WANDERINGS

THROUGH THE CONSERVATORIES

AT KEW.

O Lord, how manifold are thy works! in wisdom hast thou made them all: the earth is full of thy riches.—Psalm civ. 24.

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WANDERINGS

THROUGH

THE CONSERVATORIES AT KEW.

CHAPTER I.

HISTORICAL INTRODUCTION.

The conservatories at Kew, which of late years have assumed an importance almost national, will form the principal subjects of the following pages. But since public interest is becoming increasingly attracted to this place, and a popular account of it does not exist in any accurate form, we shall endeavour to make our notice of Kew and its conservatories complete by a general and historical account of the Village of Gardens. The close vicinity of Kew to the metropolis renders its treasures accessible to a large number of persons interested in botany; and the charming manner in which the grounds are disposed, and the exquisite neatness with which they are kept, must always draw many others to these retreats, for whom botany in itself possesses few recommenda-

tions. There are probably few persons, however ignorant of botanical science, whose attention could not be roused, if informed that, within the distance of an hour's walk from London, could be seen, without expense or trouble, the vegetable glories of the tropics, the palm-tree, the orchid, the aloe, and the cactus, in almost native luxuriance of growth. And such a spectacle is at all seasons of the year available at Kew. Let us hope that those who read the following pages will, if they can, avail themselves of such advantages, and while beholding some of the fairest works of the vegetable creation, have their thoughts elevated to Him whose hand formed them and all things for his own glory.

The plan upon which we propose to proceed is as follows:—We shall first glance at the history of Kew and its gardens; to this we shall add a general description of the gardens in their present highly-cultivated condition; and, in remaining chapters, go through the contents of the various conservatories, selecting for illustration their most rare and interesting vegetable occupants.

It may be interesting to mention at the outset, and it will certainly confer an additional value on the following series of papers, that the illustrations with which they are accompanied are of undoubted fidelity, since they are the transcripts of daguerreotypes taken on the spot. The visitor to Kew will not, therefore, find that the imagination of the artist has beguiled him from the truth; and the

wondrous forms of the plants must be faithfully pictured, since the original drawing was a reflection from themselves, caught by a sensitive compound on the polished plate, and there truly retained and fixed. This application of photography to botanical illustrations is rendered easy from the fact that the houses in which the plants are contained are necessarily abundantly lighted; and there is consequently little difficulty to any one practised in this art, in pursuing it in this direction. The preparation of the plate and its time of exposure in the camera obscura, must necessarily be adapted to the requirements of particular cases; but a long acquaintance with the art soon indicates the proper course to be pursued in these instances. Some of the daguerreotypes forming the original of this series of illustrations possess remarkable force and beauty, and reflect in every particular, except the colour, the graceful appearance of the original objects.

Reverting now to the history of Kew, we shall seek to derive a few principal facts from the best authorities. As it is very customary to make long inquiries into the origin of the names of localities, we shall so far comply with this precedent as to quote the words of Lysons, who says:—

"The most ancient record in which I have seen this place mentioned is a court-roll of the manor of Richmond in the reign of Henry VII. It is there written Kayhough."

In subsequent records its name is varied to Kayhowe, Kayhoo, and ultimately to Kewe. From

its situation near the water-side, it is supposed that the original name comes from the term Key or Quay. It would appear that for some centuries gardening of a high class was practised in the vicinity of Kew. The author of an old Herbal—a Dr. Turner, who lived in 1551—had a garden there for the rarer kinds of plants. In 1691 Sir Henry Capel's garden, which now forms a part of the modern gardens, was celebrated as "containing as curious greens, and as well kept as any about London." In particular were mentioned, as deserving of notice, two "mastic-trees," for which Sir Henry paid the large sum of forty pounds, and four white-striped hollies, for which he gave five pounds a tree.

It would seem that several manors of great extent and some magnificence existed near the present entrance to the Royal Gardens. One, called Suffolk Place, was occupied by a Sir John Puckering, who held the office of Lord Keeper of the Great Seal. Some curious accounts are extant, which throw a singular light upon the domestic economy of these great establishments upon such occasions as a royal visit. Sir John's steward appears to have been a thoughtful and provident person, and has placed on record his purposed arrangements in the event of Queen Elizabeth's honouring his master with a visit. This is entitled—

"A memorial of things to be considered of, if her Majesty should come to my lord's house. 1. The manner of receyvynge bothe without the house and within—as well by my lord as by

my ladye. 2. What present shall be given by my lord; when and by whome it shall be presented, and whether any more than one. 3. The like for my ladye. 5. What rewards shall be given to the footemen, gardes, and other officers. 6. The purveyed diet for the Queen, wherein are to be used her own cooks and other officers for that purpose."

Omitting several less important particulars, we pass on to the fifteenth item, which is as follows—

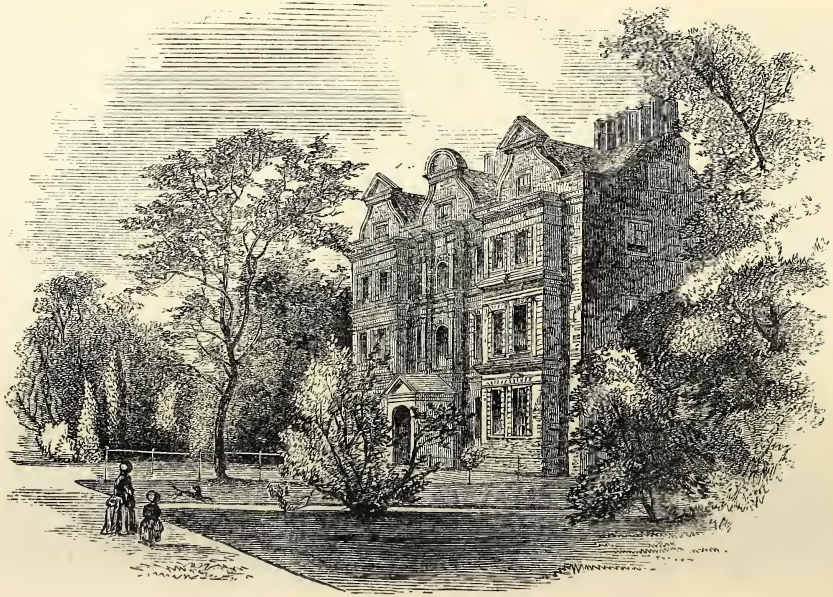
"15. The sweetynge of the house in all places, by any means."

This would probably be effected by flowers of variously-disposed perfumery, and the burning of fragrant substances. "16." This is an item on which this thoughtful person appears to have laid great stress.

"Grate care to be had, and conference with the gentleman usher, how her majestie would be lodged for her best care and likinge, far from heate or noyse of any office near her lodgyng, and how her bedchamber maye be kept free from anye noyse near it."

These preparations were probably satisfactory to her Majesty, for it is stated that the next year a visit was paid by her to the same nobleman's house. Of this entertainment the following account has been preserved, and is sufficiently interesting to repay extraction into these pages:—

"Her intertainment for that meale was great and exceeding costly. At her first lighting she had a fine fanne with a handle garnished with diamonds. When she was in the middle way between the garden-gate and the house there came rnnning towards her one with a nosegay in his hand, delivered yt to her with a short well-pened speach. It had in it a very rich jewell with many pendents of diamonds, valewed at 400*l.* at least. After dinner in her privy chamber he gave her a faire paire of virginales. In her bedchamber he presented her with a fine gown and jupkin, which things were pleasynge unto her Highness: and to grace hys lordship the more, she of herself tooke from him a salt, a spoone, and a forke of faire agate."



KEW PALACE.

This mansion was afterwards pulled down. Kew House, the residence of Sir Henry Capel in the middle of the seventeenth century, must be regarded as the origin of the present gardens. Sir Henry, who became afterwards Lord Capel, was much attached to the culture of plants, and brought many curious trees with him from France. The cost of some of these specimens has already been noticed, and it is interesting to find that nearly two centuries ago valuable plants and trees were cultivated with some degree of success on the spot where they are now fostered into almost native luxuriance. An old author, in allusion to these gardens, observes—

"The plantations of the Right Honorable Lord Capel are to be seen at Kew over against Brentford. The greatest advance made by him therein was in the bringing of fruits of rare kinds from France. The earliness in which this Lord appeared in gardening merits a very great place in my history, and a better pen than mine to draw it."

Lady Capel, succeeding her husband, still continued her residence at Kew House, and the gardens do not appear to have materially suffered by the loss of their zealous founder. Lady Capel died in 1721, and was buried in the chapel at Kew; the property then came through his wife into possession of Mr. Molyneux, secretary to George II. when Prince of Wales. In a tour through England, published in 1724, mention is made of Mr. Molyneux's fine seat at Kew, and—"excellent gardens, which were said to have the best fruit-

trees in England, collected by that great statesman and gardener, Lord Capel."

The Mr. Molyneux here spoken of was much attached to the science of astronomy, and was an intimate friend of Bradley's, the astonomer royal. A telescope, constructed by him, was erected in a space on the lawn in front of Kew House, upon which a sun-dial is now placed, with the following inscription:—

"On this spot,
in 1725,
the Rev. James Bradley made the first observations which led to his two discoveries; the aberration of light, and the nutation of the earth's axis. The telescope which he used had been erected by Samuel Molyneux, Esq., in a house which afterwards became a Royal Residence, and was taken down in 1803. To perpetuate so interesting a remembrance this dial was placed upon it in 1832, by command of His most Gracious Majesty William the Fourth."

Dr. Priestley gives the following interesting account of the two observers, Bradley and Molyneux:—

"Dr. Bradley, astronomer royal, and his friend Molyneux thinking to verify some observations of Dr. Hooke, concerning the parallax of the fixed stars, observed the star ν Draconis at Kew, on the 20th of December 1725, and found that it appeared more northerly than it had done at the beginning of the same month and the month preceding. This surprised them, and the more so as it was the contrary way from what it would have been had it proceeded from an annual parallax. But being pretty well satisfied that it would not be entirely owing to the want of exactness in the observations, and having no notion of anything else that could cause such an apparent motion as this in the star, they began to think that some change in the materials of the instrument itself might have occasioned it. In this persuasion they remained some time; but being at length fully convinced by several trials of the great exactness of the instrument; and finding by the gradual increase of the distance of the star from the pole that there must

be some regular cause that produced it, they took care to examine nicely at the time of each observation how much it was."

The result of these investigations, commenced at Kew, and prosecuted by Dr. Bradley alone afterwards at Wanstead, was the promulgation of his celebrated theory of the aberration of the Fixed Stars, one of the most useful and ingenious discoveries in modern astronomy.

It is an interesting fact that the original entry of the first night's observation at Kew, written on a torn bit of paper, is still preserved; and is as follows:—

"Dec. 21, Tuesday, 5^h 40′, sider. time
Adjusted y^e mark to y^e Plumb line
and then y^e Index stood at 8.
5^h 48′ 22″ y^e star entred
49′ 52½″, star at y^e cross
51′ 24″ star went out
as soon as I could let go y^e course
screw, I perceived y^e star too
much to y^e right hand, and
so it continued till it passed
y^e Cross thread, and within a quarter
of a minute after it had passed
I turned y^e fine screw till I saw
y^e light of y^e star perfectly
bisected; and after y^e obser-
vation I found y^e index
at 11¾, so that by this
observation y^e
mark is about 3¾″
too much south;
but adjusting y^e mark &
plumbline
I found y^e Index at 8¾."

Bradley remained long perplexed as to the cause of this motion; but it is said that in a pleasure-

excursion on the Thames the true solution was first suggested to his mind. The following anecdote is given in Dr. Thomson's History of the Royal Society:—

"Bradley accompanied a pleasure party in a sail upon the river. The boat in which they were was provided with a mast which had a vane upon the top of it. It blew a moderate wind, and the party sailed up and down the river for a considerable time. Dr.

OBSERVATORY.

Bradley remarked that, every time the boat put about, the vane at the top of the boat's mast shifted slightly, as if there had been a slight change in the direction of the wind. He observed this three or four times without speaking; at last he mentioned it to the sailors, and expressed his surprise that the wind should shift so re-

gularly every time they put about. The sailors told him that the wind had not shifted, but that the apparent change was owing to the change in the direction of the boat, and assured him that the same thing invariably happened in all cases. By tracing this phenomenon to its cause, namely, the combined motion of the boat and the wind, he was enabled to give the solution of the star's motion; namely, a small change of place arising from the spectator giving to the ray of light the effects of his own motion."

About five years subsequently—in 1730—Kew House was leased to Prince Frederick of Wales, who greatly admired its situation, and to whom a long tenure was granted by the Capel family. The fee was subsequently purchased by his son, George III. The pleasure-grounds, which extend over about one hundred and twenty acres, were commenced by Prince Frederick, and finished by the Princess Dowager, who took great delight in directing and superintending the improvements. Sir William Chambers, a talented architect, but one whose Eastern travels had left too deep an impression upon his genius, was employed to embellish the pleasure-grounds, and to erect the necessary structures in the botanical parts of the gardens.

A description of the gardens, as thus improved, was given in a very costly volume, accompanied by large plates, by Sir W. Chambers. From this and other contemporaneous writers we shall gather a few illustrations of the condition of the gardens at that period. Originally, it is stated, the ground was one dead flat. The soil was barren, and without either wood or water. Under such disadvantages it was not easy to produce a very good result. But, says a publication of the time,—

"Princely munificence, guided by a director equally skilled in cultivating the earth and in the politer arts, overcame all difficulties; that which was a desert is now an Eden."

The great wonder of the gardens consisted in the conservatories, which, for that period, were extremely good and deserving of notice. The physic, or exotic garden, was begun in the year 1760, and "from the manager's great assiduity, with which all curious productions are collected from every part of the globe, without regard to expense," it soon became stocked with rare and valuable plants. For their cultivation several conservatories were erected. One of these, which still remains, must have been a very remarkable structure for the period at which it was erected. It is thus described. This is a very large stove—

"of 140 feet, exclusive of the tan-pits; and the two ends form two dry stoves, each 25 feet long, 18 feet wide, and 20 feet high. The dry stoves are furnished with stands for placing pots on, made in the form of steps. They have three revolutions of flue in the back wall, and one of them hath likewise a flue under the pavement. On the one side of the stove in front there is a border, covered with glass, for bulbous roots; which, by the assistance of the flues under the pavement of the stove, flourish very early in the year."

This old stove, which is now No. 8 in the gardens, and still exhibits much solidity of construction, presents a remarkable contrast to some of the lighter and more modern houses in other parts of the grounds.

Another structure of much size and importance was erected in 1761—the Orangery. This is a

very fine building, and is thus described by Sir W. Chambers, its architect:—

"The front extends 145 feet, the room is 142 feet long, 30 feet wide, and 25 feet high. In the back shed are two furnaces to heat flues laid under the pavement of the Orangery, which are found very useful, and, indeed, very necessary in time of hard frost."

These flues still remain, and the house, although improved and slightly altered, is essentially in the same state as it was nearly a century ago.

In addition to these and other conservatories were a variety of structures—some useful, some ornamental, and a few, of which it might be said with some justice, that they belonged to neither of these kinds. What will appear most remarkable was the profusion of so-called temples, which were scattered about the grounds, some of them very handsome structures. There was also an extensive menagerie, the centre of which was occupied by a basin of water, stocked with water-fowl. In the menagerie, or, more properly, aviary, were large pens, in which were kept some fine specimens of "Chinese and Tartarian pheasants, besides many sorts of other large exotic birds."

There was also a royal hermitage, or grotto, containing busts of Boyle, Newton, Locke, Clarke, and Wollaston. A person of some notoriety—Stephen Duck—wrote some lines descriptive of this place, commencing—

"Tell Indian seers, thy Naiads here have seen
The sweetest grotto and the wisest queen."

The personages whose busts thus ornamented the grotto are thus described:—

> "Their awful *Bustoes* round the grot appear;—
> The brightest stars in learning's hemisphere;
> Their fathers dimly view'd the dawning ray,
> They rose like suns, and brought a flood of day."

This poetry, if such it may be called, was the composition of a man who, from being a farmer's

RUINS.

boy, rose to be the preacher of the parish. In this capacity he officiated for some years: his history and the circumstances of his humble origin gave much popularity to his sermons, and it is said that such crowds flocked to hear him whenever he

preached, that disastrous accidents were constantly the theme of the journals of the time, as attendant upon his ministry in public. His wife was keeper of the grotto. Stephen Duck himself had been for some time keeper of another singular place in these gardens, called Merlin's Cave, which was at that time considered a great curiosity. "In a secluded spot, amidst foliage and underwood," observes a modern writer, "the fragmentary remains of Merlin's Cave, and the grotto or hermitage—the creations of Queen Caroline—are still to be found, but they merely consist of ruined walls, and some dilapidated statuary."

During the latter part of the reign of George III., the royal gardens were greatly enriched with plants from the southern hemisphere, the scientific results of various exploring expeditions; and in 1789, Mr. Aiton, the curator, published a valuable catalogue of species then in cultivation, amounting to five thousand six hundred. This work, entitled 'Hortus Kewensis,' was well received by the public.

Aiton appears to have been a man of enterprise, and of a liberal mind. He instituted a sort of kindly rivalry between himself, Dr. Pitcairn of Fulham, and Mr. Lee of Hammersmith. Every acquisition of new seeds or plants was equally shared by these three cultivators, who, pursuing various methods of culture, of course had differing success. He that was most fortunate divided his stock of plants with his fellows.

At his death, in 1793, Mr. Aiton was succeeded by his son, who in 1810 published a second edition of 'Hortus Kewensis,' in which upwards of sixteen hundred genera of plants are enumerated. It is a matter of regret that no similar list has been published of late years, as it would be both interesting and useful to botanists to know what species are to be found in this great national collection.

Scheer, in his 'History of Kew Gardens,' paints before our imaginations—

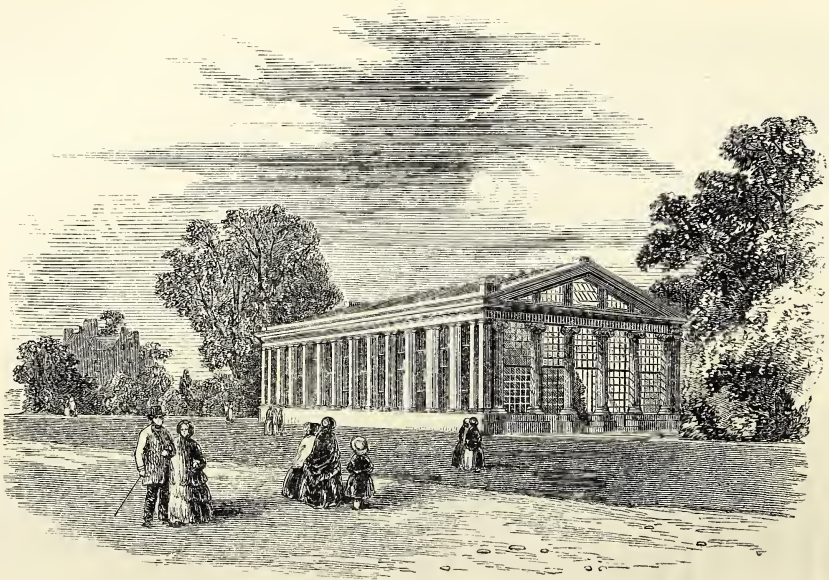
"the scene of Sir Joseph Banks introducing the first *Hydrangea hortensis* to Kew, about the beginning of 1789, for the inspection of the curious. It had begun to flower in the Custom-house, and its green petals were a puzzle to the botanists of the day. The next day he exhibited it at his house in Soho Square, from whence it was returned, and lived in Kew, the parent of its numerous progeny now spread all over Europe, till within these few years. This year saw also the *Pœonia Moutan* introduced from China; and it is in the gardens to this day, alive and well, a venerable monument of happier times. The common *Fuchsia* also became then first known, and we are told that Lee sold small plants at five guineas each!"

The predilections of George IV. and William IV. were not scientific; and Kew Gardens fell during these reigns into a neglect which was felt by the public to be disgraceful. In response to the popular call, a Commission was appointed early in the reign of her present Majesty, to inquire into the condition of the Gardens, and this resulted in the whole management being transferred to the Commissioners of Woods and Forests. Entensive improvements were at once commenced; Sir William Hooker, the present able Director, was

appointed to the control, and the Botanic Gardens were thrown open to the gratuitous admission of the public.

Since that time the collection has rapidly and steadily increased in value. It is admirably managed; energetic and scientific collectors are sent to distant regions, and the most rare and curious plants are continually pouring in from all parts of the world. The public appreciate the instruction and amusement which are there afforded, and flock to what may be emphatically called their own garden, in yearly-augmenting crowds.

Among the interesting features which have been recently added to the Gardens, the Museum, the great Tropical Conservatory, and the Victoria House, are specially prominent.



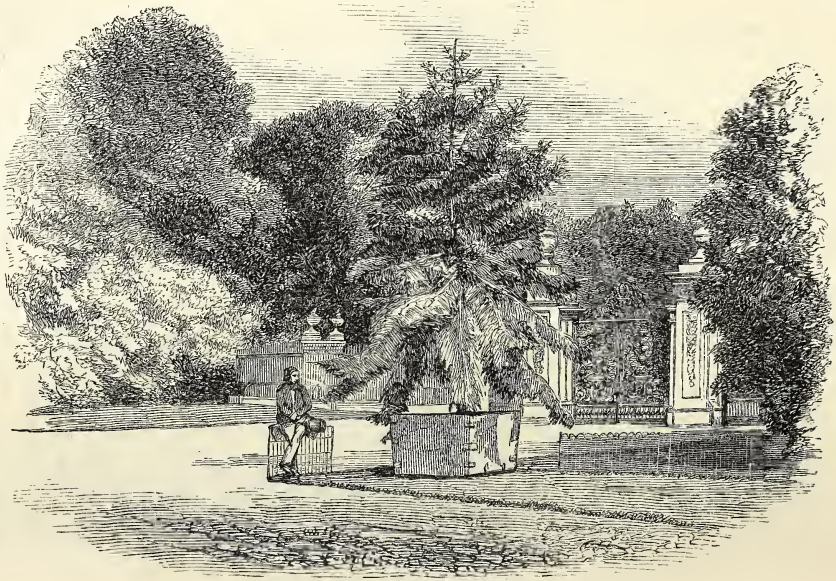
THE ARCHITECTURAL CONSERVATORY.

CHAPTER II.

THE ARCHITECTURAL CONSERVATORY.

"So sits, enthroned in vegetable pride,
Imperial Kew by Thames' glittering side,"

Writes the poet; and thither, to pay our addresses to the Court of Flowers, we would beg the accompaniment of the reader. As to conveyance, there are the railroads for those have little time, the omnibus for those who have more, and the steamboat, taking the chances of the tide, for those who have most. Whichever route we adopt, the way thither is a pleasant one, and we are sure of what the pent-up Londoner gasps vainly after—free and fresh air, and plenty of breathing-room. If the reader will come with us, we can promise more than this,—the odours and fantastic beauties of the tropics, the fairy-like vegetation of a clime more favoured in this respect than our own, and such a bewitching sight of exotic loveliness as may nowhere else be obtained. After this invitation let us proceed to ask his attention to a few of the notable vegetable wonders and curiosities caught sight of by ourselves in occasional wanderings through the Kew conservatories; we may then,



THE ENTRANCE (*from within*).

sure of what the result will be, leave the call to the Court of Flora in his hands.

BANKSIA SPECIOSA.

Precisely at one o'clock the beautiful iron gates open and usher us into the exquisitely-kept

grounds, called the Botanical Gardens. Here, turning to the right, we find ourselves before a classical building having little of the external characters of a conservatory, and indeed frequently on this account called the Architectural Greenhouse. On entering, we are, as it were, at once transported to an Australian wood. There are tall *Banksias* and *Dryandras*, *Hakeas*, *Grevilleas*, and others, chiefly evergreen shrubs and small trees, every one of them plants without a particle of the old-world look about them, and some of aspect passing strange indeed. Some of the *Banksias* are like—what are they like, as they stand with crooked stems now and then rugged with warts, waving a curious foliage strongly resembling that of the fern-tribe, and up-bearing bunches of flowers, which, when dry, are just like bottle-brushes? Then the *Dryandras*—here is one precisely resembling a thistle in foliage and flower, so much so as to deceive any casual visitor who might express surprise at apparently finding such a well-known wayside companion among the treasures of an exotic green-house! There is another, more elegant in form, having however the same habit, while its young leaves present a curious appearance of difference from those of older growth. Again, another stands, its branches all bewrapped in a leathery down as dense and soft as if fresh plucked from the heart of a bud. Several of both these kinds exhibit a remarkable appearance, in consequence of the young leaves

being often of a light-brown or even pink colour, while the older ones are of a deep green; they have also a singular woollyness of look, resembling in many respects those artificial leaves which decorate ladies' bonnets formed out of plush or velvet. Several of the *Hakeas* exhibit that curious feature which marks much of Australian vegetation, the reversed position of the leaves, which no longer look upwards and downwards, but are set

DRYANDRAS.

on their edges, and thus expose both sides alike to the light. What will our vegetable physiologists say as to the manner in which the functions of these oddly-placed organs are performed, now that both sides are alike in respect of light? Which, let us ask, is, to quote Dr. Lindley's words,

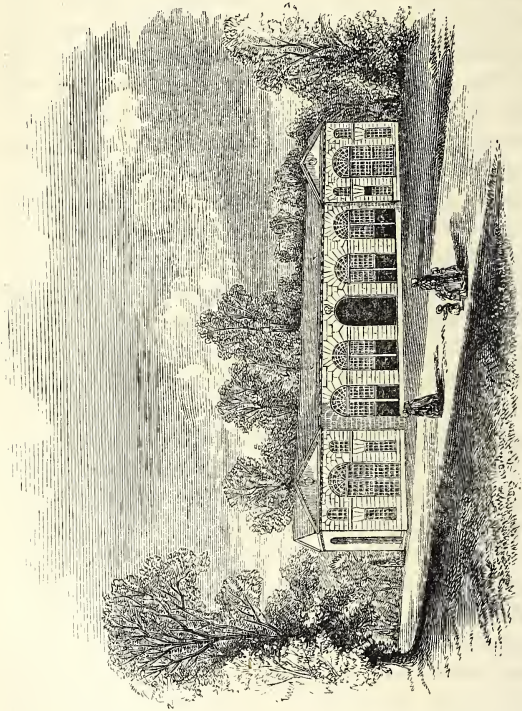
"the stomach," which "the lung" of the leaf? Others of this tribe have leaves which are bent into curious, undulated forms, and others are folded up so as to resemble the shell of a mussel! Several of the *Grevilleas* are shrubs, having flowers of unusual form, representing a pair of curved ram's horns: their colours are agreeable red and white. Many of the plants cherished with so much care in this conservatory form in their native wilds what is called the "Scrub" of the forests, and some, called by the colonists honey-suckle-trees, yield a considerable quantity of honey, which the natives collect and are extremely fond of. Towards the further end of this house are several plants which we may not pass silently by. Among them stands in conspicuous elegance and beauty the graceful form of a tree called the *Polygala speciosa*. At the time of our wandering, this beautiful tree was in flower, and attracted much admiration by the delicacy of form, colour, and texture of these elegant organs, which resembled small fair white birds on the wing. Near it were those singular trees, the *Casuarinas*, with leaves like bundles of fine wire; such trees cast no shadow on that weary ground over which they wave in the land of their birth. If the form of the leaf were much relied on as a botanical character, the tree next before us would offer a wonderful puzzle to the most learned botanist; for no two of its leaves are of the same shape. Some are oval, some are lanceolate, some are

triangular, and some show a disposition to be divided into leaflets. It may well be imagined what a curiously-irregular character is communicated to such a tree by this arrangement. Its name is *Brachychiton diversifolium*. The agreeably-aromatic *Illicium religiosum* stands hard by, having left its kindred, flourishing and growing tall under the fairer skies of Japan, while it, as their representative, displays its greenery to the gaze of our less fervid sun; by its fragrance reminding us that the smoke of its seeds fills many a Chinese temple with sweet odours. And before we quit this interesting building, a modest-looking plant at the side displays to us a vegetable curiosity of another kind: this is the *Scævola latifolia*. Who has taken a sharp knife and cut its pale-blue flowers every one in half, leaving one half behind? Such doubtless is their appearance. We have lingered, however, long enough here: let us now pursue the gravelled walk which leads in a south-west direction towards the Palace, turning, however, to the left just as we come within sight of it, and ascending by four wide steps to the great avenue, which will bring us to the Palm House.

We shall not have proceeded far before we discover, a little on the left, a large building, somewhat resembling the conservatory we have just left. It was originally intended for orange-trees, and is hence still known as the Orangery.

As our visits were made chiefly in the summer-time, all the occupants of this conservatory were

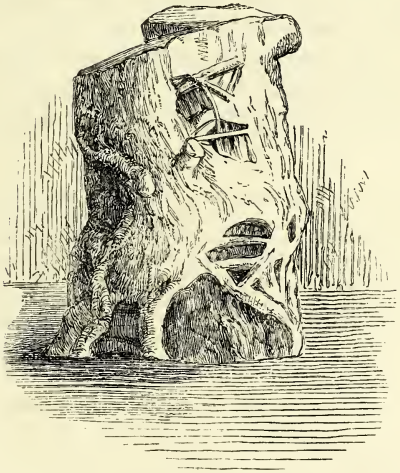
placed in the open air, with the exception of some singular creepers which climbed the tall windows and hung their graceful foliage and flowers in



ORANGERY.

festoons near the ceiling. This building is in winter appropriated to the reception of a number of beautiful and large specimens of pines, and

other half-hardy trees. It is a long, old-fashioned structure, without the lightness and elegance becoming a building devoted to the care of the tender and elegant productions of nature, and is warmed by the exploded method of pouring up hot air through a perforated floor. Almost empty as it is, there are, nevertheless, some objects of interest in it which deserve enumeration.



EMBRACING FIG-ROOTS.

Among them may be mentioned two remakable specimens of dead trees, which are held in the firm embrace of gigantic roots belonging to another tree. The thickness of these roots is not less than that of a man's leg, and the tightness of

the embrace appears to have acted very prejudicially upon the growth of the tree around which the snake-like trunks wind. Oftentimes the noblest trees of a tropical forest die in consequence of the strangulation.

One of the specimens in question was sent from Jamaica, where similar instances are very common. The enveloping roots are those of a gigantic species of fig-tree (*Ficus*), which spread over any surface with which they come into contact, forming a vast irregular network of wood upon it. A curious example has been thus described after the enclosed tree had been killed and had decayed away:—

"About thirty feet above the ground is the base of the trunk, which thence rears itself up, pillar-like, towards the heavens, and spreads abroad its vast horizontal array of branches across the road. From the same point there descends a hollow cone of roots interwoven and anastomosed, especially at the upper parts, in a net-like manner, but forming towards the bottom only three or four flattened irregular columns. Into the area enclosed by this network of roots a person may enter—for it is about six feet wide—and, looking up, behold the base of the trunk eight or ten yards above his head.

"The explanation of this curious phenomenon depends upon the tendency just mentioned. On this site once stood a large tree of some other species, probably a cotton-tree, or some other soft-timbered kind. The little scarlet berry of a fig-tree was carried, by some vagrant banana-bird or pigeon, to its boughs and there devoured. After the little truant had finished his morsel, he perhaps wiped his beak against the rough bark of the trunk, beside the branch on which he was seated. Some of the minute seeds, enveloped in mucilage, were thus left on the tree, which the rain presently washed down into the broad concavity of the forks, where, among moss and rotten leaves, one soon germinated and grew. The roots gradually crept down the trunk of the supporting tree, closely clinging to its bark, and by

their interlacement at length formed a living case, enveloping it on every side, and penetrating the earth round its base. The growth of these, and also of the enclosed tree, daily induced a tighter and tighter pressure, which at length arrived at such a degree, as to stop the circulation of the sap between the bark and wood. Death, of course, was the result; and speedy decay reduced the supporting tree to a heap of mouldering dust; whilst the parasite, now able to maintain its own position by its hollow cone of roots, increased in size and strength, and overtopped its fellows of the forest; a tree standing upon stilts.''*

Of the flowering creepers at the windows the singular and elegant habits of a plant called the *Russus androgynus* attract the visitor's eye. This plant is adorned with leaves of the form of those which we commonly recognise as belonging to the lily-tribe, a member of which in fact it is, and out of the edge of each leaf appears a cluster of the loveliest little yellow flowers. As they grow in great profusion in this curious position, the singularity of the effect produced by a luxuriant mass of leaves thus adorned, hanging in clusters up the sides and along the top of the windows, may be conceived.

Round about this building, and scattered in various picturesque groups along the walks and on the lawns in its vicinity, are the usual tenants of the Orangery during the colder part of the year, now basking in a flood of sunlight, and inhaling a balmy atmosphere, for a short season, almost comparable with that of their native habitat. Here we shall find a group of those elegant trees, the Norfolk Island pines, botanically, *Araucaria*

* Gosse's 'Sojourn in Jamaica,' p. 193.

excelsa, which in their native clime attain a size and height altogether gigantic: the tallest of the specimens here, and they are reputed to be the

ARAUCARIA IMBRICATA.

finest in Europe, is not more at present than twenty feet high. Some are remarkable for their

drooping and graceful branches, which resemble ostrich-plumes; others again, such as the *Araucaria imbricata*, wear a most fantastic appearance in consequence of the rough, scaly, and serpentiform habit of their branches, which stand out in various directions, like a group of wreathing snakes.

The fruits of this species, placed at the ends of the boughs, are of a regular globular form, as large as a man's head, and consist of beautifully-imbricated scales that cover the seeds, which are the most important part of this truly-noble tree.

