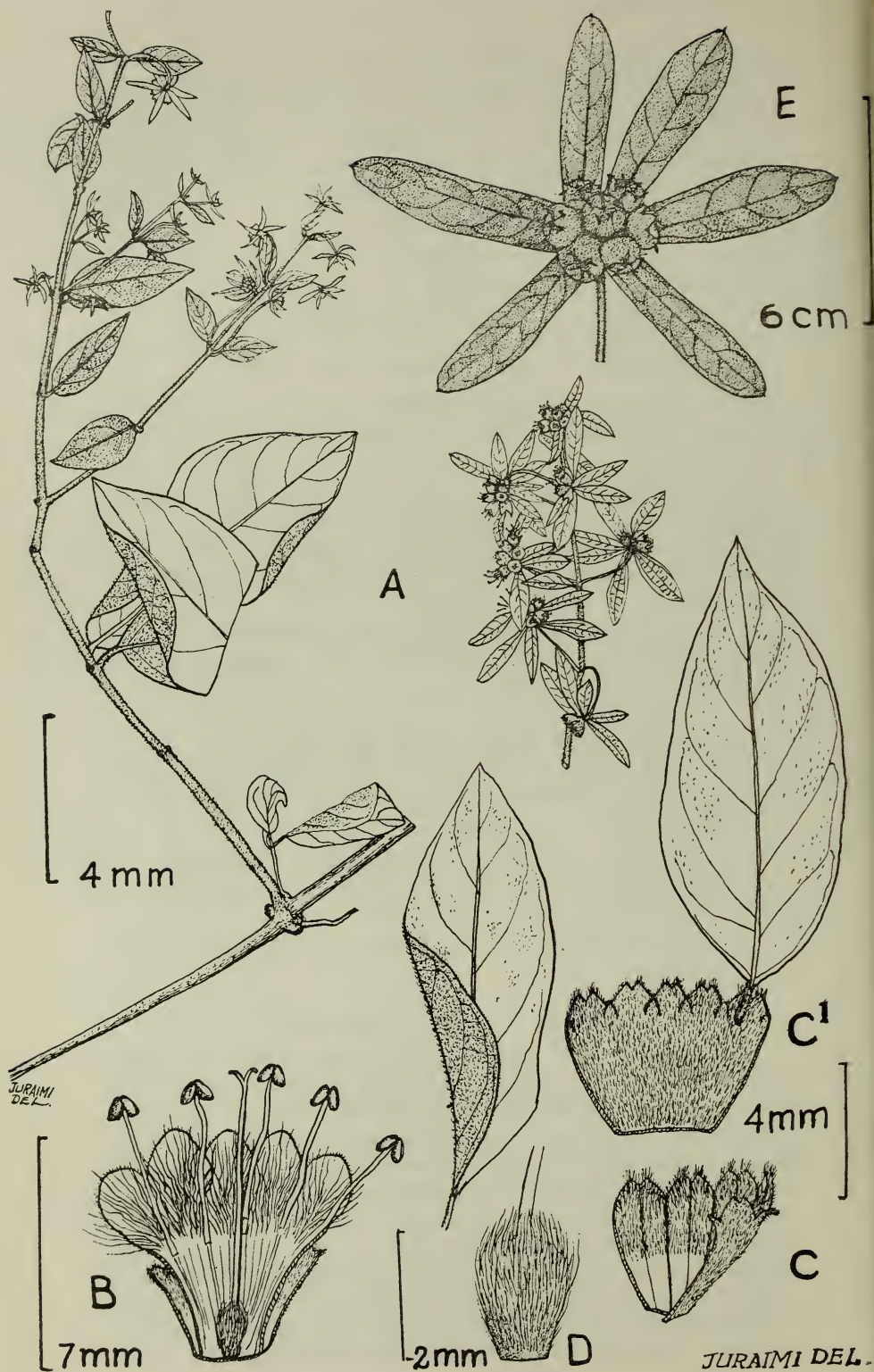


Plate 6. *Sphenodesme mollis* Craib (A-D Kerr 2,075 in Edin.; E Kerr 9,688 in Edin.).

A, Twig with leaves and inflorescence. B, Flower longitudinally cut open to show inside. C, Calyx cut open to show outside

mm. broad. *Calyx* 4.8 mm. long with 5 lobed and 5 accessory teeth; tube sericeous-tomentose without, pubescent within in the upper half, glabrous in the lower-half; lobes slightly 2-fid, sericeous-tomentose; accessory teeth small, seated externally below the sinuses of calyx-lobes. *Corolla* infundibuliform, 5-lobed, glabrous without, villous in throat, about 8 mm. long; lobes oblong, ciliate at margin. *Stamens* 5, exsert. *Ovary* ovoid, setose, about 1 mm. long; style slender, exsert,  $\pm 6.5$  mm. long; stigma bilobed.

THAILAND: **Korat**, Pak Chawng, alt. 300 m. (Marcan 1,590: E); Rachasima, Pak Chawng, alt. 200 m. (Smitinand 4,852 in Herb. Moldenke, Yonkers, N.Y., holotype of *S. smitinandi* Mold.); **Chantabun**, Tap Sai, alt. 200 m. (Kerr 9,688: E); **Sriracha**, Nawng Kaw (Kerr 2,075: E, Isotype, & K-Holotype); loc. incert. Put 457: E); **Saraburi**, Mauk Lek, alt. 200 m. (Kerr 9,117: C & E); Keng Koi, Ban Nawng Bua (Put 1,107: E); **Petchaburi**, Bo Tai (Marcan 552 & 2,739: E; Kerr 11,063: E); **Prachuap**, Hua Hin (Kerr 13,436 & Marcan 2,227: E); Sam Roi Yawt (Kerr 10,966: E); **Kanburi** (Kerr 10,107: E); Ban Ting Na Nang Rauk, alt. 100 m. (Burkill Jr. 1,260: SING); **Chanburi**, Pong Namrawn, Taru, ang. alt. 570 m. (Sangkha Chand 555: A & BKF); **Koh Sichang** (Nielsen 644: C). **Tha Ki Len** (Larsen 8,326: C); Sai Yok (Larsen 8,462 & 9,051: C); **Ban Kao** (Larsen 8,048: A & C).

VIETNAM: **Annam**, Phan-Rang, Ba Ran (Poilane 9,637: A, syntype of *S. annamitica*); Nhatrang, Phu Hu (Poilane 5,342: A, syntype of *S. annamitica*).

CHINA: **Yunnan**, loc. incert. (Henry 13,225: BM & E).

CULTIVATED: Bangkok (Kerr 11,035: E).

The adult leaves in Larsen's Nos. 8,048, 8,326 & 9,051 and Henry's No. 13,225, are almost glabrous. But, the younger leaves and other floral characters agree with the holotype; the absence of indumentum in mature leaves may therefore be a response due to age.

6. **Sphenodesme sarawakensis** Moldenke Revista Sudam. Bot. X (1956) 230, & Résumé Geogr. distr. & Syn. (1959) 193. **Plate 7.**

TYPE SPECIMEN: Sampadi Hill, Sarawak (Native Collector 5,227-NY).

Akin to *S. racemosa* in having 10-ribbed calyx with deeply 2-fid and inflexed lobes and well developed aristate accessory-teeth, but differs in its branchlets, leaves, and involucre bracts being always glabrous, cymes 5-flowered, calyx obscurely pubescent without, accessory teeth alternating with the calyx lobes and ovary setulose all over.



Plate 7. *Sphenodesme sarawakensis* Mold. (Native Collector 5,111 in Arn. Arboretum).

A, Infructescence. B, Flower with its corolla, stamens and style fallen off. C, Calyx cut open to show ovary.

Branchlets dark brown, obscurely quadrangular, lenticellate, glabrous. *Leaves* chartaceous, elliptic-lanceolate, acuminate at apex, cuneate towards base, glabrous on both the sides, dull greenish above, brown below, 5–13.5 cm. long, 2–4 cm. broad, conspicuously reticulated beneath; lateral nerves 3-pairs, rarely 4 pairs; intramarginal nerve conspicuous on the underside; petiole about 5 mm. long. Panicles axillary and terminal, spreading, puberulous in the rachis when young, later glabrous, upto 20 cm. long; cymes 5-flowered; peduncle 2.5–3.5 cm. long, puberulent, slender; involucre bracts 6, membranous, elliptic or ovate-elliptic, apiculate at apex, attenuate towards the base, brown on drying, puberulous when young, later glabrous, 1.5–3 cm. long, 5–12 mm. broad. *Calyx* (fruiting) 5-lobed and with 5 accessory teeth, campanulate, 10-ribbed; lobes deeply bifid, aristate, inflexed; accessory teeth linear caudate, erect, obscurely hairy, alternating with the lobes, 3–5 mm. long; tube pubescent within, obscurely hairy outside, 6–8 mm. long. *Corolla* . . . ? Stamens . . . ? *Ovary* obovoid, grey setulose, 2–3 mm. long.

SARAWAK: Mt. Stupang, alt. 100 m. (Native Collector (Jantan) 5,191: A); Mt. Mating (Native Collector 5,111: A).

As the type material was not available for consultation, this species has been identified only from the description. Recently the author has confirmed that the duplicates of these two aforementioned specimens in the Britton Herbarium of the New York Botanical Garden, are identical with the holotype of the species.

The taxon is described as having 6 or 7 flowered cymes, but in the two specimens cited above the cymes are always 5-flowered.

7. *Sphenodesme racemosa* (Presl) Mold. in Revista Sudam. Bot. X, No. 7 (1956) 230, & Résumé Geogr. distr. & Syn. (1959) 391. var. *racemosa*. **Plate 8.**

*S. barbata* Schauer in DC., Prodr. XI (1847) 623; Wight, Ic. Ind. Or. IV (1850) 13 t. 1474 & Illust. Ind. Bot. (1850) 217, fig. 173–b6; Miq., Fl. Ind. Bat. II (1858) 910; Clarke in Hook f., Fl. Br. Ind. IV (1885) 601; Briq. in Engl. & Prantl, Nat Pflanzf. IV 3a (1897) 181; King & Gamble in Journ. As. Soc. Beng. LXXIV, 4 (1909) 862; Lam, Malay. Verb. (1919) 333 & in Bull. Jard. Bot. Buit. III (1921) 99; Merr., Bibl. En. Born. pl. (1921) 518; Ridl., Fl. Mal. Pen. (1923) 638; Merr. in Univ. Cal. Publ. Bot. XV (1929) 266; Mold., Résumé Geogr. distr. & Syn. (1959) 164, 181, 192, 194, 345 & 391.

*S. borneensis* Merr. in Journ. Str. Br. Roy. As. Soc. 76 (1917) 114; Mold., Op. Cit. (1959) 193. **Syn. nov.**

*S. ferruginea* Wight, Ic. Ind. or. IV (1850) 13 t. 1474 (Pro Synonym *S. barbata* Schauer) **nom. nud.**

*S. winkleri* Hall. f. in Med. 's Rijks. Herb. No. 37 (1918) 86.

*Congea barbata* Wall. Cat. No. 1738 (1828) 47 & ex Walp., Rep. IV (1844 & 48) 117.

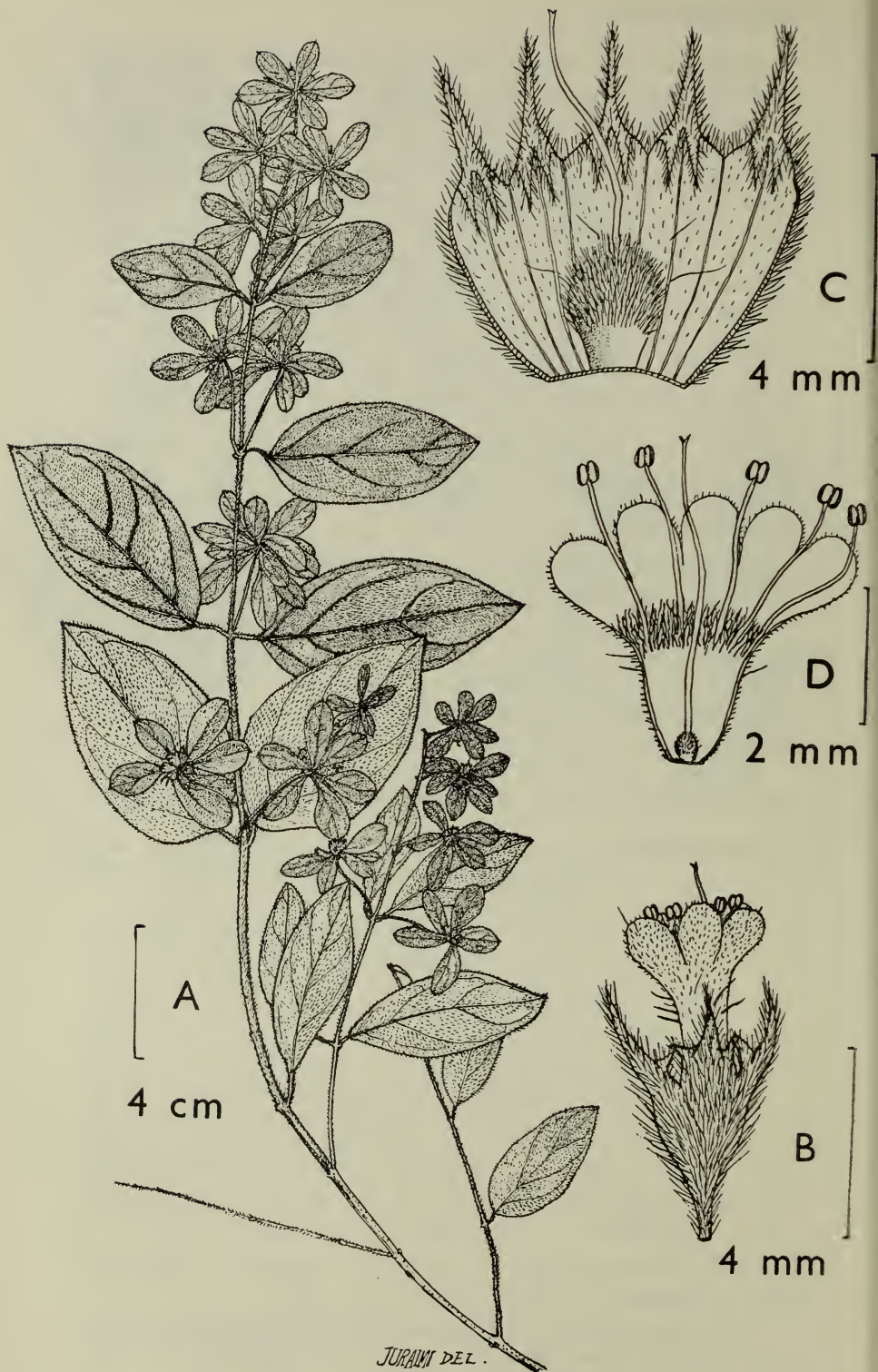


Plate 8. *Sphenodesme racemosa* (Presl) Mold. (Rostado s.n. in Sing.).  
 A, Inflorescence with leaves. B, Flower. C, Calyx cut open to show ovary. D, Corolla longitudinally cut open.

*Viticastrum racemosum* Presl, Bot. Bemerck. (1844) 148; Walp. Rep. VI (1846-47) 691: **Basionym.**

TYPE SPECIMEN: ? Malacca (Griffith).

Among the species having 7-flowered cymes, ferruginous hairy leaves, branchlets & inflorescence and exsert stamens and style, *S. racemosum* is easily distinguished by its calyx having bipartite, inflexed lobes and distinctly, often longer, accessory teeth; by its corolla-lobes being externally pubescent and ovary setose in the upper half and glabrous in the lower.

(Var. *racemosum* has the following special characters; Calyx densely ferruginous hirsute without, puberulent within; corolla with broad villous band in the throat).

Branchlets dark brown, somewhat quadrangular, lenticellate, densely rufous hirsute. *Leaves* chartaceous, elliptic-oblong to elliptic-ovate, acuminate, obtuse or mucronate at apex, cuneate or somewhat rounded at base, sparsely tawny villous above when young, later nitid glabrous except on the nerves, densely ferruginous-tomentose beneath, 4-11.5 cm. long, 2-4.5 cm. broad; lateral nerves 5-6 pairs, densely hairy; petiole 3-8 mm. long, hairy. *Inflorescence* terminal and axillary, ferruginous tomentose; panicles variable in length, usually 10-25 cm. long or more; cymes 7-flowered; peduncles 2-3.5 cm. long, densely covered with ferruginous tomentum; involucre bracts 1.5-2 cm. long, 3-8 mm. broad, obovoid-spathulate, distinctly nerved. *Calyx* 5-lobed and with 5-accessory teeth, campanulate, about 4 mm. long, 10-ribbed densely ferruginous-hirsute without, puberulent within; lobes deeply bi-partite, inflexed, hirsute; accessory teeth conspicuous linear-caudate opposite to calyx lobes, reflexed, hirsute. *Corolla* 5-lobed, infundibuliform; lobes oblong-spathulate, externally puberulous, glabrous within; tube cylindric, sparsely puberulous outside; internally glabrous except the villous throat. *Stamens* 5, exsert; filaments slender, glabrous; anther lobes almost oblong. *Ovary* rounded, setose in the upper half, glabrous in the lower; style slender, exsert; stigma bi-lobed. *Fruit* capsular, included.

**MALAYA:** **Penang**, Tulloh Bahang (Curtis s.n.: CAL & SING); Hills (Porter sub Wall. Cat. 1,738: BM; K, Holotype of *Congea barbata*). **Province Wellesley**, Krian (Ridley s.n.: SING). **Kelantan**, Kemahang (Sow & Motan 94,509: KEP & L). **Trengganu**, Bundi (Rostado s.n.: SING). **Pahang**, Ulu Sungei, Kuantan (Symington & Kiah 28,777: KEP & SING); Raub (Mat Abu 69,625: KEP; Burkill & Haniff 16,922: SING); Bentong (Kostermans 78,672: KEP); Pekan (Ridley 2,159: BM & SING). **Negri Sembilan**, Gunong Berumbun (Alvins 2,010: SING); Tampin (Burkill 3,221: SING; Nur s.n.: CAL). Malacca, Merlimau (Derry 179: BM & SING); Selandar (Burkill 531: SING); loc. incert. (Alvins 957 & 1,745: SING; Harvey s.n.: SING; Griffith s.n.: BM, isotype of *V. racemosum* ?). **Johore**, Kluang (Holttum 9,410: A & SING); Serom (Ridley s.n.: SING); Muar, Biawak (Curtis s.n.: SING).

BORNEO: **Kalimantan**, South East Hayup (Winkler 2,314: L, Holotype of *S. winkleri*; BM & SING); East Kutai (Kostermans 7,239: SING). **Sarawak**, loc. incert. (Bur. Sc. No. 1,847: PNH, Holotype of *S. borneensis*, & K; Foxworthy 450: PNH, Paratype of *S. borneensis*; Haviland s.n.: BM); Matang (Beccari 1,601: L).

SUMATRA: **Lingga Arch.**, Pulau Redjai (Bunnemeijer 7,634: L).

It seems obvious that the type of *V. racemosum* Presl was not Porter's specimen distributed by Wallich as *Congea barbata*, for Presl would not have ignored the specific epithet in Wallich's binomial. Griffith, who was an early collector in Malacca (1841-1845) corresponded with Martius & obviously the specimen quoted by Schauer from Martius herb. was Griffith's, part or duplicate of which must have been studied by Presl. In view of this it is to be presumed that Griffith's specimen in British Museum is the isotype of the species.

Moldenke who made the combination based on *V. racemosum* Presl, did not give any clue about the location or characters of the holotype. From the citation the sole reason for the combination seems to be to respect the priority of Presl's specific epithet, while Schauer and others had followed the old rule and given *Congea barbata* Wall. Cat. No. 1,738 (1828) (Porter's specimen), priority over other names subsequently published.

Though there are some discrepancies in the description of *S. borneensis* and *S. racemosa*, there seems to be no material difference between the species, and so I have treated these two as conspecific. Merrill in his protolog of *S. borneensis* regards this as having 5-flowered cymes, but both in the holotype and the paratype specimens the cymes are generally 7-flowered, 5-flowered cymes being rare and found in the younger or under-developed cymes only.

When Lam (op. cit. 1919 & 121) stated in the keys that the calyx of this species was "without horn-like teeth", he had probably in mind the "teeth" (episepals) sometimes found in each of the sinuses between sepals; for, the accessory teeth (episepals) here are well developed, setose & sepal-like, but seated outside, opposite to each of the inflexed bifid calyx-lobe.

7a. **Sphenodesme racemosa** (Presl) Mold. var. **sabahensis** Munir var. nov. Plate 9.

TYPE SPECIMEN: Tawao, Borneo (Elmer 20,838 - SING).

*A forma typica* (var. *racemosa*) *calyce utrinque pilis densissime appresso, in corollae fauce annulo villosa valde angustiore haec varietas facile distinguenda.*

This differs from the type variety by its calyx being provided on both sides with densely appressed hairs and the corolla with a much narrower villous ring in the throat.

BORNEO: **Sabah**, Tawao, Elphinstone Province (Elmer 20,838: A, C, BM, BRI, L & PNH: isotypes; SING - Holotype).



Plate 9. *S. racemosa* var. *sabahensis* Munir (Elmer 20,838 in Sing.).

A, Fertile twig. B, Calyx cut open to show its external structure.  
 C, Calyx cut open to show the internal structure. D, Corolla  
 (in bud) longitudinally opened to show stamens and ovary.

8. **Sphenodesme mekongensis** Dop in Bull. Soc. Bot. France LXI. (1914) 318 & Fl. gén. Indoch. (1936) 901; Fletcher in Kew Bull. (1938) 442; Mold., Résumé Geogr. distr. & Syn. (1959) 176 & 178. **Plate 10.**

TYPE SPECIMEN: Xang Kay, Laos (Thorel s.n. - P).

From *S. triflora* to which it is closely allied in its 3-flowered cymes, this differs in its leaves being fewer nerved (2-3 pairs), involucre bracts being glabrous, calyx-tube glabrous and provided with accessory teeth, corolla-throat densely villous and ovary setulose except at the base.

Branchlets brownish, rugose, lenticellate, glabrous. *Leaves* elliptic-ovate to lanceolate, obscurely acuminate at apex, somewhat cuneate towards base, glabrous, papyraceous, nitid above, dull below, 5-12.5 cm. long, upto 3.8 cm. broad; main lateral nerves usually 1 pair, sometimes 2 pairs, the middle one ascending almost parallel to the margins, the outermost ones frequently looping with the tertiary veinlets; secondary veins short, straight, sometimes split at apex; reticulation distinct on the underside; petiole pubescent, 5-8 mm. long. *Inflorescence* axillary and terminal, lax, pubescent when young, upto 20 cm. long; cymes 3-flowered, peduncle slender, 6-12 mm. long; involucre bracts oblong-spathulate, narrowed towards base, membranous, glabrous, distinctly reticulate, 12-18 mm. long, 4-8 mm. broad, two bracts longer than the others. *Calyx* campanulate, 5-lobed, 10-ribbed, 4-5 mm. long; tube pubescent without, glabrous within; lobes entire,  $\pm$  triangular, pubescent on both sides; accessory teeth small, alternating with the lobes. *Corolla* 5-lobed, glabrous without, densely villous in the throat, slightly longer than the calyx; lobes ciliate at margin. *Stamens* 5, exsert. *Ovary* ovoid, setulose, except at the base; style exsert, stigma faintly bilobed.

LAOS: Xang Kay [by the Mekong River] (Thorel s.n.: A, Isotype).

THAILAND: Puk Sana Vien-Chan (Kerr 20,720: E); Pu Tong (Kerr 8,825: E); Lampang, Me Sui (Winit 1,961: E).

9. **Sphenodesme pierreii** Dop in Bull. Soc. Bot. France LXI, (1914) 317 & in Fl. gén. Indoch. (1936) 906; Mold., Résumé Geogr. distr. & Syn. (1959) 176. **Plate 11.**

TYPE SPECIMEN: Cochinchine, Vietnam (Pierre s.n. & No. 70 - P).

This species is closely allied to *S. pentandra*, but is easily distinguished by its leaves being fewer nerved (2-3 each side), peduncle and calyx densely hirsute and involucre bracts broadly elliptic-obovate, ciliate towards the base.