"The *Araucaria* is the palm of those Indians who inhabit the Chilian Andes from lat. 37° to 48°, yielding to these nomade natives a vegetable sustenance, that is found in the greater plenty the more they recede from the whites, and the more difficult they find it to obtain corn by commerce. Such is the extent of the *Araucaria* forest (Pinares), and the amazing quantity of nutritious seeds that each full-grown tree produces, that the Indians are ever secure from want; and even the discord that prevails frequently among the different hordes does not prevent the quiet collection of this kind of harvest. A single fruit (*cabaza*, 'a head,') contains between two and three hundred kernels, and there are frequently twenty or thirty fruits on one stem. And as even a hearty eater among the Indians, except he should be wholly deprived of every other kind of sustenance, cannot consume more than two hundred nuts in a day, it is easily seen that eighteen Araucarians will maintain a single person for a whole year. The kernel, which is of the shape of an almond, but double the size, is surrounded with a coriaceous membrane that is easily removed: though relishing when prepared, it is not easily digestible, and containing but a small quantity of oil, is apt to cause disorders in the stomach with those who are not accustomed to this diet. When the scarcely-mature seeds are dried in the sun, a sugary substance exudes, which appears to reside chiefly in the embryo. The Indians eat them, either fresh, boiled, or roasted, and the latter mode of cooking gives them a flavour something like a chestnut. For winter's use they are dried after being boiled, and the women prepare a kind of flour and pastry from them. The collecting of these fruits would be attended with great labour, if it

were always necessary to climb the gigantic trunks: but as soon as the kernels are ripe, towards the end of March, the cones drop off of themselves, and shedding their contents on the ground, scatter liberally a boon, which nothing but the little parrot (*Psittacus choræus*, Mol.) and a species of cherry-finch, divide with the Indians."*

Some Chilian and Mexican pines of other species also deserve notice, either for the beauty of their appearance or from their importance economically, several of them furnishing eatable cones of great size, and highly valued by the inhabitants of the countries where they grow.

In various positions in the neighbourhood will be seen some trees belonging to the *Eucalyptus* genus: these are natives of Australia, and in the forests of that country they attain proportions which will be best imagined after perusing the following statement of Mr. Backhouse. He says:—

"It is the most gigantic tree of Van Diemen's Land, and there called *Stringy Bark*. Some of the specimens exceed two hundred feet, rising almost to the height of the Monument in London, before branching: their trunks also will bear comparison with that stately column both for circumference and straightness. One of them was found to measure fifty-five feet and a half round its trunk, at five feet from the ground: its height was computed at two hundred and fifty feet, and its circumferance was seventy feet at the base! My companions spoke to one another and called to me when on the opposite side of the tree, and their voices sounded so distant that I concluded they had inadvertently quitted me in search of some other object: I accordingly called to them, and they in answer remarked the distant sound of my voice, and inquired if I possibly were behind the tree. At the time when the road was forming through the forest, a man who had only two hundred yards to go from one company of people to another lost

* 'Comp. to Bot. Mag.' i. 354.

his way, he shouted and was repeatedly answered; but getting farther astray among the prodigious trunks, his voice became inaudible and he perished. A prostrate tree of this kind was measured two hundred and thirteen feet long: we ascended the trunk on an inclined plane formed by one of its huge limbs, and walked four of us abreast with ease upon the trunk. In its fall it had hurled down another one hundred and sixty-eight feet long, which had brought up with its roots a wall of earth twenty feet across!"

Specimens, even far superior in dimensions to these, are described by the Rev. T. Ewing, of Hobart Town. We are not sure that they are of the same species, as he names them Swamp-gum trees, the term Gum-tree being applied by the colonists to various species of *Eucalyptus*.

"Last week I went to see two of the largest trees in the world, if not the largest that have ever been measured. They were both on a tributary rill to the Northwest Bay River, at the back of Mount Wellington, and are what are here called Swamp Gums. One was growing, the other prostrate; the latter measured to the first branch two hundred and twenty feet; from thence to where the top was broken off and decayed, sixty-four feet, or two hundred and eighty-four feet in all, so that with the top it must have been considerably beyond three hundred feet. It is thirty feet in diameter at the base, and twelve at the first branch. We estimated it to weigh, with the first branches, four hundred and forty tons! The standing giant is still growing vigorously, without the least symptom of decay, and looks like a large church tower among the puny sassafras trees. It measures, at three feet from the ground, one hundred and two feet in circumference; at the ground one hundred and thirty feet! We had no means of ascertaining its height (which, however, must be enormous), from the density of the forest. I measured another not forty yards from it, and at three feet from the ground it was sixty feet round; and at one hundred and thirty feet, where the first branch began, we judged it to be forty feet: this was a noble column indeed, and sound as a nut. I am sure that within a mile there are at least one hundred growing trees forty feet in circumference."

The Kew specimen has already touched the ceiling of the Orangery (which is twenty-five feet

in height), and it has consequently been necessary to remove its crown so as to check its further elongation.

"The common name of Gum-tree was given to this genus, from the large quantities of strong astringent juice which the trees contain. In cutting down a Stringy-bark tree, for instance *E. robusta*, we often find large cavities, between the annual concentric circles of the trunk, filled with a most beautiful red or vermilion-coloured liquid gum, which flows out as soon as the saw has afforded it an opening. The gum yielded by *E. resinifera* is considered by druggists as not in the least inferior to the gum kino which the *Pterocarpus*, or red Saunders-wood of India, produces.

"Several of the species yield an exudation that may be called a sort of manna, in the spring and summer months, which coagulates and drops from the leaves to the ground in small irregularly-shaped snow-white particles, often as large as an almond. These are very sweet and pleasant to the taste, and are greedily devoured by the birds, ants, and other animals, and used to be carefully-picked up and eaten by the Aborigines.

"On the whole this noble genus may be said to have taken undisturbed possession of these Australian regions, clothing, as it does, with a stupendous mantle, the surface of both Van Diemen's Land and New Holland, while the intermixture of other plants which this lordly tribe occasionally permits is, compared with its own great extent, but small and partial. Wherever you go the gum-tree, of one species or other, constantly presents itself before you."*

In this conservatory is usually kept the tree (*Camphora officinarum*) from which the Japanese camphor is obtained. The tree is a native of China, Cochin-China, and Japan, but especially the Island of Formosa, where it is chiefly put to use. Large quantities of camphor are brought from this island to Canton by the Chinchew junks, and then exported to foreign markets. It is obtained by a process of dry distillation. It exists

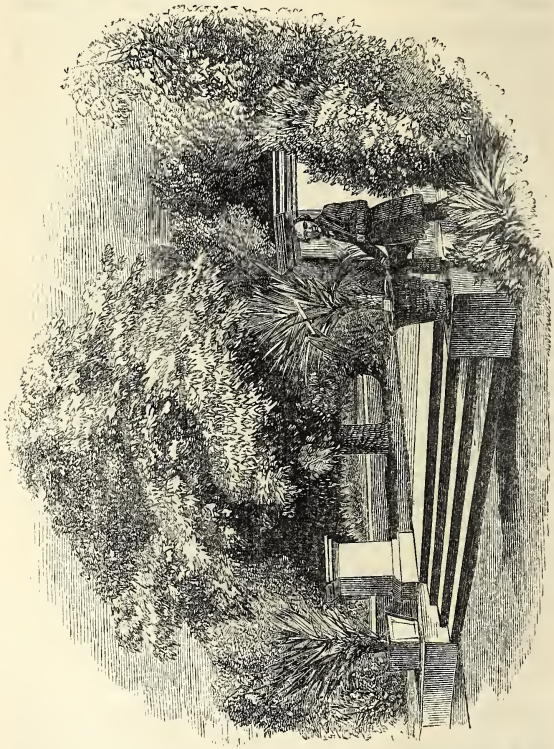
* 'Comp. to Bot. Mag.,' ii. 70.

in every part—root, stem, branches, and leaves—of the tree, which is chopped into pieces sufficiently small to be thrown into iron vessels; these vessels are afterwards covered with earthen hoods,

CAMPHOR TREE.

in which are placed rice-straw and rushes, heat being subsequently gradually supplied. The camphor is volatilized, and afterwards condenses on the straws, rushes, &c. This, after being purified from the intermixture of straws, is found

in commerce under the name of crude camphor. But it still retains many impurities; and on ar-



PROMENADE.

rival in Europe is refined, formerly exclusively at Venice, now also in England and Germany.*

* 'Penn. Cyclop.', art. Camphor.

Quitting the Orangery, we continue along the principle promenade in the gardens, leading to the Palm House, a magnificent walk of great width and length, straight as an arrow, well gravelled, and planted on each side with young specimens of the noble Deodar of alpine India, destined in future time to constitute an ample avenue. This fine tree, a native of the Himalayas, at an elevation of twelve or fourteen thousand feet, has been commonly called *Cedrus deodora;* but there is reason to think it is not specifically distinct from the Cedar of Lebanon. If this be so, it is curious to remark the devotion of the timber of the one to the construction of the temple of Jehovah by Solomon, and that of the other to similar sacred purposes by the Hindoos, who call it Devadara—that is, God-tree, and build their idol temples with it.

With respect to their identity, a very interesting point, we quote the weighty opinions of Dr. Joseph Hooker, the eminent traveller and botanist:—

"I have stated that the Deodar is possibly a variety of the Cedar of Lebanon. This is now a prevalent opinion, which is strengthened by the fact that so many more Himalaya plants are now ascertained to be European than had been supposed before they were compared with European specimens; such are the Yew, *Juniperus communis, Berberis vulgaris, Quercus Ballota, Populus alba,* and *Euphratica,* &c.

"The cones of the Deodar are identical with those of the Cedar of Lebanon: the Deodar has generally longer and more pale-bluish leaves and weeping branches, but these characters seem to be unusually developed in our gardens; for several gentlemen, well acquainted with the Deodar at Simla, when asked to point it

out in the Kew Gardens, have indicated the Cedar of Lebanon, and when shown the Deodar, declare that they never saw that plant in the Himalaya."

DEODAR.

To these observations Dr. Hooker has added the following, in a note :—

"Since writing the above, I have seen, in the magnificent Pinetum at Dropmore, noble Cedars, with the length and hue of leaf, and the pensile branches of the Deodar, and far more beautiful than that is, and as unlike the common Lebanon Cedar as possible. When it is considered from how very few wild trees (and these said to be exactly alike) the many dissimilar varieties of the *C. Libani* have been derived, the probability of this, the Cedar of Algiers, and of the Himalayas (Deodar) being all forms of one species, is greatly increased. We cannot presume to judge, from the few Cedars which still remain, what the habit and appearance of the tree may have been when it covered the slopes of Libanus; and seeing how very variable *Coniferæ* are in habit, we may assume that its surviving specimens give us no information on this head. Should all three prove one, it will materially enlarge our ideas of the distribution and variation of species. The botanist will insist that the typical form of Cedar is that which retains its character best over the greatest area, namely, the Deodar; in which case the prejudice of the ignorant, and the preconceived ideas of the naturalist, must yield to the fact, that the old familiar Cedar of Lebanon is an unusual variety of the Himalayan Deodar."*

* 'Himalayan Journals,' i. 256, 257.

CHAPTER III.

THE PALM-HOUSE.

Proceeding up the charmingly-arranged grand promenade, on each side of which lie a profusion of beds of incense-breathing flowers, decked in raiment fairer than the attire of princes, we catch sight of that noble stove, which is perhaps the most magnificent structure of the kind in the world—the Palm-stove. Truly this is a magnificent work, worthy of this great nation, and of the delightful science the interests of which it is so eminently calculated to advance. Its external aspect is very imposing, and the justness of its admirable proportions communicates an agreeable impression to the eye. It is curvilinear in form, enjoying by this arrangement almost the full benefit of the rays of light, the surface-reflection being greatly lessened thereby. It consists of a centre and two wings, its extreme length from end to end being three hundred and sixty-two feet. Each of the wings is fifty feet in width, and thirty feet high; the central portion is one hundred feet wide and sixty-six feet in height; to the summit of the lantern. Its framework is of iron, the ribs

being of vast size and strength, and imbedded into immense blocks of granite set in solid concrete. Yet, although when some of the main ribs

THE PALM-HOUSE.

are examined individually, they appear of a thickness better becoming an iron bridge or such-like structure than a conservatory, their proportionate

size to that of the whole building is so well adjusted that the stove has an appearance of great lightness and beauty, unequalled perhaps by any conservatory of similar or approximate size anywhere.

A singular effect is communicated by the green tint of the glass of this building, which, when seen in particular positions, is so deep as to give the notion that much light must be absorbed in its passage through a medium apparently so deeply coloured; but this appearance is due simply to the fact that in such positions, not one, but two, or even three thicknesses of glass are seen through, in consequence of the light having to pass from one side of the stove, across perhaps a portion of another, and again through the other side, so traversing two or three sheets of glass in its passage. This mention of the colour of the glass may be thought a trivial matter by those who have not paid much attention to actino-chemistry, and to the modern investigations of the influence of the various coloured rays upon the growth and health of vegetation. In reality it is of vast importance. From the enormous size of this palm-house it would be impossible to guard against the scorching effects of the solar rays by the ordinary plan of shading, or at least the best plans of arranging blinds would only partially effect this object. It therefore became desirable to ascertain whether it might not be possible to cut off the scorching calorific rays by the use of a tinted glass, which should neither be objectionable in appearance nor

detrimental to the plants. By a series of experiments, ingeniously made with the coloured juices of the palms themselves, Mr. R. Hunt ascertained that the rays which destroyed their colour were situated at that end of the prismatic spectrum which exhibited the utmost calorific power, and just beyond the limits of the visible red ray. After a great number of experiments, it was at length ascertained that glass tinted green appeared most likely to effect the object desired. Glass of various tints of green was experimented on, until after great pains and labour the precise tint of colour was attained, which accomplishes every intention, cuts off many of the luminous and all the non-luminous heat-rays; thus effecting the purpose of a shade without its obscurity and unsightliness, and does not in the least degree interfere with the passage of the actinic or chemical rays of light, spectral impressions obtained upon chloride of silver being the same, both in extent and character, as those procured by the action of the rays which have passed through ordinary white glass. Thus this glass, which is of a yellowish-green tint, is transparent to that principle which is necessary for the development of those parts of the plant which depend upon external chemical excitation, and it is at the same time opaque to those rays only which are injurious to vegetation. The colour is produced by means of oxide of copper; manganese, which is a common ingredient in sheet glass, and is apt to turn it pink

on long exposure to intense sunlight, is altogether absent from the composition of this glass, as such a result would render nugatory all the beneficial effects anticipated from its employment. It may be mentioned in passing, as a curious fact, that the old crown-glass, which does not differ very much in tint from that which an elaborate series of experiments has shown to be the best adapted for this purpose, has long been valued by practical men, who have noticed that their plants always flourished better under it than under the ordinary white glass. To judge from the delightfully-fresh and luxuriant aspect of the plants in this house, it would appear that the success of the experiment on the immense scale is unquestionable. It will be thought, however, we are never going to enter this wonderful stove.

A door, and the length of a couple of yards, conduct us from the temperate to the torrid zone. Without was a pleasant genial English summer day, within is the damp and oppressive heat of Hindostan. Into what noble society are we now introduced? What regal forms are these which stand bathing their green crowns in such an atmosphere of moisture, warmth, and light? These are the princes of vegetation, the royal tribe of palms. A crowd of singular sensations occupies the mind as we are thus ushered into the vegetable court. Here stands a court-beauty, whose tall and polished stem exults in up-bearing a coronet of plumes thirty or forty feet high; there another,

which casts around its long and pointed leaves over a vast area; there a third whose broad and shadowy leaves invite the wanderer to shelter and repose; and arrayed around the peers and commoners of the court, stand grisly old trees with looks so fierce and arms so horrid with spines,

EAST ENTRANCE TO THE PALM-HOUSE.

that we are by fancy led to believe them to be none other than the warriors and great fighting ones of the army of Queen Flora. Let us, however, descend to particulars.

In attempting to give an account of our ramble through this delightful stove, we would carry the reader along the same route as we ourselves pursued, informing him that our course was as follows:—Entering at the door facing the north-west, we turned to the right according to the printed directions; examined most of the plants on each side of our route along the aisle to the south-east end of the edifice, returning along the other or southern aisle to the place at which we commenced. Thence we returned to the middle of the building, perambulating the nave and each of the two wings, and, finally ascending the spiral staircase, walked round the elevated gallery, whence the beholder looks down on a fair representation of a real tropical forest, and enjoys the unwonted forms, the various tints of verdure, the luxuriant growths, the peculiar odours, the steamy breathings, from thousands of strange shrubs and trees gathered from east and west, the very *élite* of the vegetable kingdom.

Without engaging to confine our observations quite literally to the order of arrangement thus indicated, we shall in general adhere to it, as it affords facilities to our readers to follow and to verify our remarks in their own visits to this grand conservatory, the very vastness of which might otherwise bewilder and confuse.

Immediately before us, then, as we enter, stand a number of young trees belonging to various species of fig (*Ficus*), a great genus of plants

mostly tropical, containing some of the most gigantic of trees, and these most characteristic of tropical scenery. All the travellers in the South American forests speak of the grandeur of the fig-trees, their towering altitude, wide-spreading boughs, and prodigious crown of foliage casting the most welcome shadow. They are remarkable in many instances for throwing out roots from their branches, which, budding out like round warts, elongate downward till they reach the earth. Then they penetrate the soil and establish themselves as distinct stems, increase rapidly in diameter, and throw out side branches, which, by a similar process, extend the original tree over an immense area.

Mr. Hinds has pointed out the complex appearance of the main stem of many species; their immense horizontal branches, their proportionate lowness, and the vast number of smaller stems in every stage of development; some just protruding from the horizontal limbs, others hanging midway between the leafy canopy and earth; displaying, on each thick rounded extremity, an enormous spongiole; while many reach the soil, and, having attained strength and size, act as columns to sustain the whole structure.*

The most celebrated of these self-multiplying species is the banyan (*F. indica*), of which several well-grown but youthful specimens before us are already developing the remarkable habit described.

* 'Ann. Nat. Hist.' xv. 100.

They have large, downy, heart-shaped leaves with three ribs. Banyans exist in India which are thought to have an origin before the Christian era, and one is believed to be as old as the time of

THE BANYAN TREE.

Alexander the Great: a sufficient space is covered with its stems to shelter a regiment of cavalry, and immense popular assemblies have been held beneath its canopy. Roxburgh speaks of trees

more than five hundred yards in circumference, and one hundred feet in height, the principal trunk being twenty or thirty feet to the branches, and eight or nine feet in diameter.

Here, too, is the Pepul (*F. religiosa*), the sacred tree of the Brahmins, who feign that their fabulous god Vishnu was born beneath its shade. Its leaves are large, heart-shaped, running out into long points, and tremulous like those of some poplars, which they resemble in shape also. The branches do not put forth roots, but the crown is dense and expansive, so that it is a favourite tree around the homesteads of India, on account of its grateful shade.

Another interesting species is the India-rubber tree (*F. elastica*), with oval, thick, glossy leaves, and long crimson taper buds. All the caoutchouc of continental India is obtained from this species, though in the great islands other species produce it.

"The tree is chiefly found in the chasms of rocks and over the declivities of mountains, among decomposed rocks and vegetable matter. It produces, when wounded, a great abundance of milk, which yields about one-third of its weight of caoutchouc. It grows with great rapidity: a tree is described as being twenty-five feet high, with the trunk a foot in diameter, when only four years old. The juice of this valuable plant is used by the natives of Silhet to smear over the inside of baskets constructed of split ratan, which are thus rendered water-tight. Old trees yield a richer juice than young ones. The milk is extracted by incisions made across the bark, down to the wood, at a distance of about a foot from each other, all round the trunk or branch, up to the top of the tree; and the higher the more abundant is the fluid said to be. After one operation the tree requires a fortnight's rest; when it may be again repeated. When the juice is exposed to the air, it separates spontaneously into a firm elastic substance,

and a fetid whey-coloured liquid. Fifty ounces of pure milky juice, taken from the trees in August, yielded exactly fifteen and a half ounces of clean washed caoutchouc. This substance is of the finest quality, and may be obtained in large quantities. It is perfectly soluble in the essential oil of Cajeput."*

The Sycamore (*F. sycomorus*), so frequently mentioned in Scripture, is here also. It is a native of Egypt and of the Holy Land, where it is planted extensively for the sake of shade, and also for its fruit, which, though inferior to that of the luscious fig which is imported for our desserts, is yet much eaten by the inhabitants. The wood is said to be imperishable; and the coffins in which the mummies of Egypt are preserved are described as being made of it, though this is denied by some.

The cultivated Fig is of course too common to be permitted a place in such a conservatory as this, but we mention it because it affords the most familiar illustration of a peculiarity which belongs to the whole genus. Every one is aware that this delicious fruit consists of a thick fleshy skin, on the interior surface of which are crowded a multitude of seeds, each surrounded by a number of soft enveloping membranes like bits of tender skin. Now these are the flowers of the plant, and the fleshy walls constitute a great receptacle analogous to that on which the juicy globules of a mulberry are placed. The only difference is, that the receptacle in the fig is spread out and curved up all round, until the sides unite, and form a hollow globe with the tiny blossoms seated on its

* Roxburgh; 'Hist. India,' iii. 545.

internal surface. This and the sycamore are the only species of this great tribe which afford food to man; though the berries of many furnish grateful repasts to the monkeys, and various birds of the countries which they inhabit.

A dozen species or more have sent representatives from distant regions to this parliament of Flora; but we shall only allude to one more, the New Holland Fig (*F. Australis*), whose grandeur and other peculiarities resembling those of the Jamaica species, are thus described by Mr. Frazer as he saw it at Moreton Bay:—

"I observed several fig-trees upwards of one hundred and fifty feet high, enclosing immense iron-bark trees, on which originally the seeds of these fig-trees had been deposited by birds. Here they had immediately vegetated, and thrown out their parasitical and rapacious roots, which, adhering close to the bark of the iron-tree, had followed the course of its stem downwards to the earth, where, once arrived, their progress of growth is truly astonishing. The roots of the *Ficus* then increase rapidly in number, envelop the iron-bark, and send out at the same time such gigantic branches that it is not unusual to see the original tree, at a height of seventy or eighty feet, peeping through the fig, as if itself were the parasite on the real intruder. In the singular angles, or walls, as they are here termed, which are formed by the roots of these trees, and of which I observed many sixteen feet high, there is room enough to dine half-a-dozen persons. The fruit is eagerly sought by regent-birds, blue pigeons, and swamp pheasants; and the spreading and massy boughs support a number of superb parasitical plants."*

Among the Figs stand a specimen of the Paraguay Holly (*Ilex Paraguensis*), the leaves of which are very extensively used in South America as tea. It is a small tree, with smooth bark and notched leaves. Upwards of five million pounds of the

* 'Bot. Misc.' i. 241.

leaves of this tree are annually collected in Paraguay, and are sent to Chili and the viceroyalty of Buenos Ayres. It is not cultivated; but various articles of merchandize are carried into the interior, which remunerate the natives for their labour in collecting the leaves of the plant. After the branches are cut away, the ground is heated by means of a fire, and the branches being laid upon the heated ground are dried, and afterwards they are beaten and pressed into bags, in which state the "tea" comes into the market. The plant when used is steeped in boiling water, to which a little sugar and sometimes lemon-juice is added. It is drunk out of a vessel called *maté*, which has a spout perforated with holes for the purpose of preventing the powdered herb from passing out with the fluid. The Creoles are passionately fond of this infusion, and never partake of a meal without it. The properties of this plant are sedative and stimulant; and theine, the essential chemical principle of tea, has been detected in it.

Next comes *Bumelia nigra*, a forest-tree of South America, and one of those whose bark is of medicinal value as a remedy in the fevers which infest tropical regions.

The spices and other aromatic plants have always been considered eminently characteristic of the hotter parts of the earth, and here we see valuable examples of these. Two species of Pepper (*Piper nigrum* and *P. excelsum*) strike the eye at once, conspicuous by their jointed stems,

parallel-ribbed leaves, and catkin-like spikes of flowers. The former of these produces both the black pepper and the white pepper of the shops. It grows in Malabar and the adjacent isles. The plant is trained upon other trees four years before it bears merchantable fruit. The berries are gathered while green, before they are perfectly ripe, and quickly dried on mats, by which they turn black. When plucked too young, they speedily fall into a state of powder: they are separated from the others by sieves and winnowing. In this condition it is termed black pepper. White pepper is the same fruit freed from the outer rind; for this purpose the ripe berries are allowed to macerate in water, and the husks are removed. These are small, smooth, of a greyish-white colour, varying to yellow, with a less powerful odour and taste than the black.

We pass from these biting shrubs to contemplate some of the delicious fruits of intertropical India. Who has not heard of the golden-fruited Mango? Well, here you may see it; not, indeed, towering to the majestic stature which it attains in its native vales, enveloping the earth in deepest shadow, from its peculiarly dark and dense foliage: you cannot form much idea of its grandeur from these conservatory specimens; but its details, the form, colour, and polish of its leaves, the mode of its ramification, its branched spike of inconspicuous greenish blossoms, and its glowing kidney-shaped, flattened fruit, are all well expressed here, for the

trees have now borne fruit for several years. First-rate kinds of Mango are among the most exquisite of tropical fruits, though poor sorts are, it must be confessed, sorry affairs: the humorous assertion, that a mixture of sugar, tow, and turpentine, would make a mango, is but too true, as those who have resided in India well know. The tree is named *Mangifera Indica.*

The eye of a stranger might pass by all these that we have named, if not stimulated by curiosity to inquire and examine carefully, for their general forms do not differ importantly from those of familiar European trees; but not even the most unobservant could look on a group which we now come to, without at once exclaiming, "These are strangers!" They are the flag-like Plantains and Bananas (*Musa*); among the most elegant denizens of the torrid zone, and, in conjunction with the Palms, perhaps more than any other plants characteristic of tropical scenery. They are stately plants, with succulent spongy stems, sheathed by the bases of the leaves, which are wide-spreading, of exquisite delicacy, though of great size, sometimes a single leaf being ten or twelve feet long, and of the most verdant hue. The fruit is produced in immense bunches, arching out from amidst the leaves, each cluster sometimes weighing sixty or eighty pounds. A single fruit somewhat resembles a cucumber in form; it is of a soft, sweet, farinaceous substance, particularly agreeable to those who are used to it. These fruits form an immense

part of the sustenance of the inhabitants of hot countries all round the globe, and the Musa is often the whole support of an Indian family. Some of the varieties of the banana surpass in flavour and melting softness the finest pears; but

THE PLANTAIN.

others are coarser: the plantain is not eaten as a dessert fruit (at least in the West Indies); but, when cooked as a farinaceous vegetable, in many modes, it is even more valuable than the luscious banana.

Several species of this beautiful family are cultivated in the great conservatory we are exploring. Some of these are of no value for their fruit, but are pre-eminent for their noble beauty. Thus the *Heliconia*, or Wild Plantain of America, has its massive bunches of blossom enveloped in great boat-like bracts of the most gorgeous scarlet colour. And the various species of *Strelitzia* (as *S. augusta*, *S. regina*, *&c.*) are said to be "among the most brilliantly-coloured flowers in nature." These are South African *Musaceæ*, with rigid leaves, and singularly-irregular flowers of great size, coloured yellow, blue, red, and white; and considered worthy of perpetuating the royal names which have been given to them, in honour of the queen of George III., a princess of the house of Mecklenburg Strelitz. Once more, the Arbre des Voyageurs (*Urania speciosa*), of Madagascar, has sent us a representative hither, that we may judge how well its magnificent stature and palm-like habit, superimposed on the characteristics of a plantain, become those awful forests in which it reigns.

The appearance of this last, as well as the useful peculiarity which has given it the appellation of the Traveller's Tree, is thus described by Backhouse:*—

"Clumps of these trees, composed of several stems rising from the same root, are scattered over the country in all directions. The trunks, or more properly root-stocks, which are about three feet in circumference, sometimes attain to thirty feet in height; but whether of this elevation, or scarcely emerging above ground,

* 'Visit to the Mauritius.'

they support grand crests of leaves of about four feet long and one foot wide, but often torn into comb-like shreds. The head is of a fan-like form, and the flowers, which are not striking for their beauty, are white, and produced from large horizontal green sheaths. The foot-stalks of the leaves, which are somewhat shorter than the leaves themselves, yield a copious supply of water very grateful to the traveller, on having their margin cut away very near to the base, or forced from contact with those immediately above them, especially those about the middle of the series. Probably the water may originate in the condensation of dew, and be collected and retained by the peculiar structure of the leaf; it has a slight taste of the tree, but is not disagreeable."

Several species of *Psidium*, the deliciously-fragrant fruits of equatorial America, called Guavas, are cultivated here. They belong to the great Myrtle family; and, like many others of this race, the fruits are great favourites, not only in their native regions, but in the hot countries of the Old World to which they have been transported. They resemble an apple in form, size, and colour, and a strawberry in flavour. In Europe they are little known, except by the conserve called guava-jelly, which is made from them.

As if in contrast with these useful plants, which are not only pleasant to the sight, and smell, and taste, but also good for food, we now observe grouped, in close proximity, some of a deadly poisonous character. The first is *Tabernaria coronaria*, beautiful indeed, and treacherously attractive, being commonly cultivated in the gardens of India for the elegance and fragrance of its blossoms, but highly poisonous. The seeds are surrounded with a pulp of a rich crimson hue, which is capable of yielding a beautiful dye.

There is a tradition among the natives of Ceylon, that a species of this tree was the fruit which tempted Eve, the scene of Paradise being claimed for their island. In proof of their assertion they point to the beauty and fragrance of the flower, to the inviting aspect of the fruit, and to a mark on it, which is considered to be that of the teeth of our first mother. Until the sin was committed, they say the fruit was as wholesome as delicious; but that it then became poisonous, as it has ever since remained.

Then we find *Amyris toxifera*, the representative of an order abundant in fragrant resins, balsams, and incenses. The species before us in its poisonous properties is an exception to the general character of the tribe. We shall presently discover some whose venomous qualities are far more deadly, and have acquired a world-wide infamy.

Close to these is placed *Dillenia speciosa*, a noble tree in India, valuable for its excellent timber, and remarkable for the grandeur of its splendid flowers. Its fruit is acid, and useful in medicine; and before maturity is eaten in curries in Bengal.

Then follows *Picrasma excelsa*, a West Indian forest-tree, which yields the intense bitter of our shops, called quassia—the chips and shavings of its wood. It has been used instead of hops in the brewing of beer.

We pause a moment before *Gardenia nitida*, enchanted with the beauty and fragrance of its magnificent flowers, and comparing them with

those of its near neighbour *Hibiscus rosa sinensis*, sometimes called the South Sea Rose. Both these plants are favourites in tropical gardens; the large size of the expanded corolla in the latter, its stately central pillar, and its deep crimson colour, must always entitle it to admiration.

Proceeding, we notice the Soap-berry tree, whose valuable properties are appreciated by the sable laundresses of both the Indies. This is the common species of the Antilles (*Sapindus saponaria*), a small tree bearing a profusion of scarlet glossy berries resembling cherries, within which are black shining nuts, which used formerly to be imported in great numbers, and used as waistcoat buttons, having been first tipped with gold or silver. The fleshy pulp of the berries is viscid, and in drying assumes a gummy semitransparent appearance; when rubbed with water they quickly form a lather like soap. This depends on the presence of a chemical principle called *saponine*, which is often united in these plants with an acrid principle, whence the berries are said to be injurious to clothes that are much washed with them. However, they are universally used in washing, and in India are sold for this purpose in every bazaar. A handful of these berries are said to cleanse more linen than sixty times their weight of European soap.

Near the Soap-tree is another denizen of the West Indies, a tree of renown in its own regions, one of the giants of the old forests, though here

appearing as a slender sapling with its foot in a tub. It is the Locust-tree (*Hymenæa courbaril*), one of that vast family that bear papilionaceous or pea-like blossoms, and seeds enclosed in long pods. The pods are here filled with a sweet mealy substance, enveloping the seeds. This is frequently eaten, though apt to be purgative when freshly gathered. A decoction of this substance is fermented, and used as a sort of beer.

Many trees allied to this species are found in Guiana and Brazil, and are generally remarkable for the excellence of their timber, being close-grained, tough, and very hard. Valuable resins are produced by some; the well-known gum-animi is said to be an exudation from the Locust-tree before us. They are often of prodigious size. The Locust-trees of the West Indies have long been celebrated for their gigantic stature, and other species are the Colossi of the South American forests. Martius represents a scene in Brazil where some trees of this kind occurred of such enormous dimensions, that fifteen Indians with outstretched arms could only just embrace one of them. At the bottom they were eighty-four feet in circumference, and sixty feet where the boles became cylindrical. "They looked more like living rocks than trees, for it was only on the pinnacle of their bare and naked bark that foliage could be discovered, and that at such a distance from the eye that the forms of the leaves could not be made out."

By counting the concentric rings of such parts as were accessible, Martius arrived at the conclusion that they were of the age of Homer, and three hundred and thirty-two years old in the days of Pythagoras: one estimate, indeed, reduced their antiquity to two thousand and fifty-two years, while another carried it up to four thousand one hundred and four; from which he argues that the trees cannot but date far beyond the time of our Saviour.*

Other trees of the same great order we may see here, as two or three species of *Brownea*, a West Indian genus named after Dr. Patrick Browne, the learned author of a natural history of Jamaica in the middle of the last century. The most interesting circumstance in their economy is the sensitiveness of the leaves, a provision for protecting the fine heads of blossoms.

"Every evening," says an observer, "they rose up and lifted themselves from the blossoms to expose them to the dew, so that each morning these beautiful objects were uncovered; but as day advanced, the leaves gradually drooped, and bent down over the flowers to guard them from the rays of the sun.

"Who can imagine the gorgeousness of an equinoctial forest at midnight, with the veils thus lifted off myriads of flowers of every form and hue, which are hidden from our gaze, in this or other ways, during the hours of a tropical sun-lit day, whose brilliancy would be death to their tender texture and delicate colours!" †

We do not know whether either of the species which we see here is that celebrated by Humboldt as "the Rose of the Mountains," in the region lying

* Von Martius's 'Travels in Brazil.'
† Lindley's 'Bot. Reg.' 1841.

between the valleys of Caraccas and Aragua. He describes it with his usual felicity:—

"The vegetation was extremely rich and diversified, consisting of tree-ferns, the trunks of which reached the height of twenty-five feet, *Heliconias*, *Browneas*, gigantic figs, palms, and other plants. The *Brownea*, which the inhabitants call *Rosa del monte* or *Palo de cruz*, bears four or five hundred purple flowers together in one thyrsus: each flower has invariably eleven stamina; and this majestic plant, the trunk of which reaches the height of fifty or sixty feet, is becoming rare, because its wood yields a highly-valued charcoal."*

* Personal Narrative.

CHAPTER IV.

THE PALM-STOVE—(*continued*).

Our walk has brought us along one aisle as far as the nave, or nearly to the middle of this hyaline palace of Queen Flora. But here the arches of the span spring to a loftier elevation, and the roof of glass above our heads is thrown across at a height of sixty-six feet from the ground. For here are assembled the Palms, by common consent of botanists the royal family of plants, *Vegetabilium principes*;* and truly, as we thus see them crowded side by side, with their crowned heads, and lofty stature, and proud erect bearing, we are involuntarily reminded of the monarchs of many kingdoms met in august conclave.

"Lo! higher still the stately palm-trees rise,
Chequering the clouds with their unbending stems,
And o'er the clouds, amid the dark-blue skies,
Lifting their rich unfading diadems.
How calm and placidly they rest,
Upon the heaven's indulgent breast,
As if their branches never breeze had known!
Light bathes them aye in glancing showers,
And Silence, 'mid their lofty bowers,
Sits on her moveless throne."

Wilson's 'Isle of Palms.'

It is an immense family, this of the Palms. Von

* Linnæus.

Martius supposes, and he knew them, probably, better than any one, that a thousand species, or more, are scattered over the face of nature; though not quite half this number are yet described. And Humboldt agrees with him, asserting that there must be still an incredible number to be discovered in the equinoctial regions. He discovered in tropical America a new species in almost every fifty miles explored, so narrow are the limits within which their range is confined. The building in which we are wandering includes nearly a hundred distinct species; and though this may seem to bear but a small ratio to the total estimate just mentioned, yet, when we consider the noble size to which most of these plants attain, it will certainly be deemed a subject of warm congratulation.

These are the principal ornaments of the house to which they give name, and which was indeed built mainly with a view to their cultivation, though not confined to them. The best point from which to view them is the gallery at the summit of the nave; hence we may gaze down on their verdant tufts of radiating fronds, and admire the vigour with which the loftiest of them push up their firm but slender trunks, like iron columns, and shadow us with their crowns of foliage—even at our elevated position. Some specimens of lower stature are, it is true, scattered about other parts of the house; but as the great aggregation of them is in the centre, we shall say all we have to communicate about them together.

Palms grow in all the intertropical parts of the earth: on the coral sands of the smallest ocean-islets they spring up, as well as in the deep impenetrable forests of continents. Nor is it difficult to transmit them to Europe—at least, as to the physical capabilities of endurance in the plants. A very good plan is to take up a young plant, and enclose it in a joint of bamboo, closing up the mouth of the improvised tube. But most of the palms that are now cultivated in our hothouses arrive in an earlier stage. The ripe seeds are collected in large quantities—a process the more easy, because of the prolific profusion in which many species produce their fruit, by thousands and even by myriads. A negro climbs the stem with a hatchet, cuts across the stout fruit-stalk, and down the whole produce tumbles to be gathered at leisure.

The seeds are now packed in a box or barrel, with about an equal quantity of damp earth, the whole being thoroughly mixed together. In this state they well endure a long voyage, and are found, on being unpacked, sprouting and ready for transference to the stove.

The greatest difficulty, however, in transmitting specimens from distant and savage countries, especially if they be far from the sea, arises from the want of those facilities for intercourse which are so common at home, that we use them daily without a thought. To send large packages, such as those which contain growing plants, over a

thousand miles of country, without roads, or bridges, or vehicles, through tangled and trackless forests, over precipitous mountains, along rivers full of rocks, rapids, cataracts, and thousands of hidden dangers; among concealed and vindictive savages, and half-barbarous whites, more suspicious and jealous still—this seems a hopeless task; yet it is one which the indomitable perseverance, skill, and science of Englishmen are constantly encountering, and as constantly overcoming;—as these botanical treasures testify, which we are so calmly contemplating, note-book in hand. For whence came these stately trees, these slender climbers, these gorgeous flowers? The labels tell us—From the karroos of South Africa, from the deadly banks of the Gambia, from the snow-clad peaks of the Himalaya, from the jungles of Malacca, from the pestilential thickets of Java, from the cloudy summits of the Cordillera, from the gloomy forests of the Amazon.

The sluggish inertia of the people often presents a great hindrance to the scientific collector. It is difficult to find any inducement sufficiently tempting to overcome the laziness of the common people in many tropical regions. The traveller sees many objects within reach which he highly values, and for the obtaining of which he would be willing to pay liberally; but he finds his money useless. The case recorded by Humboldt is but too familiar to those who have endeavoured to prosecute scientific researches in the same regions:—

"In the month of January," he observes, "the stems of the Palma real (our *Oreodoxa resia*) were covered with snow-white blossoms in the immediate vicinity of the city; but although we offered, for several days running, a couple of pistoles to every negro-boy we met in the streets of Regla and Guanavacoa, for a single spadix of the hermaphrodite blossoms, it was in vain; for in the tropics no free man will ever undertake any labour attended by fatigue, unless he is compelled to do so by imperative necessity."

The palms are the chief representatives of what are called *Endogenous* plants. An oak or an elm, if cut across the stem, shows many concentric rings, which are well known to be annual lines of growth, a fresh ring of wood being added every year, on the outside of that which was already formed, and beneath the bark, which thus always remains on the exterior of the tree. This type of growth is called *Exogenous*; and from its nature there is no necessary limit to the increase of the diameter of the trunk. But a palm does not increase from without; the stem, when it first issues from the earth, has its full diameter, which never increases, though its length does. The new wood is added within the cylinder, which thus progressively increases in density and hardness towards the centre.

The successive descent of new bundles of woody fibre into the interior, exerts a constantly-increasing pressure upon the outer part, which, however, from the same cause, gradually becomes nearly as hard as iron, and is able to resist the expansile force. It is obvious, however, that there is a limit beyond which this pushing down of fibre cannot go, and

hence the duration of a palm is not indefinite. There are species, in which the exterior of the stem is capable of expansion; and sometimes, notwithstanding its hardness, the cylinder is riven by the enormous pressure, as is seen in the case of a *Sabal umbraculifera* in this house, the great Fan-palm of Jamaica, and the stoutest species here, though of comparatively stunted stature.

But it is time now that we should examine a few more of these elegant plants;—a few only, for the whole number of those cultivated in this noble conservatory would reach, as we have said before, to nearly a hundred species.

The first that attracts attention is *Euterpe edulis*, the Cabbage-palm of the West Indies, one of surpassing elegance, and here attaining nearly the stature and luxuriance of its native forests. It has a smooth slender stem, as round as if turned with a lathe, of a delicate green hue, marked with rings of pale brown, that show where the successive leaf-bases have fallen from the trunk. The extremity, for about six feet in length, is a swollen, polished green column; at the summit of which, the leaves arch out on every side, fringed with pinnate drooping leaflets, like feathers.

Within this terminal column lie, closely rolled together, the young, undeveloped leaves; which form what is called the cabbage.

In some species, the bursting of the sheath, which envelops these young leaves, is attended

with a report like that of artillery. Thus, Moore speaks of—

"——— Zeylan's giant palm,
Whose buds fly open with a sound
That shakes the pigmy forests round."
Lalla Rookh

EUTERPE EDULIS.

"The cabbage is white, about two or three feet long, as thick as a man's arm, and perfectly cylindrical. This substance is com-

posed of longitudinal flakes, like ribands, but so compact as to form a crisp, solid body. When eaten raw, it resembles the almond in flavour; but is more tender and delicious. It is usually cut into pieces, boiled, and served as an auxiliary vegetable with meat.

"To obtain this small portion, borne on the pinnacle of the tree, and hidden from the eye of man, the axe is applied to the stately trunk, and this majestic lord of the mountain-top is laid low, to furnish a small quantity of vegetable matter, which is 'eaten like cauliflower,' and which receives its distinctive name from our lowly cabbage."*

It is right, however, to state that this extravagance is rarely practised, except in the vast wilderness by travellers; who never expect to see again the tree which they thus lay under contribution.

Just below the base of the leaf-column, spring out in the flowering season two or three immense bunches of white blossoms, which yield to a multitude of small, purple fruits, resembling sloes. Mr. Wallace describes in rather tempting terms the use of this production:—

"A very favourite drink is made from the ripe fruit, and daily vended in the streets of Pará. Indian and negro girls may be constantly seen walking about with small earthen pots on their heads, uttering at intervals a shrill cry of 'Assai—i.' If you call one of these dusky maidens, she will set down her pot, and you will see it filled with a thick creamy liquid of a fine plum-colour. A pennyworth of this will fill a tumbler, and you may then add a little sugar to your taste, and will find a peculiar nut-flavoured liquid, which you may not, perhaps, think a great deal of at first; but, if you repeat your experience a few times, you will inevitably become so fond of it as to consider 'Assai' one of the greatest luxuries the place produces. It is generally taken with *farinha*, the substitute for bread, prepared from the mandiocca root, and with or without sugar, according to the taste of the consumer.

* 'Vegetable Substances,' i. 195.

"During our walks in the suburbs of Pará, we had frequent opportunities of seeing the preparation of this favourite beverage. Two or three large bunches of fruit are brought in from the forest. The women of the house seize upon them, shake and strip them into a large earthen vessel, and pour on them warm water, not too hot to bear the hand in. The water soon becomes tinged with purple, and in about an hour the outer pulp has become soft enough to rub off. The water is now, most of it, poured away, a little cold added, and a damsel, with no sleeves to turn up, plunges both hands into the vessel, and rubs and kneads with great perseverance, adding fresh water as it is required, till the whole of the purple covering has been rubbed off, and the greenish stones left bare. The liquid is now poured through a wicker sieve into another vessel, and is then ready for use. The smiling hostess will then fill a calabash, and give you another with *farinha* to mix to your taste; and nothing will delight her more than your emptying your rustic basin and asking her to refill it." *

The Areca Palms of the East are scarcely distinguishable in aspect from the Euterpe. One of the species, of which several are here, is the *A. catechu*, which produces the betel-nut, so universally chewed, for its stimulating and intoxicating properties, by the inhabitants of India. It is described graphically, if not quite scientifically, by Percival :—

"The leaf usually distinguished by the name of the *betel-leaf*, does not, however, grow upon this tree; but from being constantly chewed with the betel-nut, has acquired this appellation. [It is the leaf of a species of pepper.] The tree, though remarkably tall and straight, is equally remarkable for its extreme slenderness, being no thicker than the calf of a man's leg. The nut grows in bunches at the top of the cocoa, but are in size no bigger than a nutmeg, and with the same sort of shell. After they are pulled, the Cingles expose them in the sun to dry, and then split the outside husk in order to separate it from the nut. The leaves of the betel-tree are from four to six feet in length, and very much resemble those of the cocoa [nut], although of a

* 'Palms of the Amazon,' p. 23.

more delicate texture. From the tree, at the root of the leaves, a substance grows up, and overspreads them like a thick coat. This extraordinary substance resembles a tough leaf, or rather a skin: it is used by the natives to hold their victuals, and is of so strong a texture, that it retains water or arrack like a bladder; a purpose for which it is generally employed.

ARECA PALM.

"The nuts, from their general use, form a great article of trade among the natives. The timber of the tree is used for rafters to houses, and makes excellent lath. It is also employed in poles to fence their grounds."

Blume tells us that the Asiatic natives would rather forego meat and drink than their favourite Areca-nuts; whole ship-loads of which are annually exported from Sumatra, Malacca, Siam, and Cochin-China. They contain a large quantity of tannin, which has caused them to be employed in some parts of India for dyeing cotton cloths.

The leaf-stalks, spathes, and timber are employed for many domestic purposes; and in

Malabar an inebriating lozenge is prepared from the sap.* In the opinion of Rumphius, the practice of chewing the nuts, although offensive to Europeans, is really very conducive to health in the damp and pestilent regions of India, where the natives live upon a spare and miserable diet.

The most beautiful species of the palm kind which Ceylon produces is, according to Percival, the Talipot-tree, *Corypha umbraculifera*.

"This tree is very rare in other parts of India, and seems a peculiar blessing bestowed by Providence on the island. It grows very tall and straight: the wood is hard, and veined with yellow, and is employed in carpenter's work. The talipot bears a large yellow flower, which, when ripe, bursts with a loud noise, and diffuses a disagreeable and unwholesome smell. It is on this account that the natives will not place their huts near it. The fruit is of a round form, and about the size of a cannon-ball—it contains two nuts of the same shape. But it is from its leaves that the talipot derives its high estimation. These hang downwards from the top, and present a most elegant and grand appearance. The leaf is completely circular, terminating in the most beautiful rays: it folds up into plates like a fan, which, in figure, it nearly resembles. In size and thickness it completely surpasses almost all other leaves. The breadth of the diameter is from three to four feet,† and the length and thickness are in proportion: it is large enough to cover ten men from the inclemency of the weather. It is made into umbrellas of all sizes, and serves equally to protect the natives against the intolerable rays of the sun, and the rains, which at particular seasons, deluge their country. As it is of such an impenetrable texture as to defy either the sun or the monsoon, it affords a shelter even more secure than their huts. During the violent rains, it is not unusual to see the natives prop up one end of a talipot-leaf with a stick two or three feet long, and then creep under it for protection."‡

The principal value of this tree is, that the

* 'Rumphia,' ii. 67.

† Mr. Bennett brought home a talipot-leaf, 36 feet in circumference.

‡ Percival's 'Ceylon,' p. 326.

membrane of the leaves is the material on which the Ceylonese write with steel styles, and books are made of many square laminæ of these leaves bound together. Some of the books made from these

TALIPOT PALM.

leaves in Sir A. Johnstone's collection are thought to be more than five hundred years old; and there

are two invaluable specimens of these primitive books in the library of the Royal Asiatic Society.

The tallest palm in the house, and in some respects the most singular, is the Wine Palm of India (*Caryota urens*) :—

> "The palm, the loftiest Dryad of the woods,
> Within whose bosom infant Bacchus broods."
> BYRON'S 'Island,' canto ii.

The fruit is said to be so acrid as to produce inflammation in the mouth of those who chew it; but the tree is particularly valuable, as being one of those palms which yield toddy or wine to the natives of India, as well as sago. According to Roxburgh, it yields an immense quantity of wine during the hot season. The best trees will yield at the rate of one hundred pints in the twenty-four hours. The pith, or farinaceous part of the trunk of old trees, is said to be equal to the best sago: the natives make it into bread, and boil it into thick gruel; these form a great part of the diet of the people, whose country it inhabits; and during famines they suffer little while these trees last. Roxburgh found it highly nutritious. He ate the gruel, and thought it fully as palatable as that made of the sago we get from the Malay countries (*Sagus lævis*).

The finest specimen of the Wine Palm here is of magnificent dimensions. It rears its towering stem in the midst of the nave, the glassy span of whose roof it touches with its topmost leaves. It has a most peculiar aspect from the form of its

leaflets. The leaves are doubly pinnate, the pinnæ radiating in various directions; the pinnules are triangular in shape, one side being much longer than the other, and running off to a point, while the margin is minutely jagged or notched all along.

A fine example of the Fan-leafed palms is presented by *Thrinax excelsa*, the Great Thatch Palm of Jamaica. It bears leaves of enormous size, almost perfectly circular, with only a narrow slit in the radius through which the leaf-stalk extends from the centre; the circumference cut into pointed rays half-way to the middle, exactly in the fashion that the sun is conventionally represented on the sign-board of a country inn. The broad, leathery, durable leaves of this and of many other palms, are extensively used in their native countries for the thatching of houses, for which they are admirably adapted. They are also torn into narrow strips, and woven into baskets, hats, &c.

Among the singular uses which are subserved by the palms, not the least interesting is that of the vegetable ivory, now so much used by English manufacturers for small articles. It can scarcely be distinguished from animal ivory. This is the albuminous kernel of a South American palm, the Tagua of the Indians (*Phytelephas macrocarpa*), which was long a desideratum in European stoves. The Spanish botanists, Ruiz and Pavon, had thus described it:—

"The Indians cover their cottages with the leaves of this most beautiful palm. The fruit at first contains a clear insipid fluid by which travellers allay their thirst; afterwards this same liquor becomes milky and sweet, and changes its taste by degrees as it acquires solidity, till at last it is almost as hard as ivory. The liquor contained in the young fruits becomes acid, if they are cut from the tree and kept some time. From the kernels the Indians fashion the knobs of walking-sticks, the reels of spindles, and little toys, which are whiter than ivory; and as hard, if they are not put under water; and if they are, they become white and hard again when dried. Bears devour the young fruit with avidity."

Sir William Hooker has added the following interesting particulars from the researches of Mr. Purdie, the enterprising botanical traveller of the gardens, by whom specimens were successfully imported into England:—

"At what period these seeds, or *nuts*, were first brought to England to be used by turners, &c., we have no means of ascertaining, nor to what extent they are now imported. M'Culloch, in his 'Dictionary of Commerce,' and Dr. Ure, in his 'Dictionary of Arts, Manufactures,' &c.; are alike silent. But from the use that is made of them, the amount is probably considerable; and in the turners' and toy shops of London, may be purchased, for a shilling each, the nuts or, more properly speaking, the seeds, either entire, or with one-half of the coat removed by turning, so as to exhibit the beautiful ivory-like texture of the interior. The entire seeds, thus purchased, had been planted in our garden; but they had never been made to germinate. From Mr. Purdie we learn that the palm inhabits dense shady woods, on hills facing the Magdalena, in the province of Ocana, at an elevation of one thousand to three thousand feet above the level of the sea; never growing in hot plains or level country. At the season when the flowering takes place, the country is said to be scented with its fragrance; and when the fruit is advanced, all wild animals, especially hogs and turkeys, are extremely fond of it.

"'Enclosing the seeds,' observes Mr. Purdie, 'is a yellow sweet oily pulp, which is collected at the proper season (October), and sold under the name of *Pepe del Tagua*, for one real a pound, at Ocana. A spoonful of it, with a little sugar and water, makes

the celebrated *Chique de Tagua*, said to be the most delicious beverage of the country.' "*

Close to the Ivory Palm stands the Wax Palm (*Ceroxylon andicola*), which attains a lofty stature in the Andes of Bogota, towering to the height of one hundred and sixty or one hundred and eighty feet. It has pinnate leaves, the under-surface of which is covered with a close white papery down, that may be easily removed by the finger-nail. When full grown, the stem is covered with a resinous wax, which exudes from the spaces between the insertions of the leaves. This substance is used by the inhabitants for making candles, and for other domestic uses.

The Mackaw of the West Indies (*Acrocomia sclerocarpa*) is a handsome palm, from the arrangement of the leaves, which arch in all directions, so as to form a great globose head of plumose foliage, which is very ornamental. It bears excessively hard, round seeds, as large as walnuts, enclosed in a thin coat of orange-coloured pulp, which is eaten.

Here are seen specimens of the Date Palm of North Africa and Western Asia (*Phœnix dactylifera*), the "palm tree" of Scripture, the fruit of which forms a large portion of human subsistence in Mahometan countries. It is a beautiful tree: the stem shoots up to the height of fifty feet, with a diameter of a foot or more, and the foliage forms a magnificent crown. The graceful curvature of this palm affords many illustrations to the Oriental poets:—

* 'Journ. of Bot.' i. 250.

"Those groups of lovely date-trees bending
Languidly their leaf-crown'd heads,
Like youthful maids, when sleep descending
Warns them to their silken beds."

Lalla Rookh.

The luscious sweetness of the fruit is well known, familiar as dried dates are to us; but it is far more delicious when fresh. Like many other palms, the date-tree is applicable to a multitude of purposes. The fruit is eaten in many forms; it is distilled into an ardent spirit; the juice which exudes from the tree forms a wine called *lakhlsy*, which again is distilled into *arrack*: the *cabbage* of undeveloped leaves is eaten; and even the bunches of stalks, from which the fruit has been gathered, are given as fodder to cattle. The fibres of the stem are twisted into cordage, and the pith produces a farinaceous meal, resembling sago. But this last-named product is obtained in greater abundance from another smaller species of the same genus (*P. farinifera*), a native of the Coromandel coast, and of which a specimen may be seen in this house.

Several other kinds of date palm are also cultivated here, but we will mention only the *P. sylvestris*, which yields sugar in such quantities that Dr. Roxburgh computes one hundred thousand hundredweights to be furnished annually in Bengal, from this source alone.

But a still more important sugar-bearing palm is to be seen here. It is the sugar-tree of the Moluccas (*Saguerus saccharifer*), which is highly

valued for its versatile uses. According to Blume,* the syrup is obtained continually from the spadixes in large quantities, by wounding and pounding them while on the trees; it yields by fermentation an intoxicating beverage, and, when boiled, a kind of sugar, consumed for various purposes. When the trees are exhausted by the incessant draining of their fluids, sago of good quality is obtained from the trunk,—as much as one hundred and fifty to two hundred pounds' weight from a single tree. The timber is extremely hard, and fit for building purposes; and the leaf-stalks yield annually from four to seven pounds of the strong black fibres, resembling horsehair, called *gomutie*, which are extensively used in the manufacture of cables and various kinds of rope, as well as for making brushes and brooms. This last use well introduces us to the proper Broom Palm (*Attalea funifera*), better known by its native name of Piaçaba, of which a thriving specimen is here seen.

"Few," observes Sir William Hooker, "have walked the streets of London without remarking that of late years those streets are, in places at least, kept peculiarly neat and clean, by the stiff fibres of a new material for making brushes and brooms; those of the machines as well as those employed by hand; and if any one is asked what may be the origin of this fibre, the frequent reply is, 'Whalebone, I suppose.' But no; it is not of animal, but vegetable origin; the coarse fibre of a species of palm, which grows abundantly in Brazil, and is imported to Europe extensively from Pará, tied up in bundles of several feet in length, and sold at the price of 14*l*. the ton, under the native name of *Piaçaba*. This

* 'Rumphia,' ii. 126.

curious material, according to its stoutness and tenacity, is employed for cordage and mats as well as for brooms and brushes. The dilated base of the leafstalks separates into a long coarse fringe, which is collected by the natives and used in the country, or exported to Europe for the purposes above-mentioned, and now constitutes a considerable article of commerce.

"The fruit, or nuts, are another article of commerce, long brought into England under the name of *Coquilla nuts*, and extensively used for various kinds of turnery-work, especially in making the handles of bell-pulls, umbrellas, &c. &c.; for the shell or *putamen* is of great thickness, excessively hard, beautifully mottled with dark and light brown, and capable of taking a high degree of polish."*

Here, among many other forms of this extensive order, we may compare the *Jubœa spectabilis*, whose stem grows to a thickness of five feet,—with *Calamus rudentum*, which, though no thicker than a walking-stick, grows to the length of five hundred feet. This latter is an example of the ratans or canes, so well known for their flexibility, and for their flinty polished surface, and not unknown to little boys on account of their usefulness in education. Though true palms, the canes resemble grasses or reeds in appearance: in the Indian forests they trail along the ground, climb to the summits of trees, descend to the earth, climb and descend again, to an immense length, one species even reaching to one thousand two hundred feet.† We may contrast also the elegant little palms of the genus *Bactris* with their gigantic neighbours. Some of these, according to Mr. Wallace, do not attain a greater height than six feet, their stems having the slenderness of a goose-quill,‡ though

* 'Journ. of Bot.' i. 122. † 'Rumphia,' v. 100.
‡ 'Palms of the Amazon,' pp. 87, 89.

these minature species have the arching crown of foliage that distinguished their fellows.

Turning from these tiny fairies, let us glance at this aspiring youth, which bids fair soon to become a giant, the *Pupúnha*, or Peach palm of the Amazon (*Gulielma speciosa*). Its slender stem, bristling all over with needle-like spines set in close rings, has a formidable appearance, but this is compensated by its lovely spherical crown of leafy plumes. The fruit of this tree resembles an apricot in size and colour, but is of a mealy consistence, and is eaten boiled or roasted, or made into cakes, or fermented into a creamy subacid liquid. It is cultivated by the Indians, who subsist largely on its produce.

The extreme hardness of the wood is illustrated by Mr. Wallace in the following anecdote:—

"The wood of this tree when old and black is exceedingly hard, turning the edge of any ordinary axe. When descending the River Uaupes in April 1852, I had a number of parrots, whose objections to any restraint upon their liberty caused me much trouble. Their first cage was of wicker, and in a couple of hours they had all set themselves at liberty. Then tough green wood was tried, but the same time only was required to gnaw that through. Thick bars of deal were bitten through in a single night; so I then tried the hard wood of the Pashiúba (*Iriartea*). This checked them for a short time, but in less than a week by continual gnawing they had chipped these away, and again escaped. I now began to despair; no iron for bars was to be procured, and my resources were exhausted; when one of my Indians recommended me to try Pupúnha, assuring me that if their beaks were of iron they could not bite that. A tree was accordingly cut down and bars made from it, and I had the satisfaction of seeing that their most persevering efforts now made little impression."*

* 'Palms of the Amazon,' p. 94.

Here, too, is a young specimen of the Patawa (*Œnocarpus batawa*) of Brazil; the whole stem enveloped in the bases of the decayed leaves, from the edges of which stand up long black stiff spines. As the tree advances in age, these drop off, leaving a slender smooth column or stem, and giving a totally different character to the palm from that which these bristling *chevaux de frise* impart to it. These long spines, according to Mr. Wallace,—

"are much sought after by the Indians, who use them to make arrows for their 'gravatánas,' or blow-pipes. They are about fifteen or eighteen inches long, sharply pointed at the end, which is covered with *curari* poison for three or four inches down, and notched so as to break off in the wound. Near the bottom a little of the soft down of the silk-cotton tree is twisted round into a smooth spindle-shaped mass, and carefully secured with a fibre of a *bromelia*. The cotton just fits easily into the tube, offering a light resisting body for the breath to act upon."*

The blow-pipes here spoken of are in themselves exceedingly curious weapons, and we shall gladly avail ourselves of Mr. Wallace's beautiful book to extract his description of them, especially as they, too, are made of the wood of two other species of palms of the genus *Iriartea*, of which a closely-allied species (*I. exorhiza*) is in the house. It will be easily recognised by a remarkable peculiarity, that

"the roots are almost entirely above ground. They spring out from the stem, each one at a higher point than the last, and extend diagonally downwards till they approach the ground, when they often divide into many rootlets, each of which secures itself in the soil. As fresh ones spring out from the stem, those below become rotten and die off; and it is not an uncommon thing to

* 'Palms of the Amazon,' p. 31.

see a lofty tree supported entirely by three or four roots, so that a person may walk erect beneath them, or stand with a tree seventy feet high growing immediately over his head.

"In the forests where these trees grow, numbers of young plants of every age may be seen, all miniature copies of their parents, except that they seldom possess more than three legs, which gives them a strange and almost ludicrous appearance."*

It is with the stem of a smaller species than this, the Pashiùba miri (*Iriartea setigera*), that the Indian of the Rio Negro—

"constructs his blowing-tube, which, with the arrows just described, forms a most valuable weapon, enabling him to bring down monkeys, parrots, and curassow birds, from their favorite stations on the summits of the loftiest trees of the forest.

"When he wishes to make a *gravatána*, he searches in the forest till he finds two straight and tall stems of the Pashiùba miri of such proportionate thicknesses that one could be contained within the other. When he returns home, he takes a long slender rod, which he has prepared on purpose, generally made of the hard and elastic wood of the Pashiùba barriguda, and with it pushes out the pith from both the stems, and then with a little bunch of the roots of a tree-fern, cleans and polishes the inside till the bore becomes as hard and as smooth as polished ebony. He then carefully inserts the slender tube within the large, placing it so that any curve in the one may counteract that in the other. Should it still be not quite correct, he binds it carefully to a post in his house till it is perfectly straight and dry. He then fits a mouth-piece of wood to the smaller end of the tube, so that the arrow may go out freely at the other; and when he wishes to finish his work neatly, winds spirally round it, from end to end, the shining bark of a creeper. Near the lower extremity he forms a sight with the large curved cutting tooth of the paca (*Cœlogenys paca*), which he fixes on with pitch, and the *gravatána* is then fit for use.

"These tubes are never less than eight, and are often ten or twelve feet long; and on looking through a good one, not the slightest irregularity can be detected from one end to the other. The bore is generally not large enough to admit the tip of the little finger, so that the breath more readily fills the whole tube and propels the arrow with great velocity. The vertical direction is

* 'Palms of the Amazon,' p. 35.

that in which the surest aim can be taken, and for which the *gravatána* is best adapted. When birds are feeding at the top of a lofty tree, where the result of a gun-shot would be doubtful, a skilful Indian will take his station beneath it, and with a puff from his powerful lungs, will send up his little poisoned arrows with unerring aim. The wounded birds sometimes turn giddy and drop in a few seconds; or fly away to a neighbouring tree, and in a minute fall heavily to the ground; or try to pluck out the arrows with their beaks, which, however, invariably break in the wound. The hunter carefully marks the direction in which each one falls, and when his quiver is emptied of arrows, or the tree of birds, walks round and gathers up the game. His weapon makes no noise, and he therefore often does more execution than the best European sportsman armed with his double-barrelled Manton.*

On the eastern side of the nave stands a young tree, which we hardly recognise at first sight as a Palm, owing to the peculiar character of its leaves. It is named *Mauritia flexuosa*, and comes from the Amazon, where it grows to the majestic height of a hundred feet. The stem is slender and smooth, and the leaves, which are few in number, are set at the extremities of very long thick footstalks, which radiate from the crown, like the spokes of a cart-wheel. The leaflets are narrow ribands, fifty or more in number, which radiate in a circle from the petiole, drooping at their tips.

Among several uses to which this species is applied, Mr. Wallace mentions the manufacture of twine and cordage, from the epidermis of the leaves.

"The unopened leaves form a thick pointed column rising from the very centre of the crown of foliage. This is cut down, and by a little shaking, the tender leaflets fall apart. Each one is then

* 'Palms of the Amazon,' p.39.

skilfully stripped of its outer covering, a thin riband-like pellicle of a pale-yellow colour which shrivels up almost into a thread. These are then tied in bundles and dried, and are afterwards twisted by rolling on the breast or thigh into string, or with the fingers into thicker cords. The article most commonly made from it is the 'rede,' or netted hammock, which is the almost universal bed of the native tribes of the Amazon. These are formed by doubling the string over two rods or poles about six or seven feet apart, till there are forty or fifty parallel threads, which are then secured at intervals of about a foot by cross strings twisted and tied on to every longitudinal one. A strong cord is then passed through the loop formed by all the strings brought together at each end, by which the hammock is hung up a few feet from the ground; and in this open net the naked Indian sleeps beside his fire as comfortable as we do in our beds of down."*

One peculiarity in the Palms that strikes a stranger with surprise, is that they present widely-different appearances at different ages. We are so accustomed in our climate to see the size of a tree-head, its height, and the thickness of the trunk always bearing (at least approximately) the same relative proportions, that when we see, as we may in this noble collection, the divergent crown of fronds set here on the summit of a stem sixty feet high, and there one of the same extent a yard from the ground, and close by another set of fronds equally expansive, springing from a central spot of earth, and radiating *without any visible stem at all*, we cannot help feeling some curiosity. This, however, is the natural consequence of that peculiar *exogenous* mode of growth already alluded to: the stem of a palm having acquired its full diameter before it begins to rise from the earth, its subsequent increase is merely in height, by the progres-

* 'Palms of the Amazon,' p. 48.

sive development of one great terminal bud. The thick projecting leaf-bases that in many cases adhere to the young trunk of a palm are another source of surprise; they frequently form a great unsightly mass, increasing the diameter of the stem threefold or fourfold; and owing to the tissue of interlacing fibres that separates from the edges of these petioles, the trees look as if they were wrapped in many folds of loose coarse sackcloth. Now as the tree grows older all this investiture generally drops off, leaving a clean smooth slender stem, which it requires some discernment and experience to recognise.

Before we dismiss this interesting group of plants, we will walk round the gallery and take a bird's-eye view of them from the vantage-ground of that elevation. Let us mount the northern steps,—this spiral staircase of iron, which by its lightness and elegance is worthy of a place among these charming forms of vegetation. As we wind round and round, up and up, higher and higher, two or three noble plants close to the stairs start from the mass of inferior foliage below, and accompany our course to the top. The slender cable-like trunk of the Dragon's-blood is one; the magnificent *Strelitzia* is another; and behind them, there is a cluster of polished green stems, jointed like reeds, no thicker than one's arm, but towering up like a sheaf of arrows for straightness: it is the Bamboo (*Bambusa arundinacea*).

Now we are at the summit of the stairs. The

bunch of aloe-like leaves that forms the Dragon's crown just reaches to our level; but the bifarious zigzag leaf-sheaths of the Strelitzia are still rising, and the beautiful broad leaves spread their vast expanse over our head. Higher still, however, towers the leafy head of the Bamboo, forming a great pyramidal bush of its grass-like leaves, some of which stretch even into the lantern. This great arborescent grass is one of the noblest features of tropical scenery, of which Humboldt considers it as preeminently characteristic. The same philosophic traveller speaks of the powerful effect which the magnificence of the bamboo produced upon his imagination; and those who, like him, have seen it in its sunny homes, know that it is an object which can never be forgotten;—

"especially when growing in those isolated clumps, that look like tufts of ostrich-plumes magnified to colossal dimensions. A thousand of these noble reeds standing in close array, each four or five inches in diameter, and rising in erect dignity to the height of forty feet, and all waving their tufted summits in diverging curves, moved by every breeze, form indeed a magnificent spectacle. Growing in the most rocky situations, the bamboo is frequently planted in Jamaica on the very apex of those conical hills which form so remarkable a feature in the landscape of the interior, and to which its noble tufts form a most becoming crown. But it is scattered over all kinds of situations, from these elevated summits to the green plains that border the sea. On the steep sides of mountains it is applied to a singular use, the preservation of the roads, which are cut in zigzag lines upon the rocky face of the mountains. The gradual disintegration of the exterior edge of such a road by the influence of the weather, and the wear caused by travelling, would soon destroy its level, and necessitate the cutting of it afresh. To prevent this, it is found sufficient to lay down lengths of green Bamboo just below the edge of the road, along the mountain-side, and to cover them with earth. These germinate at every joint, roots strike out into the

earth, binding it firmly, and a rampart of young shoots spring up, which, increasing every year in number and size, effectually prevent the crumbling away of the edge, and by throwing their feathery arches over the road, form beautiful green avenues, under whose grateful shadow the traveller may journey for miles, and scarcely feel the toil of the steep ascent. These avenues are called bamboo walks, and their appearance is so peculiar, that they can be recognised at a great distance; almost as far as the surface of the mountain-side can itself be seen."*

INDIA-RUBBER FIG.

But let us walk round the gallery. We turn to

* Gosse's 'Sojourn in Jamaica,' p. 199.

the right, and looking over the rail, see just below us the top of a fine *Ficus elastica*, or India-rubber tree, with its oval compact leathery foliage, and light-brown bark, and at this season of the year

FLOWERS AND FRUIT OF THE FICUS ELASTICA.