Branchlets reddish brown, almost quadrangular, hairy at first, later glabrous, lenticellate. *Leaves* elliptic-oblong, glabrous, acuminate to obscurely mucronate towards apex,  $\pm$  rounded at base, nitid above, dull below, 8-11 cm. long, 4-4.5 cm. broad; lateral nerves prominent beneath, 2 lowermost pairs long and opposite,

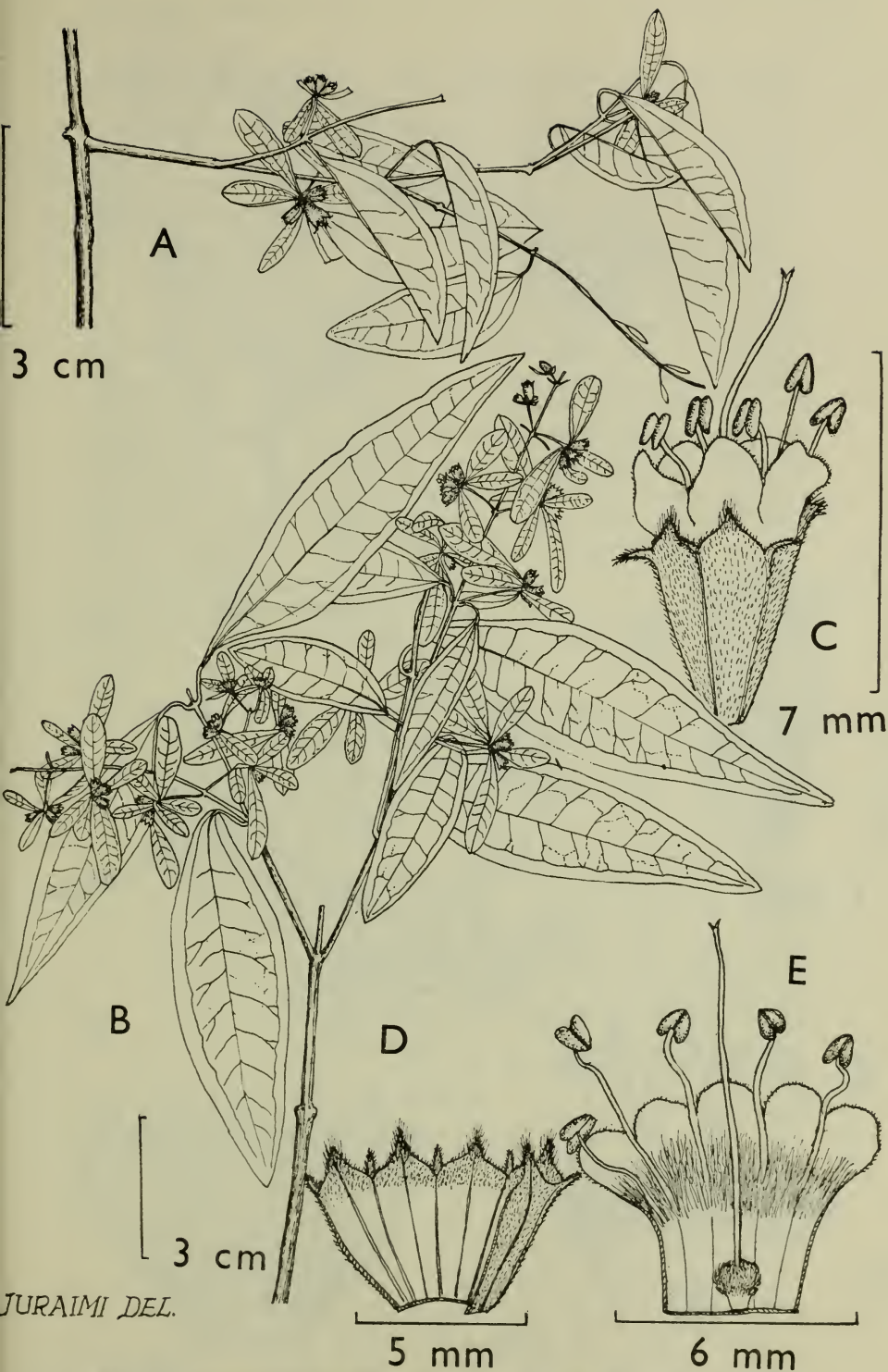


Plate 10. *Sphenodesme mekongensis* Dop (A Thorel s.n. in Arn. Arboretum; B-E Kerr 20,720 in Edin.).

A & B, Parts of inflorescence. C, Flower. D, Calyx cut open to show its ribs and glabrous tube. E, Corolla longitudinally opened to show stamens and ovary.

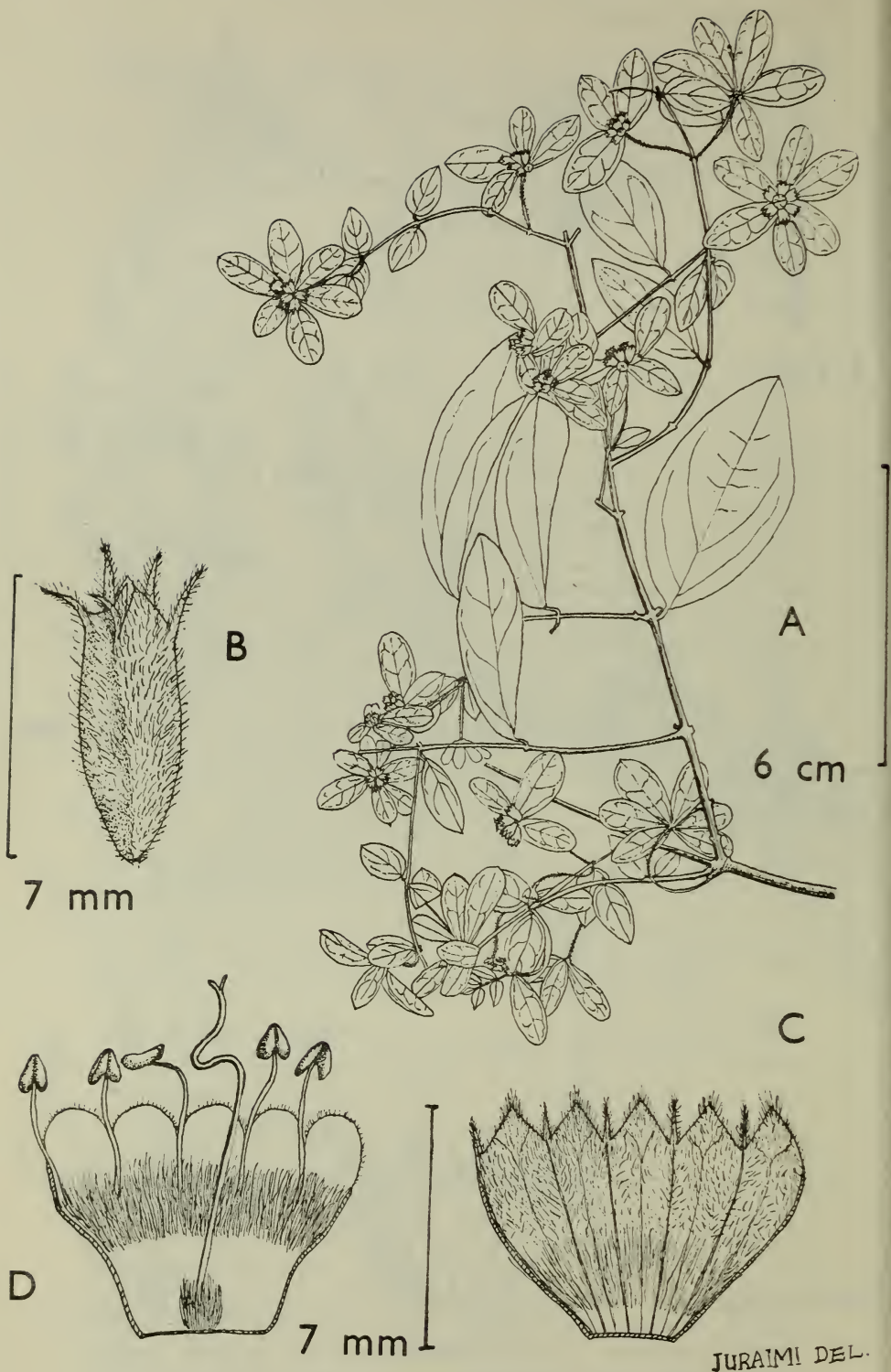


Plate 11. *Sphenodesme pierrei* Dop (Pierre s.n. in Arn. Arboretum).  
 A, Fertile twig. B, Calyx. C, Calyx longitudinally cut open. D,  
 Corolla cut open.

the other 2-4 pairs very short, alternate, horizontal; secondary veins short, transverse, nearly parallel, reticulation distinct; petiole thickly puberulent, 3-4 mm. long. *Inflorescence* axillary and terminal panicles, lax, pubescent, 15-18 cm. long, 5-7 cm. through; bracts ovate, leaf-like, pubescent, 15-20 mm. long, 8-12 mm. broad; cymes 7-flowered; peduncle pubescent, slender, 12-18 mm. long; involucre bracts subequal, elliptic-obovate, obscurely mucronate at apex, narrowed towards base, glabrous in the upper part, hairy at base, ciliate in margin with distinct reticulation, 17-25 mm. long, 8-12 mm. broad. *Calyx* with 5 lobes and 5 accessory teeth, hirsute without, hispidly tomentose within; tube 6 mm. long; lobes almost triangular, acute, 2 mm. long; accessory teeth situated in the sinuses between the lobes, ciliate, reflexed (recurved), as long as the lobes or longer. *Corolla* narrow, funnel-shaped, glabrous without, inside densely villous in the throat, otherwise glabrous, 8-9 mm. long, lobes equal, glabrous, fimbriate in the margin. *Stamens* 5, exsert, filaments slender, 4 mm. long. *Ovary* ovoid, setose; style exsert, 7 mm. long; stigma shortly 2-lobed.

VIETNAM: **Cochinchine**, Ti-tinh (Pierre s.n.: A & K, syntypes).

Of the three syntypes quoted by Dop. two were collected by Pierre in Vietnam, while the third was collected by Harmond in Laos.

10. **Sphenodesme pentandra** Jack in Malay. Misc. I (1820) 19; ed. Wallich in Hook., Bot. Misc. I (1830) 285; Clarke in Hook. f., Fl. Br. Ind. IV (1885) 602 sensu typico; Forbes & Hemsley, in Journ. Linn. Soc. XXVI (1890) 265; Briq. in Engl. & Prantl, Nat. Pflanzenfam. IV 3a (1897) 181; King & Gamb. in Journ. As. Soc. Beng. LXXIV, 4 (1909) 863; Craib in Kew Bull. (1911) 445; Lam, Malay. Verb. (1919) 335 & in Bull. Jard. Bot. Buitz. (1921) 99; Merr., Bibl. En. Born. pl. (1921) 518; Ridl., Fl. Mal. Pen. (1923) 639; Dop in Fl. gén. Indoch. IV (1936) 904; Fletcher in Kew Bull. (1938) 442; Kanjilal & Das in De, Fl. Assam (1939) 496; Mold., Résumé Geogr. distr. & Syn. (1959) 345, var. **pentandra**. **Plate 12.**

*S. acuminata* Wight, Ic. Ind. Or. IV, 3 (1850) 14 t. 1476 (pro synonym *S. jackiana* Schauer)).

*S. jackiana* (Wall.) Schauer in DC. Prodr. XI (1847) 622; Miq., Fl. Ind. Bot. II (1858) 909; Clarke in Flora of Koh Chang VIII (1904) 174; Dop in Bull. Soc. Bot. France 61 (1914) 319; Mold. op. cit. p. 345.

*S. jackiana* (Wall.) Wight t. 1477, quoad nomen tantum, (excl. Icon. et description = *S. griffithiana* Wight).

*S. pentandra* Griff., Notul. IV (1854) 181, non *S. pentandra* (Roxb.) Griff. op. cit. 176.

*Gongea jackiana* Wall. Cat. No. 1735 (1828), & in Hook., Bot. Misc. I (1830) 285 in observ.; Walp., Bot. IV (1848) 117. **isonym.**



JURAIMI DEL.

Plate 12. *Sphenodesme pentandra* Jack (A Jack s.n. in Edin.; B-E Wall. Cat. No. 1735 in Leiden).

A & B, Parts of inflorescence. C, Flower. D, Calyx longitudinally cut open to show the accessory teeth. E, Corolla vertically cut open.

*Symphorema jackianum* Kurz, For. Fl. Burma II (1877) 255.  
p.p.

TYPE SPECIMEN: Penang, Malaya (Jack s.n. - E).

Among the 7-flowered species of the sub-section *Sphenodesme* this taxon is readily distinguished by its leaves being glabrous and 4-6 veined on each side, and peduncles, involucre bracts and outside of the calyx being glabrous.

Branchlets dark brown, obscurely quadrangular, puberulous when young, later glabrous, lenticellate. *Leaves* chartaceous or sub-coriaceous, elliptic-oblong to lanceolate-oblong, acuminate-acute, often mucronulate at apex, cuneate or subrotundate at base, glabrous on both sides, nitid above, dull below, 5-18 cm. long, 3-7 cm. broad; midrib and axils of veins somewhat hairy beneath; lateral nerves 4-6 pairs; petiole 5-15 mm. long, pubescent when young, longitudinally channelled, curved. *Inflorescence* axillary and terminal, puberulous; panicles 15-37.5 cm. long, pubescent in the rachis when young, later glabrous, ciliated on the nodes; cymes 7-flowered; peduncle 1.5-3 cm. long; involucre bracts oblong-spathulate, obtuse, glabrous, 1.5-2.8 cm. long, 5-10 mm. broad. *Calyx* with 5-lobes and 5-accessory teeth, campanulate, 4-7 mm. long, 10-ribbed, sparsely hairy without, glabrous within, except for a thin band of appressed hairs towards base, conspicuously reticulate in upper part of the tube; lobes small, aristate; accessory teeth conspicuous, acuminate, aristate. *Corolla* 5-lobed, tubular or funnel shaped; lobes somewhat rounded, glabrous, spreading; tube about 5 mm. long, glabrous without, densely villous within the upper third (throat), glabrous in the lower. *Stamens* 5, exsert; filaments slender; anther lobes oblong. *Ovary* densely setose, glandular; style long, exsert, slender, about 5 mm. long; stigma shortly bifid. *Fruit* about 4 mm. long, globular, setose.

THAILAND: Terutao (Curtis=2,522: SING); Satul, Adang, Kuan po, alt. 20 m. (Kerr 13,828 & 14,070: E); Ranawng, Kao Talu, Kraburi (Kerr 16,376 & 16,535: C & E); Surat, Chumpawn, Ta Ngaw, Kaw Samui alt. 50-200 m. (Kerr 11,603, 12,583: E & 11,816: C & E); Nakawn, Tai, Sritamarat, alt. 50-200 m. (Kerr 15,396 & 5,849: E); Tongkah (Curtis s.n.: SING); Pungah (Curtis s.n.: SING); Krabin, Bupram, alt. 300 m. (Kerr 9,832: E); Bangtaphanoi (Keith 155: SING); Wat Soa Uhm (Seidenfaden 2,182: C & SING); Tassateng (Seidenfaden 2,129: C & SING); Kao Sabah, Chantaburi (Seidenfaden 2,670: C & SING); Chanburi Pong, Namrawn (Sangkhachand 581: A & BKF); Kaw Suau (Annandale s.n.: SING); Trat, Koh Chang (Smitinand 2,200: A); Kott Nam Ka Island (Vaughan 306; CAL & L); Khao Rum (? 607: E); Sriracha (Collin 495, 632, 1,388, 1,416 & 1,969: E Marcan 1,204: BM & E); Koh Chick (Schmidt 863: C); Phu Kok (Pierre s.n.: BM); loc. incert. (Fielberg in April 1869: C).

MALAYA: **Kedah**, Langkawi, Coah (Curtis 2,522: SING; Ridley & Curtis 8,320: SING; Haniff 15,478: SING; Haniff & Nur 7,070: A & SING; Fox s.n.: SING); Ulu Malacca (Dolman 21,493: SING). **Penang**, loc. incert. (Jack s.n.: E, holotype; Wallich sub. Wall. Cat. No. 1,735: BM, E, K, L and 1,735/1: BM); Telok Bahang (Curtis 269: SING); Province Wellesley, Krian (Ridley 9,391: BM & SING). **Trengganu**, Bukit Kajang (Corner s.n.: SING). **Perak**, Grik (Burkill & Haniff 12,524: SING). Gopeng (Kunstler 4,532: CAL). **Pahang**, Sungei Kechau (Walker 23,324: SING); Raub (Kalong 20,325: SING); Kuala Tahan (Seimund 14 & 275: SING); Kuala Tembling (Ridley 2,160: BM & SING). **Selangor**, Ulu Gombak (Murdoch 151: BM); Sentul (Ridley 14,937: BM & SING). **Negri Sembilan**, Sungei Ujong, Burunang (Alvins 3,304: SING). **Malacca**, Brisu (Derry 40: BM & SING); Bukit Panchur (Holmberg 825: SING); loc. incert. (Alvins 2,138: SING; Maingay sub Kew distr. No. 1,195: A & L; Griffith s.n.: DD). **Johore**, Bukit Saga (Ridley 11,122: SING); Kota Tinggi (Sinclair 40,690: E, L, KEP & SING). **Singapore**, Changi (Ridley 2,793: BM & SING); Seletar (Ridley 14,187: BM & SING); loc. incert. (Hullett 520: SING).

BORNEO: **Sabah**, Sandakan (Cuadra A1, 152: KEP, PNH & SING). **Kalimantan**, Sangkulirang, Karangan river (Kostermans 13,542: SING).

LAOS: Arboretum de Trang-bon (Poilane s.n.: A); Between Strung-treng (Poilane 16,264: A).

VIETNAM: **Annam**, Nhatrang (Alleizette s.n.: L); Bord du Selampho (Harmond s.n.: A); loc. incert. (Poilane 5,630: A). **Cochin-Chine**, Saigon, Thu Dau Moi (Thorel 649: A & SING); Bien Hoa (Pierre 70: A, SING & 1,095: A, L & SING).

The typification of the species is discussed in the introduction. As to the mis-application of *S. pentandra* Jack, see the var. *wallichiana* below.

10a. **Sphenodesme pentandra** Jack var. **wallichiana** (Schauer) Munir stat. nov.

*S. pentandra* Jack: sensu Clarke in Hook. f., Fl. Br. Ind. IV (1885) 602; King & Gamb. in Journ. As. Soc. Beng. LXXIV, 4 (1909) 863; Craib in Kew Bull. (1911) 445; Dop in Bull. Soc. Bot. France 61 (1914) 319; Lam, Malay. Verb. (1919) 335 & in Bull. Jard. Bot. Buitz. (1921) 99; Merr., Bibl. En. Born. pl. (1921) 518; Ridl., Fl. Mal. Pen. (1923) 639; Dop in Fl. Gén. Indoch. IV (1936) 904; Fletcher in Kew Bull. (1938) 442; Kanjilal & Das in De. Fl. Assam (1939) 496; Mold., Résumé Geogr. distr. & Syn. (1959) 345. **Plate 13.**

*S. pentandra* (Roxb.) Griff., Notul. IV (1854) 176 sub *Decadontia coerulescens* in observ.

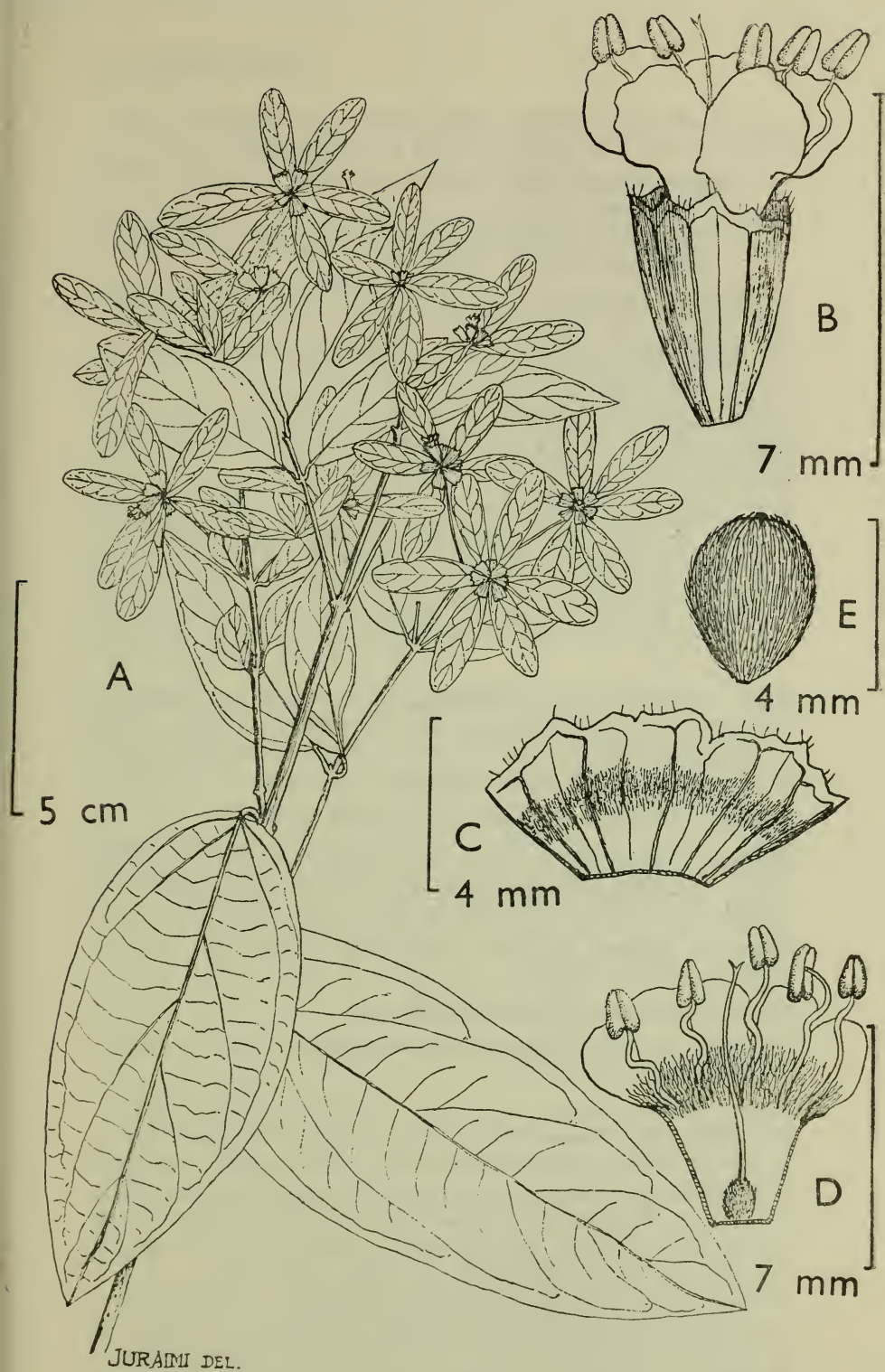


Plate 13. *S. pentandra* var. *wallichiana* (Schauer) Munir (Wall. Cat. No. 1,734 in Br. Museum).

A, Portion of an inflorescence. B, Flower. C, Calyx cut open to show the nature of accessory teeth. D, Corolla longitudinally cut open. E, Fruit.

*S. wallichiana* Schauer in DC. Prodr. XI (1847) 622; Wight, Ic. Ind. Or. IV, 3 (1850) 14 t. 1475. **Basionym.**

*Congea jackiana* Wall. var. *attenuata* Wall., Cat. No. 1735/2 (1828) nomen.

*Congea pentandra* (Roxb.) Wall. Cat. No. 1734 (1828) nomen; Walp., Rep. Bot. IV (1848) 117.

*Roscoea pentandra* Roxb., Cat. Hort. Bot. (1814) 46 nomen, & Fl. Ind. III (1832) 54.

TYPE SPECIMEN: Sylhet, E. Pakistan (Wallich Cat. No. 1,734 in herb. DC).

This variety differs from the type form, in its calyx being shortly lobed or almost truncate at apex, glabrous without, and accessory teeth being minute even after anthesis.

EAST PAKISTAN: **Sylhet**, Pandua (De Silva sub Wall. Cat. No. 1,734: A, BM, E. & L, isotypes of *S. wallichiana* Schauer); loc. incert. (Roxburgh 1823: BM, holotype of *Roscoea pentandra* Roxb.); cult. Hort. Bot. Calcutta (Wall. Cat. No. 1,735/2 [from Sylhet]: BM; Gower s.n.: E; Wight s.n.: E; Leg. ? s.n.: DD, E & L); Cult. Hort. Bot. Serampore (Voigt 2,911, 1,674, 2,115 & s.n.: C).

INDIA: **Assam**, Khasia Mountains 1,000–1,200 m. (Alleizette 5,722: L; Griffith sub Kew distr. No. 6,009: A, BM & C); Mongsendi Road (Watt 11,811: CAL & E); Tounghoo distr. (McLelland s.n.: E); Manipur (Watt 6,731: E).

NICOBARS: Glathea (Kamphovener 2,020 & 2,025: C).

BURMA: Lonton (Lace 5,165: E); Bhamo, alt. 100 m. (Cubitt 354: E); **Shan State**, Kengtung, alt. 1,000 m. (MacGregor 700: CAL & C, 2,516: E); Myitkynia (Mya 2,297: DD).

MALAYA: **Pahang**, Kuantan, Ulu Sungei (Symington & Kiah 28,773: KEP & SING).

LAOS: **a-ninh-xa-ne** (Poilane 13,680: A).

VIETNAM: **Annam**, Quang-tri (Poilane 1,209: A & B); loc. incert. (Pierre 116: B).

CHINA: **Hunan**, Taping, alt. 500–700 m. (Forrest 9,837 & 13,617: A, BM & E); **Hainan**, Ching Mai, Shan Pak Tang (Lei 439: A, B, L & SING); Kan-en, Fong Ngau Po (Lau 5,416: A); Sam Mo Watt (Lau 3,439: A); Chang-Kiang, Lok Mooi Shan (Lau 1,213: A & BM); Tam Chau-Lam Ko, Lin Fa Shan (Tsang 308: A, B, BM, E & L) Po-ting, Lingshin (Liang 61,598: A & B); loc. incert. (Ford 420: L; Liang 65,082: A).

What seems to be an anomalous distribution of this variety is the specimen from the State of Pahang in Malaya; but Dop (1914 p. 320) had examined in Paris Herbarium a specimen collected by Ridley in Pahang, as well as specimens from Thailand (leg. Kerr) & Moulmein, the last two regions not represented by the specimens examined by me.

Though Schauer had quoted *Roscoea pentandra* Roxb. as a synonym of *S. wallichiana*, it is obvious from his indications that he had seen only Pandua (Pundua) specimen represented by Wallich's Cat. 1,734 from De Candolle's herbarium on which he had based his diagnosis. Hence this should be regarded as the holotype and its duplicates isotypes.

Roxburgh's species was represented by two kinds of specimens. One directly collected in Sylhet and described in the Flora and preserved in the British Museum, and the other represented by a plant grown in Botanic Gardens, Calcutta, and referred in Roxb., Hort. Bot. Beng. (1814). Though both represent the same taxon, Wallich had referred the Calcutta specimen as *Congea jackiana* Wall. var. *attenuata* (Wall. Cat. 1,735/2), retaining the Sylhet specimen under *Congea* (*Roscoea*) *pentandra* (Roxb.) Wall. Cat. 1,734. A specimen of the Calcutta plant was drawn by Wight t. 1475 (1850) and subsequently specimens of the plant have been distributed. There is no doubt that this is identical with *R. pentandra* Roxb. (= *S. wallichiana* Schauer = *S. pentandra* Jack var. *wallichiana* (Schauer) Munir).

Griffith's specimens distributed from Kew under No. 6,009, bear a label stating that these are from Griffith's collection made in Burma and Malaya; but a presentative of the same collection in Hance's Herbarium, preserved in the British Museum, is recorded as having come from "Montibus Khasianis" (Khasia Mountains). Since this information appears to be correct, I have referred to Khasia Mts. the duplicates from Arnold Arboretum and Copenhagen. As no field notes have been entered in this Griffith's sheet, it was not possible to decide whether this specimen represents a duplicate of Griffith's No. 1,353, collected at Onswye on the Khasia Mountains and named by him as *Congea* sp. in *Notulae* II, 1848 p. 91, and identified by Clarke (Fl. Br. Ind. IV, 1885 p. 601) as *S. unguiculata*. On the other hand the latter species (= *S. involucrata*) has not been represented by any of Griffith's collection available to me.

Dop (Bull. Soc. Bot. France, 61, 1914 p. 319) recognised the difference between the two taxa but unfortunately he took *S. pentandra* Jack as if based on *Roscoea pentandra* Roxb. and later in Fl. Gén. Indoch. IV, 1936, united the two taxa as one. In addition he seems to have been confused (1914) over Wight Ic. t. 1476 which is Jack's species, but which he identified as *Roscoea pentandra* Roxb. (= *S. pentandra* Jack var. *wallichiana*).

Griffith described two species under *S. pentandra*. One was a combination based on *Roscoea pentandra* Roxb. and the other was a new species based on a specimen collected by him from Khasia Mountains (= *S. griffithiana*).

Sub-sectio **Pentadontia** Munir **sub-sectio nov.**

*Calyx 5-nervata, lobis integris 5, episepalibus carentibus.*

Calyx 5-ribbed, with 5 entire lobes and no accessory teeth.

TYPE: *S. triflora* Wight.

11. **Sphenodesme thorelii** Dop in Bull. Soc. Bot. France LXI, (1914) 318 & in Fl. gén. Indoch. (1936) 902; Mold., Résumé Geogr. distr. & Syn. (1959) 177.

*S. thorelii* var. *cordifolia* Dop in Bull. Soc. Bot. France 61 (1914) 317 & in Fl. Gén. Indoch. (1936) 903; Mold., op. cit. (1959) 177 (as var. *cordata*) **Syn. nov. Plate 14.**

TYPE SPECIMEN: Cochinchine, Vietnam (Thorel 1,385 - P).

Of the three taxa with 5-flowered cymes, *S. thorelii* is readily distinguished by its panicles being congested and hirsute, leaves  $\pm$  cordulate at the base, calyx hirsute and mid corolla-lobe slightly longer and villous towards base.

Branchlets brown, lenticellate, hirsutely fulvo-pubescent when young, later glabrous. *Leaves* ovate-oblong or lanceolate, mucronate at apex, somewhat cordulate at base, coriaceous, nitid and glabrous on both sides except the pilosity on the middle and primary nerves, 5-8 cm. long, 2-3.5 cm. broad; primary nerves 1-2 pairs, oblique and curved upto the middle of the lamina; secondary nerves upto 10 pairs, spreading almost at right angle with midrib; reticulation not distinct; petiole hirsute, 3-4 mm. long. *Inflorescence* axillary and terminal; panicles congested, densely hirsute, bearded at the nodes, 10-15 cm. long, 4-5 cm. through; bracts leaf-like, hirsute on both sides, especially on nerves; cymes 5-flowered, congested; peduncle very hirsute, 12-17 mm. long; involucre bracts sub-equal, elliptic-obovate, rounded and mucronulate at apex, attenuate towards base, ciliate in the margins, pilose at base, membranous, 17 mm. long, 7 mm. broad; flower 8 mm. long. *Calyx* with 5 lobes and no accessory teeth, hirsute all over except for a glabrous base within, 5-nerved, 6 mm. long, 4 mm. broad; lobes triangular, acute, erect, about 2 mm. long. *Corolla* infundibuliform, 5-lobed, 8 mm. long; tube glabrous without, densely villous in the throat; lobes sub-equal, rounded at apex, ciliate in the margin; middle one or two lobes slightly longer than others, villous towards base inside. *Stamens* 5, exsert, inserted in the throat, upto 8 mm. long. *Ovary* ovoid, setose; style slender, upto 10 mm.; stigma small, shortly bilobed.

VIETNAM: **Cochinchine**, loc. incert. (Thorel 1,385: A & K, syntypes).

Dop has mentioned three specimens without indicating any holotype, but from the specific epithet it seems that Thorel's 1,385 was intended to be the holotype, the collectors of the other two specimens being different.

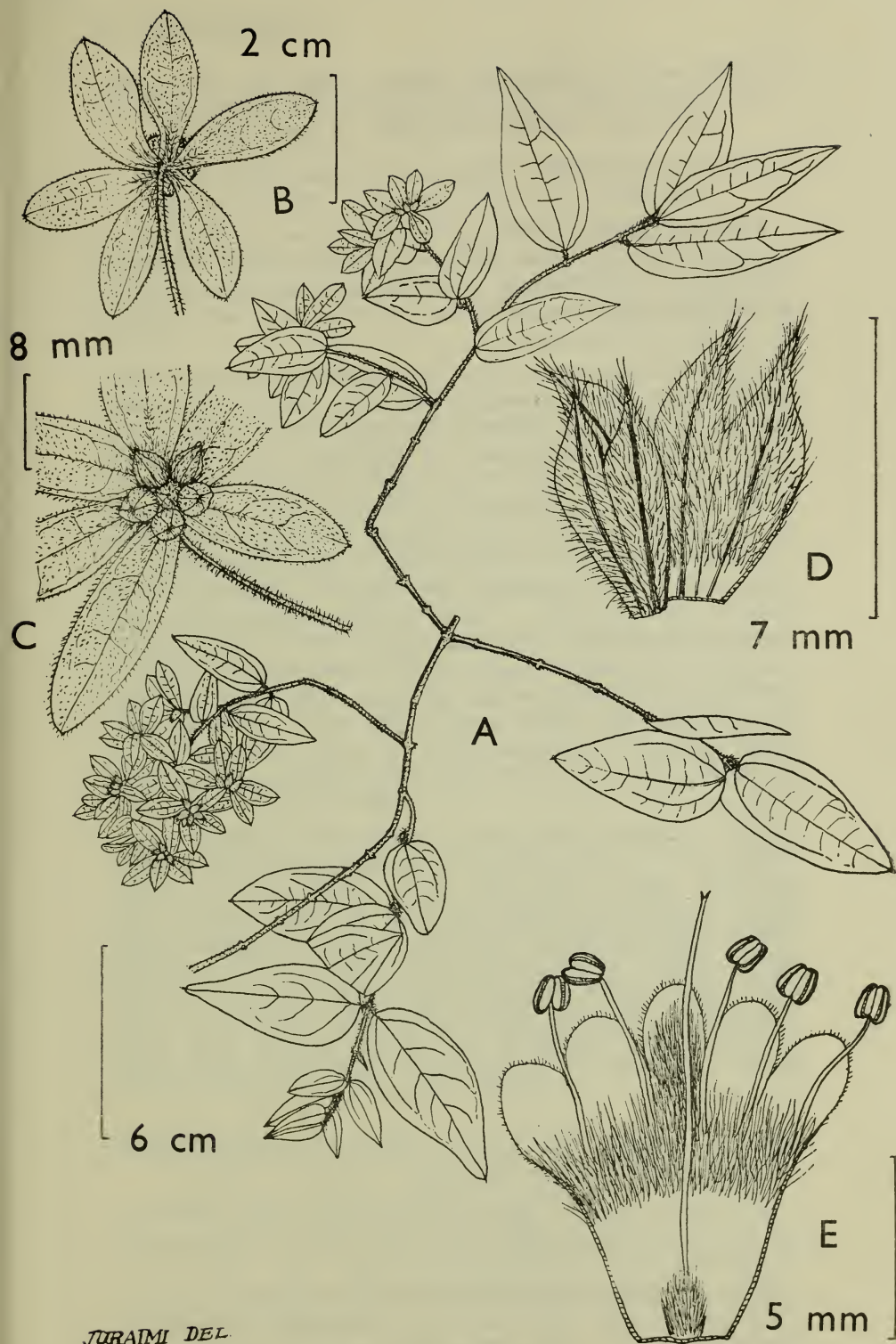


Plate 14. *Sphenodesme thorelii* Dop (Thorel 1,385 in Arn. Arboretum).

A, Fertile twig. B, Back view of a cyme. C, Ibid, its front view. D, Calyx vertically cut open. E, Corolla longitudinally cut open.

12. *Sphenodesme amethystina* Dop in Bull. Soc. Hist. Nat. Toulouse LXIV (1932) 573 & in Fl. gén. Indoch. V (1936) 901: Mold., Résumé Geogr. distr. & Syn. (1959) 176.

TYPE SPECIMEN: Nhatrang, Vietnam (Poilane 6,830 & 6,895 - P).

From the description this species appears to be a close ally of *S. thorelii* and *S. stellata*, though the author placed it near *S. mekongensis* which belongs to sub-section *Sphenodesme*; but *S. amethystina* is described to have no accessory teeth and so placed in sub-section PENTADONTIA.

Erect or climbing shrub, 2 m. high (Poilane). *Branches* almost quadrangular; younger covered with short, yellowish, branched and star-shaped hairs, afterwards glabrous; bark grey, lenticelled. *Leaves* broadly oval, rounded and cordulate at base, obtuse or suddenly and shortly acute at apex, glabrous, stellate hairy in the nerves and green above when dry, stellately pubescent and paler beneath, chartaceous, almost coriaceous, 10-15 cm. long, 7.5-10 cm. wide; nerves strong, very prominent underneath; secondary nerves 10-12, very prominent under, curved a little towards the margins and united into a quite visible intramarginal nerves; veins almost parallel and reticulations distinct; petiole thick, 7 mm. long. *Inflorescence*: capitulum of 3-4-5-flowered, grouped in a dense, violet terminal panicle, 20-30 cm. long, 10-15 cm. wide; bracts foliate, the smaller ones entirely violet, the larger ones simply arranged. *Involucral bracts* 6, elliptic, rounded at top, narrowed at the base, violet, finely stellately pubescent underneath, 18-22 mm. long, 7-13 mm. wide; peduncles stellately pubescent, 15-20 mm. long; flowers with a blue corolla (Poilane). *Calyx*: obconic, narrow, grows a little and abruptly enlarged in the upper half after anthesis, violet and shortly stellately hairy specially outside; yellow and long silky white hairs inside, 7-8 mm. long; lobes 5, triangular acute, 1 mm. long. *Corolla*: (in the bud) funnel-shaped, glabrous outside, hairy within at the insertion of stamens; lobes 5, equal, round and puberulent outside at the apex. *Stamens* 5, inserted at the throat, exsert; anthers with parallel cells. *Ovary* obovoid, a little flattened at the summit, provided with yellow stellate hairs from the middle above, mixed with simple white, silky hairs; style long, glabrous; stigma shortly bifid. Fruit . . .

VIETNAM: **Annam**, Dai Lanh in Nhatrang province (Poilane 6,830 & 6,895, syntypes, non vidi).

I have not seen the types of the species or their duplicates, nor has any specimen been found agreeing with the specific description given by the author.

Frequently young cymes may bear less than the normal number of flowers to a cyme. The fact that the author found the number of flowers to a cyme varying from 3 to 5 suggests that the panicle itself was young. The author describes corolla in the bud only.

13. **Sphenodesme stellata** Merr. in Univ. Calif. Pub. Bot. XV (1929) 266; Mold., Résumé Geogr. distr. & Syn. (1959) 192. **Plate 15.**

TYPE SPECIMEN: Tawao, Borneo (Elmer 21,631 — PNH (destroyed); UC, isotype (studied by the author)).

Among the species of the sub-section PENTADONTIA which have completely glabrous ovary and exserted stamens and style, *S. stellata* is easily distinguished by its stellately hairy branchlets (described for *S. amethystina*) and 7-flowered cymes (found in *S. triflora* var. *montana*).

Branchlets yellowish-rusty with short plumose-stellate hairs. *Leaves* elliptic-oblong, entire, abruptly and shortly acuminate at apex, cuneate towards base, glabrous above, stellate-tomentose beneath, 9–14 cm. long, 5.5–8 cm. broad; main nerves 5–6 pairs, curved upwards; petiole upto 1 cm. long, stellate-pubescent. *Inflorescence* axillary and terminal (panicles), upto 30 cm. long, stellate-tomentose, yellowish-rusty; cymes 7-flowered, peduncle 1–2 cm. long; involucre bracts 6, oblanceolate to oblong-oblanceolate, narrowed towards base, 3-nerved, reticulate, upto 2.8 by 1 cm., young ones densely stellate-pubescent. *Flowers* sessile; *Calyx* 5-lobed, without accessory teeth, densely stellate-pubescent without and with long, appressed hairs within, nonribbed,  $\pm 4$  mm. long. *Corolla* 5-lobed, slightly longer than calyx, puberulent in the lobes outside, glabrous in the tube without, villous in the throat,  $\pm 5$  mm. long. *Stamens* 5, exsert; filaments slender; anther-lobes  $\pm$  oblong. *Ovary* glabrous; style filiform; stigma shortly bilobed. *Fruit* ovoid,  $\pm 4$  mm. long.

BORNEO: **Sabah**, Tawao (Elmer 21,631: L & K, Isotypes); Sandakan, at Bettotan (Puasa 4,749: L & SING).

Merrill in his protolog of this species states that, "Corollas have all fallen, and these were apparently not observed by the Collector". Hence he failed to describe the stamens and carpel. However, I found a young flower in the isotype preserved in Herb. Leiden, a drawing of which is included here. It is obvious that this species cannot be placed near *S. ferruginea* (Griff.) Briq. of the BRACHYNEMA section which is characterized by included stamens and style; which are exsert in *S. stellata*.

14. **Sphenodesme triflora** Wight, Ic. Pl. Ind. Or. (1850) 14, t. 1478; Miquel, Fl. Ind. Bat. II (1858) 910; Clarke in Hook. f., Fl. Br. Ind. IV (1885) 601; Briq. in Engl. & Prantl, Pflanzenfam. IV 3a (1897) 181; King & Gamble in Journ. As. Soc. Beng. LXXIV, 4 (1909) 861; Lam, Malay. Verb. (1919) 332 & in Bull. Jard. Bot. Buitenz. (1921) 99; Ridl., Fl. Malay Penin. (1923) 638; Fletcher in Kew Bull. (1938) 442; Mold., Résumé Geogr. distr. & Syn. (1959) 166, 178, 181, 188, 192–194 & 345, var. **triflora**. **Plate 16.**

*S. triflora* Griff. Notul. Pl. As. IV (1854) 182.

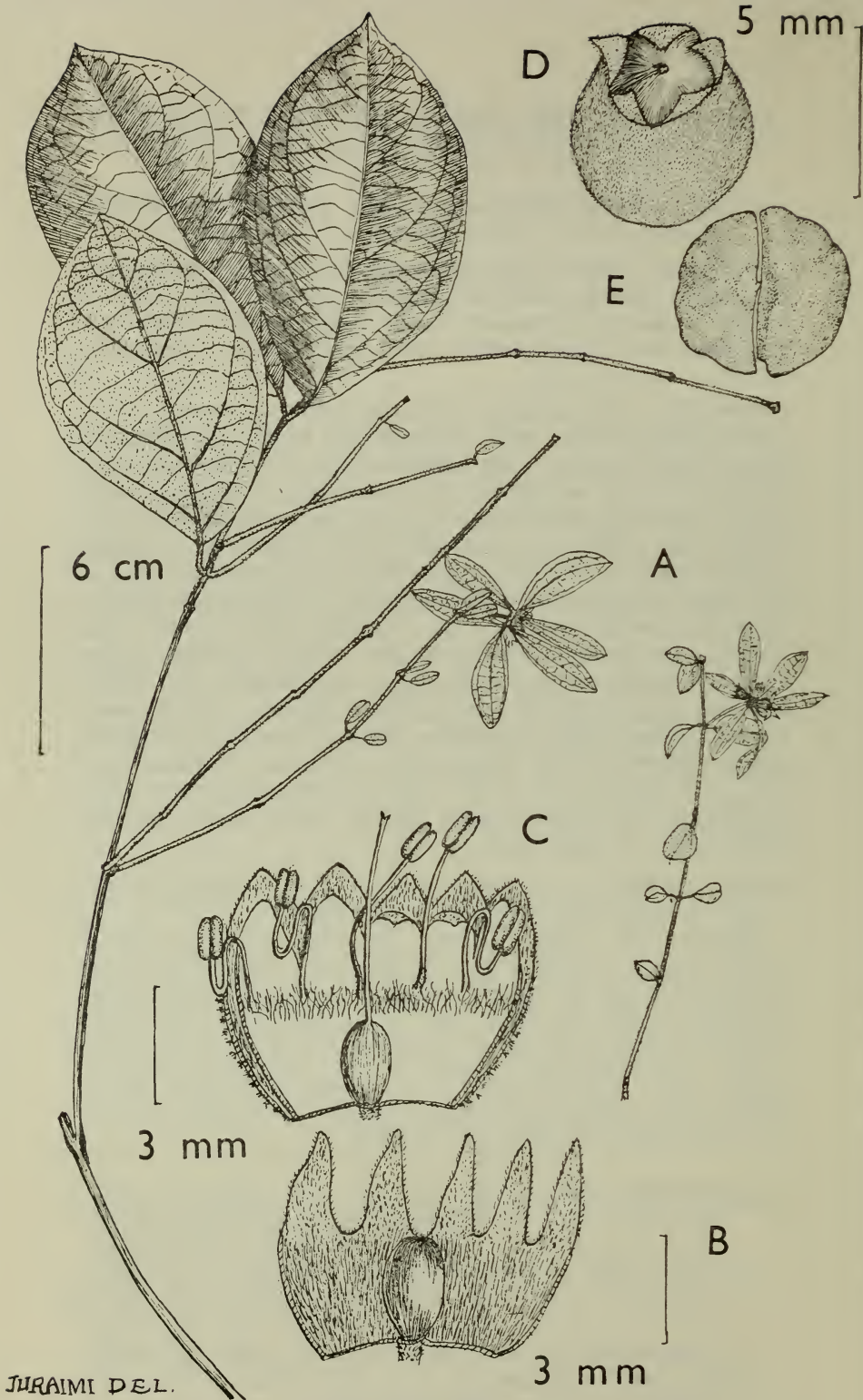


Plate 15. *Sphenodesme stellata* Merrill (Elmer 21,631 in Leiden).

A, Flowering twig. B, Calyx (mature) cut open. C, Flower (in bud) longitudinally cut open. D, Fruit enclosed in accrescent calyx. E, Cotyledons.

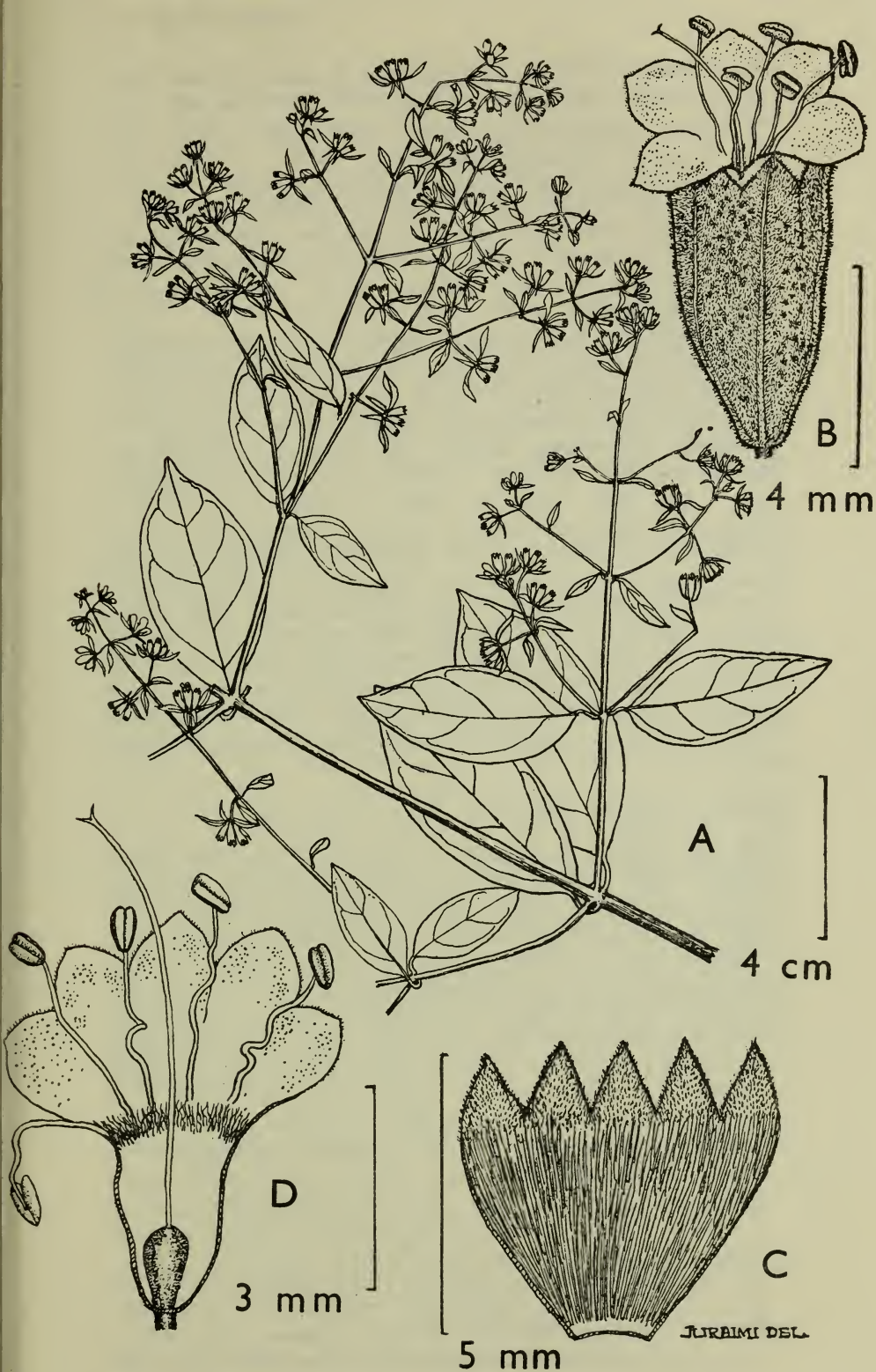


Plate 16. *Sphenodesme triflora* Wight (Griffith, sub Kew No. 6009/1 in Arn. Aboretum).

A, Flowering twig. B, Flower. C, Calyx cut open. D, Corolla cut open longitudinally.