(January), when we have just seen it, conspicuous for its young glossy leaves of tender green, and its long pointed buds.

A little farther on, the Great Wine Palm (*Caryota urens*) waves its odd triangular leaflets in our face, and intercepts our view. But we pass beyond it, and reaching the middle of this gallery, look down on an open area, a great bed of vegetation, in which we recognise almost nothing but a wilderness of palm-crowns, and one great *Musa*. The immense leaves of this latter possess a beauty which is rarely seen in their native wilds, for being here quite protected from the wind, the tender leaves are not torn and split into ribands, as they almost invariably are when exposed to the weather, but maintain their beautiful integrity.

Near the south corner a tall column springs up in single majesty from the bed of fronds, smooth, round, slender, grey with alternate bands of green. A crown of great leaves with multifarious pinnæ arches over our heads, springing from sheaths which are swathed in mats of self-made linen. This is the noble *Cocos plumosa* of Brazil, the loftiest and one of the most elegant palms in the collection, an ally of the well-known and wide-spread cocoa-nut, of which we shall find a specimen in another house.

Here too, just reaching to our feet, is a well-grown plant of the Trumpet-tree (*Cecropia peltata*), very common in the tropical parts of America. From the summit of its slender-jointed stem grow a few round palmate leaves, nearly a yard in diameter, much like those of a horse-chestnut, but with the divisions not reaching to the base; the

footstalks, which are thick and long, issue in a singularly-abrupt manner horizontally from the stem, even to the very terminal bud. The stem is hollow between the joints, and composed of very light porous wood; the bark when wounded bleeds a milky sap, which is said to make good caoutchouc.

Close to the descending staircase there are the great circular leaves, fifteen inches in diameter, of the *Hibiscus macrophyllus;* and beyond this, occupying the whole eastern quarter of the area, is a magnificent palm of singular structure, which (with the exception of another great *Caryota urens*, on this side) is the last specimen of the order that will occur to us in this house. The one we allude to is the Comb-spined palm (*Plectocomia elongata*) of Malacca and the neighbouring regions. It is of noble stature, for it also extends its topmost leaves into the lantern; the stem is slender, quite enveloped in the leaf-sheaths, which, however, are not woody and bulging as usual, but green and apparently herbaceous, and closely wrapping the stem. Every one of these leaf-sheaths, which are rather long, is studded with diagonal combs of diverging spines, most horrid to behold: these combs are scattered irregularly on the surface, and the direction of those on one leaf-sheath is at right angles to that of the next series. The leaves are of immense length, of the usual pinnate form, with lance-shaped leaflets, beyond which the mid-rib of each leaf is greatly prolonged into a slender wire

of ten feet or more, beset on each side with stout groups of reversed and barb-like spines. Sir William Hooker informs us that—

"by means of these hooks, while running up among the stems, and catching hold of the branches of other trees, the foliage and stem are propped. A yet more wonderful provision of nature is observed in the young and yet unfolded leaves of this plant, during the period when they insert themselves upwards among the branches of the forests; for then the spines are upright, and lie flat against the stalk of the leaf; not becoming reflexed till they are needed as a means of support." *

We thought we should not have occasion to speak of any more palms for the present; but there is a weak trailing one in the body of the house, which has a structure so much resembling this, that we must devote a few lines to it, especially as Mr. Wallace has made it the subject of one of his interesting observations. It is a species of *Desmoncus*, a genus exclusively American, with the flexible lengthened stems and climbing habits of the Cane-palms of India. The leaves do not form a terminal crown, but are set alternately along the slender stem throughout its length, and they are terminated by a prolongation of the mid-rib, which is set with barbed spines in the manner of the *Plectocomia* just described.

In some parts of Brazil, Mr. Wallace describes the small forest-streams as almost filled up with various climbing grasses and creepers, among which the Jacitára (*Desmoncus macroacanthus*) holds a prominent place; and it is up these streams that the Indians often delight to fix their abode.

* 'Kew Gardens,' p. 20.

"In such cases they never cut down a branch, but pass and repass daily in their little canoes, which wind like snakes among the tangled mass of thorny vegetation. They are thus almost safe against the incursions of the white traders, who often attack them in the most distant retreats, carry fire and sword into their peaceful houses, and take captive their wives and children. But few white men can penetrate for miles along a little winding stream, such as is here described; where not a broken twig or cut branch is found to show that a human being has ever passed before. Thus does the 'jacitára' help to secure the independence of the wild Indian in the depths of the forests which he loves." *

If from the grander forms of vegetation that meet our gaze in the area, we turn to the gallery itself, round which we are walking, we shall be delighted with the multitude of graceful climbing plants that trail all along the whole extent of the rails, entwine around the staircases, wind up the supporting pillars, and hang down here and there in pendent strings or luxuriant festoons and chaplets almost to the floor below. These are mostly plants distinguished for the beauty of their blossoms; as different species of *Bignonia* and *Amphilophium*, the glory of tropical forests; the elegant Jasmines and *Echites*,—the latter beautiful tubular flowers, but fatally poisonous; the *Combretums* and *Stephanotis;* the *Bauhinias*, whose curious twin-lobed leaves gave occasion to Linnæus to pay a deserved compliment to two distinguished botanists, the brothers Bauhin, after whom he felicitously named the genus. Here are several kinds of Passion-flower, with their strange but richly-coloured blossoms, the weeds of tropical America, where many of them are valued on account of their juicy

* 'Palms of the Amazon,' p. 74.

fruits, the grenadillas and water-lemons, with a scent and flavour unlike anything else. And, finally, here you may see the immense, grotesque, stained flowers of the Birthwort (*Aristolochia*), as fantastic in their forms as the Orchids, and of such size that some of them are worn by the South American children as bonnets, in their play, being fifteen or sixteen inches in diameter. The odour of some of these huge blossoms is intolerably offensive, while others are fragrant. Most of them have powerful medicinal qualities.

Those who have enjoyed opportunities of seeing the glories of tropical scenery, as has been the lot of the writer of these pages, have the gorgeous sights vividly recalled as they lean over this gallery, especially if they are so fortunate as to be present in the absence of other visitors, when a stillness and solitude prevail somewhat like those of the virgin forest. And those who have never been out of Europe may form a conception of those lands of the sun from what they see here. A faint conception, indeed; for many accompaniments are wanting that play an important part in the tropical picture; and especially the massive grandeur, the gorgeous gloom, and the inextricable confusion and profuse luxuriance that make it into a great whole. "Who," asks Mr. Darwin, "from seeing choice plants in a hothouse, can magnify some into the dimensions of forest trees, and crowd others into an entangled jungle?" The same writer has felt the poverty of language to depict the noble scenes

to which these forms belong, though his own charming descriptions might prevail to do it, if any could.

INTERIOR OF PALM-HOUSE.

"When quietly walking along the shady pathways, and admiring each successive view, I wished to find language to express my ideas. Epithet after epithet was found too weak to convey to those who have not visited the intertropical regions, the sensation of delight which the mind experiences. I have said that the plants in a hothouse fail to communicate a just idea of the vegetation, yet I must recur to it. The land is one great wild, untidy, luxuriant hothouse, made by Nature for herself, but taken possession of by man, who has studded it with gay houses and formal gardens. How great would be the desire in every admirer of nature to behold, if it were possible, the scenery of another planet! yet to every person in Europe it may be truly said, that at the distance of only a few degrees from his native soil, the glories of another world are open to him. In my last walk I stopped again and again to gaze on these beauties, and endeavour to fix in my

mind for ever an impression, which, at that time, I knew sooner or later must fail. The form of the orange-tree, the cocoa-nut, the palm, the mango, the tree-fern, the banana, will remain clear and separate; but the thousand beauties which unite these into one perfect scene must fade away. Yet they will leave, like a tale heard in childhood, a picture full of indistinct but most beautiful figures." *

Still deeper emotions we may well imagine to be produced by such a house as this on a cultivated and poetic stranger from a tropical clime, who, visiting it as a curiosity, would at once find himself among the objects familiar to him from infancy: the trees, and herbs, and flowers that grew about his home. One of our poets has chosen such a theme as the foundation of a beautiful legend—

THE PALM-TREE.

It waved not through an eastern sky,
Beside a fount of Araby;
It was not fann'd by southern breeze
In some green isle of Indian seas;
Nor did its graceful shadows sleep
O'er stream of Afric, lone and deep.

But fair the exiled Palm-tree grew,
'Midst foliage of no kindred hue;
Through the laburnum's dropping gold
Rose the light shaft of Orient mould;
And Europe's violets, faintly sweet,
Purpled the moss-beds at its feet.

Strange look'd it there! the willow stream'd
Where silv'ry waters near it gleam'd;
The lime-bough lured the honey-bee
To murmur by the Desert's tree;
And showers of snowy roses made
A lustre in its fan-like shade.

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* 'Journal,' p. 496.

There came an eve of festal hours;
Rich music fill'd that garden's bowers;
Lamps that from flow'ring branches hung
On sparks of dew soft colours flung;
And bright forms glanced—a fairy show—
Under the blossoms to and fro.

But one, a lone one, 'midst the throng,
Seem'd reckless all of dance or song;
He was a youth of dusky mien,
Whereon the Indian sun had been,
Of crested brow and long black hair,
A stranger, like the palm-tree, there.

And slowly, sadly, moved his plumes,
Glittering athwart the leafy glooms.
He pass'd the pale-green olives by,
Nor won the chestnut flowers his eye;
But when to that sole Palm he came,
Then shot a rapture through his frame.

To him, to him its rustling spoke;
The silence of his soul it broke:
It whisper'd of his own bright isle,
That lit the ocean with a smile.
Aye to his ear that native tone
Had something of the sea-wave's moan.

His mother's cabin-home that lay
Where feathery cocoas fringe the bay—
The dashing of his brethren's oar,
The conch-note heard along the shore—
All through his wak'ning bosom swept;
He clasp'd his country's tree, and wept.

Oh! scorn him not. The strength whereby
The patriot girds himself to die,
The unconquerable power which fills
The foeman battling on the hills;—
These have one fountain, deep and clear,
The same whence gushed that child-like tear.

MRS. HEMANS.

CHAPTER V.

THE PALM-HOUSE—(*continued*).

HAVING dismissed the noble and elegant tribe of Palms, we are at liberty to direct our attention to many trees and plants of interest, which stand scattered among these stately forms, and to resume our walk southward. Many, it is true, we must pass by; for, though they are duly labelled, the names which we read convey no idea except to the systematic botanist; the *Lacepedeas*, the *Platystigmas*, the *Alyxias*, the *Noronheas*, the *Coleas*, &c., are invested with no popular interest as yet,—probably because we are ignorant of their peculiarities—save that some of them, at least, we find at the suitable season adorned with beautiful flowers, and some, as we are told, belong to curious orders in scientific alliance.

Let us then be content to leave some unmentioned, and pass to those whose utility, beauty, or other qualities have conferred on them a recognised interest. Here is the tree which yields us chocolate and cocoa for breakfast; not the cocoa-*nut*, which as we have seen is a palm, nor the coco,

which the negroes in our colonies eat in the place of potatoes—which is the root-stock of a great *Arum*, but an evergreen tree of moderate size, with large oval leaves, called by Linnæus *Theobroma cacao*. This generic name, which signifies "the food of gods," shows his appreciation of the excellences of chocolate.

The cocoa-tree is a native of the tropical parts of America, and of the Philippines; but it is now cultivated in Asia and Africa. It produces large oval capsules, of the size of a goose's egg, each of which includes about twenty-five seeds or *nuts*, enveloped in a sweet pulp. The cotyledons of these seeds contain a large quantity of oily albumen, of agreeable flavour, combined with a principle similar to *caffeine* (the essential element of tea and of coffee); and hence they are well adapted to furnish a valuable article of diet. The best and simplest form in which they are used is that known as cocoa-nibs, which are merely the seeds broken by crushing; owing, however, to the peculiar nature of the endosperm, or inner coat, they require long-continued boiling to dissolve their contents.

Chocolate is made in the following manner:—The seeds are gently roasted over a fire in an iron cylinder, with holes in the ends to allow the vapour to escape. When the aroma begins to be well developed, the process is considered complete. The seeds are then turned out, cooled, and freed, by fanning and sifting, from their husks. The

husks, which often amount to 20 or 25 per cent. of the seeds employed, should not be thrown away, as they contain half their weight of soluble matter of a mucilaginous nature, which furnishes a tolerable nutriment. The seeds are then to be converted into a paste, either by trituration in a mortar heated to 130° Fahr. or (now almost universally) by a machine impelled by steam.* The paste is then put into moulds and sent into the market. It always improves by keeping.

In Trinidad, whence cocoa is chiefly imported into Europe, the plantations are particularly beautiful. The trees require shade, and hence they are planted in rows, between rows of other trees, which by their foliage afford the requisite shadow. The tree which is selected for this purpose is a species of coral-tree (*Erythrina umbrosa*), which has elegant leaves of dark glossy green, and long hanging racemes of butterfly-shaped flowers of the most vivid scarlet: so that the eye is delighted with the most charming contrast of complementary colours in these groves. The cultivation is inexpensive and profitable, and so easy that it is one of the few agricultural occupations in which Europeans can engage with comfort in the tropics.

From this useful plant we turn to the elegant Rose-apples of farthest India (*Jambusa vulgaris* and *J. ternifolia*). The flowers of these trees are beautiful from the multitude of their stamens, resembling bunches of coloured tassels; and they give

* See Ure's 'Dictionary of Arts,' &c., p. 293.

place to hollow fruits of firm but succulent flesh, which has a delicate sugary sweetness, and the most exquisite rose-like fragrance. Hence they are held in high esteem, not only in their native countries, but in the West Indies, whither they have been transported.

Moore speaks of the Rose-apple, in allusion to the Hindoo mythology, as—

> "———— The divine Armita tree
> That blesses heaven's inhabitants
> With fruits of immortality."—*Lalla Rookh.*

And here we see the Coffee-tree (*Coffea Arabica*), studded with those lovely white starry blossoms, which fill the groves where it is cultivated, both in the east and the west, with a perfume almost overpowering. In the Antilles the coffee plantations flourish best on the sides of the mountains, the trees frequently springing out of the crevices of the rocks. The specimen before us illustrates this habit, a large mass of the naked tufa lime-stone of Bermuda having been sent home by Governor Reid, with a young coffee-tree springing from it, the root firmly entwined about the projections of the rock. The plant is beautiful at all times. It is evergreen, with glossy foliage, elegant jasmine-like flowers disposed in clusters, and oval pulpy berries, which are at first scarlet, but become purple. The cotyledons, or halves of the seed enveloped in the pulp, when dried in the sun, are what we are sufficiently familiar with as green coffee.

The substance of the seed consists of albumen in a very hard condensed state, and the peculiar principle above alluded to called caffeine, which contains more nitrogen than any other known vegetable substance. It is the presence of this element which makes coffee, tea, cocoa, and chocolate, refreshing as beverages.

The coffee trade, important as it now is, has been wholly created since the beginning of the eighteenth century. Nearly all the coffee which is consumed in Europe is the produce of trees which have all been propagated from a single plant, whose history furnishes a most instructive comment on the advantage of scientific establishments such as this which we are exploring. Van Hoorn, the governor of Batavia, procured a few coffee-seeds from Arabia, about the end of the seventeenth century, from which he succeeded in raising a single plant. This he forwarded to the Botanical Gardens at Amsterdam, where it was increased by cuttings. In the year 1718, the progeny of this tree was sent to the Dutch colony of Surinam, and thence the coffee-plant has been dispersed over the whole of tropical America. The importance of this enterprise will appear by the following estimate of the coffee-trade as it stood in 1836,* by which we may compare the amount exported from the Old World with that from the New—

* 'Penny Cyclopædia,' art. Coffee.

Old World.	lbs.	New World.	lbs.
Java - -	32,000,000	Brazil - -	72,000,000
Sumatra -	3,000,000	Cuba - -	64,000,000
Ceylon - -	2,000,000	Hayti - -	40,000,000
Bourbon -	2,000,000	British W. Indies	25,000,000
Manilla - -	2,000,000	French W. Indies	4,000,000
Mocha - -	1,000,000	Porto Rico -	4,000,000
		Dutch Guiana	10,000,000
		South American States -	8,000,000
Total -	42,000,000	Total -	227,000,000

Just now, as we mounted the spiral staircase, the first object which occupied our attention was a slender leafless column reaching to the gallery, crowned with a bristling bunch of sword-shaped leaves. We will now examine it more attentively. We might have supposed it one of the palms from its general habit; but the form and arrangement of its foliage shows an alliance with the lily and aloe family. It is the dragon's-blood (*Dracæna draco*), so called from the crimson resin sold under that name by druggists—an exudation from the leaves and from cracks in the stem.

There is a Dragon-tree of great antiquity existing in one of the Canary Islands, which has acquired considerable celebrity. It grows near the town of Orotava, in the island of Teneriffe, and was found by Humboldt in 1799 to be about forty-five feet in circumference. Sir G. Staunton had previously stated it to be twelve feet in diameter at the height of ten feet; and Ledru gave even larger dimensions. It annually bears flowers and fruit; and though continuing thus to grow, does not appear much

increased in size, in consequence of some of its branches being constantly blown down, as in the storm of July 1819, when it lost a great part of its top. The great size of this enormous vegetable is mentioned in many of the older authors; indeed, as early as the time of Bethencourt, or in 1402, it is described as large, and as hollow as it is now; whence, from the slowness of growth of *dracænas*, has been inferred the great antiquity of a tree which for centuries has so little changed. Humboldt indeed remarks that there can be no doubt of the *Dracæna* of Orotava being, with the baobab (*Adansonia digitata*), one of the oldest inhabitants of our planet; and as tradition relates that it was revered by the Guanches, he considers it singular that it should have been cultivated from the most distant ages in the Canaries, in Madeira and Porto Santo, although it comes originally from India.

What is this slender shrub, growing in a small pot, with thin straggling stems and broad palmate leaves? It is one of no small importance to the inhabitants of South America, as a large portion of their subsistence is derived from it. It is the Cassava or Mandioc (*Manihot utilissima*), a plant which, though highly poisonous, is yet capable of yielding a bread which is both palatable and wholesome.

The plant produces thick tubers somewhat like parsnips, but of larger size; these are washed and peeled, and then grated down to a pulp, either by

hand-graters, or, as in Brazil, where the manufacture is carried on very extensively, by means of a wheel with a rasping surface, the pulp being received in a trough beneath.

"The next process is that of expressing the poisonous juice, which is effected by placing the pulp in bags, and subjecting it to the action of a press. The only further operation required to fit it for consumption is that of baking, which is then performed on a hot iron hearth. The pulp being placed on this, forms itself into a very thin cake, similar in form to a pancake, and fifteen inches or more in diameter. During the period occupied in this baking, the cake is kept constantly in motion, to prevent its being partially burnt; and as soon as it is crisp is removed from the fire: when sufficiently cool, it is then quite fit for use. If kept in a dry situation, these cakes (called Cassava bread) will remain good for a very long period.

"To whatever cause the poisonous quality of the juice of bitter cassava may be owing, it is so highly volatile as to be entirely dissipated by exposure to heat. Even a comparatively low temperature suffices for correcting its deleterious nature; for when the root has been cut into small pieces, and exposed during some hours to the direct rays of the sun, cattle may be fed on it with perfect safety."*

Tapioca, so often made into puddings with us, is a sort of starch prepared from the farina of the cassava root; it is imported in large quantities from Brazil.

Yonder young tree, to which a peculiar lightness and elegance is afforded by its mimosa-like foliage, composed of numerous pairs of small leaflets, is the Tamarind (*Tamarindus Indica*). The intense acid of agreeable flavour which characterizes its fruit is well known for making cooling drinks. Southey celebrates it:—

* 'Vegetable Substances used for Food,' i. 177.

"The damsel from the Tamarind tree
Had pluck'd its acid fruit,
And steep'd it in water long;
And whoso drank of the cooling draught,
He would not wish for wine."—*Thalaba*.

The acid pulp is the substance of the pods, which contain the stony astringent seeds. They are preserved in the East Indies in their own juice alone, and are then best suited for medicinal use. From the West Indies, they come to us boiled in sugar.

In its native regions the tamarind grows to a noble tree, valuable both for its shadow and its hard, firm, and durable timber. That of America is considered as the same species as that of the eastern hemisphere, notwithstanding some differences in the form of its pods.

As we gaze on this plant our sense of smell is regaled with a powerful fragrance resembling the odour of cloves, or that of our own carnation. It proceeds from a great lily (*Pancratium Caribbæum*), with broad spreading leaves, and a thick stem crowned with a cluster of large white blossoms. This species grows in immense beds on the low sandy shores of Jamaica, almost in the very wash of the sea, and is very ornamental. Its fragrance, which is very inconstant, is worthy of notice, as being the same,—viz., the clove-odour,—which characterizes a large number of tropical flowers, of widely diverse genera and even orders.

Nature, in the intertropical regions of the globe, has been far more liberal, than in our colder

climes, of gifts suited to man's convenience, with little or no labour on his part. Whether it is an advantage, indeed, is another question; it may reasonably be doubted, whether the necessity for personal labour and skill, and the claims on contrivance and mutual assistance, which a barren soil and ungenial climate involve, are not much more than a counterbalance for the pleasure of plucking our household goods ready made from the trees. Still, it is certain, we do not find our clothing, our weapons, our furniture, our cords, our honey, our wine, our butter, our wax, our tallow, growing in our woods ready for use, as we have seen the inhabitants of the tropics do. Here is another example of this liberality. The Indians of the Antilles and of South America, were found on their discovery in possession of bottles, cups, and bowls, neatly made, light, strong and serviceable, which they called calabashes. Here is the tree from which they plucked them, *Crescentia cujete*. It is still abundantly common in the West Indies,—

"Around the homesteads and negro villages, and cherished for the sake of the large gourd-like fruit, the woody shell of which, divested of its pulp, makes admirable domestic vessels. The tree has a strange appearance, easily recognised when once it has been seen, from the peculiarity of the foliage, which does not form massses, but fringes the long branches; and as these are slender and straight, shooting out in all directions, and continually crossing each other, the effect is much more curious than beautiful. The large oval gourds hang from the branches in all stages of maturity, together with the blossoms, which are large, and shaped liked the Canterbury-bell of our gardens, but of a greenish

hue, with dull purple lines. They are sessile, that is, without footstalks, and to add to their singular appearance, they sit as it were on the naked bark of the branches, and frequently on the bare trunk itself, without any leaves or bracts surrounding them."*

Far more valuable than the Cabalash tree, with its ready-made bottles, is its near neighbour, from the same regions, the Mahogany tree (*Swietenia mahogani*). We would be bold to assert that among the visitors of all ranks that throng this floral palace, a hundred would look with interest on the tree whose beautiful timber furnishes our dwellings, for one who would care about plants that keep rag and bottle shops for negroes. Many a worthy artizan that brings his family to Kew Gardens on a Whit-Monday, pauses before this tree with pride, and points it out to his wife and children, as the source of his and their honest living. Let us then look at it awhile.

In the vast forests of Honduras, the mahogany acquires a great size in low marshy lands, where the cutting of the trees, the hewing of the immense logs, and the drawing of them, by means of long teams of oxen, to the rivers, furnish employment for many hundred men, and demand peculiar strength, skill, and powers of endurance. The business of the pioneer who searches the forests for the suitable trees, in particular, is one of the most romantic adventure. It is necessary that he should be equally fearless and intelligent, swift of

* Gosse's 'Sojourn in Jamaica,' p. 46.

foot, and of strength sufficient to cut his way through the thickly-tangled underwood. The

THE MAHOGANY TREE.

beginning of August is most favourable for the research, because at this season the leaves of the mahogany are uniformly of a yellowish hue, in-

clining to red, and may be readily discovered, even at a distance, amid the deep dark foliage of the forest. Winding his way, therefore, through the thickest of the woods, and cutting a pathway as he goes, the pioneer, or huntsman, as he is called, climbs the tallest tree, and, if unsuccessful, pushes forward to another, till at length he espies the mahogany standing singly or in groups. He then descends, and, without either chart or compass, soon reaches the exact point at which he aims, and with equal precision traces back his steps to his expecting companions, who lose no time in accompanying him to the place of destination. The trees are then felled about ten feet from the ground, roads are cut through the forest, bridges are constructed over creeks, rocks and stones are split and removed, hillocks are levelled, dead stumps and logs cleared away, and huge waggons are brought to the spot, on which the logs, weighing many tons, are gradually piled. The labour, which is very oppressive both to the men and cattle, being postponed to the hottest time of the year, for the sake of the dryness of the ground, is performed almost wholly by night —the gorgeous gloomy night of a tropical forest, which no poet's imagination has ever adequately described.

Mahogany of the best kind is the produce of the rocky mountains of Jamaica. This island is indeed nearly exhausted now, yet noble trees are still to be seen springing out of crevices in pre-

cipices inaccessible, or at least unavailable. The growth of a timber tree in such a situation is accounted for by the structure of the seed, which is thin, flat and winged, and which is thus carried by the wind to the fissures of the rocks, in which it loves to grow. Rock-grown mahogany is very valuable, for the gnarled and twisted beauty of its grain. A few years ago, the Messrs. Broadwood gave the large sum of 3000*l*. for three logs of mahogany, which were each about fifteen feet long, and thirty-eight inches square. The wood was of unusual beauty, and so close-grained as to bear the finest polish.

Clustered at the south-east extremity of the house, a considerable area of which they occupy, we see a group of plants having a common character, notwithstanding the various botanical appellations that we read on their labels. They bear, in their arching pinnate leaves, radiating from the summit of a columnar stem, a certain resemblance to the palms, and also to the tree-ferns, but have neither the stately grace of the one, nor the delicate elegance of the other, while their excessive rigidity, and the tendency of their leaves to form spinous points, give them a repulsive aspect. These are the *Cycadeæ*, interesting to botanists, because in their structure they connect the two great vegetable classes of *Exogens* and *Endogens*, and to the geologist, because, essentially tropical as they now are, their fossil remains show that they once formed no inconsiderable part of

the vegetation of Britain; as at Portland, where Professor Buckland has recognised the silicified stems of plants nearly identical with the strange forms *Cycas* and *Zamia* which we see before us.

THE CAFFER-BREAD.

The economist also finds an interest in them:—

"All the species abound in a mucilaginous nauseous juice. With this, however, is mixed, in many instances, a very considerable quantity of starch, whence they are common articles of food in the countries where they grow. At the Cape of Good Hope various species of *Encephalartos* are called Caffer-bread. The great seeds of *Dion edule* furnish a kind of arrowroot in Mexico. A similar material of excellent quality is extracted in the Bahamas and other West India islands from *Zamia pumila* and other dwarf

species. In Japan a kind of sago is procured from the cellular substance occupying the interior of the stem of *Cycas revoluta*. This is said by Thunberg to be held in the highest esteem; soldiers are able to exist for a long time upon a very small quantity of it, and it is contrary to the laws of Japan to take the trees out of the country. The nuts are also eatable. So also is a sort of sago extracted from *Cycas circinalis*, whose fruit is eaten in the Moluccas, and a flour of bad quality is procured from the kernels pounded in a mortar. It is supposed that the account given by Rheede, of true sago being the produce of the plant, is a mistake. This species also yields a clear transparent gum, something like tragacanth, which when dried in the air coagulates into a gummy mass, which is applied to malignant ulcers, in which it excites suppuration in an incredibly short space of time." *

All the species named in this extract may be seen here.

In the immediate vicinity of these horrid plants, are a few others equally unapproachable, secure in their armour of proof. One is a fine specimen of *Cereus pentagonus*, one of the cactus tribe of South America, of which, as we shall by-and-by be introduced to a whole houseful of them, it will be sufficient here to state that this is the stout pillar-like species called dildoes in the West Indies, where it forms living and impenetrable field fences. The others are species of a genus which seems to represent in the hot arid plains of Africa the *Cacti* of America, *Euphorbia*. Now we have several species of this race common in our fields and by our waysides at home, but they are inconspicuous weeds, remarkable only for the milky acrid fluid which pours from them when wounded. In the African species, as *E. splendens*, *E. grandidens*,

* Lindley, 'Vegetable Kingdom,' p. 224.

&c., they form thick, angular, succulent, leafless, thorny stems, much like the cacti, except that their stiff and terrific spines are not grouped in clusters. Several of them are adorned with beautiful scarlet blossoms, and they all maintain the property of secreting a quantity of creamy fluid, which is a powerful poison, and is used by the savages of South Africa to envenom their arrows and javelins. This juice in a concrete state becomes a resin called *Euphorbium*, having very powerful medicinal properties, and used chiefly in veterinary surgery.

We have rounded the southern extremity of the house, and have begun to proceed in a northerly direction along the eastern aisle. Among a crowd of plants whose names convey no definite idea to an unscientific visitor, one presently arrests his attention, a native of the farthest east, which produces the most delightful of spices, and one which has been celebrated from the most remote antiquity. It is the true Cinnamon (*Cinnamomum verum*).

This is a native of Ceylon, of which island it constitutes the chief wealth. It is a small tree, rarely exceeding eight feet in height, with leaves somewhat like those of our laurel, but of a lighter hue, having their strongly-marked ribs running lengthwise, and fine cross fibres. They have an aromatic taste when chewed. The blossom is white, nearly destitute of odour, but so abundant that "it seems, when in full blow, to cover the

woods." The fruit somewhat resembles an acorn. It is crushed and boiled for its fragrant oil.

The spice called cinnamon is the peeled bark of the shoots. According to Percival, the process of preparing it is as follows:—Such branches as are three years old are lopped off with a large, crooked pruning-knife; from these branches the outside thin coat of the bark is scraped off with a knife of a peculiar shape, concave on the one side and convex on the other. With the point of this knife the bark is ripped up lengthwise, and the convex side is then employed in gradually loosening it from the branch till it can be taken off entire. In this state the bark appears in the form of tubes open at one side; the smaller of which are inserted into the larger, and thus spread out to dry. The heat of the sun, by quickly drying up the moisture, makes the tubes contract still closer, till they at last attain the form in which we see them in Europe. When sufficiently dry, the bark is made into bundles of about thirty pounds weight each, and bound up with pieces of split bamboo twigs.

The next step is to examine its quality. This task is imposed upon the Company's surgeons, and a very disagreeable one it proves to be. It is performed by taking a few sticks out of each bundle and chewing them successively, as the taste is the only sure method of ascertaining the quality. The cinnamon, by the repetition of this operation, excoriates the tongue and the inside

of the mouth, and causes such an intolerable pain as renders it impossible for them to continue the process above two or three days. The surgeons are, however, obliged in their turns to resume it, as they are responsible for the goodness of the cinnamon.*

That plant yonder, that you might suppose to be a tuft of grass swollen to a Brobdignag size, is also one of great economic value: it is the sugar-cane (*Saccharum officinarum*). It has a stout stalk, divided into short joints, which are not hollow, but composed of spongy cells, filled with a sweet juice, which produces sugar merely by the evaporation of the watery portion. A field of sugar-cane in flower, when the fine tall pyramidal spikes of feathery blossom are waving in the breeze like ostrich plumes, beneath the brilliant beams of a Jamaica sun, is a charming sight.

Varieties, if not species of the sugar-cane, appear to have been cultivated in remote regions of the earth from time immemorial, being not only spread over the south of Asia, but even to the islands of the Pacific; one of the kinds which are now grown in the West Indies having been found in Tahiti at the time of its discovery by Captain Cook. Sugar was known to the ancient Greeks. At present the total quantity of sugar made from the cane is estimated at about 18 millions of cwts., of which considerably more than half is produced by the West Indian Islands.

* Percival's 'Ceylon,' p. 345, &c.

Not far from this plant we see another "cane" from the West Indies, but of very different properties, the Dumb-cane (*Caladium seguinum*). It is not, however, a true cane, having no affinity with the grass-plants, but a sort of *Arum*, allied to the wake-robin of our ditches. This is a large and fine plant, growing to the height of a man, with a juice so acrid as to inflame the lips and tongue that touch it, swelling the parts so as to take away the power of speech. In the time of slavery in the British colonies, it is said to have been sometimes employed as a means of torture on the negroes. An account is related of a gardener who "incautiously bit a piece of the dumb-cane, when his tongue swelled to such a degree that he could not move it; he became utterly incapable of speaking, and was confined to the house for some days in the most excruciating torments." Few productions, however, are without some use, and even the dumb-cane is found serviceable. Its juice is employed in the boiling of sugar, to bring it to a good grain when it is too viscid, and cannot be made to granulate properly by the application of lime alone.

A poison, still more deadly and of more infamous celebrity, is the produce of a tree which we see close by, the Tanghin of Madagascar (*Tanghinia venenifera*, or *Cerbera tanghin*). In its native island this plant—

"attains the size of a tree, and has a hard wood, which may be used for many kinds of carpentry. But the part which yields the

poison is the kernel of the fruit. Although this kernel is small, not much longer than an almond, Mr. Telfair says that it contains enough poison to kill twenty persons. Its great use in Madagascar was as a means of trial, the innocent being supposed able to resist

THE TANGHIN.

its action, whilst the guilty suffered under its influence. Radama, the late King of Madagascar, was desirous of abolishing its use, but found great difficulty in doing so, on account of the prejudices of the natives. Mr. Telfair witnessed a sad instance of its use.

The King Radama was taken ill, and got well by the use of mercury; but this medicine affected his mouth, so that the impression produced upon his 'skid,' or physician, was that the King had been poisoned. He therefore insisted that the tanghin should be administered to himself and all the servants of the household, in order to ascertain the guilty party. The King protested against the procedure, but in vain. The whole household were shut up during the night without food, and in the morning were brought out for trial. The presiding 'skid,' or physician, then pounded the tanghin bean to a pulp between two stones, and applied a small quantity to the back of the tongue of each individual. The effect varied in different individuals. In some it produced vomiting, and the poison being ejected from the stomach, they recovered. In others convulsions were brought on with violent efforts at vomiting, which soon destroyed life."*

Near the middle of this aisle we see a good many very noble-looking plants, some of them having the dimensions of trees, with somewhat of resemblance to the palms, but repeatedly forking in their growth, and with peculiar foliage. They are the screw-pines (*Pandanus*) from the Oriental and Pacific archipelagoes. Their great sword-shaped leaves, resembling those of a pine-apple, set with sharp spines along each edge, sheath each other at the bases, and the series run in regular spiral turns, like a corkscrew, whence the common name of the tribe. They are botanically allied to the Palms, an interesting link of connection between the races being supplied by a plant with palm-like foliage (*Cardulovica palmata*) from South America, of which we may see a crowd of young specimens shooting up in one large box.