*S. clemensorum* Mold., Phytologia IV, No. 5 (1953) 368 & Résumé Geogr. distr. & Syn. (1959) 193. **Syn. nov.**

*Congea jackiana* Wall. Cat. No. 1,735 (1828) p.p. (ex. altera parte = *S. pentandra* Jack).

TYPE SPECIMEN: Malacca, Malaya (Griffith s.n. - K).

This is the only species of the sub-section PENTADONTIA that has its calyx velutinous-pubescent without, corolla-lobes almost glabrous outside, and ovary glabrous. (In var. *triflora*, cymes are always 3-flowered).

Branchlets dark brown, terete, lenticellate, minutely puberulous, later glabrous. *Leaves* chartaceous, lanceolate to oblong-lanceolate, acuminate, obtuse at apex, cuneate towards base, glabrous, 7-13 cm. long, 2.5-5 cm. broad; lateral nerves 4-6 pairs; petioles 5-10 mm. long. *Inflorescence* axillary and terminal, grey-pubescent; panicles spreading, about 50 cm. long; cymes 3-flowered; peduncle upto 1 cm. long; involucre bracts 6, spatulate, puberulous, longer than flowers and enlarged in fruit. *Calyx* 5-lobed, with no accessory teeth, tubular, 4-5 mm. long; lobes acute, almost triangular, pubescent on both sides; tube velutinous to stellate-pubescent without, appressedly hairy within. *Corolla* 5-lobed, dark purple; lobes puberulous, 1-2 mm. long; tube cylindrical, 3-6 mm. long, glabrous on both sides except for a narrow villous ring in the throat. *Stamens* 5, exsert; filaments slender; anthers oblong. *Ovary* pyriform, glabrous; style slender; stigma bifid. *Fruit* capsular, ovoid or obovoid, included in the enlarged prominently ribbed calyx.

THAILAND: **Pattani**, Betong, alt. 400 m. (Kerr 7,681: E).

MALAYA: **Penang**, Ayer Itam, alt. 300 m. (Curtis 210: BM & SING); Govt. Hill, alt. 650 m. (Curtis s.n.: SING); loc. incert. (Curtis s.n.: SING). **Perak**, Taiping, Ayer Kuning (Haniff 1,257: BM & SING); Kulim (Haniff 1,264: SING); Gunting Bidai (Ridley 7,598: CAL & SING); loc. incert. (Wray Jr. 1,383; Scortechini s.n.: CAL). **Trengganu**, Kemaman, Bukit Kajang (Corner 30,084: BM & SING). **Pahang**, Kuala Lipis, Jerantut (Smith 93,379: KEP); Raub (Mat Abu 69,628: KEP). **Selangor**, Semangko Pass (Ridley 12,086 & 12,088: SING); Kuala Lumpur (Curtis s.n.: SING); Sungei Buloh (Burkill Jr. 2,546: L & SING; Ridley 13,371: BM & SING; Watson 15,366: SING; Symington 23,056 & 21,064: SING; Jaamat & Osman 18,235: SING; Molesworth-Allen s.n.: SING); Ulu Langat, Bukit Plakayat (Umbai KL. 1,525: A & L); Ulu Gombak (Jaamat & Awang 18,233: SING); Kuala Lumpur, Ampang, (Jaamat 13,809: SING); Kepong, Bukit Beruang (Pawanchee 13,431: SING). **Negri Sembilan**, Seremban, Kirby Estate (R.R.I. No. K16: SING). **Malacca**, [Alor Gajah ?] (Griffith s.n.: K in Herb. Hooker, holotype; BM, DD, E & L, isotypes, & Kew distr. No. 6,009/1: A, BM & C, isotypes); loc. incert. (Maingay 1,196:

L); Sungei Udang (Derry 585: BM & SING); Brisu (Derry 35: BM & SING); Merlimau (Holmberg 817: SING; Ridley s.n.: BM); Ayer Panas (Holmberg 832: SING); loc. incert. (Alvins 1,719: SING); Batang Malaka (Burkill Sr. 1,156: BM & SING). **Johore**, Kluang (Holttum 9,301: A & SING); Gunong Muntahak (Holttum 19,911: SING); Bukit Kayara (Ridley 11,347: SING); Mt. Austin (Ridley s.n.: BM & SING); loc. incert. (Vesterdal 265: C).

**BORNEO:** **Sabah**, Sandakan (Meijer 38,796: SING); Kebun China (Singh 39,260: SING); Beaufort Hill (Ampuria 40,828: SING); Kabili-Sepilok (Enggoh 7,312: PNH & SING). **Brunei**, Belait, Andulau (Jacob 5,654: L). **Sarawak**, Limbang (Haviland s.n.: SING); Gat, Upper Rejang River (J. & M.S. Clemens 5,651 = Philipp. Bur. Sc. Herb. No. 21,781: A & NY, holotype of *S. clemensorum* Mold.); Batang Lupar, Mt. Sakkarong (Beccari 3,885: L).

**SUMATRA:** **Indragiri** (Buwalda 7,142: L); Maura Mengkulem (Forbes 3,083: L).

This species was named *Sphenodesma triflora* by Griffith himself, but Griffith's name was published posthumously in 1854, and so Wight's name has precedence, being published in 1850. Griffith states that it was collected at "Verupha" under the vernacular name "Aloor Gajah". But apparently this was an error, for there is a place known as "Alor Gajah" in Malacca, while "Verupha" may be a tamil or Malayalee name for the climbing plant, the first part VERU, VELLU or VELU meaning a creeper, and PHA a flower.

The holotype is apparently not in Calcutta, though the earliest duplicates were distributed from there, for King & Gamble (Mat. Fl. Malay Pen. IV, 1909) do not mention any Griffith's specimen except the one distributed from Kew under No. 6,009/1. Furthermore, the material of this genus on loan from Herb. Bot. Calc. does not represent any sheet of this species collected by Griffith. In view of this I believe the holotype is Griffith's specimen preserved in Herb. Hookerianum in Kew, while the specimens distributed from Kew under No. 6,009/1 appear to be the duplicates of the same, since they were also sent to Kew from Griffith's collection in Calcutta.

14a. *Sphenodesma triflora* Wight var. *riparia* Munir var. *nov.*  
**Plate 17.**

TYPE SPECIMEN: Brama district. Sarawak (Hose 419 - BM).

*A forma typica* (var. *triflora*) *cymis quinquefloris, ramulis elenticellatis haec varietas sat distincta.*

This variety is hardly distinguishable from the type form except that it has 5-flowered cymes and elenticellate twigs.

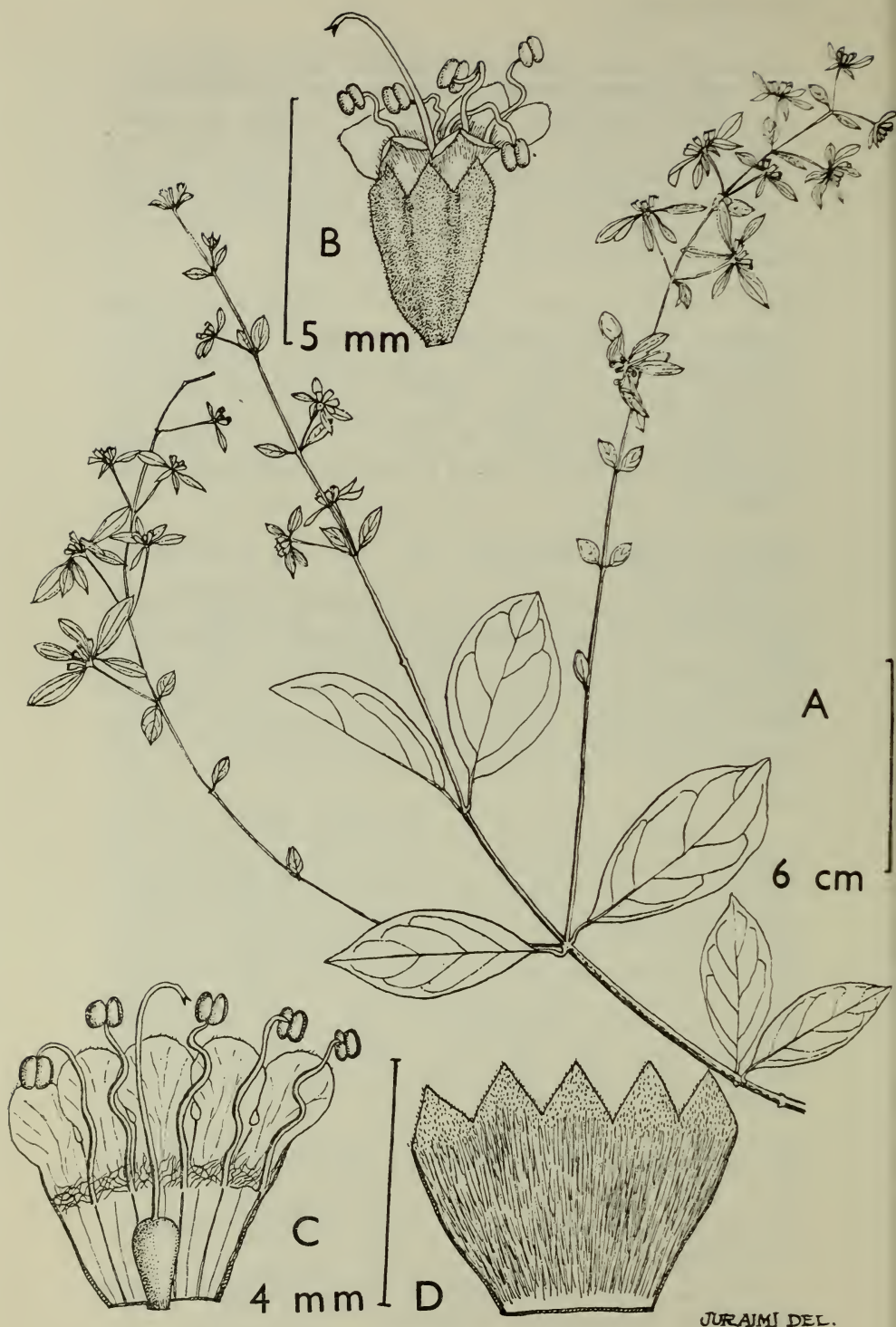


Plate 17. *S. triflora* var. *riparia* Munir (Hose 419 in Br. Museum).  
 A, Fertile twig. B, Flower. C, Corolla cut open. D, Calyx cut open.

MALAYASIA: **Sarawak**, Baram district, on the side of Entoyut river (Charles Hose 419: BM, holotype, & in A, E & PNH); Base of Bt. Lambir, Miri (Othman Haron S.21,392: SING). **Sabah**, Lahad Datu District, Silam (Muin Chai SAN. 25,582: L).

Haron S.21,392, quoted above, differs from the holotype by its leaves being sub-coriaceous and thickly grey-puberulent beneath; bracts and peduncles puberulent and comparatively thicker; branchlets puberulent. What is easily noticed in this specimen is the greyish colour of the leaves below, which is found in none of the other specimens of this or other varieties of this species.

14b. **Sphenodesme triflora** Wight var. **montana** Munir var. nov.  
**Plate 18.**

TYPE SPECIMEN: Mt. Kinabalu, Borneo (J. & Clemens s.n. - SING).

*A forma typica (var. triflora) ramis cinereo-brunneis, foliis crassioribus subcoriaceis subtus secus nervos puberulis, cymis 7-floris haec varietas differt.*

This variety differs from the type form, in its stem being cinereous-brown, puberulous; leaves thicker, sub-coriaceous, and puberulous on the nerves beneath; cymes 7-flowered.

MALAYSIA: **Sabah**, Mt. Kinabalu (J. & M.S. Clemens s.n.: SING, holotype, & in A, B, L; 26,156: L).

### LIST OF TAXA

#### Sphenodesme

1. *S. ferruginea* (Griff.) Briq.
2. *S. involocrata* (Presl) Robinson
- 2a. *S. involocrata* var. *paniculata* (Clarke) Kunir
3. *S. eryciboides* Kurz
4. *S. griffithiana* Wight
5. *S. mollis* Craib
6. *S. sarawakensis* Moldenke
7. *S. racemosa* (Presl) Moldenke
- 7a. *S. racemosa* var. *sabahensis* Munir
8. *S. mekongensis* Dop
9. *S. pierreii* Dop
10. *S. pentandra* Jack
- 10a. *S. pentandra* var. *wallichiana* (Schauer) Munir
11. *S. thorelii* Dop
12. *S. amethystina* Dop
13. *S. stellata* Merr.
14. *S. triflora* Wight
- 14a. *S. triflora* var. *riparia* Munir
- 14b. *S. triflora* var. *montana* Munir

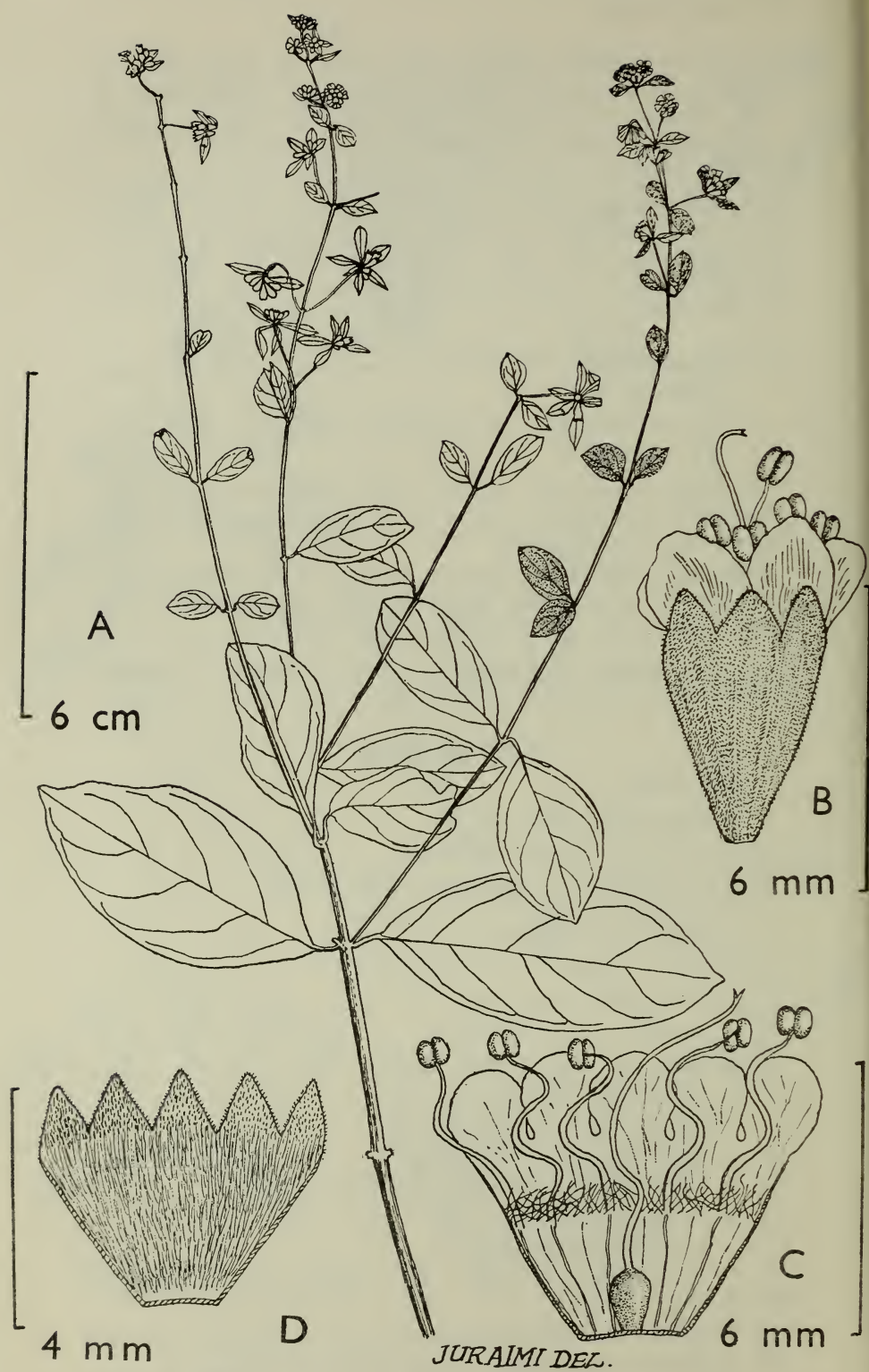


Plate 18. *triflora* var. *montana* Munir (J. & Clemens s.n. in Sing.).  
 A, Flowering twig. B, Flower. C, Corolla vertically cut open.  
 D, Calyx longitudinally cut open.

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# Five new species of *Quercus* L. subgen. *Cyclobalanopsis* (Oersted) A. Camus from Malesia\*

by E. SOEPADMO†

*Herbarium Bogoriense, Bogor, Java, Indonesia.*

## Introduction

THE PRESENT paper is part of the work on the family *Fagaceae* from Malesia, now being prepared in Cambridge. Due to the limited time available, the present taxonomic account is restricted to the revision of the genus *Quercus* L. from Malesia.

During the preparation of this work, I have been able to investigate all specimens collected from Malesia, available in the Herbaria of Bogor, Cambridge, Edinburgh, Florence, Kew, Leiden, Paris, Sarawak and Singapore.

Two of the five new species described here, namely *Q. steenisii* and *Q. sumatrana*, were recognized as new by Dr. S. Hatusima, a Japanese botanist, who worked at the Herbarium Bogoriense, Bogor, Indonesia, during the period of 1943–1945. He, however, never published his work.

Specimens of *Q. gaharuensis* and *Q. percoriacea* were collected recently by Dr. J. A. R. Anderson from Sarawak.

Of the fifth species, *Q. pseudo-verticillata*, the first collection was made by Fuchs & Collenette in 1963 from Pinosuk Plateau, Mt. Kinabalu, North Borneo. During the second Royal Society expedition to Mt. Kinabalu (1964), Mr. E. J. H. Corner and Dr. Chew Wee Lek collected ample materials of this new species, and their specimens were chosen as type.

## Acknowledgement

I would like to express my gratitude to the Colombo Plan Scheme for the scholarship given to me, which made this work possible.

I am very indebted to Mr. E. J. H. Corner, F.R.S., who supervised my work and for his help in preparing the latin diagnoses.

My sincere thanks are also due to the Directors and Keepers of the following Herbaria: Bogor, Cambridge, Edinburgh, Florence, Kew, Leiden, Paris, Sarawak and Singapore, for their cooperation in sending me specimens for study and for providing me with all facilities and help during my visit to their Herbaria.

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\* A more detailed revision of the genus *Quercus* L., occurring in Malesia will be presented in a subsequent paper.

† At present Botany School, The University of Cambridge, England.

1. *Q. pseudo-verticillata* E. Soepadmo, spec. nov. Fig. 1.

Arbor 30 m. alta, trunco 90 cm. lato, ad basim alis 2 m. altis praedita; cortice squamoso, profuse exfolianti. Ramuli glabri lenticellati, foliis subverticillatis. Alabastra 2-3 × 2 mm., ovoideoglobosa. Petiolus 5-10 × 3-5 mm., brevissimus tomentosus glabrescens, supra applanatus. Lamina 7-17 × 3-6.5 cm., elliptico-lanceolata vel oblanceolata, coriacea, integra, basi cordato vel auriculato, apice obtuso vel acuto, supra glabra, subtus pubescens; costa nervisque lateralibus subtus valde prominentibus, supra applanatis vel praesertim apicem versus subdepressis; nervis lateralibus 8-15, ascendentibus, marginem versus arcuatis; nervis secundariis confertis, subtus vix visibilibus.

Inflorescentiae invisae.

Cupula 2-3.5 cm. alta, 2.5-4 cm. lata, nucis partem dimidiam vel tertiam obtegens, obconico-globosa basi acuto, extus brunneo-sericea glabrescens, intus brunneo-setosa; lamellis 10-12 tenuibus, liberis dentatis praesertim inferioribus. Nux 3-5 × 2-3 cm., cylindrico-subglobosa sericea, apice rotundato vel depresso, umbone conico annulato, basi convexo vel applanato.

Typus: *Chew & Corner RSNB. 4434 (K).*

Tree about 30 m. tall, trunk about 90 cm. in diameter. Buttresses up to 2 m. high. Bark scaly, peeling off profusely. Twig glabrous, lenticellate. Leaves pseudo-verticillate. Buds ovoid-globose, about 2-3 mm. long, and 2 mm. in diameter. Petiole very short, about 0.5-1.0 cm. long and 2 mm. in diameter, tomentose, glabrescent, flattened at its adaxial side. Lamina coriaceous, elliptic-lanceolate or oblanceolate, about 7-17 cm. long, 3-6.5 cm. wide, margin entire, base cordate to auriculate, apex blunt, rounded to acute, upper surface glabrous, lower surface pubescent. Midrib and lateral nerves strongly prominent below, flattened to slightly sunken above, especially at the upper half of the leaf-blade. Lateral nerves about 8-15 pairs, ascendant, arcuating near the margin; secondary nerves faintly visible on the lower surface, close to one another.

Male and female inflorescences and flowers unknown.

Cupule obconical-globose, pointed at its base, covering about  $\frac{1}{3}$ - $\frac{1}{2}$  part of the nut, about 2-3.5 cm. deep, and 2.5-4.0 cm. in diameter; outside brownish sericeous, glabrescent, inside covered all over with brownish stiff hairs; lamellae 10-12, thin, free from one another, dentate at its margin, especially the lower ones. Nut cylindrical-subglobose, sericeous, apex rounded to depressed, with conical, ringed umbo, base convex to flat, about 3-5 cm. long and 2-3 cm. in diameter.

Distribution: so far only known from Mt. Kinabalu, North Borneo.



Fig. 1. *Quercus pseudo-verticillata* E. Soepadmo, spec. nov.: 1, 2 after Chew Wee Lek & Corner RSNB. 4434; 3, 4, 5 after Fuchs & Collette 21665.

Habitat: mountain rain forest, alt. about 1650 m.

Specimens examined: British North Borneo, Mt. Kinabalu, Bembangan River, alt.  $\pm$  1650 m., Febr. fr., *Chew Wee Lek & Corner RSNB. 4434* (K, type); *ibid.*, South Slope of Mt. Kinabalu, Pinosuk Plateau, alt. 1650 m., Sept. fr., *Fuchs & Collenette 21665* (A, CANB, G, K, L, SAR, paratype).

Note: This species may be distinguished from the other species of *Quercus* L. subgen. *Cyclobalanopsis* from Malesia by its pseudo-whorled, short-petioled, coriaceous, elliptic-lanceolate or oblanceolate leaves and by its big cupule and nut.

2. *Q. percoriacea* E. Soepadmo, *spec. nov.* Fig. 2.

Arbor trunco 50 cm. lato, ad basim alis ad 1 m. alto praedita; cortice laevi griseo annulato. Ramuli grisei glabri lenticellati. Alabastra 3  $\times$  2 mm., ovoideo-globosa tomentosa. Petiolus 2–3.5  $\times$  0.2–0.3 cm., glaber, ad basim incrassatus, teres, supra subsulcatus. Lamina 10–20  $\times$  5–9 cm., elliptico-ovata, crasse coriacea, subtus sparsim stellato-pubescent, glauca, supra nitida glabra; basi rotundato-acuto, margine incurvato integro undulato, e medio apicem versus distanter crenato; apice acuto vel acuminato 1–1.5 cm. longo obtuso; costa nervisque lateralibus subtus prominentibus, supra depressis vix visibilibus; nervis lateralibus 8–10 ascendentibus, marginem versus arcuatis.

Inflorescentiae invisae.

Infructescentia juvenis 20–30 mm. longa, 3–4 mm. lata, fructus 1–4 immaturos gerens, sericea, glabrescens, lenticellata.

Cupula mature 20 mm. lata, 7–10 mm. alta, nucis partem 1/6 vel 1/5 obtegens, applanata, basi rotundato, dense sericea; lamellis 6–8, inferioribus 4–6 denticulatis, superioribus integris. Nux matura 2 cm. lata et alta, ovoideo-globosa, dense sericea, umbone conico annulato, basi rotundato vel cordato, hilo convexo. Stili in nucibus immaturis 3 recurvi sericei; stigmatum capitato, glabro.

Typus: *Anderson S. 20226* (SAR).

Tree with trunk about 50 cm. in diameter. Buttresses up to 1 m. tall. Bark smooth, grey, hoop-marked. Twig grey, glabrous, lenticellate. Buds ovoid-globose, about 3 mm. long and 2 mm. in diameter, tomentose. Petiole about 2–3.5 cm. long and 0.2–0.3 cm. thick, glabrous, thickened at its base, terete and slightly grooved at its adaxial side. Leaves thick coriaceous, elliptic-ovate, about 10–20 cm. long, 5–9 cm. wide, base rounded-acute, margin incurved, entire and undulate at the lower half, and distantly crenate at the upper half; apex acute to acuminate, tip blunt; acumen about 1–1.5 cm. long; lower surface sparse, stellate pubescent, glaucous, upper surface shiny, glabrous. Midrib and lateral nerves prominent below and sunkened and almost invisible above. Lateral nerves about 8–10 pairs, ascendant, arcuating towards the margin.

Male and female inflorescences and flowers unknown.



Fig. 2. *Quercus percoriacea* E. Soepadmo, spec. nov. After Anderson S. 20226.

Young infructescence about 2–3 cm. long and 0.3–0.4 cm. in diameter, carrying 1–4 young fruits, sericeous, glabrescent, lenticellate. Young cupule obovoid, sericeous, about 0.7–1.0 cm. long and 0.8–1.0 cm. in diameter; base attenuate, lamellae 4–8, the lower ones denticulate, upper ones entire. Young nut ovoid-globose, attenuate towards the conical, ringed umbo; sericeous. Styles 3, recurved, sericeous; stigma glabrous, capitate. Mature cupule flattened, cup-shaped, covering about 1/6 or 1/5 part of the nut, dense sericeous, base rounded, about 0.7–1.0 cm. deep, and 2.0 cm. in diameter; inside dense sericeous; lamellae free from one another, thin, about 6–8, the 4–6 lower ones denticulate, the rest entire; rim thin. Ripe nut ovoid-globose, dense sericeous, apex rounded, except at the ringed, conical umbo; base rounded to cordate; about 2 × 2 cm; scar convex.

Distribution: only known from the type locality.

Habitat: primary heath forest on terrace sand, at altitude about 1100 m.

Specimens examined: Borneo, Bario, Ulu Baram, path to Pa'Ukat, alt. ± 1100 m., July fr., *Anderson S. 20226* (A, K, L, SAN, SAR, SING, type).

This new species is characterized by its big (up to 20 cm. long and 9 cm. wide), thick coriaceous leaves and dense sericeous, flattened cup-shaped cupule and ovoid-globose, dense sericeous nut.

3. **Q. gaharuensis** E. Soepadmo, *spec. nov.* Fig. 3.

Arbor c. 27 m. alta, trunco c. 30 cm. lato, ad basim breviter alata; cortice laevi, maculato-annulato, lenticellatis sparsis in series longas instructis praedito. Ramuli dense stellato-pilosi, glabrescentes. Alabastra ovoideo-globosa, 2 × 2 mm., dense stellato-tomentosa. Petiolus 2–3.5 cm. × 2 mm., gracilis, dense stellato-tomentosus, glabrescens, superne applanatus, basim versus incrassatus. Lamina 7–15 × 3–6 cm., elliptico-lanceolata, tenue coriacea, basi attenuato-acuto, margine integro vel subundulato, apicem versus crenato, apice obtuso vel subacuto, supra glabra, subtus dense stellato-pubescentibus et maculis ceraceis glaucis praedita; costa nervisque lateralibus subtus prominentibus, supra vix elevatis; nervulis reticulatis subtus claris; nervis lateralibus utrinsecus 10–15, parallelis dein marginem versus arcuatis.

Inflorescentiae invisae.

Cupula semi-evoluta 1.5–2 cm. alta et lata, ovoideo-globosa, nucem ex integro obtegens, apice rotundato vel truncato, margine tenui, basi attenuato vel truncato, lamellis tenuibus, c. 6–7, inferioribus crenatis recurvatis, aliis integris extus dense sericea, intus pilis rigidis brunneusculis setosa. Nux immatura 1–1.5 cm. longa et lata, ovoidea vel depresso-conica, dense sericea, glabrescens, apice rotundato vel abrupte truncato; stilibus 3 recurvatis, dense stellato-pubescentibus; stigmatibus capitato lato. Hilum nucis convexum.



Es. 1965.

Fig. 3. *Quercus gaharuensis* E. Soepadmo, spec. nov. After Anderson et alia S. 15534.

Typus: *Anderson et alia S. 15534* (SAR).

Tree about 27 m. tall, trunk about 30 cm. in diameter. Buttresses short, spreading, up to 70 cm. high. Bark smooth, mottled hooped, lenticels scattered and in long rows. Young twig densely covered all over with stellate hairs; older twig glabrous, lenticellate. Buds ovoid-globose, about  $2 \times 2$  mm., dense stellate tomentose. Petiole slender, dense stellate tomentose, glabrescent, thickened at its base, flattened at its adaxial side, about 2–3.5 cm. long, and 2 mm. in diameter. Leaves elliptic-lanceolate, about 7–15 cm. long and 3–6 cm. wide, thin coriaceous, base attenuate-acute, margin entire and slightly undulate at the lower two-third part, and distantly crenate at the upper part; apex rounded to bluntly-acute; upper surface glabrous, lower surface dense, stellate pubescent, below which are glaucous waxy dots. Midrib and lateral nerves prominent below and slightly raised above; reticulation of the secondary nerves distinctly visible at the lower surface. Lateral nerves parallel, ascendant, arcuating towards the margin; about 10–15 pairs.

Male and female inflorescences and flowers unknown.

Half-ripe cupule ovoid-globose, covering the whole nut, apex rounded or truncate, margin thin, base attenuate or truncate, lamellae thin, about 6–7, the lower ones crenate at their margin, recurved, the rest entire, dense sericeous outside and covered all over with brownish, stiff hairs inside; about 1.5–2.0 cm. long and diameter. Young nut ovoid or depressed conical, dense sericeous, glabrescent; apex rounded or abruptly truncate, about 1–1.5 cm. long and diameter; styles 3, recurved, dense stellate pubescent; stigma broad, capitate. Scar of the nut convex.

Distribution: lower slope of Bukit Gaharu, Serian, Sarawak, Borneo.

Habitat: mixed dipterocarp forest, near stream, at altitude about 100 m.

Specimens examined: Borneo, Sarawak, Serian, lower slope of Bukit Gaharu, alt.  $\pm$  100 m., Oct. fr., *Anderson et alia S. 15534* (A, BO, BK, K, L, SAN, SAR, type).

Note: This species was named after the Hill (Bukit) Gaharu, from where the type specimens were collected. Its leaves are rather similar to those of *Q. elmeri* Merr. from Borneo, but it may be distinguished from this species by its bigger sized, stellate pubescent leaves and thin-lamellate cupule, covering the whole nut. A rather similar type of cupule is found in *Q. turbinata* Bl. var. *crassilamellata* Gamble from Malaya, but the later species has the lamellae woody and very thick, and smaller leaves than that of *Q. gaharuensis*.

4. *Q. sumatrana* E. Soepadmo, *spec. nov.* Fig. 4.

Arbor c. 35 m. alta, trunco c. 130 cm. lata, ad basim alis 1–2.5 m. altis praedita; cortice scabro griseo. Ramuli lenticellati, dense et rigide brunneolo-hirti, glabrescentes. Alabastra c. 2–3 × 1.5–2 mm., ovoideo-globosa, dense pubescens, glabrescentia. Petiolus 1–2.5 cm. × 1–2 mm., gracilis, teres, supra subappplanatus, sparsim et rigide brunneolo-hirtus, ad basim sub-incrassatus. Lamina tenue-chartacea, elliptico-lanceolata, ad basim attenuato-acuta, margine integro undulato vel e medio apicem versus serrulato, apice acuminato 0.5–1.5 cm. longo acuto, subtus sparsim et rigide brunneolo-hirta, glauca, supra glabra; costa nervisque lateralibus subtus prominentibus, supra vix elevatis; nervis lateralibus 8–13, ascendentibus, marginem versus arcuatis.

Inflorescentiae invisae.

Cupula matura applanata, 2–2.5 cm. lata, 0.7–1.0 cm. alta, nucis partem 1/6 vel 1/5 obtegens, ad basim attenuata, dense sericea; lamellis tenuibus, denticulatis, ad marginem liberis. Nux 1.8–3 cm. longa, 1.2–2 cm. lata, ovoideo-conica, ad basim truncata vel cordata, apice acuto, dense sericea; hilum nucis concavum.

Typus: *Achmad 1501* (BO).

Tree up to 35 m. tall, diameter about 130 cm. Buttresses about 1–2.5 m. high. Bark rough, grey. Young twig smooth, covered all over with brownish, stiff hairs; older twig glabrous, lenticellate. Buds ovoid-globose, dense pubescent, glabrescent, about 2–3 mm. long and 1.5–2 mm. in diameter. Petiole slender, terete or slightly flattened at its adaxial side, slightly thickened at its base, sparsely covered with stiff, brownish hairs, about 1–2.5 cm. long and 1–2 mm. thick. Leaves thin-chartaceous, elliptic-lanceolate, base attenuate-acute, margin entire-undulate, or entire near the base and serrulate at the upper part, apex sharp acuminate, acumen about 0.5–1.5 cm. long; lower surface sparsely covered with brownish stiff hairs, dotted all over with glaucous, waxy puncts; upper surface glabrous. Midrib and lateral nerves prominent below and slightly raised at the upper surface; lateral nerves about 8–13 pairs, rarely opposite, ascending and arcuating towards the margin.

Male and female inflorescences and flowers unknown.

Mature cupule flattened cup-shaped, covering about 1/6 or 1/5 part of the nut, base attenuate, dense sericeous on both surfaces, about 0.7–1 cm. deep and 2–2.5 cm. in diameter; lamellae thin, denticulate, free at their margin, about 5–6. Mature nut ovoid-conical, about 1.8–2 cm. long and 1.5–2 cm. in diameter, dense sericeous, base truncate or cordate, scar concave, apex acute.

Distribution: Sumatra.

Habitat: lowland forest.

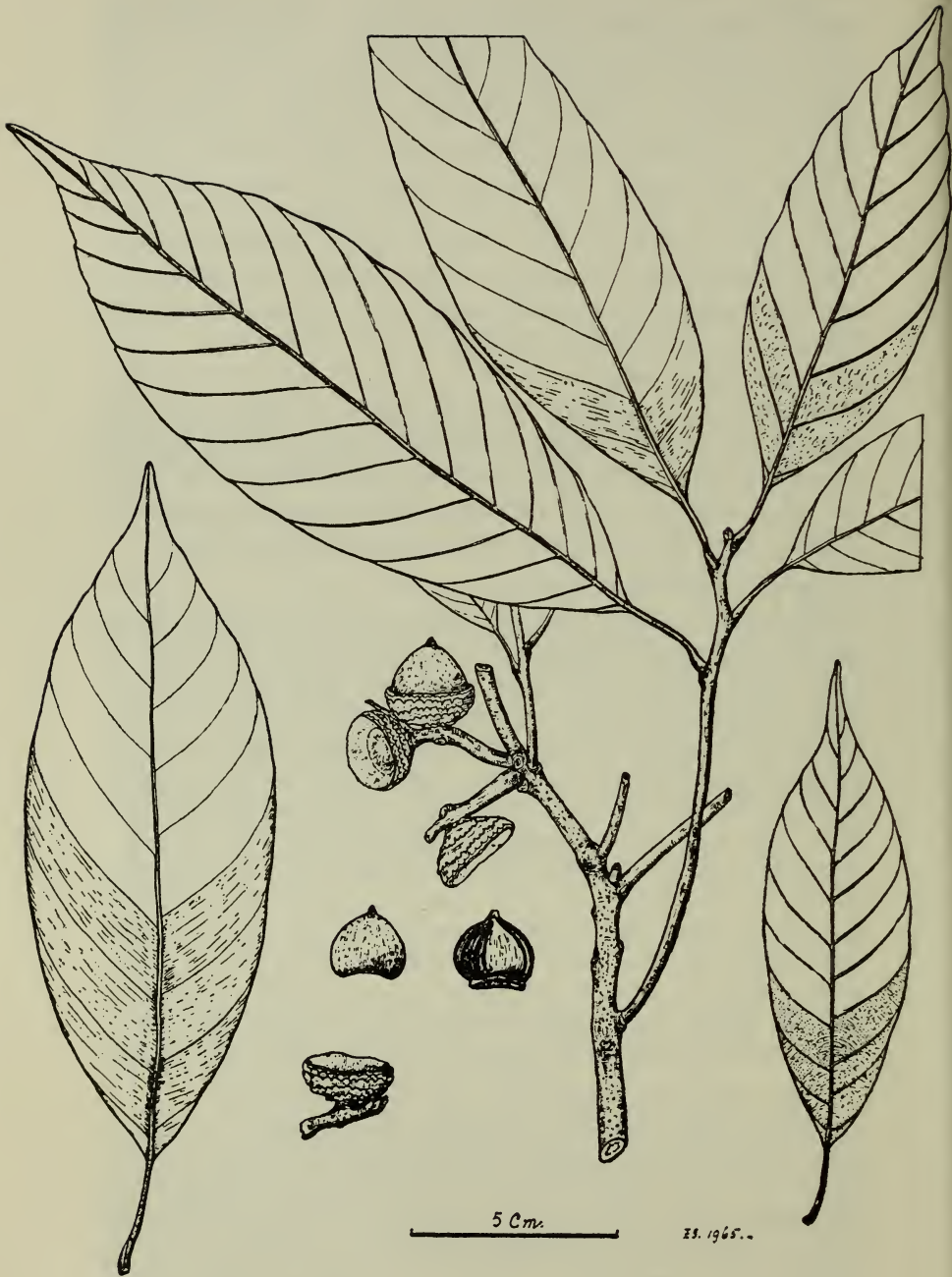


Fig. 4. *Quercus sumatrana* E. Soepadmo, spec. nov. After Achmad 1501.

Specimens examined: NW. Sumatra, Simalur, Tapah, Nov. fr., *Achmad 1501* (BO, L, Type); *ibid.*, May st., *Achmad 1094* (BO, L); *ibid.*, June st., *Achmad 1199* (BO, L).

Note: *Q. sumatrana* may be recognized by its thin-chartaceous, sharp acuminate, glaucous below leaves and flattened cup-shaped, dense sericeous cupule, and by its ovoid-conical, dense sericeous nut with concave scar.

5. *Q. steenisii* E. Soepadmo, *spec. nov.* Fig. 5.

Arbor 15 m. alta, trunco 60 cm. lato. Ramuli fusci sparsim lenticellati, dense et rigide brunneolo-hirti, glabrescentes. Stipulae 5–10 × 1–2 mm., lineares obtusae dense pubescentes. Petiolus 2–5 × 1–2 mm., brevissimus, ad basim incrassatus, supra applanatus, dense pubescens, glabrescens. Lamina 3–8 × 2–5 cm., elliptico-ovato vel ovato-orbicularis, crasse coriacea, basi rotundato obtuso vel cordatulo, apice rotundato vel subacuto subretuso, margine integro vel undulato, praesertim apicem versus leviter et distanter serrato, paginis ambis primo dense et rigide brunneolo-hirtis glabrescentibus; costa nervisque lateralibus subtus valde elevatis, supra carinatis vel applanatis; nervis lateralibus 6–10, angulo 45°–60° exorientibus, parallelis, marginem versus arcuatis; nervulis reticulatis subtus prominentibus, supra invisibilibus.

Inflorescentia mascula c. 5 cm. longa, gracilis flexuosa axillaris, dense pubescens, cymulis trifloris. Bractee 2 × 1 mm., ovatae obtusae, dense pubescentes. Perianthium alte 4–6-lobatum membranaceum, lobis solo ad basim conjunctis, dense pubescens. Stamina 4–6 extrorsa; filamentis 1–1.3 mm. longis, glabris filiformibus; antheris 1 × .5–1 mm., globosa-reniformibus, 4-lobatis, 2-ocularis, basifixis, longitudinaliter dehiscentibus; pistillodio ad fasciculam setularum reducto.

Inflorescentia feminea (modo in statu fructu juvenum visa) 1.5–3 cm. longa, 2–3 mm. crassa, sparsim lenticellata, brunneolo-setulosa, fructus 2–7 gerens. Bractee ovato-acutae, crasse coriaceae; bracteolis minoribus caducis. Perianthium 5–6-lobatum, crasse coriaceum, dense pubescens. Staminodia 0–6, plerumque suppressa. Stili 3–4, 1–2 mm. longi, recurvi; stigmatate lato capitato glabro.

Cupula 12–25 mm. lata, 7–10 mm. alta, patellata vel obconica, nucis partem tertiam vel quartam obtegens; lamellis 7–8, crassis dentatis, summa integra, marginibus recurvis, dense pubescentibus.

Nux 1–2 cm. alta et lata, globosa vel ovoideo-cylindrica, apice rotundata vel depresso, dense sericea glabrescens.

Typus: *van Steenis 8607* (BO, fructu, holotype).

*van Steenis 8379* (BO, inflorescentia mascula, paratype).



Fig. 5. *Quercus steenisii* E. Soepadmo, spec. nov.: 1, 2, 3 after van Steenis 8607; 4 after van Steenis 8379.

Tree about 15 m. tall, trunk 60 cm. in diameter. Twigs cylindrical, dark in colour, sparsely lenticellate; older twigs glabrous, or sparsely covered with brownish, stiff hairs; young twigs dense brownish, stiff pubescent. Stipule linear with blunt tip, about 0.5–1 cm. long, 1–2 mm. wide, dense pubescent. Petiole very short, about 2–5 mm. long, 1–2 mm. thick, thickened at its base, flattened at its adaxial side, dense pubescent, glabrescent. Leaves elliptic-ovate or ovate-orbicular, thick coriaceous, 3–8 cm. long, 2–5 cm. wide, base rounded, obtuse or slightly cordate, margin entire or undulate or shallowly, distantly serrate, especially near the apex; apex rounded or bluntly acute with slightly emarginate tip; upper surface of the young leaf densely covered with stiff, brownish simple hairs, becoming glabrous or sparsely pubescent, especially on the midrib and lateral nerves; lower leaf surface densely covered with thick layer of brownish, stiff, simple hairs, soon becomes glabrous. Midrib and lateral nerves strongly elevated on the lower leaf surface and keeled or flattened on the upper surface. Lateral nerves about 6–10 pairs, forming 45°–60° with the midrib, parallel, at first straight then arcuating towards the margin; reticulations prominent below, invisible above.

Male inflorescence slender, flexuous, arising from the axil of lower leaf, about 5 cm. long, dense pubescent; cymules 3-flowered. Bract ovate-obtuse, dense pubescent, about 2 mm. long and 1 mm. wide. Male flower with the perianth membranaceous, 4-6-deeply lobed, the lobes join at the base only, dense pubescent. Stamens 4–6, extrorse; filament filiform, glabrous, about 1–1.3 mm. long; anther globular-reniform, basifixed, 2-locular, 4-lobed, longitudinally dehiscent, about 1 × 0.5–1 mm. Rudimentary ovary is reduced to a cluster of stiff hairs. Female inflorescence is not known. Bract ovate-acute, thick coriaceous; bracteoles ovate-acute, smaller than the bract, caducous. Perianth thick coriaceous, 5-6-lobed, dense pubescent; staminodia 0–6, usually suppressed; styles 3–4, about 1–2 mm. long, recurved; stigma broad, capitate, glabrous. Young infructescence about 1.5–3 cm. long, 2–3 mm. thick, sparsely lenticellate and sparsely covered with brownish, stiff, simple hairs; bearing 2–7 young fruits. Young cupule ovoid-globose, dense pubescent; lamellae thick, 3–4, the 2 lower ones dentate, the rest entire. Mature cupule obconical or patelliform, rim thick, enclosing about 1/3 or 1/4 part of the nut; lamellae thick, 7–8, dentate, except the uppermost one, dense pubescent; about 0.7–1.0 cm. deep, and 1.2–2.5 cm. in diameter. Nut globose or ovoid-cylindrical, dense sericeous, glabrescent; apex rounded or depressed; about 1–2 cm. long and 1–2 cm. in diameter.

Distribution: Sumatra.

Habitat: ridge forest, at altitude about 2500–3500 m.

Specimens examined: Sumatra, North Sumatra, Atjeh, Gajolands, Mt. Losir, alt. 3300–3460 m., Febr. fr., v. *Steenis* 8607 (A, BO, K, L, PNH, SING, type); *ibid.*, Putjuk Angasan, alt. 2000 m., Jan. male flower, v. *Steenis* 8379 (A, BO, K, L, PNH, SING, paratype).

Note: This new species may be distinguished from the other known species by its thick, coriaceous, ovate-orbicular, short-petioled leaves with strongly elevated nerves on the lower surface, which is covered all over with very thick layer of brownish, stiff, simple hairs, and by its thick-lamellate dense brownish, stiff-pubescent cupule with recurved, dentate thick rim.

# New records of plant diseases in Sarawak for the years 1963 and 1964

By: G. J. TURNER

*Department of Agriculture, Sarawak*

LISTS OF plant disease records for Sarawak have been given by Johnston (1) and Turner (2; 3). The present list of previously unrecorded diseases and entomogenous fungi, noted or collected in Sarawak during 1963 and 1964, includes records from orchid hybrid genera (4).

The causal organisms are arranged alphabetically under their individual hosts. The frequency of occurrence is given, together with the Commonwealth Mycological Institute Herbarium serial number, where identification has been performed by the Institute. Two of the species have been identified at the Royal Botanic Gardens, Kew.

<b>Aranda</b> vars. (Orchid)			
Leaf blight	<i>Phytophthora palmivora</i> (Butler) Butler	Occasional	—
<b>Averrhoa bilimbi</b> L. (Blimbing)			
Leaf blight	<i>Corticium solani</i> (Prill. & Delacr.) Bourd. & Galz.	1 record	—
Thread blight	<i>Marasmiellus scandens</i> (Mass.) Denis & Reid	1 record	—
<b>Averrhoa carambola</b> L. (Carambola)			
Leaf blight	<i>Corticium solani</i> (Prill. & Delacr.) Bourd. & Galz.	Occasional	—
Thread blight	<i>Marasmiellus scandens</i> (Mass.) Denis & Reid	Occasional	—
<b>Bambusa</b> species (Bamboo)			
Leaf speckle	<i>Dasturella divina</i> (Syd.) Mundkur & Kheswalla	Common	111027
<b>Bauhinia purpurea</b> L.			
Sooty mould	<i>Meliola</i> species	Occasional	105118 & 108207
<b>Beta vulgaris</b> L. (Chard)			
Leaf rot	<i>Corticium solani</i> (Prill. & Delacr.) Bourd. & Galz.	1 record	—
<b>Brachiaria brizantha</b> Stapf.			
Leaf rot	<i>Corticium solani</i> (Prill. & Delacr.) Bourd. & Galz.	1 record	—

<b>Brachiaria mutica</b> Stapf. (Para grass)			
Leaf rot	<i>Corticium solani</i> (Prill. & Delacr.) Bourd. & Galz.	Occasional	—
<b>Brassica alba</b> Rabenh. (Mustard)			
Leaf rot	<i>Choanephora cucurbitarum</i> (Berk. & Rav.) Thaxt.	1 record	—
Leaf rot	<i>Corticium solani</i> (Prill. & Delacr.) Bourd. & Galz.	1 record	—
<b>Brassica alboglabra</b> Bailey (Kai Lan, Chinese Kale.)			
Leaf rot	<i>Choanephora cucurbitarum</i> (Berk. & Rav.) Thaxt.	1 record	—
On rotted leaves	<i>Nigrospora sphaerica</i> (Sacc.) Mason	1 record	—
Downy mildew	<i>Peronospora parasitica</i> (Pers. ex Fr.) Fr.	Occasional	108208
<b>Brassica campestris</b> L. (Turnip)			
Leaf rot	<i>Choanephora cucurbitarum</i> (Berk. & Rav.) Thaxt.	1 record	—
Leaf rot	<i>Corticium solani</i> (Prill. & Delacr.) Bourd. & Galz.	1 record	—
<b>Brassica rapa</b> L. (Choy Sam, Spinach Mustard)			
Leaf rot	<i>Choanephora cucurbitarum</i> (Berk. & Rav.) Thaxt.	1 record	—
<b>Calliandra haematocephala</b> Hassk.			
Pink disease	<i>Corticium salmonicolor</i> Berk. & Br.	1 record	—
Leaf and flower blight	<i>Corticium solani</i> (Prill. & Delacr.) Bourd. & Galz.	Occasional	—
<b>Camellia sinensis</b> (L.) Kunze (Tea)			
Leaf blight	<i>Corticium solani</i> (Prill. & Delacr.) Bourd. & Galz.	1 record	—
Leaf blight	<i>Glomerella cingulata</i> (Stonem.) Spauld. & Schrenk.	1 record	108210
Horse hair blight	<i>Marasmius equicrinus</i> Müll.	1 record	—
<b>Canavalia ensiformis</b> L. (Jack bean)			
Wilt	<i>Sclerotium rolfsii</i> Sacc.	1 record	—
<b>Capsicum frutescens</b> L. (Bird pepper)			
Leaf and fruit rot	<i>Corticium solani</i> (Prill. & Delacr.) Bourd. & Galz.	Occasional	—