Springing from the shallow loose sands of coral islands, the screw-pines need to have their attach-

* 'Botanical Magazine,' fol. 2968.

ment to the soil strengthened, to resist the force of furious winds. This is supplied, as we may see, in a curious manner. Thick straight roots

THE SCREW-PINE.

issue from various parts of the stem, and proceed in a slanting direction to the ground, which they enter, like those of the *Iriartea* already mentioned. They look like so many "shores" nailed to a post by a carpenter.

The best-known species, *P. odoratissimus*, is highly esteemed in all the countries of southern Asia, for its most fragrant perfume, which is cele-

brated by the Sanscrit and Arabic writers. Dr. Roxburgh states that it is the tender white petals of the blossoms which yield the fragrant essential oil so highly valued.

But these singular plants have other uses, which are well described by a writer, from his acquaintance with them in the Radack group of islands.

"The most useful palm found here is the common *Pandanus*, or *screw-pine* of the South Seas. It grows wild in the most arid sands, where vegetation first commences, and enriches the soil by its numerous decaying leaves, which it throws off in great numbers. In the moist lowlands of the richer islands, it thrives equally well, and numerous varieties of it are cultivated with care, being propagated by layers, and their fruit much improved by culture. All of these, if increased by seed, reassume the original characteristics of the parent species, the *Eruan*. More than twenty varieties are reckoned; the difference between them existing in the outward form of their fruit, or its compound nature, or the number of separate kernels which it contains. The male tree is always called *Digar*, the wild female, *Eruan;* each variety having a different name. That part of the fruit which is used for food by the people of Radack, is by the natives of the Sandwich, Marquesas, and Friendly Islands, employed as an odoriferous golden-shining garland. The fruit constitutes the chief food of the people of Radack. Each of the seeds of which this compound fruit is composed, contains at the base where it is affixed an aromatic juice. To obtain this, the fruit is first knocked to pieces with a stone, and then being chewed, the fibres are rejected from the mouth. The fruit is also baked in pits, as in the South Seas; not so much for the sake of eating it in this state, but that the *Mogun* may be prepared from it. This is an aromatic dry confection, which is carefully stored up for voyages. All the members of one or more families are employed together in making the *Mogun*. When the fruit has been baked, its concreted juice is carefully scraped out with the edge of a mussel-shell, then spread on some leaves over a gridiron and dried in the sun, or by a gentle fire. The thin cake thus formed is closely rolled up, and the roll neatly tied up in the leaves of the tree. The almond of this fruit is pleasant, but being difficult to get out, it is often neglected. From the foliage of the

Pandanus, the women of those islands prepare all sorts of mats, some to serve for their aprons, others with ornamented borders, and the coarser and thicker kinds which form the sails of their vessels, and are employed by them for bedding." *

The Star-apple trees (*Chrysophyllum*) attract the eye by the varying tints of their foliage. The leaves are of a rich dark-green above, but on the under-surface are clothed with a down of golden-brown hue, and the interchange of the tints as the tree waves in the breeze is very beautiful. An agreeable mucilaginous fruit, the star-apple, is produced by *C. cainito*, a fine West Indian species: and a still nobler tree is *C. macrophyllum*, remarkable for the great size of its oval leaves.

Here are several specimens of the singular Anchovy-pear of Jamaica (*Grias cauliflora*); whose enormous oblong leaves, spreading from the summit of a slender tall stem, some fifty feet high, give it the aspect of a palm. Its fruit, which is like a huge pear in shape and size, and like a mango in taste, is frequently used for pickles before it ripens.

And here we see another West Indian "pear," so called from its shape and size, though having no botanical affinity with our grateful northern fruit. It is the Aguacate of the Indians, corrupted by the Spaniards to "Avogado," and by the English colonists to "Alligator-pear" (*Persea gratissima*). This most exquisite of fruits grows on a lofty tree of the laurel kind; it is composed

* 'Botanical Miscellany,' i. 308.

of a delicate melting pulp, in flavour somewhat between a peach and the best vegetable marrow. It is usually eaten uncooked, with roast meat, with salt, pepper, and gravy; but not seldom as a dessert-fruit, with lime-juice and sugar. Those who are familiar with it esteem it above every other fruit.

The well-known Allspice, or pimento of the shops, is the unripe fruit of a beautiful tree which grows abundantly in Jamaica (*Pimenta vulgaris*). A healthy young specimen is placed beside the eastern aisle. The pimento estates in the south of Jamaica have all the beauty of a well-tended park; the elegant trees springing up from the greensward, displaying their smooth pale bark and dark glossy foliage, studded with myriads of star-like white blossoms, or with the shining black berries, or with multitudes of strange birds with brilliant plumage and eagerly feeding,—form a charming scene. Every part of the tree is aromatic;—the wood, the leaves, the blossoms, the fruit, but especially the ripe seeds of the latter. The berries are in their most pungent state when quite green, and at this time they are picked by hand for drying; as, if suffered to ripen, they speedily become mild and sweet.

In the formation of a pimento-pen, the planting is left to nature. A piece of land where the tree is common in the woods is set apart, and cleared of all timber and brushwood, except the pimento-trees. In the course of twelve months young

pimento plants are found springing up all over the land; from the seeds scattered by the numerous birds which feed on the ripe berries. After a while these are thinned out, the most vigorous only being preserved; and in about seven years the plantation is in a bearing condition.

Perhaps the most gigantic tree of tropical America is the Silk-cotton tree (*Ceiba eriodendron*), of which we may here see the young form, when the trunk covered with green bark is studded with huge triangular prickles, that disappear as the tree acquires its full-grown dimensions. It is by no means uncommon for the colossal trunk, fifty feet in circumference, to reach to eighty or a hundred feet in naked majesty, before a single branch is sent forth. Then limbs, of the bulk of ordinary forest trees, break out from the bole, three or four upon the same level, and radiate horizontally to a vast distance.

These contorted limbs, and their ample forks, are copious nurseries of parasitic plants. Multitudes of fantastic Orchideæ here rear their brilliant flowers far out of reach of man; long ragged Cacti (*Cereus triangularis* and other whip-like species) creep and hang loosely from these limbs; immense numbers of wild pines, from the rough hairy tufts of "Old man's beard" (*Tillandsia usneoides*) to the noble *Æchmæ* and *Vriesiæ*, are never wanting, and slender flexible lianes of great length dangle in the air from the lofty branches.

As the *Ceiba* attains age, the basal part of the

trunk sends out vast spars or buttresses, like perpendicular walls of timber, radiating in every direction, and enclosing great triangular areas.

This tree has the remarkable property of producing its leaves and its flowers in alternate years. "In every second year," observes Mr. Hill—

"the foliage comes out early after the latter rains, and continues thickening and darkening, and finally becomes sere before the autumn. It is, perhaps, as early as July in those years, when no further sap flows from the root to the leaf-buds, that it declines into the sere and yellow leaf. The leaves having by that time ceased to perform their office of vegetative lungs, and to give out oxygen to the atmosphere under the action of the sun's rays, the sap is descending as pulp to the roots. The twigs are beginning to harden and shrink, and if not emptied, are now so drained by the terminal buds which are elaborating flowers for the year to come, that the leaves of what I call the foliage-year, as distinguished from the alternate flower and seed-year, become soon detached and fall, particularly if the season has been such as to thicken the juices by rapid exhaustion. The frail-bound vegetation withering, or not adhering firmly, in such a season, would be shaken off in a shower of leaves under any one of those fitful tornadoes, that sweep by so often, and so gustily, after the sun has a second time reached the zenith of our island, and is hastening with its train of storm-clouds to recross the equator and to enter the southern hemisphere." *

Not far from the cotton-tree is another curious plant of the same order, the Hand-tree, or Manita of Mexico (*Cheirostemon platanoides*). Its leaves are like those of the plane-tree; its flowers have no petals, but a large angular calyx resembling a leathern cup, from the midst of which springs a column, bearing five curved stamens, which look like a hand of five hooked claws. Humboldt in-

* Gosse's 'Sojourn in Jamaica,' 277.

forms us that the tree is held sacred in Mexico, where it appears to be very rare.

Here too is a specimen of a tree from the Antilles which possesses properties quite unique. It is the Papaw (*Carica papaya*), a tall green almost herbaceous stem, with much-cut leaves on long footstalks diverging from the summit. The fruit, which is of a large size, is eaten, but is of poor quality.

"Its great peculiarities are that the juice of the unripe fruit is a most powerful and efficient vermifuge (the powder of the seed answers the same purpose), and that a constituent of this juice is fibrine, a principle formerly supposed peculiar to the animal kingdom, and to Fungals. The tree has, moreover, the singular property of rendering the toughest animal substances tender by causing a separation of the muscular fibres; its very vapour even does this; newly-killed meat suspended among the leaves, and even old hogs and old poultry when fed on the leaves and fruit, become tender in a few hours." *

Besides the elegant blossoming climbers that are trained up the staircases and around the gallery, there are others in various parts of the house that festoon the glassy walls, and stretch in verdant strings from pillar to pillar, adding greatly to the wild grace of the scene. Of these we shall particularize only two genera. The first is *Dioscorea*, several species of which grow luxuriantly here. These are the Yams of tropical countries, great farinaceous tubers much resembling in quality those of the potato, but more compact; they are very extensively cultivated both in the East and West, and efforts are now

* Lindley's 'Vegetable Kingdom,' 321.

being made to introduce a Chinese species (*D. batatas*) into British horticulture, as a promising addition to popular subsistence.

The other plant belongs to the same family; it is the Elephant's foot (*Testudinaria elephantipes*). The tubers here are exterior to the ground, looking like great blocks of timber, with a dry woody bark, cut as if by art into many-angled pieces, bearing no slight resemblance to the plates of a tortoise; whence the generic name. The profuse shoots that issue from these masses, as slender as whipcord, and studded with round leaves of a light-green hue, look particularly elegant as they climb and hang loosely from post to post.

CHAPTER VI.

THE PALM-HOUSE—(*continued*).

BEFORE we quit the palm-house we must once more make the circuit of the whole, directing our attention to the stone tables which project from the walls, and which are crowded with plants, mostly of small size. A large proportion of these, it is true, are unlabelled, and appear to be duplicates of larger specimens in the area of the house, mostly cuttings, or seedlings in process of propagation. But we shall find some objects of interest that we have not yet observed.

The first thing that strikes us is a stout plant, with large arrow-shaped leaves, much like the wake-robin of our hedges, or the beautiful Calla of our green-houses. It is a member of the same tribe (the Arums) as these plants; which have farinaceous tubes containing a juice so acrid as to be poisonous in a raw state, but which, on the dissipation of this principle by heat, become a wholesome and nutritious food. In hot countries these plants (*Colocasia*) are extensively cultivated, the *Taro* of the South Sea islands, and the *Coco*, that forms so large a portion of the subsistence of our West Indian negroes, are species of this genus;

and this one before us is the *Colocasia antiquorum*, which is much eaten by the people of the south of Europe, and is mentioned by Virgil.

Here is another plant of the same family, not claiming notice for any usefulness that attaches to it, so far as we are aware, but of remarkable form and aspect. It is *Anthurium coriaceum*, from Brazil; a great arum with a compact stem, densely covered with a shaggy mat of small roots, overlapping each other as close as they can lie. A circle of large leathery oblong leaves stands around the summit, like the ribs of a great basin, seated on long cylindrical footstalks, whose bases throw off a fibrous tissue like that of the palms, so that the top of the plant seems as if it were swathed in tow.

Specimens of the very interesting sensitive plants (*Mimosa sensitiva* and *M. pudica*) stand on these shelves; the former easily distinguished by having apparently simple leaves, while those of the latter are minutely compound. These are natives of tropical America, and have long been celebrated for their spontaneous movements when touched or otherwise stimulated.

> "Weak with nice sense the chaste *Mimosa* stands,
> From each rude touch withdraws her timid hands:
> Oft as light clouds o'erpass the summer glade,
> Alarmed, she trembles at the moving shade;
> And feels, alive through all her tender form,
> The whispered murmurs of the gathering storm;
> Shuts her sweet eyelids to approaching night,
> And hails with freshened charms the rising light."

It is in their native regions that the sensitive pro-

perties of these plants are seen to most advantage; a blow on the ground at some distance will often cause the folding and falling of the leaves. Martius tells us that in Brazil the falling of a horse's feet on the road is sufficient to set whole beds of *Mimosæ* in motion. In this country the motions of the plant are always best displayed in high temperatures. It is an annual, and has compound digitate leaves, which are formed of four pinnules, or leaflets, each of which is furnished with numerous pairs of smaller leaflets, which, in a natural state, are expanded horizontally. The parts of the leaf, which are subject to the movements, are the joints, or the points where the petioles and sub-petioles are united to the stem, and to each other. At each of the joints there is a little swelling or knot, in which the irritable property seems to reside. If any one of the pairs of leaflets be touched or cut, or concentrated light be thrown upon it from a lens, the

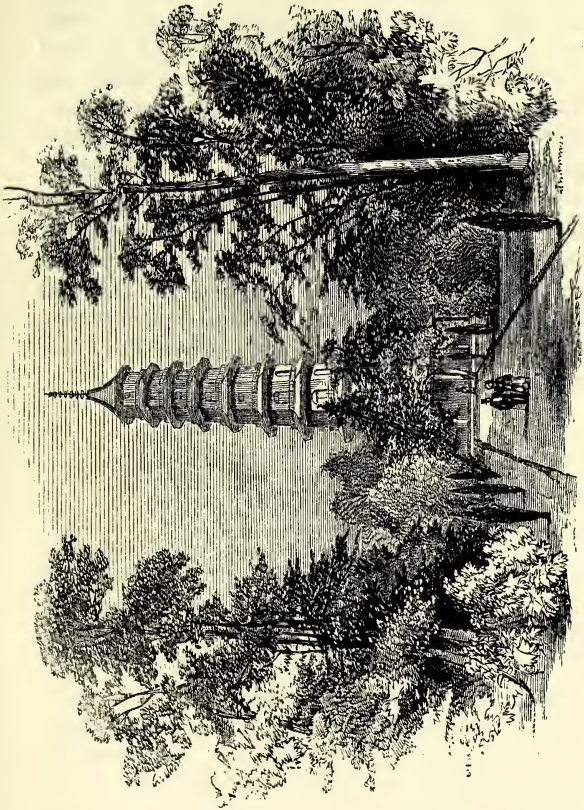
"leaflet will immediately move, together with the one opposite to it; both bringing their upper surfaces into contact, and at the same time inclining forwards, or towards the extremity of the partial petiole on which they are seated. Other pairs of leaflets, nearest to the one first stimulated, will then close in succession in a similar manner; and at length the partial petioles themselves fold together by inclining upwards and forwards. Last of all, the influence is transmitted to the common petiole, which bends downwards with its extremity towards the ground, in a direction the reverse of those taken in the former cases. The effect is next continued to the other leaves nearest to the one first stimulated, and they fold their leaflets and depress their petioles in a similar manner." *

* Henslow's 'Outlines of Botany.'

The lemon-grass of India (*Andropogon schœnanthus*) is familiar to some of our readers, as it is frequently cultivated for the delightful fragrance of its bruised leaves. An essential oil is distilled from them, which in the Oriental isles is valued as a perfume.

A little beyond the tuft of this fragrant grass is a group of several species of *Melastomaceæ*, whose opposite leaves—marked with several stout nerves running lengthwise, connected by fine ones crossing from one to another at right angles—are so very characteristic of the tropical regions of America, especially on the lower mountains. Extensive as the tribe is, not an unwholesome species belongs to it; the fruit of many is eatable, but frequently has the property of staining the mouth black; whence the scientific name *melastoma;* from μέλας, *black*, and στόμα, *the mouth*. On the opposite side of the house is a very ornamental plant of this order, *Blakea trinervis*, the beauty of whose large crimson flowers has procured for it the appellation of the mountain-rose of Jamaica.

When we come to the south-west wing, we find a considerable space of the running table occupied by liliaceous plants of the genus *Sanseviera;* coarse-looking but curious plants, much like the wild pines which we shall by and by notice, with tubularly sheathing, stiff leaves. They are natives of Africa, yielding a hemp-like fibre of great strength, which, from the use to which it is applied by the negroes, has given to these plants the name of bowstring hemp.



THE PAGODA VISTA.

Here we may stand for a moment at the massive door of glass that looks toward the west. Three diverging avenues are before us, stretching away through the pine-trees. That to the right is called the Cedar Vista, the central one is Syon Vista, and the left is the Pagoda Vista, from the lofty Chinese edifice that conspicuously terminates the view along the walk.

Little worthy of note then occurs till we come to the opposite side, where we find growing that Chinese shrub which at once appeals to our sympathies, conjuring up the snug fireside, the domestic party, and all the sweet accompaniments of "evenings at home." It is the Black Tea (*Thea bohea*).

> "Now stir the fire, and close the shutters fast,
> Let fall the curtains, wheel the sofa round,
> And, while the bubbling and loud-hissing urn
> Throws up a steamy column, and the cups,
> That cheer but not inebriate, wait on each,
> So let us welcome peaceful evening in."*

But we forget: it is a lovely summer's day, and as if that were not enough, we are sweltering and welting in this steamy atmosphere, contemplating the productions

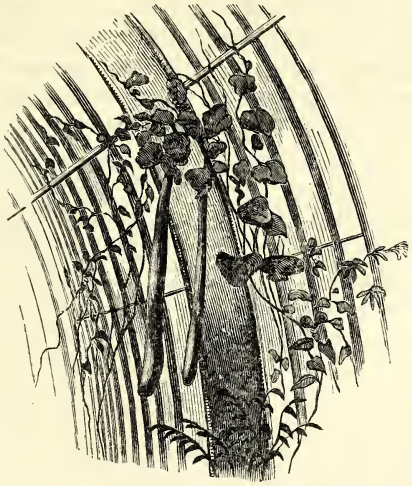
> "Of Afric, Araby, and farthest Ind."

What a contrast in the commerce of a single article, and that no necessary of life, no important item of human food, do the last two centuries furnish; from 1676, when the directors of the East India Company ordered their servants to send

* Cowper's 'Task,' book iv.

home 100lbs. of the best "tey" they could procure, to the present time, when about 50,000,000lbs. are imported into Britain annually, yielding a revenue to the government of 4,000,000*l.* sterling!

The introduction of the tea culture into Assam, and still more recently into the Himalaya region, where Dr. Hooker informs us,* the plant succeeds admirably, is doubtless the precursor of important changes in the tea trade, and of profit to Great Britain.



THE CLUB-GOURD.

In many places we see hanging from the arching crystal walls, great club-like gourds, of a yellow

* Himal. Journ. i. 143.

hue when ripe, or mottled with a hoary grey. Some of them are four or five feet long. These are the fruits of the *Lagenaria vulgaris* of India, frequently called the bottle-gourd, and used as flasks for liquids. As the pulp is poisonous, however, they are not to be carelessly trusted.

The ground nuts which are frequently imported and sold in our markets may be familiar to some of our youthful readers, who are in the habit of eating the two pea-like seeds, contained within the brittle reticulated oblong husk. Here you may see the plant which produces them, *Arachis hypogœa*, one of the pea tribe. It is sometimes called the underground kidney-bean, because of the very singular way in which the fruit is ripened.

"Instead of hanging down from among the leaves in the manner of other plants, this conceals itself in the earth, in which it is deeply buried at the period when it becomes ripe, a phenomenon which happens thus:—The young fruit, instead of being placed at the bottom of the calyx, as in other kinds of pulse, is found at the bottom and in the inside of a long slender tube, which looks like a flower-stalk. When the flower has withered, and the young fruit is fertilized, nothing but the bottom of this tube with its contents remains. At this period, a small point projects from the summit of the young fruit, and gradually elongates, curving downwards towards the earth. At the same time the stalk of the fruit lengthens, until the small point strikes the earth, into which the now half-grown fruit is speedily forced, and where it finally ripens in what would seem a most unnatural position. When mature it is a pale-yellow, wrinkled, oblong pod, often contracted in the middle, and containing two or three seeds the size of a hazel nut. These are considered a valuable article of food in Africa, and the tropical parts of Asia and America. In flavour the nuts are as sweet as an almond, and they yield when pressed, an oil in no respect inferior to that of olives."*

* 'Penny Cyclopædia,' art. Arachis.

A tub of water standing near by displays to us some interesting aquatic plants from Brazil. To look at these as they lie so carelessly flung on the surface of the water, more resembling plants which had been torn up by some careless hand and thrown into the tub to take their chance, than anything else, it is difficult to conceive that such is their natural mode of growth; as in reality it is. Such plants require no place of attachment for their bundles of white straggling roots, but put forth their leaves, flowers, and seed while floating free on the surface of the waves. They belong to the genus *Pistia*, and are allied to the duckweed of our ponds. In a common earthenware vessel full of water floats the plant sung by poets, and specially enumerated by Dr. Darwin, under the epithet, "The chaste Vallisner." Botanists recognise it as *Valisneria spiralis*. The history of this humble and mean-looking plant, which abounds in the ditches of Italy, and is also frequently seen rearing its flowers above the surface of the turbulent Rhone, is of no ordinary interest. It produces two kinds of flowers, one with a pistil, ovary, &c., in which the seed is contained; the other with only stamens and anthers, which secrete the fertilizing dust or *pollen*. But it is curious that the pistil-bearing flowers are seated on the end of a very long slender spiral stalk, so that they float on the surface of the water, while the pollen-bearing flowers have a very short stalk, and are therefore chained down under water. Now unless the

delicate dust of the latter is applied to the appropriate organs of the former, the plant will produce no perfect seed: between the two flowers rolls a foaming tide—how is the difficulty to be got over? By a truly wonderful contrivance. It has been ordained that the time of the expansion of the flower which floats on the surface shall coincide also with the time of the maturation of the flowers below, and when this time arrives, the little flower below by some curious process detaches itself from the main stem, and rises upwards like an air-bubble to the surface, where it expands, and its pollen is wafted by the air to the other flowers, by whose side it now floats: this done, it withers and dies. Curious to relate, as if the plant were conscious that there was now no further need for its pistil-bearing flowers to float at such a distance above it, the spiral stalk is gradually contracted, the flower being thus drawn gently down until it touches the bed of the river, where its seed can strike root and become a new plant. We might challenge all botanical science to produce a series of phenomena so striking as this, or so satisfactorily demonstrating the skill and foreknowledge of the great Creator.

Here is another of the sugary fruits of the tropics, the Naseberry, or Sapodilla plum (*Achras sapota*), which, though not always thought highly of by an European at first, almost invariably soon comes to be reckoned among the most delicious of productions. In size and appearance it resembles a very

rough russet apple, firm and fleshy, of a rich sugary sweetness; when young, the fruit contains eight or nine cells, diverging from the axis, most of which become abortive, from one to three being usually found when ripe, each containing a large flat oval black seed, When green the fruit yields by incision, as does also the bark of the tree, a viscid milk, which soon acquires, by exposure to the air, a strong tenacity, and makes an effective birdlime. It is much used for the capture of the frugivorous birds by the negro youths, who call the substance naseberry gum. The tree is large, spreading, and handsome, with glossy green leaves, having a tendency to crowd together in rosettes; the flowers form bunches, each being a deep narrow cup, with white fleshy petals, nearly hidden by the calyx. It grows to a tall and spreading tree.

And now we shall take our leave of this magnificent palace, with a plant of terrible, though somewhat mythic celebrity: the renowned Upas-tree of Java (*Antiaris toxicaria*). The stories reported, and until lately believed, of the virulence of this tree, which was said to be unique of its kind, were most marvellous. It was described as a large tree growing in the island of Java, in the midst of a desert caused by its own pestiferous qualities; its exhalations were reported to be so unwholesome, that not only did they cause death to all animals which approached the tree, but even destroyed vegetation for a considerable

distance round it; and finally, the juice which flowed from its stem, when wounded, was said to be the most deadly of poisons. To approach the

FRUIT OF THE UPAS-TREE.

upas-tree, even for the momentary purpose of wounding its stem and carrying away the juice, was stated to be so dangerous that none but criminals under sentence of death could be found to undertake the task.

"Where seas of glass with gay reflections smile
Round the green coasts of Java's palmy isle;
A spacious plain extends its upland scene,
Rocks rise on rocks, and fountains gush between;
Soft zephyrs blow, eternal summers reign,
And showers prolific bless the soil,—in vain!
No spicy nutmeg scents the vernal gales,
Nor towering plantain shades the mid-day vales;
No grassy mantle hides the sable hills,
No flowery chaplet crowns the trickling rills!
Nor tufted moss, nor leathery lichen creeps
In russet tapestry o'er the crumbling steeps.
No step retreating, on the sand impress'd,
Invites the visit of a second guest;
No refluent fin the unpeopled stream divides,
No revolant pinion cleaves the airy tides;
Nor handed moles, nor beaked worms return,
That mining pass the irremeable bourn.
Fierce in dread silence on the blasted heath
Fell UPAS sits, the HYDRA-TREE of death.
Lo! from one root, the envenom'd soil below,
A thousand vegetative serpents grow;
In shining rays the scaly monster spreads
O'er ten square leagues his far-diverging heads;
Or in one trunk entwists his tangled form,
Looks o'er the clouds, and hisses in the storm,
Steep'd in fell poison as his sharp teeth part,
A thousand tongues in quick vibration dart;
Snatch the proud eagle towering o'er the heath,
Or pounce the lion, as he stalks beneath;
Or strew, as marshall'd hosts contend in vain,
With human skeletons the whiten'd plain."

DARWIN'S *Bot. Gard.*, ii. 109.

As usual, it is found that there is some truth here, overlaid with a good deal of error. Such a desert and poisonous valley exists in Java, but its fatal atmosphere is not produced by the upas, but by exhalations of carbonic acid from the ground. It may be interesting to mention what recent research has determined concerning this much-dreaded poison-tree.

The tree is one of the largest in the forests of Java, rising, completely naked, to the height of sixty, seventy, or even eighty feet, but dividing near the surface into numerous broad excrescences. The bark upon being wounded yields plentifully the milky juice from which the celebrated poison is prepared. The inner bark is employed by the poorer class of people in making a coarse stuff, which they wear when working in the fields; but persons clad in this dress, on being exposed to the rain, are affected with an intolerable itching, which renders their flimsy covering almost insupportable.

The inhabitants do not like to approach the tree, as they dread the cutaneous eruption which it is known to produce when newly cut down. But except when the trunk is extensively wounded, or when it is felled, by which a large portion of the juice is disengaged, the effluvium of which affects the persons exposed to it with the symptoms just mentioned, the tree may be approached and ascended like the common trees of the forest.

In order to prepare the poison, about eight ounces of the juice from the tree, which had been collected during the preceding evening, was carefully strained in a bowl. The sap of the following substances, which had been finely grated and bruised, was then expressed, and poured into it, viz., arum, amomum, common onion, and garlic, of each about half a drachm; the same quantity of finely-powdered pepper, was then added, and

the mixture stirred. A single seed of *Capsicum fruticosum* was then placed on the fluid, in the middle of the bowl; the seed began to reel round rapidly, now forming a regular circle, then darting towards the margin of the cup, with a perceptible commotion on the margin of the liquor, which continued for one minute. Pepper and capsicum were twice added in succession, with less and less commotion, until the latter remained quiet, forming a regular circle in the fluid, resembling the halo of the moon. This is the sign that the preparation of the poison is complete.*

Sir S. Raffles states that—

"The common train of symptoms is a trembling of the extremities, restlessness, erection of the hair, affection of the bowels, drooping and faintness, slight spasms and convulsions, hasty breathing and increased flow of saliva, spasmodic contraction of the pectoral and abdominal muscles, retching, vomiting, great agony, laborious respiration, violent and repeated convulsions, and death."

Reviewing as a whole what we have been looking at in detail, we cannot help being struck with the enlargement of ideas which such a house as this is calculated to give. We can form some approximation to an idea of tropical scenery, far more correct at least than any number of volumes could convey; and of it may, in a subordinate degree, learn what is true of a personal acquaintance with equatorial regions.

Humboldt, in his 'Cosmos,' has observed that—

"He who is endowed with susceptibility for the natural beauties of mountains, streams, and forest scenery, who has wandered

* 'Comp. Bot. Mag.' i. 316.

through the countries of the torrid zone, and has seen the luxuriant vegetation, not only upon the cultivated shores, but in the vicinity of the snow-capped Andes, the Himalaya mountains, and the Neilgherry hills of the Mysore, or in the wide-spread forests between the Orinoco and the Amazon—that man can alone understand what an immeasurable field for landscape-painting is open between the tropics of both continents, or in the islands of Sumatra, Borneo, and the Philippines, and how the most splendid and spirited works which man's genius has hitherto accomplished cannot be compared with the vastness of the treasures of nature, of which art may, at a future time, avail itself."

And again—

"If in the frigid zones the bark of the trees is covered with discoloured spots, occasioned by the presence of lichens or mosses, in the regions of the feathery palms, *Cymbidium* and the aromatic *Vanilla* enliven the trunks of *Anacardium* and of gigantic fig-trees. The fresh green of the *Dracontium* and the deeply-cut leaves of ferns, contrast with the many-coloured blossoms of orchises; the twining *Bauhinia*, the passion-flower, and the yellow-blossomed *Banisteria* climb high into the air around the stems of the forest-trees; delicate blossoms unfold themselves from among the roots of the *Theobroma*, as well as from the thick and rugged barks of *Crescentia* and *Gustavia*. In the multitude of flowers and leaves, in this luxuriant growth, and the confusion of climbing plants, it often becomes difficult to distinguish to which tree the blossoms, and to which the leaves, belong; indeed a single tree, adorned with *Paullinias*, *Bignonias*, and *Dendrobium*, presents a multiplicity of plants, which, if separated one from another, would cover a considerable space."

CHAPTER VII.

THE VICTORIA HOUSE.

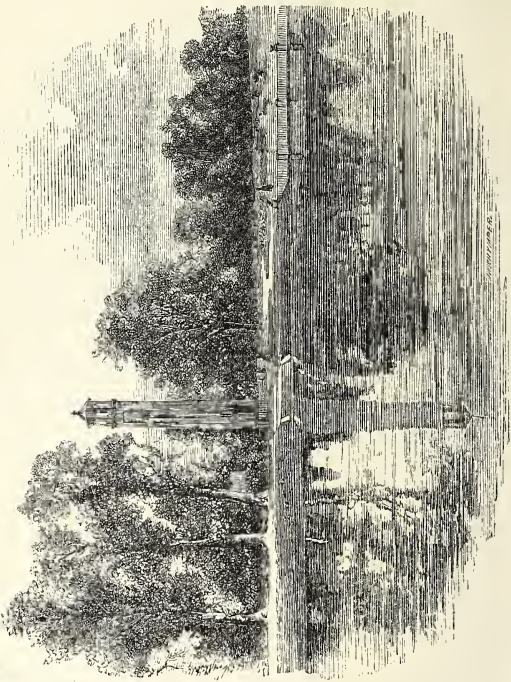
Leaving the Palm House, which has so long detained our unreluctant steps, we emerge by the handsome east door, and find ourselves on a broad terrace, with well-kept parterres of flowers beneath, furnished with seats for the accommodation of visitors. Just before us is the lake, an ornamental piece of water, on whose banks weeping-willows lave their drooping branches, and on whose placid bosom float proudly the swans and other aquatic birds that have been from time to time presented to the gardens. We think of the words of the poet as we look at them :—

> "The swan, on sweet St. Mary's lake,
> Floats double,—swan and shadow."

A canoe, made by the Indians of Canada of the bark of the paper birch (*Betula papyrifera*), lies moored near the steps, and recals our thoughts to exotic botany, which we must go and seek in other houses.

Before entering, however, we might turn a little to the right, whence looking across the lake, we have a fine view of the Water Tower, a shaft of much architectural beauty.

This is the outlet for the smoke created in the heating of the Palm House. That no chimney might interfere with the *coup d'œil* of the building, the smoke is conveyed to this point, a distance of



LAKE AND WATER-TOWER.

nearly five hundred feet, by a flue contained within an underground tunnel of brickwork seven feet high. This tunnel encloses also a railway,

for the purpose of bringing coals to the furnaces at the Palm House, which are all underground, and of bringing away the ashes.

Immediately facing the northern door of the Palm House, by which we entered that building, stands the Victoria House, an unpretending, but roomy and commodious stove recently erected for the cultivation of the great Water Lily (*Victoria regia*) of Demerara. Passing through a vestibule, where we see the hot-water pipes, which maintain the requisite temperature both of air and water for the health and vigour of this denizen of an equatorial clime, we enter through a glass door which must not be left open, and find ourselves in a temperature even higher than that which we have just left, but damp and steamy. The centre of the room is occupied by a circular tank thirty-six feet in diameter, on whose tepid water float the grand salver-shaped leaves of the noblest flower ever discovered, worthy to bear the name of England's Queen.

It was first seen by Hœnke, in 1801, on one of the tributaries of the Amazon, and subsequently by Bonpland in 1820, by D'Orbigny in 1828, and by Pöppig in 1832. It is, however, to Sir R. Schomburgk that we owe the most detailed account of this grand aquatic; and his interesting narrative of the discovery, given in ignorance that the plant had been seen by any scientific observer before, we shall quote at length:—

"It was on the first of January 1837, while contending with the difficulties which, in various forms, Nature interposed to bar our progress up the Berbice River, that we reached a spot where the river expanded, and formed a currentless basin. Something on the other side of this basin attracted my attention; I could not form an idea what it might be; but, urging the crew to increase the speed of their paddling, we presently neared the object which had roused my curiosity,—and lo! a vegetable wonder! All disasters were forgotten; I was a botanist, and I felt myself rewarded. There were gigantic leaves, five to six feet across, flat, with a deep rim, light green above and vivid crimson below, floating upon the water; while in keeping with this astonishing foliage, I beheld luxuriant flowers, each composed of numerous petals, which passed in alternate tints from pure white to rose and pink. The smooth surface of the stream was covered with the blossoms; and as I rowed from one to another, I always found something new to admire. The flower-stalk is an inch thick near the calyx, and is studded with elastic prickles about three quarters of an inch long. When expanded, the four-leaved calyx measures a foot across, but is concealed by the expansion of the hundred-petaled corolla. This beautiful flower, when it first unfolds, is white, with a pink centre; the tinge spreads as the bloom increases in age; and at a day old the whole is rose-coloured. As if to add to the charm of this noble water-lily, it exhales a sweet scent. As in the case of other flowers of the same tribe, the petals and stamens pass gradually into each other; and many petaled leaves may be seen bearing the vestiges of an anther. The seeds are numerous, and imbedded in a spongy substance.