<b>Capsicum frutescens L. var. baccatum (Ornamental Pepper)</b>			
Leaf rot	<i>Corticium solani</i> (Prill. & Delacr.) Bourd. & Galz.	1 record	—
<b>Capsicum grossum L. (Sweet pepper)</b>			
Leaf rot	<i>Choanephora cucurbitarum</i> (Berk. & Rav.) Thaxt.	1 record	—
Leaf spot	<i>Colletotrichum capsici</i> (Syd.) Butler & Bisby	1 record	—
Fruit rot	<i>Colletotrichum capsici</i> (Syd.) Butler & Bisby	1 record	—
Leaf rot	<i>Corticium solani</i> (Prill. & Delacr.) Bourd. & Galz.	1 record	—
<b>Carica papaya L. (Papaya)</b>			
Root rot	<i>Phytophthora palmivora</i> (Butler) Butler	Occasional	—
<b>Cassia grandis L.</b>			
On dead branches	<i>Poria leucoplaca</i> (Berk.) Cooke	1 record	Kew Herb.
<b>Cattleya skinneri Batem. (Orchid)</b>			
Leaf blight	<i>Phytophthora palmivora</i> (Butler) Butler	1 record	—
<b>Cattleya var. (Orchid)</b>			
Leaf blight	<i>Phytophthora palmivora</i> (Butler) Butler	1 record	—
<b>Citrus grandis (L.) Osb. (Pomelo)</b>			
Pink disease	<i>Corticium salmonicolor</i> Berk. & Br.	1 record	—
<b>Citrus limon Burm. f. (Lemon)</b>			
Pink disease	<i>Corticium salmonicolor</i> Berk. & Br.	1 record	—
<b>Clerodendron thomsonae Balf. f.</b>			
Wilt	<i>Sclerotium rolfsii</i> Sacc.	1 record	—
<b>Cocos nucifera L. (Coconut)</b>			
Sooty mould	<i>Microxyphiella</i> species	1 record	108183
Leaf spot	<i>Periconiella</i> species	1 record	108182
Fruit rot	<i>Phytophthora palmivora</i> (Butler) Butler	Occasional	—
<b>Coffea arabica L. (Arabian coffee)</b>			
Die back, leaf spot, berry disease	<i>Colletotrichum coffeanum</i> Noack	Occasional	—
Leaf blight	<i>Corticium solani</i> (Prill. & Delacr.) Bourd. & Galz.	1 record	—
Root disease	<i>Sphaerostilbe repens</i> Berk. & Br.	1 record	—
<b>Coffea robusta Linden (Robusta coffee)</b>			
Leaf blight	<i>Leptosphaeria coffeicola</i> Maubl.	1 record	108184

<b>Coix lachryma-jobi L. (Job's tears)</b>			
Smut	<i>Ustilago coicis</i> Bref.	Occasional	105117
<b>Congea tomentosa Roxb.</b>			
Brown root disease	<i>Fomes noxius</i> Corner	1 record	—
<b>Crotalaria quinquefolia L.</b>			
Leaf rot	<i>Corticium solani</i> (Prill. & Delacr.) Bourd. & Galz.	1 record	—
<b>Cucumis sativus L. (Cucumber)</b>			
Leaf rot	<i>Corticium solani</i> (Prill. & Delacr.) Bourd. & Galz.	Occasional	—
<b>Delonix regia Rafin (Flamboyant)</b>			
Leaf blight	<i>Corticium solani</i> (Prill. & Delacr.) Bourd. & Galz.	Occasional	—
White root disease	<i>Fomes lignosus</i> (Klotzsch) Bres.	1 record	—
<b>Duranta repens L.</b>			
Pink disease	<i>Corticium salmonicolor</i> Berk. & Br.	1 record	—
<b>Durio zibethinus Murr. (Durian)</b>			
Pink disease	<i>Corticium salmonicolor</i> Berk. & Br.	Occasional	—
<b>Eugenia malaccensis L. (Malay apple)</b>			
Thread blight	<i>Marasmiellus scandens</i> (Mass.) Denis & Reid	Occasional	—
<b>Eugenia species (Jambu)</b>			
On leaves	<i>Aschersonia</i> species	1 record	—
Leaf blight	<i>Corticium solani</i> (Prill. & Delacr.) Bourd. & Galz.	1 record	—
<b>Flemingia congesta Roxb.</b>			
Sooty mould	<i>Caldariomyces</i> species	1 record	108209
Sooty mould	<i>Meliola</i> species	Occasional	108180
<b>Flemingia strobilifera R. Br.</b>			
Leaf blight	<i>Corticium solani</i> (Prill. & Delacr.) Bourd. & Galz.	1 record	—
Thread blight	<i>Marasmiellus scandens</i> (Mass.) Denis & Reid	1 record	—
Sooty mould	<i>Meliola</i> species	1 record	105119
<b>Garcinia mangostana L. (Mangosteen)</b>			
Thread blight	<i>Marasmiellus scandens</i> (Mass.) Denis & Reid	1 record	—
<b>Gliricidia sepium Steud.</b>			
Leaf blight	<i>Corticium solani</i> (Prill. & Delacr.) Bourd. & Galz.	1 record	—

<b>Glycine max (L.) Merr. (Soya bean)</b>			
Leaf rot	<i>Choanephora cucurbitarum</i> (Berk. & Rav.) Thaxt.	Occasional	—
Leaf blight	<i>Leptosphaerulina trifolii</i> (Rost.) Petr.	1 record	108215
Sooty mould	<i>Phaeoxyphiella</i> species	1 record	108187
<b>Hevea brasiliensis Muell. Arg. (Rubber)</b>			
On leaves	<i>Aschersonia</i> species	1 record	—
Trunk rot	<i>Ganoderma lucidum</i> (Leyss. ex Fr.) Karst.	1 record	—
Thread blight	<i>Marasmiellus scandens</i> (Mass.) Denis & Reid	Occasional	111030
Horse hair blight	<i>Marasmius equicrinus</i> Müll.	Occasional	—
<b>Hibiscus esculentus L. (Ladies fingers)</b>			
Leaf rot	<i>Choanephora cucurbitarum</i> (Berk. & Rav.) Thaxt.	Occasional	—
<b>Hibiscus schizopetalus Hook.</b>			
Flower blight	<i>Choanephora cucurbitarum</i> (Berk. & Rav.) Thaxt.	1 record	—
<b>Indigofera teysmannii Miq</b>			
Pink disease	<i>Corticium salmonicolor</i> Berk. & Br.	1 record	—
White root disease	<i>Fomes lignosus</i> (Klotzch) Bres.	1 record	—
<b>Ipomoea batatas Lam. (Sweet Potato)</b>			
White root disease	<i>Fomes lignosus</i> (Klotzsch) Bres.	1 record	—
<b>Ipomoea bona-nox L. (Moon flower)</b>			
Pink disease	<i>Corticium salmonicolor</i> Berk. & Br.	1 record	—
On stems	<i>Septobasidium</i> species	1 record	—
<b>Ischaemum aristatum L.</b>			
Smut	<i>Sorosporium flagellatum</i> Syd.	Common	111040
<b>Ischaemum rugosum Salisb.</b>			
Smut	<i>Sphacelotheca hainanae</i> Zundel	Occasional	111044
<b>Ischaemum timorense Kunth</b>			
False smut	<i>Cerebella andropogonis</i> Ces.	Occasional	111039
<b>Ixora species</b>			
Thread blight	<i>Marasmiellus scandens</i> (Mass.) Denis & Reid	Occasional	—
<b>Laelio-Cattleya var. (Orchid)</b>			
Leaf blight	<i>Phytophthora palmivora</i> (Butler) Butler	1 record	—

<b>Languas galanga</b> Stuntz (Galangal; Lengkuas)			
Sooty mould	<i>Caldariomyces</i> species	1 record	108213
Leaf speckle	<i>Cercospora alpiniae</i> H. & P. Syd.	Common	108216 & 111053
Leaf speckle	<i>Nakataea</i> species	Occasional	111032
<b>Lansium domesticum</b> Jack (Langsat)			
Horse hair blight	<i>Marasmius equicrinus</i> Müll.	1 record	—
<b>Lonicera</b> species (Honeysuckle)			
Leaf blight	<i>Corticium solani</i> (Prill. & Delacr.) Bourd. & Galz.	1 record	—
<b>Luffa acutangula</b> Roxb. (Angled loofah)			
Leaf rot	<i>Corticium solani</i> (Prill. & Delacr.) Bourd. & Galz.	1 record	—
<b>Luffa cylindrica</b> Roem. (Loofah)			
Leaf spot	<i>Myrothecium roridum</i> Tode ex Fr.	1 record	111050
<b>Lycopersicon esculentum</b> Mill. (Tomato)			
Leaf spot	<i>Corynespora cassicola</i> (Berk. & Curt.) Wei	Common	111048
<b>Mangifera foetida</b> Lour. (Horse mango)			
Pink disease	<i>Corticium salmonicolor</i> Berk. & Br.	Occasional	—
Thread blight	<i>Marasmiellus scandens</i> (Mass.) Denis & Reid	1 record	—
<b>Mangifera indica</b> L. (Mango)			
Pink disease	<i>Corticium salmonicolor</i> Berk. & Br.	1 record	—
Thread blight	<i>Marasmiellus scandens</i> (Mass.) Denis & Reid	Occasional	—
<b>Mangifera odorata</b> Griff. (Kwini)			
Horse hair blight	<i>Marasmius equicrinus</i> Müll.	1 record	—
<b>Manihot utilisima</b> (Pohl) (Cassava)			
White root disease	<i>Fomes lignosus</i> (Klotzsch) Bres.	Occasional	—
Associated with leaf spotting	<i>Fusarium semitectum</i> Berk. & Rav.	1 record	108205c
Leaf rot	<i>Leptosphaerulina trifolii</i> (Rostr.) Petr.	1 record	108205b
<b>Melinis minutiflora</b> Beauv. (Molasses grass)			
Leaf rot	<i>Corticium solani</i> (Prill. & Delacr.) Bourd. & Galz.	1 record	—

<b>Mucuna benettii</b> F. Muell. (New Guinea creeper)			
Thread blight	<i>Marasmiellus scandens</i> (Mass.) Denis & Reid	1 record	—
<b>Mucuna deeringiana</b> Merr. (Velvet bean)			
Pink disease	<i>Corticium salmonicolor</i> Berk. & Br.	1 record	—
<b>Musa textilis</b> Née (Manila hemp)			
Leaf blotch	<i>Cordana musae</i> (Zimm.) Hönnel	Occasional	111029
Associated with stem rot	<i>Curvularia fallax</i> Boedijn	1 record	110075
Stem rot	<i>Deightoniella torulosa</i> (Syd.) M. B. Ellis	Common	110076 & 110077
<b>Musa sapientum</b> L. (Banana)			
Thread blight	<i>Marasmiellus scandens</i> (Sacc.) Denis & Reid	1 record	108181
<b>Nephelium lappaceum</b> L. (Rambutan)			
Brown root disease	<i>Fomes noxius</i> Corner	1 record	—
Thread blight	<i>Marasmiellus scandens</i> (Mass.) Denis & Reid	1 record	—
Sooty mould	<i>Meliola nephelii</i> Sacc.	Occasional	105116
<b>Nephelium litchi</b> Camb. (Litchi)			
Thread blight	<i>Marasmiellus scandens</i> (Mass.) Denis & Reid	1 record	—
<b>Nephelium longana</b> Camb. (Longan)			
Pink disease	<i>Corticium salmonicolor</i> Berk. & Br.	1 record	—
<b>Nephelium mutabile</b> Blume (Pulasan)			
Pink disease	<i>Corticium salmonicolor</i> Berk. & Br.	1 record	—
<b>Nerium oleander</b> L. (Oleander)			
Leaf blight	<i>Corticium solani</i> (Prill. & Delacr.) Bourd. & Galz.	1 record	—
<b>Oryza sativa</b> L. (Rice)			
Leaf spot and sheath blight	<i>Corticium solani</i> (Prill. & Delacr.) Bourd. & Galz.	Occasional	—
<b>Panicum maximum</b> Jacq. (Guinea grass)			
Leaf rot	<i>Corticium solani</i> (Prill. & Delacr.) Bourd. & Galz.	Occasional	—
<b>Paspalum scrobiculatum</b> L.			
Seed blight	<i>Fusarium</i> species	Occasional	111038

**Passiflora foetida** L.

Sooty mould	<i>Schiffnerula mirabilis</i> Höhn.	Common	111045
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**Phaseolus atropurpureus** (Moç & Sesse) ex DC.

Leaf rot	<i>Corticium solani</i> (Prill. & Delacr.) Bourd. & Galz.	1 record	—
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**Phaseolus mungo** L. (Black gram)

Leaf rot	<i>Corticium solani</i> (Prill. & Delacr.) Bourd. & Galz.	1 record	—
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**Piper betle** L. (Sireh)

Thread blight	<i>Marasmiellus scandens</i> (Mass.) Denis & Reid	1 record	—
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**Piper nigrum** L. (Pepper)

Leaf blight	<i>Choanephora</i> <i>cucurbitarum</i> (Berk. & Rav.) Thaxt.	1 record	—
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**Pisum sativum** L. (Pea)

Leaf rot	<i>Corticium solani</i> (Prill. & Delacr.) Bourd. & Galz.	1 record	—
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**Psidium cattleianum** Sabine (Purple guava)

Pink disease	<i>Corticium salmonicolor</i> Berk. & Br.	1 record	—
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Leaf blight	<i>Corticium solani</i> (Prill. & Delacr.) Bourd. & Galz.	1 record	—
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**Psophocarpus tetragonolobus** DC. (Four angled bean)

Leaf spot	<i>Cercospora</i> species	1 record	108186
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Flower blight	<i>Choanephora</i> <i>cucurbitarum</i> (Berk. & Rav.) Thaxt.	Occasional	—
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**Raphanus sativus** L. var. *hortensis* Backer (Chinese radish)

Leaf rot	<i>Choanephora</i> <i>cucurbitarum</i> (Berk. & Rav.) Thaxt.	Occasional	—
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**Raphanus sativus** L. var. *radicula* Pers. (Radish)

Leaf rot	<i>Choanephora</i> <i>cucurbitarum</i> (Berk. & Rav.) Thaxt.	1 record	—
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Leaf rot	<i>Corticium solani</i> (Prill. & Delacr.) Bourd. & Galz.	1 record	—
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**Ricinus communis** L. (Castor oil plant)

Sooty mould	<i>Clypeolella ricini</i> Rac.	1 record	108179
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**Ridleyara** var. (Orchid)

Leaf blight	<i>Phytophthora palmivora</i> (Butler) Butler	1 record	—
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<b>Saccharum officinarum</b> L. (Sugar cane)			
Sooty mould	<i>Caldariomyces</i> species	1 record	108212
Leaf spot	<i>Curvularia geniculata</i> (Tracy & Earle) Boedijn	1 record	108189
<b>Setaria italica</b> Beauv. (Foxtail millet)			
Leaf blight	<i>Curvularia</i> species	1 record	111034a
Leaf blight	<i>Leptosphaerulina trifolii</i> (Rostr.) Petr.	1 record	111034b
<b>Solanum melongena</b> L. (Brinjal)			
Leaf rot	<i>Choanephora cucurbitarum</i> (Berk. & Rav.) Thaxt.	1 record	—
Fruit rot	<i>Phytophthora palmivora</i> (Butler) Butler	Occasional	—
<b>Sorghum halapense</b> (L.) Pers. (Johnson grass)			
Leaf spot	<i>Phyllachora sorghi</i> Höhn.	Common	111043
Smut	<i>Sphacelotheca reiliana</i> (Kühn.) Clint.	Occasional	111042
<b>Sorghum sudanense</b> Stapf. (Sudan grass)			
Leaf spot	<i>Phyllachora sorghi</i> Höhn.	1 record	111036
<b>Spondias cytherea</b> Sonn. (Hog plum, Kedondong)			
Pink disease	<i>Corticium salmonicolor</i> Berk. & Br.	1 record	—
<b>Sporobolus poiretii</b> (Roem. & Schult.) Hitch.			
Flower mould	<i>Helminthosporium ravenelii</i> Curt.	Common	111041
<b>Stylosanthes humilis</b> H.B. & K.			
Leaf and stem rot	<i>Sclerotium rolfsii</i> Sacc.	1 record	—
<b>Stylosanthes sundaica</b> Taub.			
Leaf rot	<i>Corticium solani</i> (Prill. & Delacr.) Bourd. & Galz.	1 record	—
<b>Tephrosia candida</b> DC.			
Leaf rot	<i>Corticium solani</i> (Prill. & Delacr.) Bourd. & Galz.	Occasional	—
<b>Theobroma cacao</b> L. (Cocoa)			
White root disease	<i>Fomes lignosus</i> (Klotzsch) Bres.	1 record	—
Root and bole decay	<i>Trametes corrugata</i> (Pers.) Bres.	1 record	Kew Herb.
<b>Thunbergia erecta</b> (Benth.) T. Anders			
Leaf blight	<i>Corticium solani</i> (Prill. & Delacr.) Bourd. & Galz.	Occasional	—

**Vanda** vars. (Orchid)

Leaf blight	<i>Phytophthora palmivora</i> (Butler) Butler	Occasional	—
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**Vigna sinensis** Savi. (Long bean)

Wilt	<i>Pythium</i> species	1 record	—
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**Xanthosoma sagittifolium** Schott.

Leaf blight	<i>Curvularia geniculata</i> (Tracy & Earle) Boedijn	1 record	108214
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**Zea mays** L. (Maize)

Tassel mould	<i>Cladosporium sphaerospermum</i> Penz.	1 record	111028 <i>b</i>
Tassel mould	<i>Curvularia geniculata</i> (Tracy & Earle) Boedijn	1 record	111028 <i>a</i>
Leaf blight	<i>Curvularia</i> species	1 record	108191 <i>a</i>
Leaf blight	<i>Leptosphaerulina trifolii</i> (Rost.) Petr.	1 record	108206
Associated with leaf blight	<i>Khuskia oryzae</i> stat. conid. <i>Nigrospora oryzae</i> (Berk. & Br.) Petch	1 record	108191 <i>b</i>

**Zingiber officinale** Rose. (Ginger)

Leaf rot	<i>Corticium solani</i> (Prill. & Delacr.) Bourd. & Galz.	Occasional	—
On rhizome	<i>Poria</i> species	1 record	105121

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# The Distribution of Annonaceae and Myristicaceae on Singapore Island

By: Y. C. WEE (WEE YEOW-CHIN)

Department of Botany, University of Singapore\*

## Introduction

Between the years of 1956 and 1959 a great deal of activity was centered in the University of Malaya in Singapore on the "Phytochemical Survey of Malaya". The Departments of Botany and Chemistry together with the Department of the Protector of Aborigines, Federation of Malaya, accumulated a collection of reputed native drug plants, identified these and processed them for alkaloids and other products.

Douglas and Kiang (1957) report the results of tests on 214 species of plants collected around Singapore and Malaya. Kiang, Douglas and Morsingh (1961) report on a further 708 species belonging to 104 families and 408 genera.

The survey was largely in botanical terms *ad hoc*, and consequently it was resolved that, on the first available opportunity, a survey with special reference to defined taxonomic groups and a limited area of land would be undertaken.

The present survey is the first attempt of its kind along these lines. Two tropical families of plants, the *Annonaceae* and the *Myristicaceae* were chosen. These families have been recently revised by Sinclair (1955, 1958, 1961). With the continued presence of Mr. Sinclair at the Botanic Gardens, Singapore, taxonomic problems could be dealt with expeditiously. Again, in the two reports of tests made by Douglas and Kiang (1957) and Kiang, Douglas and Morsingh (1961) a number of annonaceous plants was found to give strong positive tests for alkaloids. Information regarding the distribution and amount of the two families within Singapore Island was sought. By amount is meant the number of plants (classified according to their respective stem diameters at breast height) existing, as well as the amount of air-dried plant materials (in the form of leaves, stem, bark, etc.) that can be got. This knowledge is basic for ecological and phytochemical assessment.

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\* Present address: Pineapple Research Station, Pekan Nanas, Johore.

The members of these two families are typically forest plants, and the island, after more than a century of colonisation, is devoid of any natural vegetation save 4,805 acres of now-protected forests. Of these 4,805 acres, only 163 acres at Bukit Timah are anywhere near the original condition. The present situation can be traced to the pepper and gambier cultivation and timber and firewood exploitation prevalent in those early years (Wee, 1964).

### **Materials and Methods**

The survey was conducted in two parts:

- (i) The areas outside the Nature Reserves.
- (ii) The areas gazetted as Nature Reserves.

The method adopted in the survey of the 129,286 acres of land outside the Nature Reserves was one of reconnaissance. For such a survey a detailed map of the Island (scale 1:25,000) and a "Singapore Guide and Street Directory" (1961 edition) were of great help. The main roads were used as the base of the exploration from which subsidiary roads and paths were traversed. The surrounding areas were examined for existing annonaceous and myristicaceous plants — cultivated or otherwise. The exact locality and the number of trees were noted. The distribution of the major species existing outside the Nature Reserves was later plotted.

The various areas of protected forests were visited and the presence or absence of the relevant plants was noted. Of these areas the 4,006 acres of the Water Catchment area however proved a problem. This large mass of forest consists of a mixture of vegetational types. A general view of the area from any one point on the island is not possible. In this respect, aerial photographs proved useful. These stereo-prints (taken by the R.A.F. in 1955) helped in the differentiation of a number of vegetational types. Visits to various parts of the area were made to confirm conclusions drawn from the photographs.

The relevant areas were sampled after the method of Gilliland and Wantman (1959). A surveyor's chain of 100 feet was laid on the ground in the forest. Annonaceous and myristicaceous plants occurring to within 3 feet of either side of the chain were noted and classified according to their diameter at breast height (dbh). A throw thus made up 600 sq. ft., and a sample consisting of 10 throws gave a total area of 6,000 sq. ft.

The size of each plant with respect to an arbitrary chosen one was also noted. The dry weights of the leaves, stem and bark (in the case of trees) of the chosen plants were later found by air drying them for about a week before weighing. An estimate of the total dry weights of the parts concerned for the commoner species within the vegetational types were then made.

### Results and Discussions

The survey of the 129,286 acres outside the Nature Reserves unearthed a very limited number of relic native annonaceous and myristicaceous species (Fig. I). However, two introduced species, \**Annona muricata* and *Cananga odorata* were found to be abundant.

*A. muricata* was brought into the country during the last century from Tropical America. It is planted extensively throughout the island, especially in Jurong, for its delicious fruits. In most cases it exists as a minor fruit crop among papaya, rambutan, Jack fruit, guava, etc. A total of 3,642 plants were actually counted during the survey (Fig. II).

*C. odorata* was introduced into this region also through cultivation. It is of Malesian origin, probably originating from the Philippines and Java (I.H. Burkill, 1935). It is a favourite village tree, especially among the Malays, who delight in the fragrant flowers. Also, it used to be a favourite wayside tree. A total of 452 plants were observed, scattered singly or in small groups through the island (Fig. III). The distribution is closely associated with man. Within the rural areas, it is most common in kampongs. Its occurrence within the urban areas is centered around the older inhabited sections like Geylang, Balestier Road and Grange Road areas.

It is significant that of the 452 plants observed, only 38 were saplings and 45 were seedlings. Of these seedlings, 42 were found within a piece of abandoned land along Scotts Road. This large number of seedlings is related to the presence of 13 mature trees serving as a large "seed reservoir". Further development of these seedlings was prevented by the periodical clearing of the undergrowth in this area. The other 3 seedlings and the 38 saplings were tenderly cared for in kampongs. Thus taken from its natural habitat and introduced into this region, *C. odorata* has been successful only when man gives a helping hand.

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\* The nomenclature of annonaceous and myristicaceous members is after Sinclair, 1955, 1958 and 1961.

The 4,805 acres of protected forests consist of the following:

	Acres
(i) Bukit Timah Nature Reserve ... ..	184
(ii) Kranji Nature Reserve ... ..	51
(iii) Pandan Nature Reserve ... ..	542
(iv) Labrador Nature Reserve ... ..	11
(v) Water Catchment Area ... ..	4,006
(vi) Jungle at Botanic Gardens ... ..	11
	4,805

Only the Bukit Timah Nature Reserve, the Water Catchment area and the jungle at the Botanic Gardens were found to contain annonaceous and myristicaceous plants. Within these areas four vegetational types were found to support the above plants. They are as follows:

(i) Belukar Tua — or the more advanced belukar stages. The vegetation consists mainly of poles of dbh varying from 0.5 to 3.0 inches or more. The canopy is in the early stages of closing. Undergrowth is light.

(ii) Regenerating High Forest: This stage is characterised by the presence of isolated high forest trees, often reaching a dbh (or above buttress) of 2 feet or more. These tropical dendrons are commonly members of the *Dipterocarpaceae* (Gilliland and Wantman, 1959).

(iii) Regenerating Swamp Forest: as with Regenerating High Forest.

(iv) High Forest: of unexploited original vegetation with a *Dipterocarpaceae* family dominance (Richards, 1957). It is also typified by the presence of numerous tropical dendrons, a closed canopy and a sparse undergrowth.

A total of 17 transects were taken from representative Belukar Tua types. Two samples were taken from the High Forest at Bukit Timah, one from the Regenerating Swamp Forest at Nee Soon and 10 samples from 10 different "pockets" of Regenerating High Forest found within the Water Catchment area. Samples from the Regenerating Forests and from the High Forest areas are grouped together for purposes of analysis. They are henceforth termed "Regenerating Forests".

Table I: Summarised results of the 17 transects taken from representative Belukar Tua areas

Species	DIAMETER CLASSES						Total	OvB
	S	0-1	1-3	3-5	5-7	over 7"		
<i>Pyramidanthe prismatica</i> ..	135	106	..	..	..	..	241	17/17
<i>Mitrella kentii</i> ..	119	133	..	..	..	..	252	15/17
<i>Xylopia ferruginea</i> ..	128	138	15	9	2	10	302	14/17
<i>Artabotrys suaveolens</i> ..	61	86	..	..	..	..	147	13/17
<i>Fissistigma latifolium</i> ..	103	82	..	..	..	..	185	12/17
<i>Fissistigma fulgens</i> ..	11	13	..	..	..	..	24	8/17
<i>Xylopia fusca</i> (?) ..	22	16	..	..	..	..	38	6/17
<i>Oxymitra latifolia</i> ..	7	9	..	..	..	..	16	6/17
+ <i>Knema communis</i> ..	6	7	2	..	..	..	15	6/17
<i>Xylopia malayana</i> ..	10	12	..	..	..	..	22	4/17
<i>Fissistigma manubriatum</i> ..	8	3	..	..	..	..	11	3/17
+ <i>Knema latericia</i> ..	3	2	..	..	..	..	5	3/17
+ <i>Knema laurina</i> ..	1	3	..	..	..	..	4	3/17
+ <i>Knema malayana</i> ..	1	2	..	..	..	..	3	3/17
<i>Polyalthia rumphii</i> ..	1	3	..	..	..	..	4	3/17
<i>Cyathocalyx ramuliflorus</i> ..	0	1	1	1	..	..	3	3/17
<i>Desmos dasymaschalus</i> ..	4	3	..	..	..	..	7	2/17
<i>Cyathocalyx ridleyi</i> ..	..	4	1	..	..	1	6	2/17
<i>Oxymitra</i> sp. I ..	1	3	..	..	..	..	4	2/17
<i>Oxymitra biglandulosa</i> ..	..	3	..	..	..	..	3	2/17
<i>Uvaria cordata</i> ..	..	2	..	..	..	..	2	2/17
+ <i>Knema intermedia</i> ..	..	1	1	..	..	..	2	2/17
+ <i>Gymnacranthera forbesii</i> ..	5	9	..	..	..	..	14	1/17
<i>Oxymitra glauca</i> ..	..	10	..	..	..	..	10	1/17
+ <i>Horsfieldia subglobosa</i> ..	..	1	1	..	..	..	2	1/17
+ <i>Horsfieldia grandis</i> ..	..	1	1	..	..	..	2	1/17
<i>Fissistigma lanuginosum</i> ..	..	1	..	..	..	..	1	1/17
<i>Phaeanthus ophthalmicus</i> ..	..	1	..	..	..	..	1	1/17
<i>Polyalthia angustissima</i> ..	..	..	1	..	..	..	1	1/17
+ <i>Knema cinerea</i> var. <i>patentiner-</i> <i>via</i> ..	..	..	1	..	..	..	1	1/17
+ <i>Gymnacranthera bancana</i> ..	..	..	1	..	..	..	1	1/17
Total ..	626	655	25	10	2	11	1,329	..

Note:— (+) = Members of the = *Myristicaceae*.

S = Seedlings.

OvB = the number of transects out of 17 in which a species occurs.

Table II: Summarised results of the 13 transects taken from areas of Regenerating High Forest, Regenerating Swamp Forest and High Forest

Species	DIAMETER CLASSES						Total	OvB
	S	0-1	1-3	3-5	5-7	over 7"		
-Fissistigma latifolium ..	25	49	..	..	..	..	74	13/13
-Oxymitra latifolia ..	16	32	..	..	..	..	48	11/13
±Knema latericia ..	2	13	13	1	..	1	30	11/13
Popowia fusca ..	16	36	5	1	..	..	58	10/13
-Polyalthia rumphii ..	..	35	7	..	..	..	42	10/13
-Cyathocalyx ramuliflorus ..	2	4	9	4	4	7	30	10/13
-Phaeanthus ophthalmicus ..	15	48	5	..	..	..	68	9/13
±Knema laurina ..	11	48	8	..	..	..	67	9/13
±Knema malayana ..	5	19	6	1	..	..	31	9/13
Polyalthia cauliflora ..	..	22	6	..	..	..	28	9/13
-Fissistigma fulgens ..	8	18	..	..	..	..	26	8/13
±Gymnacranthera forbesii ..	4	19	2	..	..	..	25	8/13
Cyathostemma viridiflorum ..	8	12	..	..	..	..	20	8/13
-Polyalthia augustissima ..	..	12	3	..	..	..	15	8/13
-Cyathocalyx ridleyi ..	4	33	18	5	6	11	77	7/13
±Knema communis ..	4	17	7	1	..	..	29	7/13
+Knema hookeriana ..	1	4	12	1	2	3	23	7/13
-Horsfieldia subglobosa ..	..	7	8	1	2	..	18	7/13
-Mitrella kentii ..	7	32	..	..	..	..	39	6/13
-Pyramidanthe prismatica ..	9	25	..	..	..	..	34	6/13
-Xylopia ferruginea ..	..	12	1	2	2	..	17	6/13
-Fissistigma lanuginosum ..	4	13	..	..	..	..	17	6/13
-Xylopia malayana ..	4	12	..	..	..	..	16	6/13
-Desmos dasymaschalus ..	3	16	..	..	..	..	19	5/13
Polyalthia glauca (?) ..	1	9	..	..	..	..	10	5/13
-Artabotrys suaveolens ..	3	6	..	..	..	..	9	5/13
Popowia pisocarpa ..	..	6	2	..	..	..	8	5/13
<i>Carried forward</i> ..	152	559	112	17	16	22	1,878	..

Table II—continued

Species	DIAMETER CLASSES						Total	OvB
	S	0-1	1-3	3-5	5-7	over 7"		
<i>Brought forward</i> ..	152	559	112	17	16	22	1,878	
± <i>Gymnacranthera bancan</i> ..	..	2	5	1	..	..	8	5/13
± <i>Knema intermedia</i> ..	12	53	14	1	1	..	81	4/13
+ <i>Horsfieldia wallichii</i> ..	..	16	8	1	1	..	26	4/13
- <i>Oxymitra</i> sp. I ..	3	23	..	..	..	..	26	4/13
+ <i>Gymnacranthera eugeniifolia</i> var. <i>eugeniifolia</i>	2	12	..	..	..	..	14	4/13
- <i>Uvaria cordata</i> ..	..	4	..	..	..	..	4	4/13
<i>Goniothalamus</i> sp. ..	..	7	..	..	..	..	7	3/13
+ <i>Knema conferta</i> ..	..	1	1	1	1	..	4	3/13
+ <i>Gymnacranthera eugeniifolia</i> var. <i>griffithii</i> ..	..	8	1	..	..	..	9	2/13
+ <i>Horsfieldia crassifolia</i> ..	..	1	4	..	..	..	5	2/13
- <i>Oxymitra glauca</i> ..	..	5	..	..	..	..	5	2/13
- <i>Xylopia fusca</i> (?) ..	1	3	1	..	..	..	5	2/13
<i>Polyalthia</i> sp. ..	..	4	..	..	1	..	5	2/13
+ <i>Myristica elliptica</i> ..	..	3	1	..	..	..	4	2/13
- <i>Fissistigma manubriatum</i> ..	..	3	..	..	..	..	3	2/13
- <i>Oxymitra biglandulosa</i> ..	..	3	..	..	..	..	3	2/13
<i>Alphonsea maingayi</i> ..	..	..	1	..	2	..	3	2/13
<i>Polyalthia sumatrana</i> ..	..	2	..	..	..	..	2	2/13
<i>Anaxagorea javanica</i> ..	35	33	4	..	..	..	72	1/13
<i>Goniothalamus ridleyi</i> ..	..	..	3	1	..	..	4	1/13
<i>Polyalthia laterifolia</i> ..	..	3	..	..	..	..	3	1/13
<i>Meiogyne virgata</i> ..	..	2	1	..	..	..	3	1/13
+ <i>Horsfieldia superba</i> ..	..	..	1	1	..	..	2	1/13
<i>Artabotrys costatus</i> ..	..	1	..	..	..	..	1	1/13
<i>Artabotrys wrayi</i> ..	..	1	..	..	..	..	1	1/13
<i>Oxymitra</i> sp. II ..	..	1	..	..	..	..	1	1/13
<i>Polyalthia macropoda</i> ..	..	..	1	..	..	..	1	1/13
± <i>Horsfieldia grandis</i> ..	..	..	1	..	..	..	1	1/13
+ <i>Myristica iners</i> ..	..	1	..	..	..	..	1	1/13
+ <i>Myristica cinnamonea</i> ..	..	1	..	..	..	..	1	1/13
Total ..	205	752	159	23	22	22	1,183	..

Note:— (+) = Members of the *Myristicaceae*.

(-) = Species also found within Belukar Tua areas.

OvB = the number of transects out of 13, in which a species occur.

TABLE III.— Total number of species and plants found within the two main vegetational types

<i>Belukar Tua</i> :	<i>Annonaceae</i>	<i>Myristicaceae</i>	Total
Species ...	21	10	31
Genera ...	11	3	14
Plants/Transect ...	76.2	2.9	79.1
<i>"Regenerating Forest"</i> :			
Species ...	38	18	56
Genera ...	17	4	21
Plants/Transect ...	61.8	29.2	91.0

The distributions of the commoner species were tested against the Poisson series for randomness (Blackman, 1935; Clapham, 1936; Archibald, 1948). The results of the analysis are presented in Tables IV and V.

TABLE IV

Poisson test for randomness as applied to the more abundant *Annonaceae* and *Myristicaceae* members found within the Belukar Tua areas.

	<i>Pyr amidantiae prismatica</i>		<i>Mitrella kentii</i>		<i>Xylopia ferruginea</i>		<i>Artabotrys suaveolens</i>		<i>Fissistigma latifolium</i>	
	OBS.	EXP.	OBS.	EXP.	OBS.	EXP.	OBS.	EXP.	OBS.	EXP.
0*	92	41.09	81	38.73	90	27.81	113	71.57	123	57.12
1	41	58.34	40	57.26	24	50.34	30	61.91	21	62.39
2	12	41.43	15	42.36	19	45.56	12	26.78	6	34.00
3	8	19.60	8	20.91	10	27.49	5	7.72	4	12.24
4	4	6.95	8	7.74	5	12.44	5	1.67	1	3.40
5	2	1.97	7	2.30	4	4.51	1	0.29	6	0.68
6	1	0.48	4	0.56	6	1.36	-	0.03	2	0.16
7	3	0.10	1	0.12	2	0.36	-	-	0	0.01
8	2	0.02	2	0.02	4	0.09	2	-	1	-
9	1	0.003	2	-	-	0.02	-	-	2	-
≥ 10	4	-	2	-	6	-	2	-	4	-
	170	169.983	170	170.00	170	169.98	170	169.97	170	170.00
	x2 = 101.85		x2 = 79.00		x2 = 222.25		x2 = 51.47		x2 = 127.25	
	P < 0.001		P < 0.001		P < 0.001		P < 0.001		P < 0.001	

\*Note: The first column gives the number of plants per sample of 600 square feet.  
OBS. = Observed;  
EXP. = Expected.



Allowance was made to group the values together so that no expected value is less than 5 (after Greig-Smith, 1957). This arbitrary level is that commonly used in calculations of Chi square ( $\chi^2$ ) to eliminate the disproportionate effect of small differences from a low expectation. The total value of  $\chi^2$  is entered in the table with degrees of freedom two less than the number of values from which  $\chi^2$  is calculated, one degree of freedom being used in the determination of the mean. The limit of P chosen, beyond which the agreement is too poor to substantiate the hypothesis is 0.05 (after Blackman, 1935).

The analysis of the more common species shows conclusively that the individuals of these species occurring within their respective communities are distributed non-randomly (Table IV and V). The rarer species were not examined. Their limited existence made it impossible to use the Chi-square tests. A direct consequence of this non-random distribution is that the mean density of a species cannot be estimated with useful accuracy from its frequency index. Thus the dry weights of the various parts of the commoner species as given in Table VI are *strictly estimations*.

TABLE VI.—The amount of plant parts available for the commoner species of *Annonaceae* and *Myristicaceae*  
(Note that the amounts are derived through estimations)

		Air-dried Weights in Kilograms/Acre		
Belukar Tua:		Leaves	Twigs	Bark
Artabotrys suaveolens	...	0.6	1.0	—
Fissistigma latifolium	...	0.2	0.6	—
Knema communis	...	0.4	0.6	—
Mitrella kentii	...	0.6	1.2	—
Pyramidanthe prismatica	...	0.8	1.2	—
Xylopia ferruginea	...	92.8	324.8	162.7
<i>Regenerating and High Forest:</i>				
Cyathocalyx ridleyi	...	153.1	358.2	152.5
Fissistigma latifolium	...	0.1	0.4	—
Knema communis	...	4.2	11.1	2.2
Knema laurina	...	1.8	2.7	—
Mitrella kentii	...	0.1	0.1	—
Oxymitra latifolia	...	0.6	0.9	—
Phaeanthus ophthalmicus	...	1.3	1.8	—
Polyalthia rumphii	...	1.9	4.2	—
Popowia fusca	...	1.3	12.3	—

Note:—*Knema communis* is specially included here although its occurrence is low because it has been found to contain some interesting alkaloids.

The results from the survey of the 4,805 acres of protected forests clearly show that the *Annonaceae* and *Myristicaceae* are forest plants. The myristicaceous plants in particular demand a forest habitat. A total of 18 species were encountered from regenerating and high forest areas, with a mean of 29.2 plants per transect of 6,000 sq. feet. This is contrasted to the ten species found within the Belukar Tua areas. In this case the mean number of plants per transect was only 2.9 (Table III). Again, most of the Belukar Tua occurrences were of the 0-1" dbh category and found only within the more advanced Belukar Tua areas. Only when the canopy was closed with an absence of undergrowth did they occur.

The annonaceous plants on the other hand, equally tolerate the Belukar Tua as well as the Regenerating Forest. Although the density is more or less the same, the number of species increases in the Regenerating Forest habitats.

It is of interest to note that five annonaceous species viz: *Pyramidanthe prismatica*, *Mitrella kentii*, *Xylopi ferruginea*, *Artabotrys suaveolens* and *Fissistigma latifolium* stand out as the important members of the Belukar Tua areas (Table I). The rest of the 26 species form the casual members of the community. Of these five species, *F. latifolium* plays a major role in the Regenerating Forest community also. It should be noted further that of the 31 species encountered within the Belukar Tua areas, only *Knema cinerea* var. *patentinervia* was absent from the Regenerating Forest areas. A total of 26 more species were encountered in the latter community.

The distribution of members of the two families is not uniform within the two communities. *P. prismatica* was found in all 17 transects taken from Belukar Tua areas; *F. latifolium*, in all 13 transects from the Regenerating Forest areas. The other species were encountered in a rather erratic fashion. Of the 31 species from the Belukar Tua samples and 56 species from the Regenerating Forest samples, only five and eight species respectively occur with a high enough frequency to be tested for the Poisson distribution. Of these 11 species\* tested, all showed a significantly non-random distribution, with a tendency towards clumping.

Clapham (1936) is of the opinion that clumping is a widespread phenomenon. Of the 44 species he investigated, only four were found to conform to the Poisson distribution. Blackman (1935), on the other hand, expresses the opinion that the dominant species in most cases approximates to a normal distribution curve.

---

\* *Fissistigma latifolium* and *Mitrella kentii* occur in both communities.

Skewness is greater for occasional species and greatest for rarer species. These authors believe that the mode of reproduction has a direct effect on the distribution of the plant. Where reproduction is by seed, random distribution is to be expected. This is contrasted to vegetative reproduction as a cause of non-random distribution. Archibald (1948), takes the argument a step further by saying that random distribution would occur where single seeds are dispersed by wind or water. In cases of animal or bird dispersal, particularly where the fruit contains several seeds, it is highly probable that a fruit, when carried away, would result in a number of individuals subsequently arising in a cluster.

Such is the case with the *Annonaceae*, where the fruit contains several seeds, and distribution is by animals — squirrels, civet cats, bats and birds. The *Myristicaceae* is also animal disperse, although each fruit carries only one seed. Thus with animal dispersal, the distribution of the plants concerned depends on the habits of the agents.

An excellent example is afforded by *Cyathocalyx ridleyi*. The species is concentrated in three main areas of Regenerating High Forest. The existence of representatives from each of the various diameter classes within the three localities suggests successful regeneration. Of the 77 plants encountered in seven areas, 67 plants were seen from these three areas. One may well ask why *C. ridleyi* is not more widely distributed, considering the fact that it is successfully regenerating itself. Again, it is now about 100 years since the first of the Catchment block was put under control (H.M. Burkill 1961), and within this period of time surely the plant ought to have spread more extensively. Why this is not so is still a puzzle. The plant is mainly distributed by squirrels, which tend to scatter the seeds around the base of the parent plant. It is possible that its distribution follows in some way the distribution of the squirrel.

Such a situation is also found in *Knema intermedia*, where two areas of Regenerating High Forests revealed a total of 79 plants.

*Anaxagorea javanica* is found in Singapore only at the Botanic Gardens' jungle. It grows profusely within a limited area, regenerating successfully. The reason why it has not been successful in escaping from this locality can be seen from its mode of dispersal. The fruits are follicles. Each follicle contains two hard, black shiny seeds pressed together. The ripe follicle splits open and then suddenly contracts as it dries so as to eject the seeds with a click. In this respect it behaves as a capsule. The seeds can be shot out to a distance of two to three yards, not far enough to spread successfully.

*Popowia fusca* is present in large numbers at the Taban Circle area, Bukit Timah Nature Reserve. A sample of 6,000 square feet recorded a total of 40 plants, all within the 0-1" dbh category. None of these were capable of reproducing. Probably a number of seed plants existed nearby. Within the same area, aggregations of *Phaeanthus ophthalmicus* and *Knema laurina* were also encountered.

It thus seems that each of the isolated pockets of Regenerating Forests supports its own favoured species. The isolated nature of these pockets which are surrounded by younger communities may in some way hinder the spread of these species.

During the course of this survey a total of 39 and 21 native annonaceous and myristicaceous species respectively were recorded in the areas covered by the transects. This is a little more than half the total species of these families recorded from Singapore (Sinclair, 1955, 1958). This difference is no surprise, considering the fact that the members of these two families are essentially forest plants, and today, only 3.6% of the island is forested.

### Summary

1. Since the establishment of a trading post and settlement in 1819, Singapore has experienced an almost complete change in its vegetation.
2. The present survey is an attempt to gather information regarding the amount and distribution of *Annonaceae* and *Myristicaceae* left on the island.
3. The survey of the 129,286 acres of non-forested areas uncovered the distribution of two common introduced species — *Cananga odorata* and *Annona muricata*.
4. *C. odorata* is closely associated with the Malays and *A. muricata* with the Chinese.
5. Of the 4,805 acres of protected forests, only Bukit Timah Nature Reserve, the Water Catchment area and the jungle at the Botanic Gardens support any of these plants in great number.
6. The myristicaceous plants are typically a High Forest family. The annonaceous plants on the other hand tolerate the Belukar Tua as well as the Regenerating and High Forest habitats.
7. Members of these families exhibit erratic occurrences and are distributed non-randomly. This is correlated with the habits of the animal dispersal agents.
8. An attempt was made to estimate the availability of air-dried plant materials of the commoner species.

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It is a pleasure to acknowledge the advice and patient guidance of the late Professor H. B. Gilliland throughout the course of this investigation.

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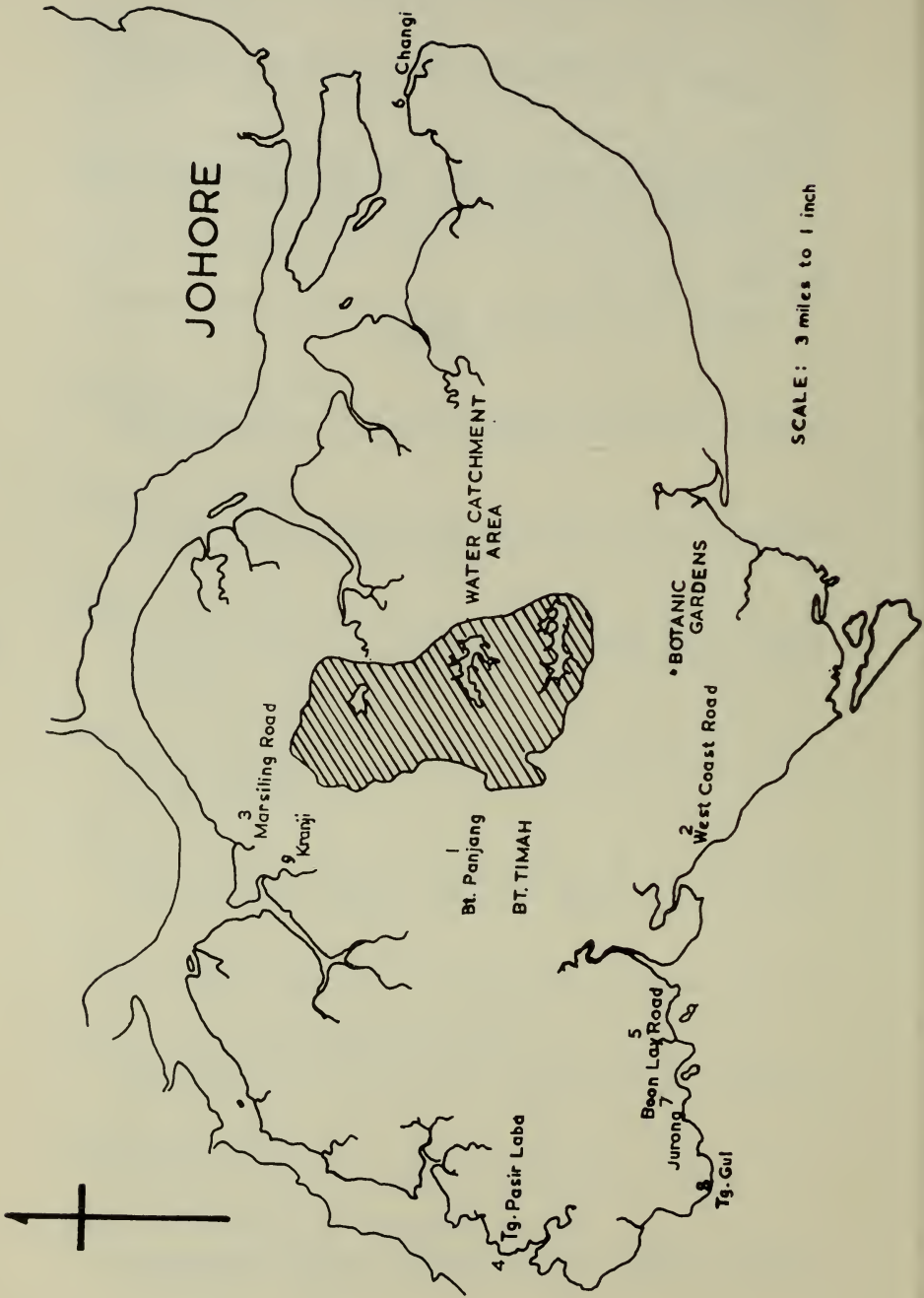


Fig. 1

The extent of recorded occurrences of native *Annonaceae* and *Myristicaceae*  
(Present day)  
(See facing page.)

Key:

1. *Uvaria grandiflora*: — flourishing by a path leading up Bukit Panjang.
2. *Uvaria leptopoda*: — off 8th mile West Coast Road (Sinclair, 1955).
3. *Horsfieldia crassifolia*: — 3 trees, along the fringe of farmland at Marsiling Road.
4. *Horsfieldia superba*: — a sapling growing along the coast at Tanjong Pasir Laba (Sinclair, 1958).
5. *Horsfieldia irya*: — 2 trees, along the fringe of farmland at ± 16 milestone, Boon Lay Road.
6. *Knema globularia*: — 3 trees growing by the coast near Changi Point.
7. An area of a few acres of relic forest at Jurong. Forest thoroughly exploited for firewood. *Phaeanthus ophthalmicus*, *Knema intermedia* and *K. conferta* found within this area.
8. *Knema globularia* and *Myristica iners*: — by the coast at Tanjong Gul (Sinclair, seen October, 1961).
9. *Horsfieldia superba*: — tree, growing at the edge of a swamp at Kranji (Sinclair, seen May, 1965).