"Ascending the river we found the plant more frequently, and the higher we advanced the more gigantic did the specimens become. One leaf we measured, and ascertained it to be six feet five inches in diameter, the rim five inches and a half (nearly half a foot) deep, and the flowers a foot and a quarter across. A beetle (*Trichius sp.?*) infests the blossoms to their great injury, often completely destroying the inner part of the disc; we counted sometimes from twenty to thirty of these insects in one flower."*

In 1842, Sir Robert again detected the plant in the Rupununi, a tributary of the Essequibo. In 1845, Mr. Bridges, in the course of his botanical journey into Bolivia, met with it.

* 'Botanical Magazine,' 1847.

"During my stay," writes this traveller, "in the Indian town of Santa Anna, in June and July 1845, I made daily shooting excursions in the vicinity, and on one occasion I had the good fortune, while riding along the wooded banks of the Yacuma, a tributary of the Mamoré, to arrive suddenly at a beautiful pond, or rather small lake, embosomed in the forest, when to my delight and surprise I descried for the first time the queen of aquatics, *Victoria regia!* There were at least fifty flowers in view; and Belzoni could not have been more enraptured with his Egyptian discoveries, than was I, on beholding this beautiful and novel sight, which few Englishmen can have witnessed. Fain would I have plunged into the lake to obtain specimens of the splendid flowers and foliage; but the knowledge that these waters abounded with alligators, and the advice of my guide, deterred me. I turned over in my mind how I could secure these treasures, and I clearly saw that a canoe was necessary; therefore I promptly returned to the town, and communicating my discovery and my wishes to the corregidor, or governor, he kindly sent Indians with a yoke of oxen, for the purpose of drawing a canoe from the river Yacuma to the lake. As soon as it was ready I set off, accompanied by several Indians, to aid in bringing home the expected prize of leaves and blossoms. The canoe was so small that it would carry but three persons, myself in the middle and a Indian at either end. In this tottering little craft we rowed among the magnificent flowers and foliage, unavoidably crushing some and selecting only such as pleased me. The leaves were so enormous that but two could be stowed in the canoe, one before me and the other behind, and their fragility rendered extreme care necessary, so that we had to make several trips in the canoe before I could obtain as many as I wanted. The load of blossoms, leaves, and ripe seed-vessels being collected, I next mused how they might be safely carried away, and I decided upon suspending them upon long poles by small cord attached to the stalks. Two Indians, each bearing on his shoulder the end of a pole, conveyed them into the town, the poor creatures wondering the while why I should take so much trouble to get at flowers, and for what object they were destined by me.

"The *Victoria* grows in from four to six feet of water; each plant generally sends but four or five leaves to the surface, yet these cover the water in those parts where the plant abounds, touching one another so closely that I observed a beautiful aquatic bird (*Parra sp.?*) walking with perfect ease from leaf to leaf, and many of the *Muscicapidæ* find food and a resting-place upon them. Except a few small water-plants, among which I noticed a beautiful *Utricularia*, the *Victoria* usurps the entire possession of the lake. Its blossoms rise about half a foot above the surface, and

expand first in the evening; they are then pure white, but they change, by exposure to the sun, to a most lively pink or rose-colour; flowers may be seen at the same time, partaking of every intermediate tinge, the recently opened being quite white, and the adult rosy, the latter almost sinking under water to ripen the seed, and produce a new race of plants when required."*

The spacious reservoir in this aquarium is capable of supporting other ornamental aquatics, which are scattered between the leaves of the Victoria, near the margin. These chiefly consist of beautiful water-lilies from the tropics, belonging to the same genus as the lovely and fragrant flower, with clustering, snowy petals, that adorns our own still rivers and lakes, and which is one of the finest examples of floral development that this climate produces. The leaves of these tropical species might easily be mistaken for those of an English water-lily, but the blossoms, according to the species, are blue or crimson, while others are pure white. They are *Nymphœa cœrulea*, *rubra*, *dentata*, *lotus*, &c., all agreeing in general form and structure with their gigantic amazonian cousin. These lovely lilies, rocked on the silvery streams of India, are exquisitely alluded to by Southey:—

"—— —— —— Like burnished steel,
Glowing, it lay beneath the eye of noon;
And when the breezes in their play
Ruffled the darkening surface, then with gleam
Of sudden light, around the Lotus stem
It rippled, and the sacred flowers that crown
The lakelet with their roseate beauty, ride,
In easy waving rock'd, from side to side;
And as the wind upheaves
Their broad and buoyant weight, the glossy leaves
Flap on the twinkling waters, up and down."
'*Kehama*,' xiii.

* 'London Journal of Botany,' iv. 571.

Their beauty insures for them a frequent mention in Hindoo poetry, especially the elegant blue species (*N. cærulea*).

> "His floating eyes—oh! *they* resemble
> Blue water-lilies when the breeze
> Is making the stream around them tremble."
> MOORE'S '*Lalla Rookh*' (after the Sanscrit).

Among these is *Hydrocleis Humboldtii*, a lovely aquatic from tropical America, with three-petaled flowers of a delicate pale-yellow hue.

The four corners of the house are formed into as many shallow triangular tanks, in which interesting plants are growing. Those on the right and left as we enter the door are occupied by the Sacred Bean of India (*Nelumbium speciosum*). It is a magnificent plant, with numerous great peltate leaves a yard in diameter, seated on upright footstalks six feet high. The blossoms are as large as a child's head, oval in shape, with crimson-tipped white petals, the outer ones embracing the interior like those of a rosebud, but revealing, as they partially unfold, many yellow stamens, surrounding a seed-receptacle with a flat surface. Altogether the plant is one of exquisite beauty. As the petals fall, they leave the receptacle standing naked, which is then seen to be an inverted cone, much increased in size, or rather shaped like the half of a lemon, from the truncate surface of which stand out many black almond-like seeds. You would suppose that a child had amused himself by sticking a number of beans perpendicularly into

the pulp of a divided fruit, from the appearance; but such is the natural growth, the nuts being half buried in the cavities of the fleshy *torus*, in which, when ripe, they are so loose as to be readily shaken out, making a loud rattling noise as the plant rocks with the wind or wave. Darwin thus poetically alludes to this curious fact:—

"Cold from a thousand rocks where Ganges leads
The gushing waters to his sultry meads;
By moon-crown'd mosques with gay reflections glides,
And vast pagodas trembling on her sides;
With sweet loquacity NELUMBO sails,
Shouts to his shores, and parleys with his gales;
Invokes his echoes, as she moves along,
And thrills his rippling surges with her song."

'*Botanical Garden*,' ii. 169.

These nuts are eaten with avidity in the native regions of the plant; they are believed to be the Egyptian bean (κύαμος) of which Pythagoras speaks. The flower, conjointly with those of *Nymphœa lotus* and *N. cærulea*, mentioned above, takes a very prominent place in the paintings and sculptures of ancient Egypt. It was reared in every garden; it was borne in sacred processions; it was presented to guests at social entertainments; it was worn by ladies in their hair; and its representation, with every possible variety, was used for the adornment of designs in furniture, in dress, in architecture—in short, in every situation in which elegance of form was a requisite element.

The plant has now disappeared from the Nile, but in the rivers of Southern Asia it is still abundant. The creeping root, which is fleshy, is used

as food in China; and in India the tender shoots of the roots between the joints are eaten by the natives, either simply boiled or in their curries. The nuts are eaten raw, roasted, or boiled. Dr. Wright tells us that the stalks, both of the flowers and leaves, abound in spiral vessels, which in India are carefully extracted, and formed into those wicks which on great and solemn occasions are burnt in the lamps that the Hindoos place before the shrines of their senseless idols.

In another corner grows *Euryale ferox*, a water-lily, bearing a very close resemblance to the Victoria, but of inferior dimensions, and a native of India and China. The leaves, which are much corrugated, bristle with stiff prickles. The seeds are eaten boiled or roasted in hot sand.

The fourth corner exhibits, in great luxuriance, a plant far exceeding in interest all the water-lilies in the world, with the *Victoria regia* at their head. It is the Papyrus of the Nile (*Papyrus antiquorum*). We see a great cluster of tall, three-sided stems, with slender grassy leaves,—in short, a gigantic sedge some twelve feet high, crowned with large umbrels of radiating flowers. Bruce tells us that one of the sharp angles of the stem is always opposed to the current of the stream in which it grows, as if to break its force. Its proper home is the Nile, but it is found in the Syrian rivers, and even in those of Sicily.

But what makes this plant so interesting is its connection with literature.

"Papyrus is not only the name of the plant, but also the material which used to be derived from it for writing upon; and the written scrolls made of that material, which have been found in various countries, are called papyri. The ancients employed for this purpose the thin concentric coats or pellicles that surround the triangular stock of the plant, those nearest the centre being the best and finest; they cut them into strips of a certain length, and placed them side by side in a layer on a board, another layer of the same material being pasted over it crosswise, so as to form a sheet of convenient thickness, which, after being pressed and dried in the sun, was polished with a shell or other hard and smooth substance. A number of these sheets, about twenty in general, were glued together to form a *scapus*, or roll. The breadth of the roll was determined by the length of the slips taken from the plant, the broadest being about thirteen fingers' breadth, and others ten; the length of the *scapus*, or roll, might be carried to almost any extent; some have been found as long as thirty feet. The writing, as in all ancient rolls of whatever material, is in columns, extended in the direction of the length of the roll, with a blank strip between them. In the Egyptian papyri, the lines run in the direction of the length of the papyrus for six or eight inches, and when the scribe came to the bottom of the papyrus, he began a new page to the left of the first, leaving between the first and second page a small blank strip, which of course would lie in the direction of the breadth of the papyrus.

"We have the testimony of Herodotus (v. 58), that Egyptian papyrus was an article of commerce and a material for writing long before his time. He calls it *byblos*, from the Egyptian name of the papyrus plant, from which perhaps the Greek name '*biblion*,' for book, has been derived. There was a town in the Delta called Byblus. "The 'byblos,' says Herodotus, 'annually springs up: after it is plucked from the marshes, the top is cut off and converted to a different use from the other parts. The bottom part that is left, to the length of about one foot and a half, they sell as an eatable commodity.' And in other passages he notices incidentally the uses to which the top part was turned. 'The priests wear shoes made of the byblos; the sails of the Egyptain boats are made of byblos; the priests read to me out of a byblos roll the names of three hundred and thirty kings.' With the possession of Egypt by the Greeks, the use of papyrus increased, and was for many centuries an important branch of export from that country; and although linen, parchment, and other kinds of writing materials were used, we may infer from passages in ancient authors, that none was in so great demand as papyrus. The vast quantity of

papyri found at Herculaneum proves the extensive use of it in Italy. At the commencement of the sixth century, Cassiodorus (xi. Ep. 38), in one of his letters, congratulated the world on the abolition by King Theodoric of the high duty on imported papyrus; and speaks in animated terms of the usefulness and general use of that material. Papyrus continued to be used in Italy till about the eleventh or twelfth century, when it was superseded by cotton-paper introduced from Asia. There is a papyrus at Ravenna, of the twelfth century, containing a brief of Pope Paschal II., in favour of that archiepiscopal see."*

Darwin celebrates the invention of paper, to which he attibutes the origin of letters, in the following lines:—

"Papyra, thron'd upon the banks of Nile,
Spread her smooth leaf, and wav'd her silver style,
The storied pyramid, the laurel'd bust,
The trophied arch, had crumbled into dust;
The sacred symbol, and the epic song,
(Unknown the character, forgot the tongue,)
With each unconquer'd chief, or sainted maid,
Sunk undistinguished in oblivion's shade.
Sad o'er the scattered ruins Genius sigh'd,
And infant Arts but learn'd to lisp and died.
Till to astonish'd realms PAPYRA taught
To paint in mimic colours Sound and Thought,
With Wisdom's voice to print the page sublime,
And mark in adamant the steps of Time."
'*Botanical Garden*,' ii. 62.

* 'Penny Cyclopædia,' art. Papyrus.

CHAPTER VIII.

THE SMALL TROPICAL STOVE.

Leaving the Palm House in the rear, we will now pursue a walk along the north side of the lake, till we arrive at the foot of a hill, on which stand some noble trees, and the summit of which is crowned by a little edifice, dignified—according to the silly fashion of the time when it was built, of imitating the mythological tastes of the Greeks and Romans—with the title of the Temple of Æolus.

During the summer months, groups of young people may commonly be seen clustered on this mound, or running, hand in hand, at full speed down its slope.

We leave our young friends to their hilarious exercise, and pursue our way towards the north, close to the side of the Richmond road, through an extensive garden, devoted to the culture of such foreign herbaceous plants as will flourish in the open air of our clime. Many interesting plants, systematically arranged and legibly labelled, will be found here; but we hasten on till we reach the Museum, a rather recent feature in the Gardens, and one of great value. It was established in 1847,

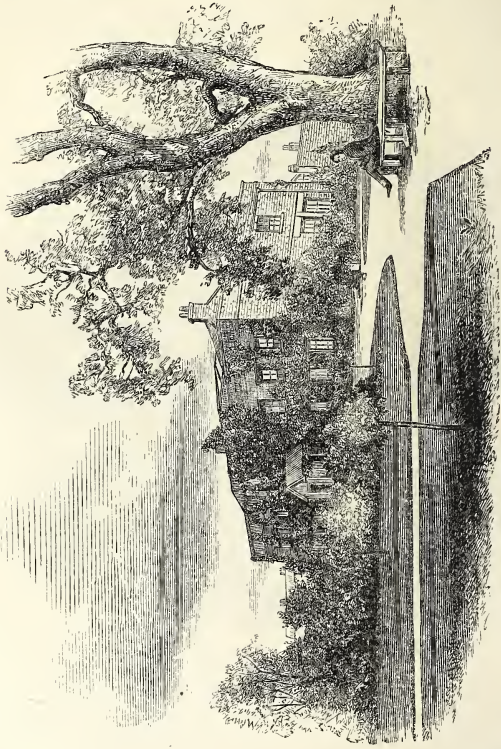
for the reception of "Specimens of *Fruits* and *Seeds* (dried, or preserved in pyroligneous acid or alcohol), *Gums*, *Resins*, *Drugs*, *Dye-stuffs*, *Sections of Woods*,—in short, all interesting vegetable *products*, particularly those that are useful to mankind, in

TEMPLE OF ÆOLUS.

the *Arts*, in *Medicine*, and in *Domestic economy*; substances which neither the living plants nor the Hortus Siccus can exhibit." *

* 'Guide to Kew Gardens,' p. 45.

So extensive is this collection, and so full of interest are its constituents, that it would require a volume of equal size with the present to do



THE MUSEUM.

anything like justice to it. We shall, therefore, not attempt to examine it now, hoping for another

occasion to introduce our readers into this ample storehouse of knowledge.

Confining ourselves, then, to the Conservatories, we find attached to the back of the Museum, to which it forms what is called by architects a *lean-to*, a long stove with a sloping roof of glass, and but a single walk running through its length. We enter, and find ourselves surrounded by plants of the very choicest kinds, in nowise inferior (perhaps even superior) in interest to those which occupy the magnificent Palm House.

The first plant on the right hand of the entrance door is *Poinsettia pulcherrima*, a North American tree of the *Euphorbia* tribe. It is striking, because its young leaves are arranged in the form of a disk at the end of the shoots, of the richest crimson approaching to scarlet, which might be mistaken for magnificent flowers; on examination, however, the real blossoms, which are small, and of singular structure, are seen clustered in the centre of these leaf-disks.

Here, too, is another plant of the same order, the *Siphonia elastica* of South America, from whose milky juice the best Indian-rubber is made. The United States derive almost their whole supply from this source, while Europe is largely indebted to the *Ficus elastica* of India, already mentioned, for the same substance.

Pará, on the Amazon, is the great depôt for this valuable article, and a rapidly-increasing, and almost boundless trade is carried on in rubber

from this city. The substance is there known by the name *seringa*, a far more elegant appellation than the barbarous and almost unpronounceable *caoutchouc*. For the latest description of the tree and the manufacture, we are indebted to Mr. Edwards's 'Voyage up the River Amazon,' a work full of delightful pictures of Brazilian forest-life, drawn in the most graphic manner.

"The island was covered by a fine forest, in which were abundance of seringa-trees, all scarred with wounds. We made some incisions with our *tresádos*, and the milk at once oozed out and dripped in little streams. Its taste was agreeable, much like sweetened cream, which it resembled in colour. These trees were often of great height, and from two to three feet in diameter. The trunks were round and straight, and the bark of a light colour, and not very smooth. The wood was soft, and we easily cut off a large root, which we brought away with us. The top of the seringa is not very wide-spreading, but beautiful from its long leaves, which grow in clusters of three together, and are of an oblong-ovate shape, the centre one rather more than a foot in length, the others a little shorter. These leaves are thin, and resemble in no respect the leaves of an East Indian plant, often seen in our green-houses, and called the caoutchouc. Around these trees were many of the shells (*Ampullaria*) used in dipping the gum, and also some of the mud cups, holding about half a gill each, which are fastened to the tree for the purpose of catching the gum as it oozes from the wound. We found also the fruit of the seringa. It is ligneous, the size of a large peach, divided into three lobes, each of which contains a small black nut. These are eagerly sought by animals; and although the ground was strewed with fragments, it was with great difficulty that we found a pair in good preservation. Specimens of all these things, wood, leaves, shells, cups, and seeds, we secured. The manufacture of the gum we had not yet seen, but shall describe shortly.

"At ten o'clock we stopped at an anatto-plantation, awaiting the tide, and here we saw the manufacture of rubber. The man of the house returned from the forest about noon, bringing in nearly two gallons of milk, which he had been engaged since daylight in collecting from one hundred and twenty trees, that had been tapped upon the previous morning. This quantity of milk, he

said, would suffice for ten pairs of shoes, and when he himself attended to the trees he could collect the same quantity every morning for several months; but his girls could only collect from seventy trees. The seringa-trees do not usually grow thickly; and such a number may require a circuit of several miles. In making the shoes, two girls were the *artistes*, in a little thatched hut, which had no opening but the door. From an inverted water-jar, the bottom of which had been broken out for the purpose, issued a column of dense white smoke, from the burning of a species of palm nut, and which so filled the hut that we could scarcely see the inmates. The lasts used were of wood, exported from the United States, and were smeared with clay, to prevent adhesion. In the leg of each was a long stick, serving as a handle. The last was dipped into the milk, and immediately held over the smoke, which, without much discolouring, dried the surface at once. It was then redipped, and the process was repeated a dozen times until the shoe was of sufficient thickness, care being taken to give a greater number of coatings to the bottom. The whole operation, from the smearing of the last to placing the finished shoe in the sun, required less than five minutes. The shoe was now of a slightly more yellowish hue than the liquid milk, but in the course of a few hours it became of a reddish-brown. After an exposure of twenty-four hours, it is figured as we see upon the imported shoes. This is done by the girls, with small sticks of hard wood, or the needle-like spines of some of the palms. Stamping has been tried, but without success. The shoe is now cut from the last, and is ready for sale, bringing a price of from ten to twelve *vinters*, or cents,* per pair. It is a long time before they assume the black hue. Brought to the city, they are assorted; the best being laid aside for exportation as shoes, the others as waste rubber. The proper designation for this latter, in which are included bottles, sheets, and any other form excepting selected shoes, is *borácha*, and this is shipped in bulk. There are a number of persons in the city who make a business of filling shoes with rice-chaff and hay, previous to their being packed in boxes. They are generally fashioned into better shape by being stretched upon lasts, after they arrive at their final destination."†

Specimens are here seen of those trees which yield the delicious fruits known in the West Indies

* An American *cent* is about equal to a halfpenny sterling.

† Edwards' 'Voyage up the Amazon,' chap. 18.

by the name of Sops and Custard apples. These are large fruits, very succulent, with the flesh soft, in one species (*Anona reticulata*) resembling in consistence, appearance, and taste, a custard (whence the common name); sometimes this is sweet, as in this species and the Sweet Sop (*A. squamosa*); in others agreeably acid, as in the Sour Sop (*A. muricata*), which is bigger than a child's head, with the green rind beset with soft prickles. All have a tough skin, and black seeds in the midst of the fleshy pulp. The fruit of one kind (*Anona palustris*), though beautiful and agreeable, is strongly narcotic, and therefore not generally eaten; but it forms a favourite food for the crocodiles of the West Indian marshes, and for the great yellow lizard called the Galliwasp (*Celestus occiduus*). The wood of this tree is so soft that it is used for stopping bottles, and the tree is sometimes called Cork-wood, at others Alligator apple.

But a fruit-tree of far greater renown now catches our eye and absorbs our attention. We recognise it at once, even before we read its conspicuous label, by its thick, apparently jointed twigs, and magnificent leaves rough with points, and cut into broad fringes, not less than by its great ball-like fruits, covered with warts. It is the Bread-fruit (*Artocarpus incisa*) of the Pacific Islands,—

> "That tree which in unfailing stores
> The staff of life spontaneous pours,
> And to those southern islands yields
> The produce of our labour'd fields."

Or, as another poet describes it,—

"The bread-tree, which without the ploughshare yields
The unreap'd harvest of unfurrow'd fields;
And bakes its unadulterated loaves
Without a furnace in unpurchas'd groves,
And flings off famine from its fertile breast,
A priceless market for the gathering guest."

Old Dampier, in his quaint but graphic manner, gave the first account of this fruit in 1688:—

"The bread-fruit," he says, "grows on a large tree, as big and high as our largest apple-trees; it hath a spreading head, full of branches, and dark leaves. The fruit grows on the boughs like apples; it is as big as a penny loaf, when wheat is at five shillings the bushel; it is of a round shape, and hath a thick, tough rind. When the fruit is ripe, it is yellow and soft, and the taste is sweet and pleasant. The natives of Guam use it for bread. They gather it when full grown, while it is green and hard; then they bake it in an oven, which scorcheth the rind and maketh it black; but they scrape off the outside black crust, and there remains a tender thin crust; and the inside is soft, tender, and white, like the crumb of a penny-loaf. There is *neither seed nor stone* in the inside, but all of a pure substance, like bread. It must be eaten new, for if it be kept above twenty-four hours, it grows harsh and choky, but it is very pleasant before it is too stale. This fruit lasts in season *eight months* in the year, during which the natives eat no other sort of bread-kind. I did never see of this fruit anywhere but here. The natives told us, that there is plenty of this fruit growing on the rest of the Ladrone Islands; and I did never hear of it anywhere else."*

The botanists who accompanied Captain Cook found it in greater perfection in the Society Islands, and on their return gave the most glowing accounts of its value. The British government, induced by their representations, fitted out a ship expressly to transport the living plant to the West Indian colonies. This attempt, though interrupted by

* Voyage.

the sad mutiny of a portion of her crew (a story familiar to all our readers), was at length accomplished by Captain Bligh, in 1793. Since that time the bread-fruit has been extensively cultivated in our colonies, where it furnishes a magnificent feature to the landscape, and a useful addition to the food of the inhabitants, though its value is not equal to the anticipation.

BREAD-FRUIT TREE.

We are indebted to Mr. Ellis for some interesting

particulars of the use of this fruit in its native regions of Polynesia.

THE BREAD-FRUIT.

"The general and the best way of dressing the bread-fruit is by baking it in an oven of heated stones. The rind is scraped off, each fruit is cut in three or four pieces, and the core carefully taken out; heated stones are then spread over the bottom of the cavity forming the oven, and covered with leaves, upon which the pieces of bread-fruit are laid; a layer of green leaves is placed

over the fruit, and other heated stones are laid on the top; the whole is then covered in with earth and leaves several inches in depth. In this state the oven remains half an hour or longer, when the earth is cleared away, the leaves are removed, and the pieces of bread-fruit taken out; the outsides are, in general, nicely browned, and the inner part presents a white or yellowish cellular, pulpy substance, in appearance slightly resembling the crumb of a small wheaten loaf. Its colour, size, and structure are, however, the only resemblance it has to bread. It has but little taste, and that is frequently rather sweet; it is somewhat farinaceous, but by no means so much so as several other vegetables, and probably less so than the English potato, to which, in flavour, it is also inferior. It is slightly astringent, and, as a vegetable, it is very good, but is a very indifferent substitute for English bread.

"To the natives of the South Sea Islands it is the principal article of diet, and may indeed be called their staff of life. They are exceedingly fond of it, and it is evidently adapted to their constitutions and highly nutritive, as a very perceptible improvement is often witnessed in the appearance of many of the people a few weeks after the bread-fruit season has commenced. For the chiefs it is usually dressed two or three times a-day; but the peasantry, &c., seldom prepare more than one oven during the same period, and frequently *tihana*, or bake it again on the second day.

"During the bread-fruit season, the inhabitants of a district sometimes join to prepare a quantity of *opio*. This is generally baked in an immense oven. A large pit, twenty or thirty feet in circumference, is dug out; the bottom is filled with large stones, logs of firewood are piled upon them, and the whole is covered with other large stones. The wood is then kindled, and the heat is often so intense as to reduce the stones to a state of liquefaction. When thoroughly heated, the stones are removed to the sides; many hundred ripe bread-fruits are then thrown in, just as they have been gathered from the trees, and are piled up in the centre of the pit; a few leaves are spread upon them, the remaining hot stones built up like an arch over the heap, and the whole is covered, a foot or eighteen inches thick, with leaves and earth. In this state it remains a day or two; a hole is then dug on one side, and the parties to whom it belongs take out what they want, till the whole is consumed. Bread-fruit baked in this manner will keep good several weeks after the oven is opened."*

* 'Polynes. Researches.' i. 354.

These feasts were very injurious to health and morals, and are now almost discontinued. The genus *Artocarpus* is represented by another species, the *jacka*, or jack-fruit, (*A. integrifolia*,) which grows upon a tree of a very large size, spreading out its branches like our chestnut.

"This fruit is of a very extraordinary appearance, growing to the thickness of a man's waist. It does not, like other fruits, spring from the branches, but issues from the body of the tree itself, or immediately from the root; the latter is preferred. Nothing can exceed the grotesque appearance of the body of the tree, when it is stuck all over with these immense protuberances, hanging from short stalks, which, though exceedingly tough and strong, are frequently unable to support their unwieldy burden; the fruit is therefore often obliged to be prevented from falling off by being placed in baskets of cane or cocoa-tree leaves, which are fixed to the trees, and remain there till the fruit is ripe for pulling.

"The external coat of the fruit is extremely thick and hard, of a green colour, and full of prickles. The inside of this coat is covered with a soft, white, glutinous substance, which, when touched, adheres to the fingers like bird-lime. When cut, it distils a milky, ropy kind of gum. The eatable pulp is small, when compared to the size of the fruit, while it is covered with the outer coat. It is divided into different compartments, each containing a kernel or two, of the size of a chestnut, but longer. When roasted or boiled, these kernels, in taste, very much resemble a potato. The pulp is not very agreeable to the palate of an European, having a strong smell, not unlike turpentine. The only way we could bring ourselves to eat it, was by first soaking it in a glass of salt-water. The natives eat it with much relish; and when they go upon a journey they generally travel with a bag of the kernels roasted."*

The Jack-tree is a native of the whole of eastern Asia, with the Oriental Islands, as well as Ceylon, and is generally cultivated.

Two trees are cultivated in this house, which

* Percival's 'Ceylon,' 316.

produce those spices now so indispensable in our domestic economy, the Nutmeg and the Clove. Both of these trees are natives of the Moluccas, and both have been guarded with jealous vigilance by the Dutch, who wished to retain in their own hands the monopoly of traffic in these valuable spices. Hence they endeavoured to extirpate the nutmeg from all the islands except Banda; the wild pigeons feeding on the fruit, and dropping the seeds, however, frustrated their designs, and the nutmeg has been rather widely disseminated over the Oriental Archipelago. It is now cultivated with greater or less success, not only in our own Indian possessions, but also in the Mauritius and the Antilles. Sir Thomas Raffles, speaking of the plantation at Bencoolen in Sumatra, in 1820, says, "Out of the number of one hundred thousand nutmeg-trees, one-fourth are in full bearing; and although their culture may be more expensive, their luxuriance and produce are considered fully equal to those of the Moluccas."

The Nutmeg-tree (*Myristica moschata*) is a large tree with handsome foliage. The flowers are small, and destitute of petals, but produce a fruit as large as a peach, which, when ripe, splits and discovers the spice, in the form of a porous, woody seed (the nutmeg), within a shell, and surrounded by a fleshy envelope or *arillus*, the mace.

The latter is a leaf-like network of a fine red hue, which contrasts with the glossy blackness of

the shell within it. When separated and dried, it becomes of an orange-brown, and horny and brittle in substance. Its strong, sharp, aromatic taste is well known.

The black nut is then dried in the sun, until the kernel within will rattle, as before this the shell could not be safely broken. It is closely invested by a membranous coat, which dips down into the substance of the seed, giving that peculiar appearance which resembles the borings of worms.

Two or three gatherings of nutmegs are made in the year, in April, July, and December. Agreeable as this spice is, it cannot be used safely except in very small quantities; in excess it produces oppression of the chest, intense thirst, headache, and even delirium and fatal apoplexy.

The Clove (*Caryophyllus aromaticus*) is also a handsome tree, somewhat resembling the bay in its foliage. Every part of it is highly aromatic and pungent, and its beauty and fragrance make it a favourite.

"Clove-trees," says Sir T. Raffles, "as an avenue to a residence, are perhaps unrivalled: their noble height, the beauty of their form, the luxuriance of their foliage, and, above all, the spicy fragrance with which they perfume the air, produce, on driving through a long line of them, a degree of exquisite pleasure, only to be enjoyed in the clear, light atmosphere of those latitudes."

The cloves which we use in cookery are the flower-buds, gathered before they open, and dried in the sun; their name is derived from the French *clou*, a nail, which they resemble. The lengthened part is the tube of the calyx, of which the four

radiating points are the sepals; and the round knob is the unopened corolla, enclosing the stamens.

The same selfish policy which prompted the Dutch to confine the nutmeg to Banda, induced them to extirpate the clove from all the islands except Amboyna. Here they allotted to the inhabitants four thousand parcels of land, on each of which it was expected that one hundred and twenty-five trees should be cultivated; and in 1720 a law was passed compelling the natives to make up the number: there were in consequence five hundred thousand clove-trees planted in this small island; each of which, on an average, produced annually more than two pounds of cloves, so that the aggregate produce weighed more than a million of pounds.

About 1769 the French introduced it into the Isle of France, the Isle of Bourbon, and the Seychelles, and in 1771 into Guiana. In 1798 the cultivation of this tree was commenced in Sumatra, and more recently it has been introduced into Brazil. A tree twelve years old will yield from five to twenty pounds of cloves annually; when older it may yield about sixty pounds; after which the quantity again diminishes. But as a single plant will live one hundred and fifty years, it may furnish during that time eleven hundred pounds of cloves; so that it may be imagined how valuable these spice-plantations are to their possessors.

Another of those plants already alluded to,

which produces spontaneous imitations of our laboured manufactures, is next seen. It is the Lace-bark of Jamaica (*Lagetta lintearia*); the inner bark of which, when macerated, separates into many thin layers, and these, being stretched laterally, open into a white fibrous textile material, bearing the closest resemblance to rather coarse lace. A pair of ruffles made of this native lace were presented to Charles II. by some of the inhabitants of Jamaica, and were worn by him in public. The negro belles were accustomed to make petticoats and dresses of it, for the setting off of their sable charms on those gala occasions in which they so much delight. But they knew its properties in a less agreeable manner; for the same material, twisted and knotted, made the infamous slave-whip, used by cruel negro-drivers in the dark days of servitude.

If we can without astonishment contemplate a tree making *lace*, we are scarcely prepared to hear without surprise of one that gives milk. Yet such a wonder exists, and here you may see a young and healthy specimen of it. There is not much remarkable in its appearance, except that its leaves, which are dark-green and smooth, are unsymmetrical, the midrib dividing each leaf into unequal portions. Though closely allied to the deadly Upas, it yields a wholesome fluid bearing the greatest resemblance to cow's milk, and hence well named by Humboldt, *Galactodendron utile*, "the useful milk-tree."

This eminent philosopher, who discovered the tree in the interior of Venezuela, has described it, together with the feelings it elicited in his own mind, in a passage of the most interesting character. The traveller had heard, at Porto Cabello, of a tree yielding milk, which was drunk by the natives, but it was not till he approached Valencia that he was gratified with a sight of this phenomenon, growing at a farm called Barbula.

"It is called," he says, "*the cow-tree;* and we are assured that the negroes of the farm, who drink plentifully of this vegetable milk, consider it a wholesome aliment. All the milky juices of plants being acrid, bitter, and more or less poisonous, this assertion appeared to us very extraordinary; but we found by experience during our stay at Barbula, that the virtues of the *palo de vaca* had not been exaggerated. This fine tree rises like the broad-leaved star-apple. Its oblong and pointed leaves, tough and alternate, are marked by lateral ribs, prominent at the lower surface, and parallel. They are some of them ten inches long. We did not see the flower; the fruit is somewhat fleshy, and contains one, or sometimes two nuts. When incisions are made in the trunk of the *cow-tree*, it yields abundance of a glutinous milk, tolerably thick, destitute of all acrimony, and of an agreeable and balmy smell. It was offered to us in the shell of the *tutumo* or calabash-tree. We drank considerable quantities of it in the evening, before we went to bed, and very early in the morning, without feeling the least injurious effect. The viscosity of this milk alone renders it a little disagreeable. The negroes and the free people who work in the plantations drink it, dipping into it their bread of maize, or cassava. The majordomo of the farm told us that the negroes grow sensibly fatter during the season when the *palo de vaca* furnishes them with most milk. This juice, exposed to the air, presents at its surface, perhaps in consequence of the absorption of the atmospheric oxygen, membranes of a strongly-animalized substance, yellowish, stringy, and resembling a cheesy substance.

"Amid the great number of curious phenomena which have presented themselves to me in the course of my travels, I confess there are few that have so powerfully affected my imagination as the aspect of the cow-tree. Whatever relates to milk, whatever

regards corn, inspires an interest which is not merely that of the physical knowledge of things, but is connected with another order of ideas and sentiments. We can scarcely conceive how the human race could exist without farinaceous substances; and without that nourishing juice which the breast of the mother contains, and which is appropriated to the long feebleness of the infant. The amylaceous matter of corn, the object of religious veneration among so many nations, ancient and modern, is diffused in the seeds and deposited in the roots of vegetables; milk, which serves as an aliment, appears to us exclusively the produce of animal organization. Such are the impressions we have received in our earliest infancy; such is also the source of that astonishment which seizes us at the aspect of the tree just described. It is not here the solemn shade of forests, the majestic course of rivers, the mountains wrapped in eternal frost, that excite our emotion. A few drops of vegetable juice recall to our minds all the powerfulness and the fecundity of nature. On the barren flank of a rock grows a tree with coriaceous and dry leaves. Its large woody roots can scarcely penetrate into the stone. For several months of the year not a single shower moistens its foliage. Its branches appear dead and dried; but when the trunk is pierced, there flows from it a sweet and nourishing milk. It is at the rising of the sun that this vegetable fountain is most abundant. The blacks and natives are then seen hastening from all quarters, furnished with large bowls to receive the milk, which grows yellow, and thickens at its surface. Some empty their bowls under the tree itself, others carry the juice home to their children. We seem to see the family of a shepherd who distributes the milk of his flock."*

This vegetable milk has been analyzed by various chemists, especially Mr. E. Solly, who finds in it as much as thirty and a-half per cent. of galactine.†

In these assemblages of vegetable organisms from all quarters, we pass from the deadly to the useful, from the useful back again to the deadly, so that we cannot complain of want of variety. Side by side with the bland and health-sustaining

* 'Personal Narrative,' iv. 212.

† Phil. Mag. 1837.

milk-tree stands the insidious Manchineel (*Hippomane mancinilla*), which stands, in the Hesperidan Isles of the west, the rival of the Upas of the east, in its dreadful power, causing the death of those who unwarily sleep beneath its shade.

> "If rests the traveller his weary head
> Grim Mancinella haunts the mossy bed,
> Brews her black hebenon, and, stealing near,
> Pours the curst venom in his tortur'd ear."
>
> DARWIN'S '*Botanical Garden*,' ii. canto 3.

The manchineel is a tall and handsome tree, common in the West India Islands, although pains have been taken to extirpate it. In some places it forms thick woods, as upon Sandy Island, near Tortola, to the exclusion of all other vegetation, for not a blade of grass will grow beneath its branches. The whole plant abounds in a milky juice of the most venomous description; dropped on the skin, it produces a sensation of severe burning, followed by a blister, and the fruit, when bitten, causes dangerous inflammation of the mouth. This is denied by some of the West Indian settlers, but it is undoubtedly true, according to the elder Jacquin, and to the more recent testimony of Mr. Schomburgk, who suffered severely from having tried the experiment of eating the fruit. Jacquin asserts that to sleep beneath the shade of the manchineel-tree is not dangerous, as is commonly reported. But Mr. Schomburgk says, that if rain passes through the branches and drops upon the skin of a person

below them, it produces severe inflammation, and that the dew which falls at night causes the same effects, as he saw in certain cases which came beneath his own observation; but he added that it acts differently upon different persons, he himself not suffering any inconvenience from rubbing the juice on the skin. But while the dangerous qualities of this tree are thus undoubted, it is very uncertain whether the poisonous quality which, it is believed in the West Indies, the land-crabs acquire from the manchineel-tree is really owing to that cause. Jacquin denies it, and Mr. Schomburgk could obtain no proof that it is so: all that is certain is, that land-crabs are frequently found under the shade of manchineel wood, and that these animals are often poisonous. The wood of this tree is represented to be of fine quality, handsome, and well suited for cabinet-makers' purposes.*

Again we bridge the wide interspace that divides the extremes of evil and good to examine the well-known Cocoa-nut (*Cocos nucifera*). No specimen of this valuable Palm is as yet exhibited in the great Palm House, though several examples of other noble species of the same genus may be seen there. It is probably a native of the isles of the Pacific, on the coral sands of whose low shores it springs up with its roots in the sea; but it has been spread over the whole equatorial region of the globe, with the exception of the remote

* Lindley, in Pen. Cycl.

interior of the great continents, where as yet it remains unknown. Though a handsome tree, it has a massive solidity, which contrasts with the feathery grace of many palms, but which comports well with the size and weight of the fruit which it produces in enormous clusters.

The nuts themselves are so well known as to need no description; but the manifold uses which this valuable tree subserves are perhaps less familiar to our readers. In its native regions these uses are almost innumerable.

"The roots are chewed in place of the areca-nut; gutters, drums, and the posts of huts, are formed from the trunk; the young buds are a delicate vegetable; shade is furnished by the leaves when growing, and after separation from the tree, their large size and hard texture render them invaluable as thatch for cottages; they are, moreover, manufactured into baskets, buckets, lanterns, articles of head-dress, and even books, upon which writing is traced with an iron stylus. Their ashes yield potash in abundance; their midrib forms oars; and brushes are formed by bruising the end of a leaf, with a portion of the midrib adhering to it. From the juice of the stem, a kind of palm wine, and subsequently an ardent spirit, are prepared; the farinaceous matter contained in the stem is a good substitute for sago; and a coarse, dark-coloured sugar, called *jagghery*, is obtained from inspissating the sap. This jagghery, mixed with lime, forms a powerful cement, which resists moisture, endures great solar heat, and will take a fine polish. The ripe fruit is a wholesome food, and the milk it contains, a grateful, cooling beverage; indeed, these together constitute the principal sustenance of the poorer Indians in many countries. The fibrous bark is used to polish furniture, as brushes, and to form a valuable elastic cordage, called *coir;* the fibrous matter is also employed to stuff mattresses. The shell is manufactured into drinking-vessels and vessels of measure; and, finally, the *albumen*, or white solid matter contained within the shell, yields, by pressure or decoction, an excellent oil; the former is the method usually employed. This oil is not only employed for burning, but in the manufacture of torches, and in the composition of pharmaceutical preparations; and mixed with

dammer (the resin of *Shorea robusta*), it forms the substance used in India for paying the seams of boats and ships.

"The name cocoa seems to be a contraction of the Portuguese *ma coco*, or macaco, a monkey, and to have been given from the resemblance between the end of the shell, where the three black scars are, and the face of a monkey. These three scars indicate the places through which the three embryos of the fruit, if equally and completely developed, would be protruded. But as out of the three ovules originally formed in the cocoa-nut, two are constantly abortive, it happens that one only of the scars has to fulfil its destined purpose: that one is known by its being easily pierced by a pin; the others are as hard as the rest of the shell. It is immediately below the soft scar that the embryo of the cocoa-nut is formed, and the use of the scar is to allow of a passage through the shell of the nut for the germinating embryo, which, without this wise contrivance, would be unable to pierce the hard case in which it is confined."*

Some interesting particulars concerning this palm in a cultivated state, and its products, especially toddy, arrack, and jagghery, are communicated by a writer in the Journal of Botany:—

"The *Cocoa-nut Palm*, after having been transplanted, begins to bear in from thirteen to sixteen years. It continues in full vigour for forty years, and lives for about thirty years more, but is then constantly on the decline. When the trees show flower for the first time, a trial is made by cutting a young flowering-branch, to ascertain whether it be fit for producing palm-wine. If the incision bleeds, it is fit for the latter purpose, and is more valuable than a tree whose flower-branch, when cut, continues dry and is fit only for producing nuts. The palms fit for wine are then let to the *Téars*, or *Sharars*, who extract the juice and boil it down to *jaggary*, or distil it to extract arrack. In a good soil the trees yield juice all the year; but in a poor soil they are exhausted in six months. A clever workman can manage thirty or forty trees, and pays annually for each from one to one and a half *fanam*. When the spadix, or flowering-branch, is half shot, and the *spatha*, or covering of the flowers, is not yet opened, the *Téar* cuts off its point, binds the stump round with a leaf, and beats the remaining part of the spadix with a small stick. For fifteen days this operation is repeated, a thin slice being daily

* Pen. Cycl. art. Cocos.

removed. The stump then begins to bleed, and a pot is fixed under it to receive the juice, or *Callu*, which the English call *Toddy*. Every day afterwards a thin slice is taken from the surface of the stump, which is then secured by a ligature; but after it has begun to bleed the beating is omitted. The juice is removed once a-day. If it be intended for drinking, nothing is

THE COCOA-NUT PALM.

put into the pot, and it will keep for three days. On the fourth it becomes sour, and what has not been sold to be drunk while fermenting, is distilled into arrack. In the pots intended to receive juice which is to be boiled to *jaggary*, a little quick-

lime should be put to prevent fermentation, and the juice must be boiled on the same day that it is taken from the tree. Twelve trees daily fill a large vessel with juice, which, when boiled down, gives six balls of *jaggary*, each worth one *caas*. The cocoa-nut palm, during the season that it is productive, pushes out a new *spadix* once a month; and after each spadix begins to bleed, it continues to yield freely for a month, by which time another is ready to supply its place. The old spadix continues to yield a little juice for another month, after which it withers; so that there are never more than two pots on one tree. Each of these *spadices*, if allowed to grow, would produce a bunch of nuts, containing from two to twenty. When the nuts are very numerous, they attain but an inconsiderable size, and are of little value; and from seven to ten nuts may be considered as the average produce of each bunch. Trees in a favourable soil produce twelve bunches in the year: ordinary trees give only six bunches. From this it does not appear to me that the gross average produce can be possibly calculated at less than fifty nuts a tree." *

Almost every palm in this small house is a treasure, a choice botanical gem; but the very gem of gems is the Double Cocoa-nut, or Coco de Mer of the Seychelles (*Lodoicea Sechellarum*). A plant of fabulous renown, it was long a desideratum in these gardens; but the present thriving specimen is the first that has been seen in Europe; and this only two years ago was forwarded by M. Bojer from the Mauritius. It was formerly believed that the nuts were produced at the bottom of the sea, whence they were cast up only on the shores of the Maldive Islands, the isles which produce them being then unknown. Marvellous virtues were ascribed to them, and they were sold at high prices. At present they are valued only as curiosities. The nut resembles a common cocoa-nut half split open and healed, and weighs from twenty

* 'Journ. of Bot.' ii. 24.

to twenty-five pounds; it contains a whitish jelly-like substance, which is eatable.

The appearance of the plant, here growing, is highly curious and interesting. It is very young, though strong and healthy, the stem not having yet severed its connection with the nut. The latter, which strongly reminded us in form of the two hemispheres of the human brain, is lying on the summit of an earthenware column, like a chimney-pot, filled with earth, and is thus elevated some eighteen inches above the surface of the vessel in which the plant is growing, since the nut will not germinate if buried, while it readily shoots if allowed to lie on the surface of the soil. The nut has shot out a thick germ or radicle, as stout as one's wrist, from which the fine young plant has shot downwards into the main pot, and is rearing its expanding fronds into the air, like any other palm.

The double cocoa-nut grows naturally only on one of the islands of the Seychelles group, Praslin. The inhabitants derive great benefits from it. Besides the fruit, which is eaten, though it is tasteless, the wood is used for many domestic purposes; the cabbage, which is found at the summit of the tree, though bitterer than that of the common palm, makes an excellent pickle. With a hundred of its leaves a house may be built, and the majority of the houses in Praslin are made of them. The down of the leaves is put into mattresses and pillows; the stalks are formed into

baskets and brooms; and the heart of the younger leaves is cut into narrow strips, from which hats for both sexes are made, and generally worn in the island. The fibrous covering of the nut is manufactured into ropes, and the shells are universally used as pitchers, many of them capable of containing six or eight pints: divided longitudinally they make plates and dishes for the slaves; and when small, form drinking-cups. All attempts to transplant this tree to the other islands have hitherto proved fruitless.

We must pass quickly over some plants remarkable for the magnificence of their flowers, as the Spanish Jasmines (*Plumieria*), the ornament of the South American thickets; the *Dillenia speciosa* of India, remarkable no less for the magnificence of its foliage than the splendour of its flowers; "the most splendid of all flowering trees, *Amherstia nobilis*;" the Mountain Pride (*Spathelia simplex*) of Jamaica, a tall, slender stem, with a palm-like crown of pinnate leaves, from whose centre shoots up a dense pyramid of pink blossoms, visible to an immense distance above the summit of the forest; and the curious *Napoleona imperialis*, with great disk-like flowers, of most singular structure, from the interior of Africa.

Neither can we linger on the Tropic Birch (*Bursera gummifera*), a noble tree of tropical America, whence exudes the substance known as Chibou resin; nor on the Logwood (*Hæmatoxylon Campechianum*), whose wood, producing a valuable

crimson dye, is exported in large quantities from Honduras, its native region, and from Jamaica, over which it is creeping, an insidious and ungrateful guest, to the exclusion of everything else.

Here is a specimen of the famous Teak-tree of India (*Tectona grandis*), the timber of which is so highly valued for ship-building. It grows in dense forests on the mountains of Malabar and Coromandel, but most extensively in the farther peninsula, on the banks of the Irrawaddy. Immense quantities are thence supplied to Calcutta, and other Indian ports, as well as to Europe.

From extensive experience, teak has been generally considered the most valuable timber for ship-building, and has been called the oak of the East. The wood is light, brownish-coloured, easily worked, but at the same time strong and durable. It is soon seasoned, and, from containing a resinous oil, resists the action of water, as well as insects of all kinds. It does not injure iron, and shrinks but little in width. The tree attains an enormous size, and is remarkable for its large leaves, which are sometimes two feet in length and a foot and a half in diameter, so that Oriental writers compare them to elephants' ears. In every respect this noble tree deserves it specific name of *grandis*. The foliage is used for dying silk and cotton of a purplish-red hue, and is said to be used by the Malays in cholera. Dr. Lindley says the leaves have lately been imported into London, carefully rolled up, but for what purpose is a secret.

Valuable as is the timber of the Oriental teak, however, it is said to be more than surpassed by the teak of Africa (*Oldfieldia Africana*), a tree of a different order from the former, but of similar qualities. The two species are here seen side by side. The African teak, or oak, is but recently known, though, as is often the case with vegetable products useful in the arts, it was familiar to commercial men long before it was recognised by botanists. It is now, however, known by this specimen, which was raised from seed sent from Western Africa by Mr. Oldfield, after whom it has been worthily named by Sir William Hooker.

The like may be predicated of two other plants in this collection, both of which produce substances of great commercial importance, though only recently indentified by botanists. The first is the *Xanthochymus pictorius* of India, one of the plants which yield on being punctured a yellow juice, that speedily hardens into the gum called gamboge, well known for its brilliant colour in painting, and for its drastic power in medicine. The gamboge of this tree is said to be inferior to that exported from Siam, the true origin of which is yet a matter of uncertainty.

The other is the Gutta-percha tree (*Isonandra gutta*), the concrete gum-resin from which, though only a discovery of yesterday, is now extensively employed in various arts and manufactures, and is of almost incalculable value. Scarcely a dozen years have elapsed since a few pieces of the gum

in its hardened form, and a phial full of the fluid, were forwarded from Singapore to the Society of Arts, by Dr. Montgomery. Now, immense factories for its manufacture, and great establishments for its sale, are found in every city in Europe and America, and many ships are engaged in conveying the raw material from distant India hither, and in dispersing the goods made from it over the world.

Dr. Montgomery thus speaks of his discovery of this valuable substance :—

"As far back as 1822, when I was on duty at Singapore, as assistant-surgeon to the Presidency, I had obtained the name of it while making inquiries relative to *caoutchouc*, of which there are several varieties; and some very fine specimens were brought me, particularly one called *gutta girak;* and I was told there was another variety called *gutta percha*, and sometimes *gutta tuban*, which they said was harder than the *gutta girak;* but none of it was brought to me at that time, and I lost sight of it, having returned to the Bengal Presidency. But being again sent on duty to the Straits settlements, and while at Singapore, in 1842, I on one occasion observed in the hands of a Malayan woodman the handle of a *parang*, made of a substance which appeared quite new to me. My curiosity was excited, and on inquiry I found it was made of the *gutta percha*, and that it could be moulded into any form by simply dipping it into boiling water until it became heated throughout, when it becomes as plastic as clay, and when cold regained, unchanged, its original hardness and rigidity. I immediately possessed myself of the article, and desired the man to fetch me as much more of it as he could get. On making some experiments with it, I at once discovered that, if procurable in large quantities, it would become extensively useful; and if only in small quantities, it would still be invaluable in the formation of many surgical instruments which were made of *caoutchouc*, dissolved in naphtha or other solvents, which became speedily damaged and totally useless in the damp and hot climate of the tropics. I, therefore, wrote to the Medical Board in Calcutta, strongly recommending its adoption; and sent specimens of the substance. After having examined it, the Board highly approved of my suggestion, and directed me to procure and send some of it to

Calcutta, which was done. I also addressed a communication to the Secretary of the Society of Arts, London, and sent some of the substance for investigation and analysis, for which, after my return to England, I had the honour to receive the Society's gold medal. I ascertained that the tree producing it is one of the largest of the forest, growing to the size of three or four feet diameter; that the wood is of no value as timber, but that an edible concrete oil is procurable from the fruit, and often used by the natives with their food."*

According to Dr. Oxley, the natives obtain the gutta by cutting down the trees of full growth, ringing the bark at distances of about twelve to forty-eight inches apart, and placing a cocoa-nut shell, the spathe of a palm, or such-like receptacle, under the fallen trunk, to receive the milky sap that immediately exudes upon every fresh incision. This sap is collected in bamboos, taken to their houses, and boiled, in order to drive off the watery particles and inspissate it to the consistency it finally assumes. Although the process of boiling appears necessary when the gutta is collected in large quantity, yet if a tree be freshly wounded, a small quantity allowed to exude, and it be collected and moulded in the hand, it will consolidate perfectly in a few minutes, and have all the appearance of the prepared article.

When it is quite pure, the colour is of a greyish white, but as brought to market, it is more ordinarily found of a reddish hue, arising from chips of bark that fall into the sap in the act of making the incisions, and which yield their colour to it. Besides these accidental chips, there is a great deal

* Mech. Mag. 1846.

of intentional adulteration by sawdust and other materials.

The uses to which this new material are applied with us are so familiar, that we will not enumerate them, but quote, instead, the following vivid picture of the native regions of the gutta percha tree :—

"The localities in which the trees delight are the alluvial terraces along the foot of the hills, where they flourish luxuriantly, forming, in many spots, the principal portion of the jungle. The profusion of vegetation which adorns the Indian Archipelago, and of which the gutta-percha tree forms so conspicuous a portion, can scarcely be conceived. The greater part of it is clothed to the water's edge with wood. Passing into the deep shade of its mountain-forests, trees of gigantic forms and exuberant foliage rise on every side, each species shooting up its trunk to its utmost measure of development, and striving, as it seems, to escape from the dense crowd; others, as if no room were left for them to grow in the ordinary way, emulate the shape of serpents, compass their less pliant neighbours in their folds, twine their branches into one connected canopy, or hang down, here loose and swaying in the air, or in festoons from tree to tree, and there stiff and rooted. No sooner has decay diminished the green array of a branch, than its place is supplied by *epiphytes*, chiefly of the fragrant Orchid tribe, of the most singular and beautiful forms.

"The interrupted notes of birds, loud or low, rapid or long-drawn, cheerful or plaintive, and ranging over a greater or less musical compass, are the most pleasing sounds heard; the most constant are those of insects, which sometimes rise into a shrill and deafening clangour; and the most impressive are the prolonged complaining cries of the apes called unkas. As we penetrate deeper into the forest, green and harmless snakes hang like tender branches; others of deeper and mingled colours, but less innocuous, lie coiled up, or, disturbed by the human intruder, assume an angry and dangerous look, but glide out of sight. Insects, in their shapes and hues, imitate leaves, twigs, and flowers. Monkeys, of all sizes and colours, spring from branch to branch, or in long trains rapidly retreat up the trunks. Deer, and among them the graceful *polandoh*, no bigger than a hare, and celebrated in Malayan poetry, on our approach fly startled from the pools which they and the wild hog frequent. Lively squirrels, of

different species, are everywhere met with. Among a great variety of other remarkable animals which range the forest, we may, according to our locality, number herds of elephants, the rhinoceros, tigers, the tapir, the babirúsa, the orang utan, the sloth; and of the winged tribes, the gorgeously-beautiful birds of Paradise, the loris, the peacock, and the argus pheasant. The margins of rivers and creeks are haunted by large alligators. An endless variety of fragile and richly-coloured shells not only lie empty on the sandy beaches, but are tenanted by pagurian crabs, which in clusters batten upon every morsel of fat seaweed that has been left by the retiring waves. The coasts are fringed by living rocks of beautiful colours, and shaped like trees, flowers, bushes, and other symmetrical forms."*

With some tropical fruit-trees we shall close our examination of this small, but most interesting stove. Here is the tree that produces the recently-introduced Suwarrow nuts (*Pekea tuberculosa*, called also *Caryocar butyrosum*), the kernel of which is one of the most delicious fruits of the nut kind known, and produces an oil by pressure, which is not inferior to that of olives. The tree is a native of the South American forests, where it grows to a vast size, yielding timber of great strength and durability, according to Sir R. Schomburgk.

Here also is the Mammee (*Mammea Americana*), a large and excellent fruit-tree of the West Indies. It is a noble tree, with a fruit not unlike a great russet apple. When the tough skin is peeled off, it consists of a fleshy pulp, of the colour and consistency of an apricot, very fragrant and of delicious taste, though rather unsuited to weak stomachs. It is one of the best dessert fruits of the Antilles.

* Journ. of Ind. Archipelago, No. 1.

Close beside this rears the graceful young stem of the most exquisite of all fruits, the far-famed Mangosteen (*Garcinia mangostana*). It is a native of Sumatra and the Moluccas, but has been transplanted to the surrounding regions.

"Malaya's nectar'd mangosteen."

MOORE.

It is, however, peculiarly impatient of removal; all attempts to cultivate it in the western hemisphere have been vain, nor will it fruit in the stoves of Europe.* The fruit is described as round, about the size of an ordinary orange, with a little cap on the extremity, under which it is platted into rays. The shell of the fruit, which is at first green, but changes to brown, marked with yellow spots, has some resemblance to that of a pomegranate, but is thicker and softer, and the contents are more juicy. The pulp is divided internally by thin *septa*, like those in an orange, and the seeds are lodged in the divisions. The flavour of the pulp is said to be that of the finest grape and strawberry united; but those who have tasted the fruit in perfection, and attempted to convey to others some idea of the impression that it had made on them, are not agreed as to what it resembles. Dr. Abel says that he and his companions were anxious to carry with them some precise expression of its flavour; but after satisfying themselves

* Since the above paragraph was written the Mangosteen has ripened in England, and the fruit was served up at Her Majesty's table.

that it partook of the compound nature of the pine-apple and the peach, they were obliged to confess that it had many other equally good, but utterly inexpressible flavours.

Finally we notice the Durion (*Durio zibethinus*), another Oriental fruit of renown, which is accounted next to the mangosteen; and, in the opinion of some, is superior to it. "However excellent the taste may be, the durion is revolting to those unaccustomed to it; for it has a strong smell, which is said to arise from sulphuretted hydrogen. Yet this quality is soon forgotten, after the palate becomes familiar with it. Though of the most nutritious quality, and the most dainty taste, the durion never palls upon the appetite or injures the digestion; its effects are directly opposite.

"The tree which produces the durion is about the size and sometimes in the form of a pear-tree; but the leaves are in shape like those of the cherry, only they are entire and smooth at the edges. The flowers are large, and of a yellowish white. The fruit is larger—in some of the varieties as large as a man's head; and externally, it is not unlike the bread-fruit, having a hard rind covered with warts and tubercles. When ripe, it becomes of a brownish yellow, and opens at the top; it must then be eaten fresh from the tree, as it putrefies in less than twenty-four hours.

"Internally the fruit contains five large longitudinal cells, in each of which are the seeds, about the size of pigeon's eggs, and from one to four in each cell. The remainder of the cells is filled with the pulp, which is the delicious part of the fruit. It is of the consistence of thick cream, of a milk-white colour, highly nutritious, and blending the flavour and qualities of a delicate animal substance with the cool acidity of a vegetable. This compound flavour is peculiarly its own, and cannot be imitated by any process of cookery. The Spanish *Mangia blanco*, pullet's flesh distilled with vinegar, is said to come the nearest to it.

"The durion is a particular favourite with the natives of the Eastern Archipelago; and there are many varieties of it. The

kernels, or seeds of the durion, when roasted, have nearly the same taste as chestnuts. It has not been found in a wild state; but in the countries where it will grow and ripen at all, it is easily cultivated. So highly is it esteemed, that it is the most costly fruit in the Archipelago—a single durion being worth more than a dozen of the choicest pine-apples."*

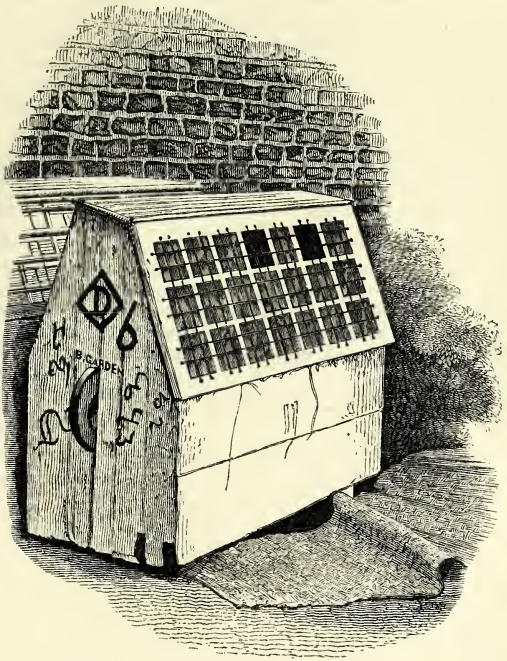
It may be interesting to learn how these delicate foreign plants are transmitted in life and health from the most distant regions of the globe. Until Mr. Ward's beautiful discovery of the growth of plants in closed cases, it was indeed a precarious matter, but by the means of this invention their safe transit is almost certain. The late Mr. Loddiges said to Sir W. J. Hooker, in speaking of the Wardian cases, "Whereas I used, formerly, to lose nineteen out of twenty of the plants I imported, during the voyage, nineteen out of twenty is now the average of those that survive."

The cases for transmission are stout, tight boxes, with a singly or doubly sloping top, like the roof of a house. This top is well glazed, and the glass is protected by a netting of strong wire. Before the glass top is fastened down, the bottom is filled with six inches of damp mould, in which the young trees are carefully planted; seeds of various kinds may be also sown in the earth, which will generally be found to have sprouted by the end of the voyage.

The case, well nailed up, is then conveyed on shipboard, and carefully lashed in some secure place *on the deck*, so that the plants may have the

* Veg. Subst. ii. 165.

advantage of light on the voyage, without the admission of air. The result is, that the plants are commonly found to be in the most healthy verdure on being opened.



PLANT CASE.

What number of plants have been *received* from abroad by this means, we know not; but some idea may be formed of the value of the invention, by

the enumeration of such as have been sent to distant countries from the Kew Gardens within the limited space of four years. Sir William Hooker states, in his Report on the Kew Gardens,

"that there have been sent abroad, mainly to our own territories, between January 1847 and December 1850, living rooted plants in glazed Wardian cases, as follows:—To Ascension Island, 330 plants (mostly trees and shrubs calculated to bear exposure to the sea-breezes and the most powerful winds, and the success of these has been beyond all expectation, affording shelter and protection, where none could be obtained before); Bombay, 160; Borneo, 16; Calcutta, 211; Cape of Good Hope, 60; Cape de Verdes, 20; Ceylon, 136; Constantinople, 90; Demerara, 57; Falkland Islands, 118; Florence, 58; Grey Town, Mosquito, 30; Hong Kong, 108; Jamaica, 124; Lima, 33; Mauritius, 36; Port Natal, 29; New Zealand, 57; Pará, 33; Port Philip, 33; St. Domingo, 34; Sierra Leone, 71; Sydney, 392; South Australia, 76; Trinidad, 215; North-west Africa, 65; West Australia, 46; Van Diemen's Land, 60; Valparaiso, 34. Total 2722, despatched in sixty-four glazed cases, besides four cases of Pará grass.—N. B. From nearly all the above-mentioned colonies or countries very rich and valuable returns have been sent, either to the Garden or the Museum, or both."*

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* Ward on Closed Cases (2nd Edit.), p. 132.

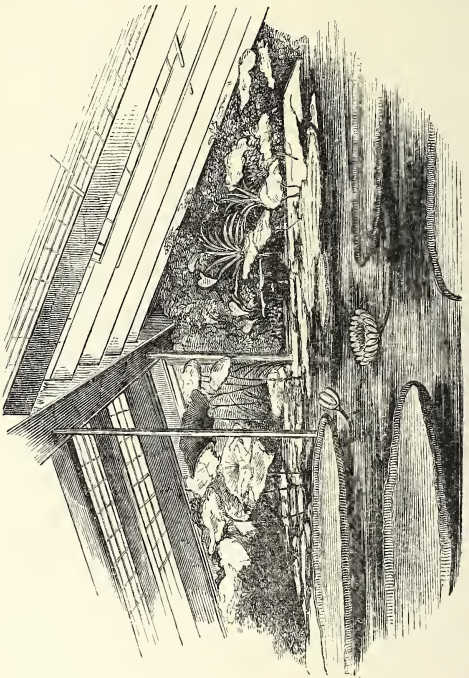
CHAPTER IX.

THE SMALL AQUARIUM.

Having emerged from the small tropical stove marked No. 16, we proceed through the open garden for a few yards in a westerly direction, when we arrive at a cluster of irregular, low stoves, marked with the numbers 3, 4, 5, and 6. The first of these is a small green-house, devoted to the protection, during the cold weather, of such succulent plants as *Crassulæ* and *Mesembryanthema*, which in summer stand in the open air. The second is a propagating house for *Orchideæ*, and is not free to the visits of strangers. The other two are filled with interesting tropical plants, worthy of our attention, and we shall consider them in inverse order, taking the southern one, which is marked 6, first.

The area of this house is occupied by a large tank of tepid water, originally formed for the reception of the *Victoria regia*. Specimens of that noble water-lily are still cultivated in it, though the finest have been transferred to the new Victoria House, already described. When we visited it last, which was in the very heart of winter (Jan.

2nd), the main plant had disappeared, and was believed to be dead; a circumstance of less value, since many seeds (like black peas) were seen



SMALL AQUARIUM.

scattered over the mud of the bottom, several of which were shooting into fine young plants.

In pots, partly plunged in the water of the tank, we saw specimens of the interesting Pitcher plant

of the remote East (*Nepenthes ampullacea*, and other species); but we defer a particular account of them for the present, as we shall have occasion to visit other kinds of more luxuriant growth, in one of the orchideous houses.

In another part of the reservoir, at the time we allude to, there was a large tuft of Rice (*Oryza sativa*), in fine condition, displaying its already ripening panicles of hard grain. These stand between oats and barley in their mode of arrangement and appearance, having the open panicle of the former, with the harsh rigidity of the latter.

Rice forms the staple food of nearly half the whole human race; being the common sustenance of the people throughout the vast and swarming regions of southern and western Asia. It is a light, wholesome, and nutritive food, abounding in starch, but deficient in gluten; hence, not capable of being made into bread. But it is a precarious crop, utterly failing if sufficient moisture be lacking, and hence, famines are of frequent occurrence in rice-eating countries. These, when they do happen, are most fatally destructive, because the people have no substitute, and consequently no resource to fall back upon, when this fails.

Rice cannot be cultivated in the open air in this country, as it requires a higher average of temperature than that of our summers. A large supply of moisture is also essential to it; in the germination of the seed, and again in the ripening of the crop, the ground should be actually

under water. The alternate flooding and draining of the fields in a hot climate is productive of effluvia which are highly detrimental to health, and hence, agues and low fevers abound in the rice districts. Still, its very prolific yield, being from thirty to sixty bushels per acre, and the possibility of obtaining two crops in a year, with the complete independence of any system of manuring, will always make rice a profitable grain in the regions which are suitable for it.

The rice plant is indigenous to India, where it grows wild, as on the borders of the lakes in the Rajahmundy Circars; but it has been cultivated from remote ages in China and the great Indian islands, and in modern times has been transported to the south of Europe, and to the southern United States, whence England is largely supplied. The circumstances of the introduction of rice into America are interesting, as showing from what small events great results may sometimes spring. A brig from the island of Madagascar happened to put in at Carolina, having a little seed-rice left, which the captain gave to a gentleman of the name of Woodward. From part of this the latter raised a very good crop, but was ignorant for some years how to clean it. It was soon dispersed over the province, and by frequent experiments and observations they found out ways of producing and manufacturing it to so great a perfection, that it is thought to exceed any other in value. The captain subsequently received a handsome gratuity from

the gentlemen of Carolina, in acknowledgment of the service he had done the province.

FIRE-PROOF PALM.

There may occasionally be seen in this tank, pots partially plunged in the water, as represented in the accompanying engraving, containing specimens of *Geonoma*. These are small South American

palms, the leaves of which are generally entire while young, and in growing, split at the tip into two equal divisions. The one here represented, for some reason unknown to us, bears the name of Fire-proof Palm.

On the side-benches that surround the tank we see, as we slowly perform the prescribed circumambulation, several small plants of interest in pots. Among them are several species of *Maranta*, and of *Calathea*, some of which are conspicuous by the striped or otherwise variegated character of their broad leaves.

These plants are often handsome, with showy flowers, and have tuberous root-stocks well filled with starch: the well-known substance called arrowroot is obtained from several of the oriental and occidental species of *Maranta*. It is procured in the following simple but effective manner.

When the roots are a year old, they are dug up, and having first been well washed in clear water, are either grated or beaten to a pulp in large wooden mortars. This pulpy substance is next thrown into a large quantity of clean water, and after the whole has been agitated for some time, the fibrous parts are collected in the hand, squeezed, and rejected. The milky liquor which remains is a mixture of the starch with water; and this, after being strained through a hair-sieve to separate such fibrous particles as yet remain, is left for some time to settle, when the water is drained off. The white pasty mass remaining at the bottom is

then again washed in water, and allowed to subside as before; and this process is sometimes repeated a third time, and even oftener by persons who wish to be exceedingly nice in preparing the powder. When this is considered to be sufficiently cleansed, it is dried on clean white cloths in the sun, and is then fit for consumption.

Other plants, with ornamentally-painted leaves, are here displayed, as some species of Dragon's-blood,—*Dracæna ferrea*, with sword-shaped leaves of dark purple, and *D. terminalis*, the foliage of which is handsomely striped with purple on a light crimson ground. But still more singular is the *Graptophyllum pictum*, whose leaves are marked with an irregularly-angular stripe of cream-colour, down the centre, on a dark-green ground; as the shape of these marks frequently bears a resemblance to the forehead, nose, and chin of a portrait in profile, the species has been called the Caricature plant.