The above gives the relics unearthed, the present distribution is concentrated about the central mass of Nature Reserves.



Fig. II

Distribution of *Annona muricata* in Singapore  
(See facing page.)

Each DOT represents SIX plants.

1. 900 plants, Tuas area.
2. 1,020 plants, Jurong area.
3. 96 plants, Jurong area.
4. 150 plants, Choa Chu Kang area.
5. 72 plants, Jurong Road, 11½ milestone.
6. 96 plants, Day Road.
7. 336 plants, Bukit Panjang.
8. 114 plants, Geylang Road.

Total number of plants = 3,642.

Fig. III

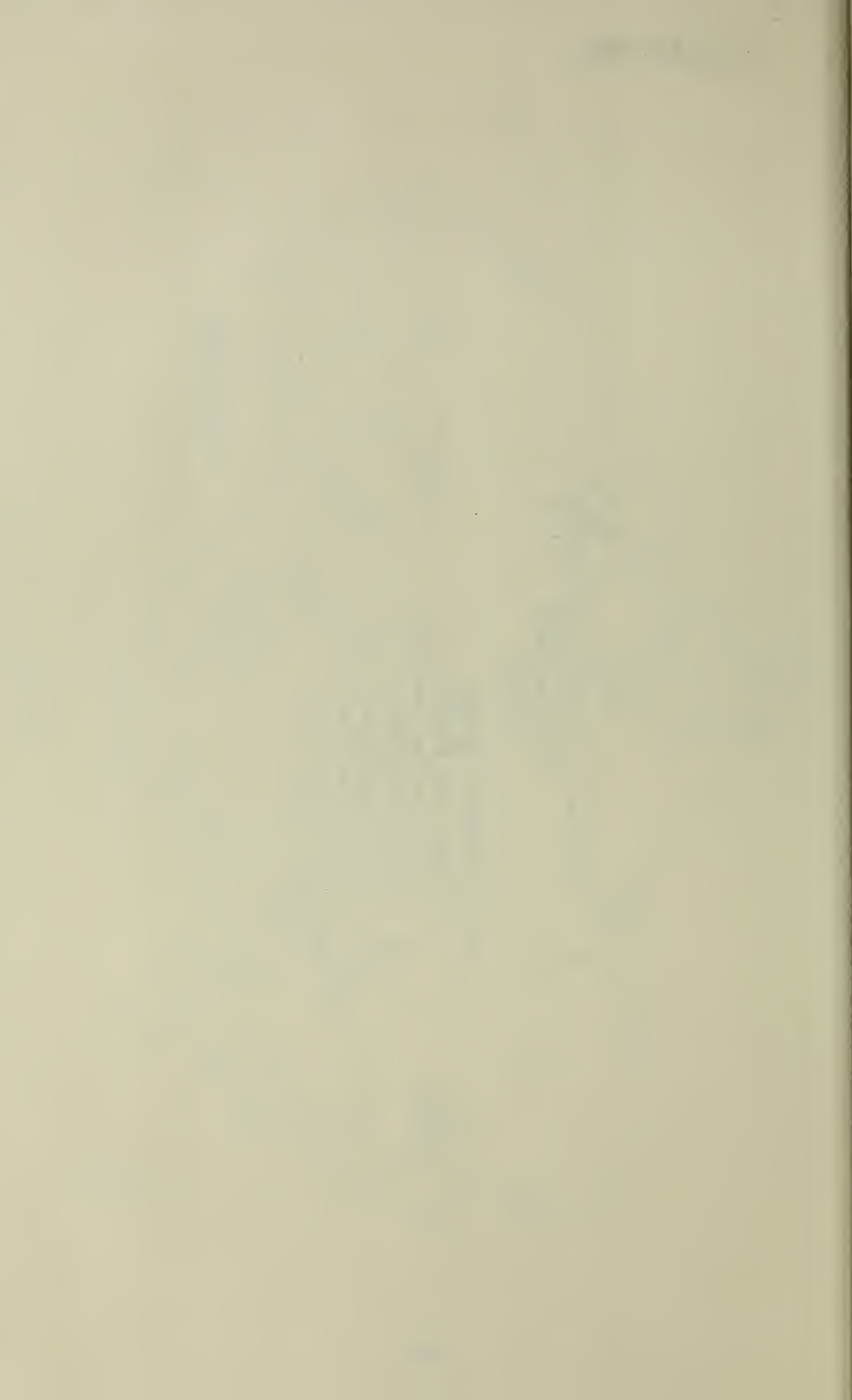


Distribution of *Cananga odorata* in Singapore  
(See facing page.)

Each DOT represents ONE plant.

1. 16 trees, Grange Road area.
2. 20 trees, 42 seedlings, Scotts Road.
3. 11 trees, Thomson Road.
4. 19 trees, Balestier Road.
5. 100 trees, Geylang Road.

Total number of plants = 452.



## Book Review

**The Flora of Delhi** by J. K. Maheshwari. Council of Scientific and Industrial Research, New Delhi, India. Printed by N. K. Gossain & Co. Private Ltd., 7/1 Grant Lane, Calcutta - 12 — 1963 — 447 pages. Price £2 16s or Rs28 or \$8U.S.

University students of botany at Delhi are fortunate in now having a flora dealing with the wild, naturalized and cultivated plants of their area. Moreover, amateur and professional botanists, school teachers, nature lovers, foreign visitors and those with gardens should also find in this 447 page book something to their interest. The very thick covers will stand up to severe handling whether in the field or in the laboratory and their dark blue colour will not be easily soiled in monsoon rains or in classroom ink fights. The general facies is pleasing and each species stands out clearly in print from the next. There are few printer's errors and the author's style is clear. The keys and descriptions are short but give the important and essential characters of the various species and groups and how to distinguish one from another. Thus the busy undergraduate with other subjects to read as well as botany is not left discouraged, over-burdened and blurred with unnecessary detail. He is introduced to a wide range of families of flowering plants in the Bentham and Hooker style, a system which is easy to grasp and which will probably lead him down to the correct identification of a required species quicker than some of the more modern systematic disciplines. What he may believe in later is another matter.

The book is not just a dull compilation of keys and descriptions for the author brightens it by comments on each species in a short paragraph which often contains some edifying, stimulating, original or unexpected information. Thus: "*Peganum harmala* — The presence of this plant is said to indicate accumulation of potassium nitrate in the soil. *Sesbania sesban* — An excellent gun-powder charcoal is made from its soft, white wood. *Carthamnus oxyacantha* — It is believed that the seeds were brought to Uttar Pradesh a few years ago by the *Pili Aandhi* (yellow dust-storm). The weed exhausts the soils. The seeds germinate as the atmosphere warms up in April and May."

Flowering and fruiting months are given as well as localities. For most species there is a vernacular name, here wisely included. Country people in India often have an amazing knowledge of the local names of their plants and the collector can ask them the name of a species in the field and will usually find, on consulting the book, that it fits the plant in question. English names are given if there is one but are strangely omitted for certain well-known

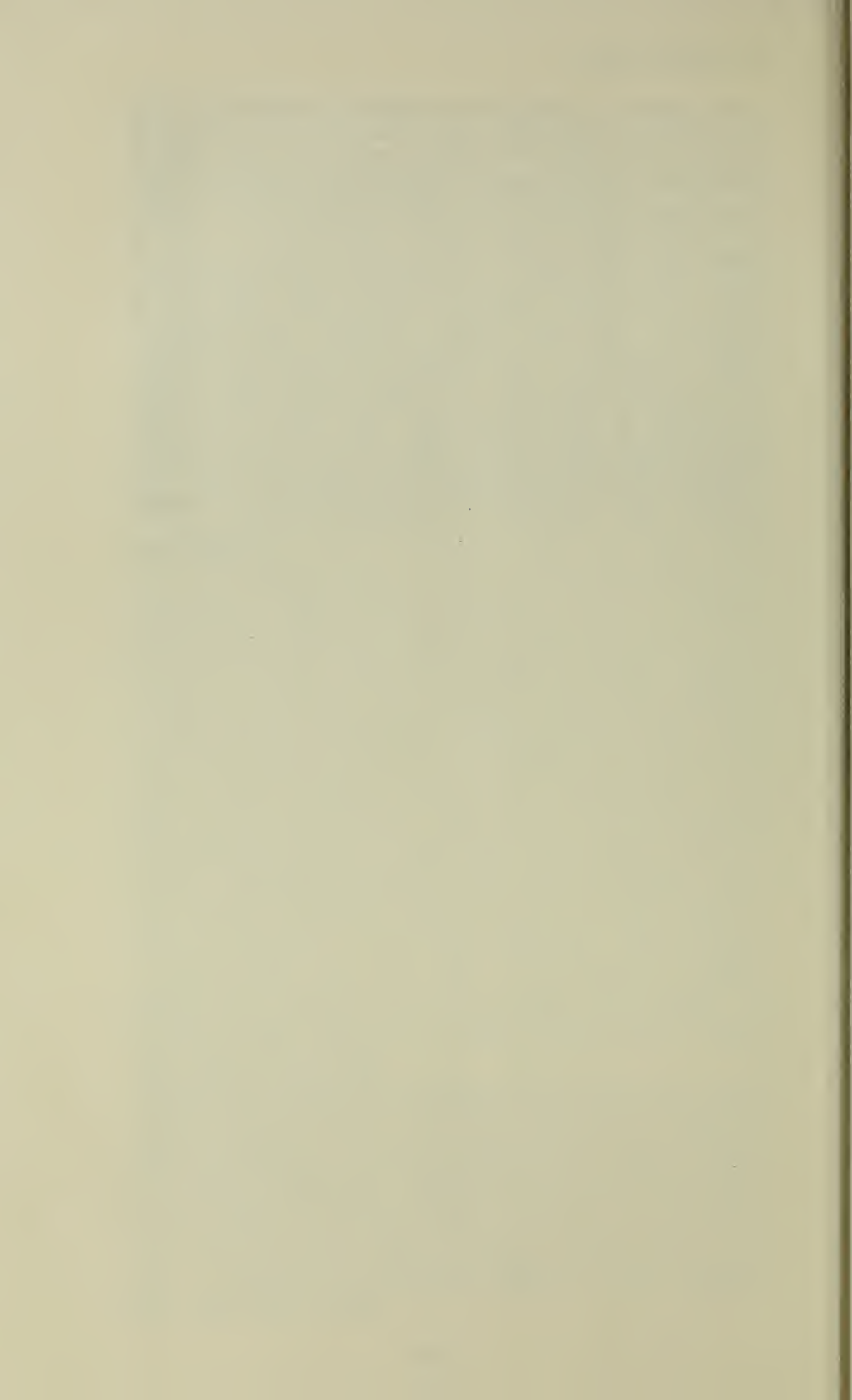
species such as lucerne, *Medicago sativa*, papaw or papaya, *Carica papaya*, chicory, *Chicorium intybus* and lettuce, *Lactuca sativa*. The last one, however, is called salad in Delhi. There is a very useful and selective bibliography at the end which will give the student a good insight into works on the Indian flora and will also introduce him to the plants of some neighbouring countries.

A notable feature of the book is the 38 page introduction dealing with previous work in the area, geographical features, climate, soils and plant communities. The collector looking for rare or spectacular plants in Delhi State would probably be a bit disappointed as the flora here consists mostly of pantropical weeds, aliens and exotic avenue trees with other common weeds which may be seen in most parts of India. These will all be new to a beginner but it is the true native flora of Delhi Ridge that has the greatest appeal to the author and the reviewer and most probably to the systematic botanist and conservator. This vegetation, although it contains no endemics and nothing that cannot be found in the bordering tracts of the Rajputana desert, the Punjab plains and the drier parts of Uttar Pradesh, is interesting never-the-less, and consists of tropical, thorny, xeromorphic shrubs and low trees, mingled with a characteristic ground flora of herbs and climbers, this herbaceous element varying in composition with the dry, wet, hot and cold seasons. Here we find thickets of *Prosopis spicigera*, *Anogeissus pendula* and various species of *Acacia* with *Balanites roxburghii*, *Butea monosperma*, *Capparis decidua*, *Grewia tenax*, *Salvadora oleoides* and *S. persica*. The author laments the loss of certain plants which used to grow on the Ridge in Royle's time and has made an appeal in the hope that the vegetation of the Ridge may be preserved. He states that out of 531 indigenous and naturalized species 478 have been dealt with; the rest have not been considered on account of their rarity, incomplete names and abnormal distribution. This remainder, 53 species, seems a rather high number, and its omission may arouse some curiosity. Perhaps some of the 53 are single individuals, mere adventive annuals that have arisen from a blown seed, unlikely to establish themselves and therefore not to be considered true members of the flora. Of these that have incomplete names surely the genus could have been mentioned.

Whatever the merits and usefulness of this book may be to the different classes of people who consult it, the most pleasing and satisfactory thing that the reviewer has noticed and for which he would award marks is the great attention that the author has paid to the rules of nomenclature. Although he may not have the correct botanical name and author's name in every case, his publication is more accurate in this respect than many that have come out of India in the past decade and the reviewer will certainly use his book as a guide when checking the validity of certain doubtful names and authors' names.

One may ask why there are no pictures in a publication of this kind. Perhaps it is intended that an illustrated volume should be prepared later if the need arises. It would have been helpful if some of the true native plants of the Ridge had been depicted but it is not necessary really to include the pantropical weeds as they are already illustrated to quite an extent in so many floras including some recent Indian ones. Unless the main outline drawings of species to be compared are accompanied by very careful enlarged insets of parts such as flowers and seeds, there is little point in adding any more rough sketches. Equipment and technique in India for processing such drawings must be in many instances defective while that for the reproduction of photographs, especially in government publications, is infinitely worse. Even original photographs of forest vegetation that are a credit to the author often look like scenes from the bottom of the sea by the time they have gone through the machinery of the press. For this reason probably some authors avoid submitting photographs altogether.

*J. SINCLAIR.*



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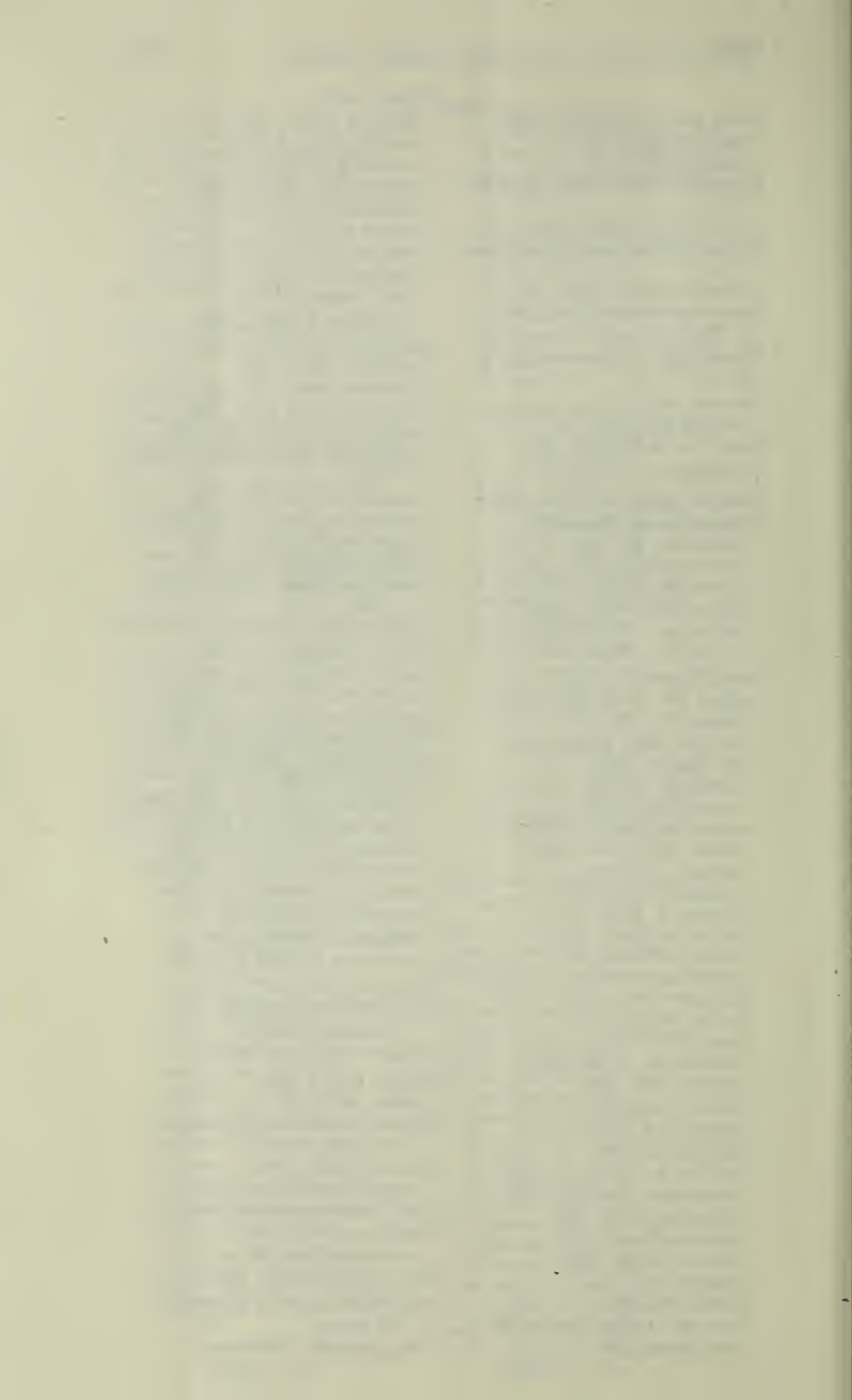
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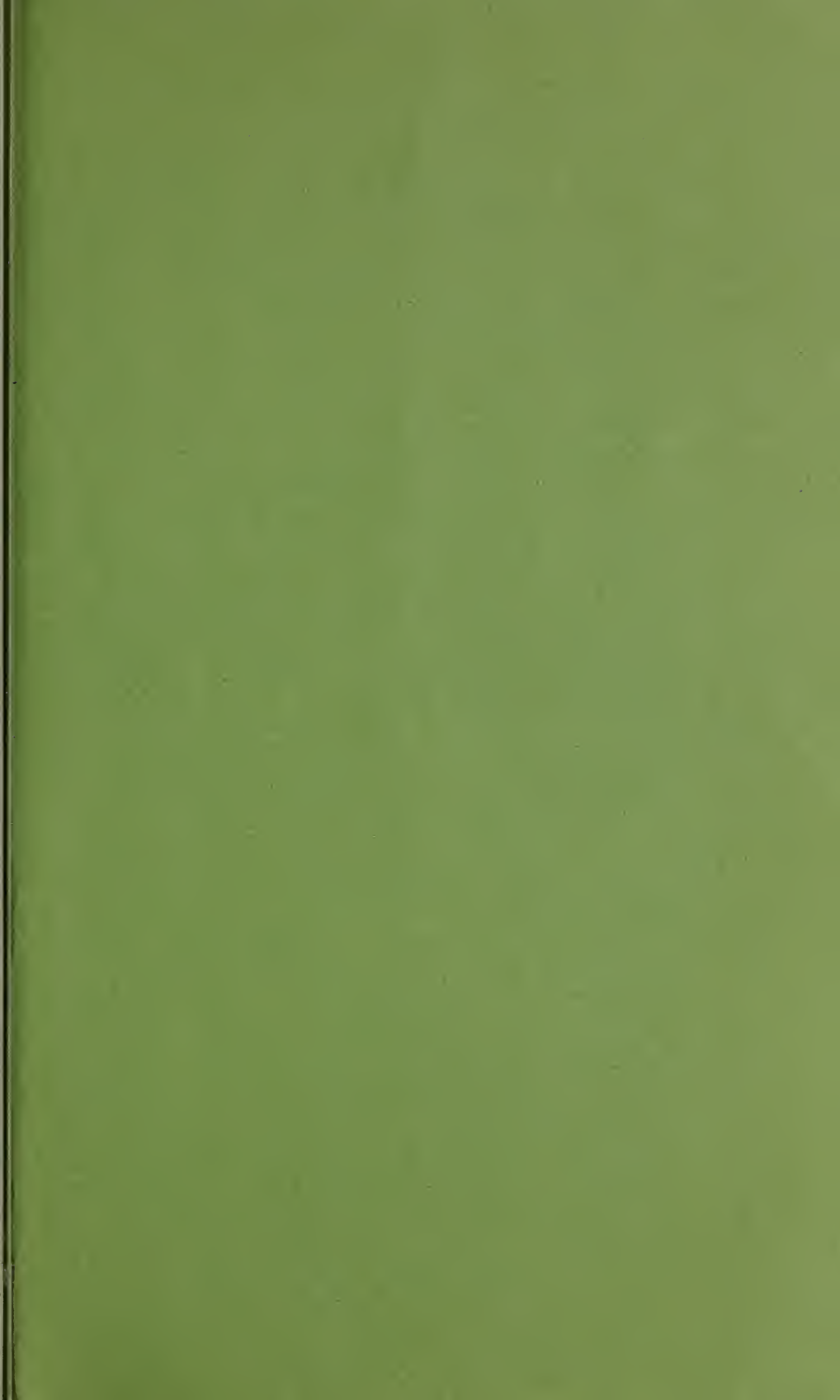
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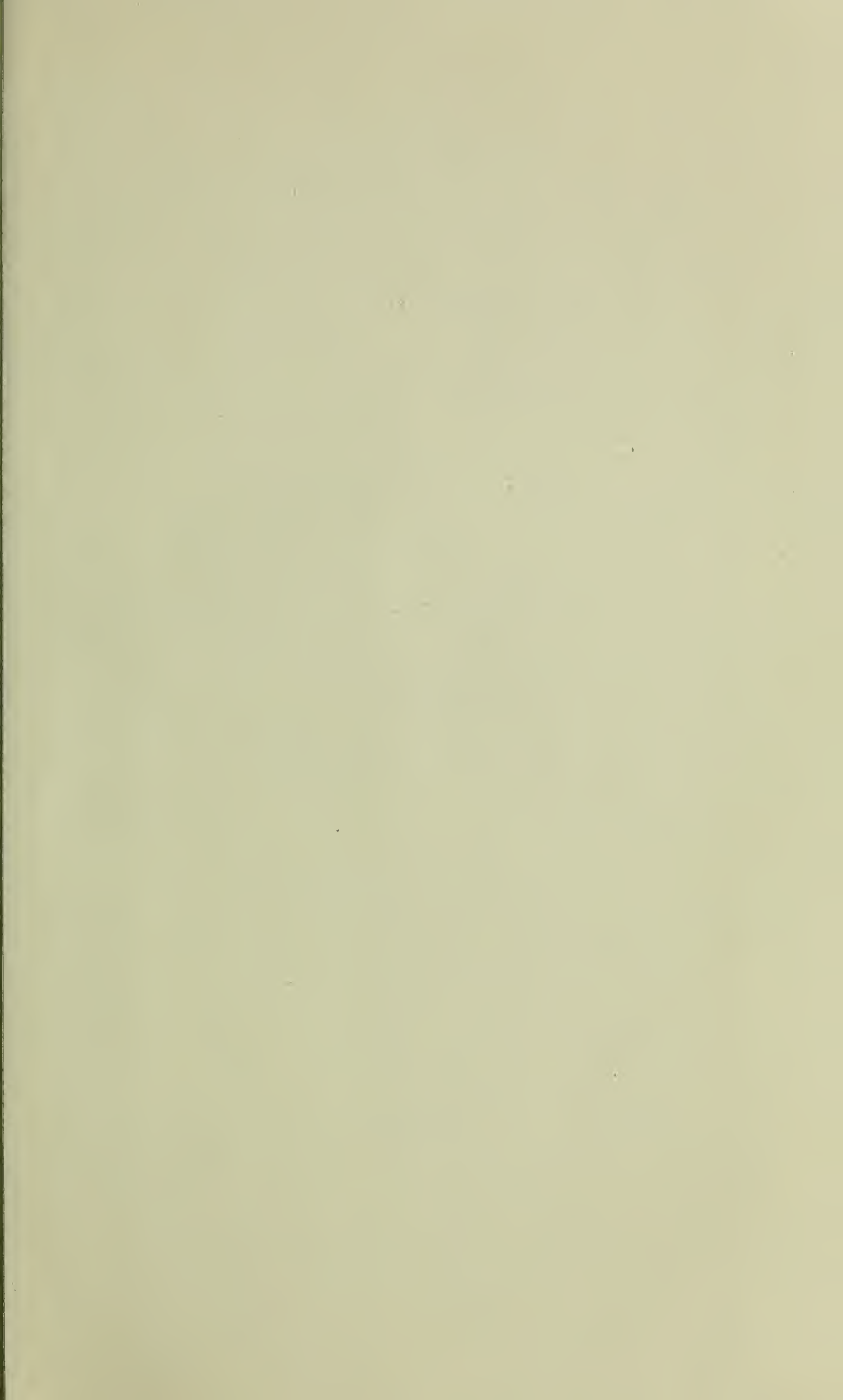
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