The Cream-fruit (*Roupellia grata*), a delicious production of Western Africa, stands here, in the midst of many beautiful flowering plants, chiefly of the labiate and bignonial orders. Among these, conspicuous in loveliness, are several species of *Gesneria*, as *G. zebrina*, and *G. Herbertiana*, having round leaves of a velvety-green, with dark ribs, and great spikes of magnificent blossom, much like our foxglove in size and shape, but varied with brilliant scarlet and yellow hues. At the time we saw them (January), the attendant assured us,

these noble plants had been in profuse bloom for upwards of three months, and they were in full floral beauty still.

And here may be witnessed one of the most curious and unaccountable of the phenomena of vegetation, the apparently voluntary, or at least spontaneous, movements of the Dancing plant (*Desmodium gyrans*) of Bengal. The leaves are ternate, like those of clover, but the terminal leaflet far exceeds the lateral ones in size. It is in these leaflets that the motions take place, which have been thus described by M. Hufeland, after careful investigation. He distinguishes the motions into two kinds, which he calls voluntary and involuntary. The involuntary movements are those which take place in the large terminal leaflets, and which are only observable during the influence of the sun's rays upon the plant. Early in the morning the petiole forms an acute angle with the stem, and as the sun's rays get stronger, the leaf, which was previously pendent, begins to rise: this goes on till noon, when the leaf and the petiole are on the same plane. As the sun declines, the leaf begins to fall, and the petiole approaches closer to the stem, till at last, when night comes, the stem and petiole are parallel, and embraced by the leaf, which cannot be separated without destroying its tissues. These movements are best seen in hot weather and clear days. The passing of a few clouds over the sun will influence the movements considerably. This motion is entirely

independent of mechanical stimuli, and cannot in any way be increased by their application.

The second kind of motion in these plants, called by Hufeland voluntary, is seen in the two smaller lateral leaflets. This movement consists in the alternate rising and falling of the two opposite leaflets; when one is up the other is down. By the time the one has attained its lowest point, the other has attained its highest, and they thus both commence a contrary action at the same moment. These movements continue day and night. The rapidity with which they are effected differs according to circumstances. In the hot native climate of the plant these leaves move most rapidly.

Dr. Burnett adds, that the plant in our stoves, even under the most favourable treatment, never displays its irritability to such an extent as in its own climate. Warmth is essential, as the movements are most lively when the heat is greatest; yet that they are not attributable to the sun's rays, nor to any currents of air, is shown from the fact that the plant loves the shade, and that the motion is most evident when the stove is closed and the atmosphere quite still. These movements have more the semblance of spontaneity than any others that have been observed in the more perfect plants; for the leaflets, if held quiet between the fingers for a short time, and their movements thus prevented, are said immediately on their release to revolve with accelerated force, as if to make up for the time lost during the forcible interruption.

The last object observable in this house is an East Indian Fig (*Ficus barbata*), creeping up the wall, on the left hand of the door as you go out. Three shoots run up, clinging so close that the leaves look as if they were actually glued to the bricks, one over the other in the most regular manner. Yet, on examination, you see that the leaves do not adhere at all; the only support is that of the tiny rootlets that proceed laterally from each stem, which the leaves conceal. The appearance of the whole was so curious, with the pale growing bud peeping out from beneath the topmost leaf, that we were greatly attracted by it. The lowest part of the plant was in a pot; but, as the attendant informed us, this connexion was about to be cut off, by severing each shoot at the point where it first seized the wall. The leaves above this point, by their superior size and vigour, showed that the plant needed not its connexion with the earth, being capable of supporting itself, like a true air-plant, from the atmosphere alone, and dependent on an external body (the wall in this instance) only for fixity of position.

CHAPTER X.

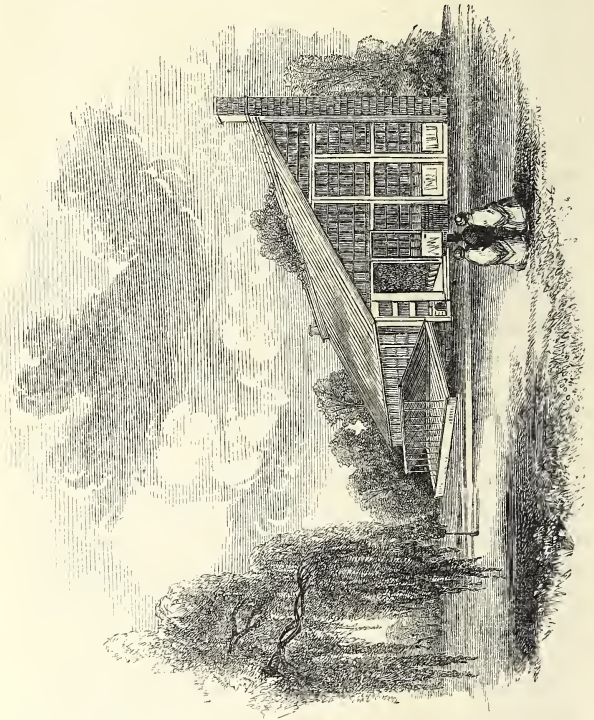
THE NEW ZEALAND AND ALOE HOUSES.

Proceeding now across the grass towards the north-west, we soon arrive at another cluster of stoves and green-houses, marked with numbers ranging from 7 to 14. These will now occupy our attention. The first of them is a house of low temperature, appropriated for the most part to plants of the southern temperate zone, and is usually called the New Zealand House, from the country which has yielded the majority of the collection.

The most striking plant in the house is the New Zealand Flax (*Phormium tenax*), a large liliaceous herb, with showy yellow flowers, and of a noble aspect, somewhat between a grass and an agave. It yields a beautiful and strong fibre, which is imported into Europe in considerable quantities for manufacturing purposes.

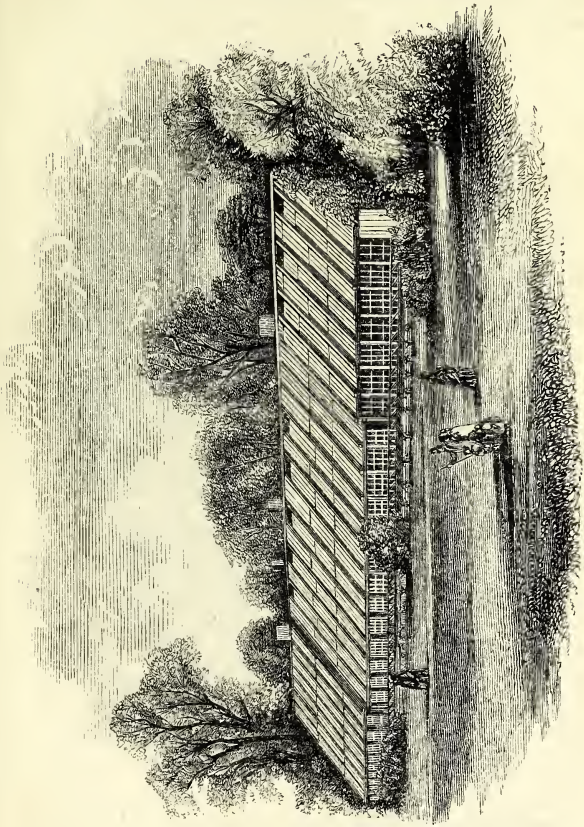
Here are young specimens of the Kauri Pine (*Dammara australis*), whose excellent timber has formed a great inducement to Europeans to visit the islands. Here also is the Aki (*Metrosideros buxifolia*), and several other species of the same

genus; shrubs with small myrtle-like foliage, that grow on the summits of other trees, and adorn them with brilliant flowers.



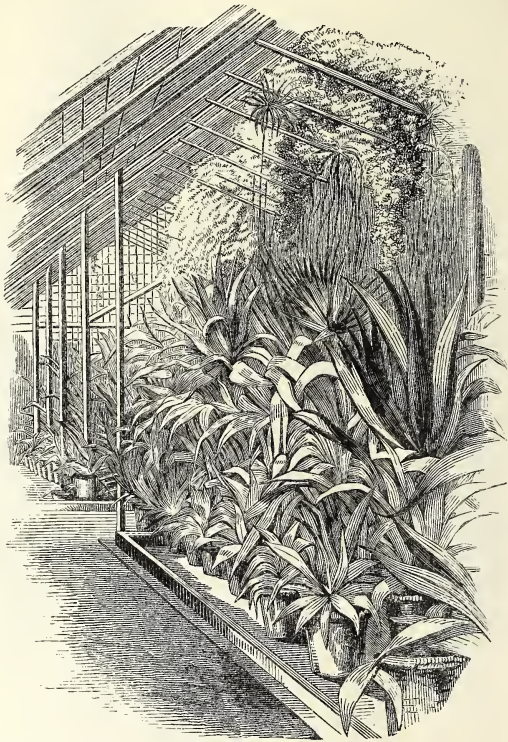
NEW ZEALAND HOUSE.

This house contains the curious beeches of Tierra del Fuego, which Darwin has immortalized in his interesting Voyage. Of the little evergreen



ALOE HOUSE.

beech (*Fagus betuloides*) he speaks as densely covering those barren regions almost to the exclusion of everything else. Ascending the summit of



ALOE HOUSE (*interior*).

a mountain, 1500 feet high, he says,—"At length we reached that which, from a distance, appeared

like a carpet of fine green turf, but which, to our vexation, turned out to be a compact mass of little beech-trees, about four or five feet high. They were as thick together as box in the border of a garden, and we were obliged to struggle over the flat but treacherous surface."* In other situations, however, it attains a large size,

Among these antarctic plants we find two valuable trees of Syria and southern Europe, the Mastich-tree, and the Carob. The former, *Pistachia lentiscus*, yields the well-known varnish-resin, *mastich*, by incision, principally in the island of Chios. The latter, *Ceratonia siliqua*, almost the only tree that grows in Malta, but growing all round the Mediterranean, especially in Syria, produces pods filled with a sweet pulp, which have been absurdly supposed to be the locusts and the wild honey (united in one) on which John the Baptist fed in the wilderness.

Near this house is one of higher temperature, divided into two compartments, devoted chiefly to the prickly and succulent lilies of the tropics, the bromelias, the agaves, and the aloes.

As we enter, the first objects that strike our attention are two tall cacti of the species called the Old Man (*Pilocereus senilis*), from the profusion of silvery hair with which they are covered. This character, however, will be better seen in the more youthful specimens which we shall by and by come to in the proper Cactus House. These specimens

* Darwin's 'Journal,' ch. x.

resemble closely-fluted columns, 15 feet high, and were sent from Mexico. In the accompanying representation one of them is seen, with a Tree Aloe (*Aloe arborescens*) behind it, and the foliage of several huge Agaves in the front.

OLD-MAN CACTUS.

The latter plants are well-known inhabitants of our own gardens, popularly believed to flower once in a hundred years, which is so far an approxima-

tion to truth, that the plant is very many years before it reaches its flowering state. When this is attained, it throws up a towering panicle of

AGAVE.

blossom with remarkable rapidity, and dies. Some of the specimens in this house are of enormous

size, and several of them are of singular aspect, from their leaves having broad and well-defined margins of yellow. One very fine species (*Agave glaucescens*) is distinguished by its thick stout leaves, which swell gracefully in the middle, being destitute of the prickles which margin those of its fellows.

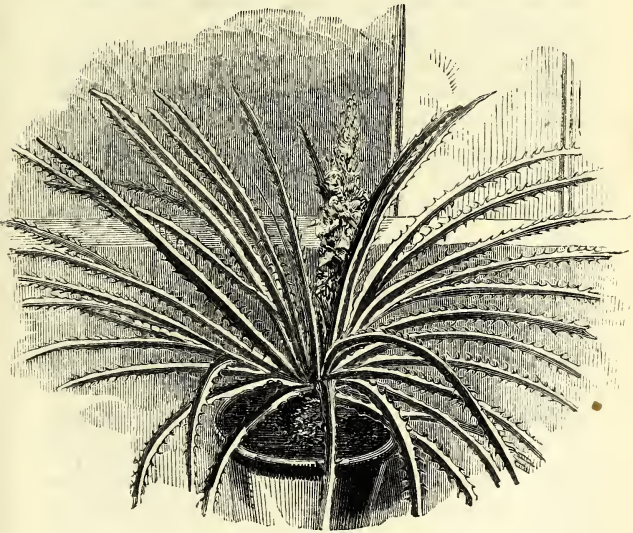
Of two plants of the same tribe (*Fourcroya gigantea*), formerly called *Agave vivipara*, of which several specimens may be here seen, Sir W. Hooker has given us some interesting particulars:—

"The two plants in question had been in the Royal Gardens, first of Hampton Court and then of Kew, probably from the earliest introduction of the species into Europe, upwards of a century ago (in 1731). On one and the same day, in the summer of 1844, each was seen to produce a flowering-stem, which resembled a gigantic head of asparagus, and grew at first at the astonishing rate of two feet in the twenty-four hours. So precisely did the twin plants keep pace with each other, that at the very time it was found necessary to make an aperture in the glass roof of the house, for the emission of one panicle of flowers (twenty-six feet from the ground), a similar release was needed by the other. The rate of growth then most sensibly diminished: still, in two months the flower-stalks had attained a height of thirty-six feet! The flowers were innumerable on the great panicles: they produced no seed, but were succeeded by thousands of young plants, springing from the topmost branches (whence the Linnæan name of *vivipara*); and these continued growing while attached to the stem for a long while after the death of the parent-plants, both of which perished, apparently from exhaustion. Our collection now, therefore, contains only young individuals of this particular *Agave*."*

Towards the western end of this division we find rigid plants, with radiating narrow leaves, for the most part formidably armed with recurving marginal spines. The *Littææ* of Mexico resemble

* 'Guide to Kew Gardens.'

dense tufts of thick rigid grass, but shoot up an immense spike of close-set blossoms, and the Grass-tree (*Xanthorrhœa hastilis*) of Australia has a similar habit. The inner leaves of this singular plant are eaten by Europeans as well as by the natives.



BROMELIA.

By mounting the narrow steps we reach the *Bromelias* of the upper platform. To this tribe belongs the delicious pine-apple of our desserts; but the species here collected, as *B. pinguin*, *B. bracteata*, &c., have not their drupes aggregated into a succulent compound fruit, but scattered

(though crowded) in a panicle of hard woody berries, extremely acid when young, but becoming sickly-sweet when old.

They are used in the West Indies to make fences, for which their quick growth and impenetrable spines well fit them, though they have a very slovenly aspect.

The western division of this house is mainly filled with true Aloes, of many species. We saw one behind the Old Man Cactus which has the peculiarity of being much branched and tree-like (hence named *Aloe arborescens*), whose tufts of leaves at the ends of its long writhing branches, with here and there a terminal spike of scarlet blossoms, give it a remarkable aspect.

All the species yield the resinous drug so well known in medicine under the name of aloes, but the species which has the reputation of producing the best is *A. socotrina*,

"a plant having, when old, a round stem three or four feet high; leaves of a sword form, a foot and a half to two feet long, sharp-edged, sawed, hard, and pungent at the apex, often collected in clusters at the top of the stem; and red flowers tipped with green, borne in clusters on tall stalks, which rise erect from among the leaves.

"This is a native of the Cape of Good Hope and the Island of Socotora, but it is now commonly cultivated in the West Indies. The processes of preparing the drug are various. Sometimes the leaves are cut off at their base, and placed in an iron vessel to drain, until they have discharged all their juice, which is then inspissated: in other places, the leaves are cut into slices and boiled for ten minutes, after which, the water in which they have been boiled is evaporated; occasionally pressure is resorted to for the purpose of procuring the greatest quantity of juice."*

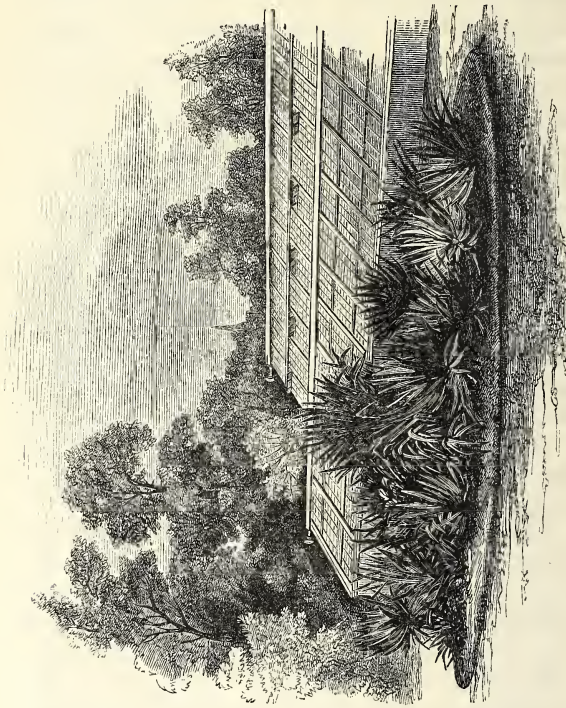
* Penn. Cycl. art. Aloe.

The side-benches of this house display many succulent plants. Those of the genus *Gasteria* are remarkable for the way in which the thick leaves expand in two opposite rows, resembling an opening pocket-book: this is best seen in *G. obtusa*. Other very thick plants, as *Haworthia*, *Echeveria*, with its brilliant scarlet bells, and its allies *Pachyphytum* and *Cotyledon* and *Kleinia*—some of which have fleshy leaves, and others stems apparently suffering under a very severe attack of the gout—lead us to the *Stapeliæ*, which any one who saw them out of flower for the first time would say were Cacti of a kind to be found in every cottage, but which expand great five-petalled flat flowers, shaped like a starfish, grotesquely spotted, and smelling like carrion. The latter peculiarity deceives the flesh-flies, which deposit their eggs on the blossoms, to the starvation and death of the poor maggots when they are hatched. The tribe, and indeed a large number of the plants of this house, are natives of Africa.

Among the *Bromelias* are some specimens of the American plants called Adam's Needles (*Yucca*); but these are mostly sufficiently hardy to bear our winters, and a circular bed of them is planted not far from the next stove (No. 9), in the open air.

The house just mentioned is not open to the generality of visitors, as it is devoted to the propagation of specimens from seeds and cuttings, or the nurture of such as are sickly or peculiarly tender. The scientific visitor, however, may

always obtain admission, on application to the very obliging and intelligent assistants who are usually at work within. The most interesting



YUCCA BED.

objects are the Doum palms of Egypt (*Hyphæne Thebaica* and *H. coriacea*), which are distinguished from all other palms by their trunk dividing into

two branches, and crowned with a tuft of foliage.

AUSTRALIAN HOUSE.

These specimens, however, are far too young to manifest any tendency to division.

We now make our way into a large greenhouse (marked No. 10), built in the form of a cross, and well stocked with the flowering plants of Australia. The *Acaciæ*, in their fragrant blossom and their curious vertical *phyllodia*, that represent true leaves, are worthy of attention. The beautiful *Epacrideæ*, which resemble the Cape Heaths, are highly attractive; and the amaranthine blossoms of the *Gnaphaliums* and *Xeranthemums*, which retain their beauty in dying, are interesting.

CHAPTER XI.

THE FERNERY.

Close to the Australian House there is a long low building, into which we no sooner enter than its hot steamy atmosphere assures us that we shall find here the denizens of the dense and humid tropical forests. It is divided into two compartments, which are numbered respectively 11 and 12, and both are mainly occupied with the Ferns of the Equatorial regions.

We are so accustomed to ferns in our woodland scenery, that no description is needful to recal their gracefully-curving leaves, and the elegant tracery into which they are often minutely cut. But it is only to those who have visited the tropics that ferns emulating the stature of the palms are familiar. There, where a saturated atmosphere prevails, especially in islands, as Jamaica, New Guinea, the Philippines, Tahiti, Pitcairn's Island, &c., the ferns form a slender stem from ten to fifty feet in height, from the summit of which the wide-spreading fronds gracefully arch on every side, often shadowing a circle whose diameter is equal to the height of the tree.

Humboldt tells us that the Bamboo and the

Tree-fern were the forms of tropical vegetation which took the strongest hold of his mind. The

FERNERY (*interior*).

former we have already described; the character of the latter, as they appear in the cool mountain-

forests of Jamaica, is expressed in the following extracts:—

"It was here that I first became acquainted with those elegant plants, perhaps more than almost any others peculiarly characteristic of tropical vegetation, the Tree-ferns. Many specimens were growing on the wooded hill, but all, I believe, of one species, *Alsophila aculeata*. I gazed upwards with peculiar delight at the minutely-fretted fronds that formed a wide umbrella of open work between me and the sky. In one respect only was I disappointed; from descriptions and figures in books, I had expected to see the tree-fern far loftier, and more palm-like than I found it. I do not think any specimen that I saw exceeded fifteen feet from the ground to the bases of the fronds; but then the expansion much exceeded my preconceptions. I should conjecture that some of these trees, covered with their arching shade a circle of nearly twenty feet in diameter. There is no very close similarity between a tree-fern and a palm in appearance: there is a remarkable lightness and voluptousness, if I may be allowed the expression, in the filagree work of the one produced by the minute subdivision of the immense fronds (of which every one may form a feeble notion from the commonest ferns of our heaths), that contrasts with the stiff, simply-pinnate or fan-shaped leaves of the palms; yet these latter have a beauty and elegance of their own.

"When the emotion produced by the first sight of these interesting plants had subsided, I still found much to admire on a more minute examination. The formidable prickles, studding the knobbed bases of the fronds, that swelled out around the summit of the trunk, like the bulging branches of a candlestick: the elongated scars on the stem, that marked the position of the fallen fronds; and especially the basal part, that looked like a mass of intertwining wire, black and shining, as if running down with the concentrated moisture of those damp woods; all were novel, curious, and pleasing."*

The same writer thus alludes to another species:—

"I will mention but one more member of this tribe, a tree-fern of peculiar beauty, that I found growing in some abundance in a spot of more than usual gloom and grandeur, far on towards Rotherwood. The species was, I believe, *Cyathea arborea*, taller

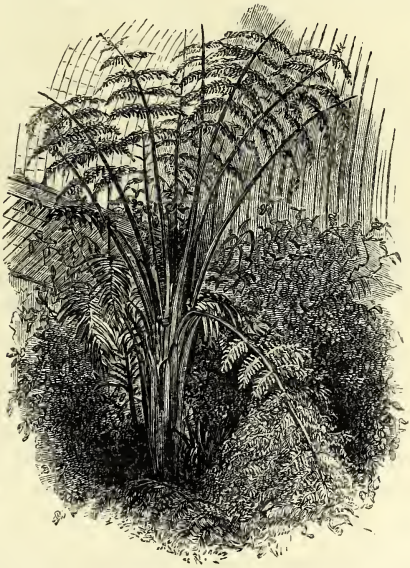
* Gosse's 'Sojourn in Jamaica,' p. 68.

and more graceful than the *Alsophila* of the mountain-brow. The slender stems, each marked with its oval, scale-like scars, and throwing out from its summit its swelling cluster of leaf-bases, so compact and so regular as to look like the elegantly-fluted knob of some cast-iron pillar, again constricted before they spread abroad in a wide umbrella of finely-cut foliage, had an imposing effect here in the rather open woods, surrounded by the naked, irregular trunks, moss-grown and studded with parasites, of the tall trees that towered up, and interwove their branches far above their heads, shutting out the sun and almost the light."*

Both of the species mentioned in these extracts are to be seen here. It is true they are comparatively small examples; for the noblest specimens of the tribe, which were kept in the Palm House, were unfortunately destroyed in the arctic weather of January 1854. The light and tender foliage of *Alsophila*, the scars on the stem of *Cyathea serra* above alluded to, the stout leaf-bases of *C. elegans*, springing from nests of pale-brown silky membrane that fringe them, and the armature of prickles with which the ribs of all of them are studded,—are highly characteristic and worthy of attention. As we walk around the side-paths, or up the central avenue, through this capital mimicry of a dense tropical "bush," we mark other forms of diverse, but equal beauty. Here is the *Didymochlœna truncatula*, with curious lobulate pinnæ, on the under surface of which the oblong spore-cases are, as it were, stuck about like seeds upon a bun. Then comes *Diplazium arborescens* from New Zealand, with rather coarse crisped foliage; and *Marattia elegans*, from the Isle of Ascension, with

* Gosse's 'Sojourn in Jamaica,' p. 137.

stout contorted branches and still coarser foliage. Finally, we notice *Lastræa villosa*, whose frond-bases are more shaggy even than those of *Cyathea elegans*, the satiny husk running far up the ribs,



CYATHEA ELEGANS.

and being very conspicuous, from its rich, deep-brown hue. The arching foliage, too, is particularly beautiful, from the regular arrangement of the spore-cases, in double rows, on the tracery of the pinnæ.

Besides these arborescent Ferns, there is here displayed a multitude of tropical species, whose

lowly habit so nearly resembles that of our native kinds, as scarcely to attract discriminative notice from the unbotanical visitors. Yet some of these are highly curious.

STAG'S-HORN FERN.

Over the entrance, and at various other parts, are specimens of the Stag's-horn Fern (*Platycerium grande*) from Australia, a most striking plant, which one may compare to the half of an enormous plump cabbage, cut perpendicularly, and glued on a board, the outer leaves growing up and expanding like stags', or rather like elks' horns. In its native country it grows on the trunks of great trees, firmly adhering to them, as it does here to

the board. The tender, delicate hue of the plump mass, and the elegant neuration, will not fail to elicit admiration.

The *Platycerium stemaria*, from Sierra Leone, is an allied species, but the great leaves are not adherent, and it is much less curious.

A very fine plant is the Oak-leaf Fern (*Drynaria quercifolia*) from the East Indies. In its mode of growth it is like the Stag's-horn; but the basal adhering fronds are in shape like enormous oak-leaves, and frequently assume a beautiful golden-brown tint; from these are thrown out widely-reaching pinnate fronds of the ordinary fern aspect.

Many beautiful ferns from Jamaica, an island particularly rich in this elegant order, are in the collection, mostly collected by the scientific industry of Mr. Purdie. Among them we recognise the great arching fronds of *Phlebodium aureum*, elegantly pinnate, and its massive twisted leaf-bases covered with golden hair that shines like silk, and its brown delicate thread-like rootlets, that cling to the grey rock-work, meandering over it like a spider's web. And several species of *Adiantum*, some hardly to be distinguished from our own much-prized Maiden-hair; others with the segments much more minute than in that species; and others again, as the noble *A. macrophyllum* and *A. trapeziforme*, with segments of large size, overlapping and gradually diminishing to the point of the frond; but all retaining the elegant triangular or trapezoidal shape so characteristic of this genus.

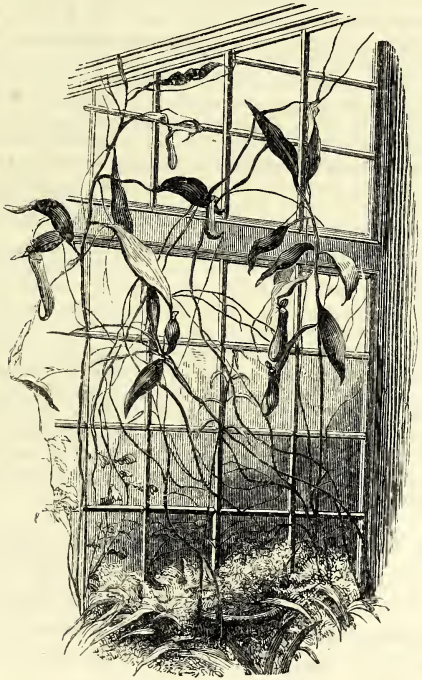
To add to the interest, the eye is everywhere refreshed with the lovely verdure of the Club-mosses (*Lycopodium*, *Selaginella*, *&c.*), which conceal the nakedness of the rough stones with their mossy carpeting.

The end of this compartment is occupied by the Indian Pitcher-plants, the species of the genus *Nepenthes*. *N. distillatoria* is one of the most singular of plants; the end of each leaf is protracted into a stalk, which, curving downwards and then upwards, bears at the end a pitcher-like reservoir, something like the bowl of a tobacco-pipe, but deeper, and narrowed at the mouth. When young, a lid like a tankard-lid covers it tightly, fitting very close; at which time the pitcher contains a quantity of water, distilled from the plant itself, which tastes like lemon-juice much diluted; but as it grows older the lid opens, and this liquor evaporates. The lid in the young pitchers looks like the head of a caterpillar of some of the larger sphinges. The pitcher is developed after the leaf is grown, and dies before the leaf; but there are always several on the plant green: their use is probably to drain off the superfluous moisture of the plant, which grows in wet, mossy situations. It is a native of Ceylon, where the liquor is drunk by the people.

Sir William Hooker furnishes some interesting particulars concerning these natural reservoirs, which are great centres of attraction to visitors.

"Nothing can exceed the sportive variety which nature has displayed in the adornment of these singular plants. Their chief

peculiarity is the urn-shaped appendage to the leaf, the use and purpose of which it is not easy to discover. Some naturalists, who think it necessary in all cases to give an answer to the question 'cui bono,' have expatiated with more imagination than truth, on the benevolent provision of these vegetable fountains for



PITCHER-PLANTS.

the refreshment of the thirsty traveller in tropical regions. Into the field of speculation it is unnecessary to enter, or to detail the superstitious ideas entertained respecting them by the ruder inhabitants of the countries in which they grow.

"The tendril hangs from the extremity of the leaf, frequently twisting itself around some neighbouring twig, and dilates at its extremity into an urn, which turns upwards in such a manner as always to preserve its perpendicularity. These urns vary in form in the different species, and are frequently tinted with the most beautiful colours. Some are long and tubular, and others are variously dilated or inflated. They are not, however, quite cylindrical, being all more or less flattened anteriorly, and some species being there furnished with two membraneous wings or fringes. The bottom of the urn is beautifully and finely punctate on the inner surface, apparently by ducts or vessels, from which the water is secreted. The margin is finely and regularly striated, and generally more highly coloured than the rest of the urn; it turns inwards, and forms a peculiar inverted rim, which is denticulated at the edge, in a manner corresponding to the striæ. By this peculiar inversion, it becomes impossible entirely to empty the cup of its water by holding it downwards, and it also forms a kind of trap for whatever enters from without, as ingress proves easier than regress, owing to the row of teeth just mentioned, which oppose themselves to it. The cups, in consequence, are almost always found full of insects that have been lured into the toils, and paid the forfeit of their curiosity. While young, the mouth of the cup is closed by an operculum, or lid, attached by a kind of hinge to the posterior angle, which opens at a certain stage, and never closes again. The young cups are about half-full of a pure, limpid, and almost tasteless fluid; but after the opening of the operculum, it soon becomes polluted with foreign matter. It has been stated that the lid shuts every night to supply the waste of fluid during the preceding day, but a very little observation shows this to be a mistake." *

The minute seeds of the capsular fruit are enveloped in a long loose tunic, which, at first, acts as a buoy, to float the seed upon the surface of the water, and afterwards as an anchor to keep it fast upon the mud, until it can have struck root.†

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* 'Comp. to Bot. Mag.' i. 269.

† 'Jameson's Journal,' April 1830.

Passing now into the other room, we find ourselves still in the midst of Ferns; many of them duplicates of such as we have already noticed, but others new. That fine Jamaica Tree-fern, *Hemitelia horrida*, displays its formidable chevaux-de-frise of spines; another species from Venezuela, *H. speciosa*, is worthy of its name, from the exquisite beauty of its simple pinnules, which have their margins cut into vandykes, and edged with a row of round spore-cases, following the indented curvatures.

We are arrested, too, by *Angiopteris erecta*, a fern of enormous dimensions, from the East Indies and Polynesia. It is not arborescent, but its great branches are as stout as one's wrist, spread over a diameter of twenty feet, springing from a huge black tuberculous centre. The foliage is very elegant, consisting of narrow lanceolate pinnules, with the margins turned down to form the spore-cases, as in our familiar brake (*Pteris*).

The Tongue-fern (*Dictyoglossum crinitum*) is a singular form, from the West Indies. The leaves are large and coarse, not cut at all; studded with harsh, pointed black hairs, with footstalks bristled like some hairy caterpillars.

Finally, we see a singular vegetable production, of which, under the name of Scythian Lamb, many fabulous stories are told. It was said, among other things, to be part animal, part vegetable, and to have the power of devouring all the other plants in its vicinity. It is in reality nothing but

the prostrate hairy stem of a fern, called *Cibotium Barometz*, which, from its procumbent position

TONGUE FERN.

and shaggy appearance, looks something like a crouching animal, just as the hairy, tawny end of

the *Trichomanes Canariensis* looks like a hare's foot, whence its English name of Hare's-foot fern. Darwin, in some fanciful verses about the barometz, attributes animal life and feeling to it:—

> "Cradled in snow, and fann'd by arctic air,
> Shines, gentle *Barometz!* thy golden hair;
> Rooted in earth each cloven hoof descends,
> And round and round her flexile neck she bends;
> Crops the grey coral moss, and hoary thyme,
> Or laps with rosy tongue the melting rime.
> Eyes with mute tenderness her distant dam,
> Or seems to bleat, a *Vegetable Lamb.*"
>
> '*Botanical Garden*,' ii. 30.

Many curious and interesting plants, besides ferns, are to be seen here. A very singular one is the *Dionœa muscipula* of North America, called Venus' Fly-trap. It is thus described:—

"The leaf, which is the only remarkable part, springs from the root, spreading upon the ground, or at a little elevation above it. It is composed of a petiole or stem, with broad margins, like the leaf of the orange-tree, two to four inches long, which, at the end, suddenly expands into a thick and somewhat rigid leaf, the two sides of which are semicircular, about two-thirds of an inch across, and fringed around their edges with somewhat rigid cilia, or long hairs like eyelashes. The leaf, indeed, may be very aptly compared to two upper eyelids joined at their bases. Each portion of the leaf is a little concave on the inner side, where are placed three delicate, hair-like organs, in such an order that an insect can hardly traverse it without interfering with one of them, when the two sides suddenly collapse and enclose the prey, with a force surpassing an insect's attempt to escape. The fringe or hairs of the opposite sides of the leaf interlace, like the fingers of two hands clasped together. The sensitiveness resides only in these hair-like processes on the inside, as the leaf may be touched or pressed in any other part, without sensible effects. The little prisoner is not crushed and suddenly destroyed, as is sometimes supposed, for I have often liberated captive flies and spiders, which sped away as fast as fear or joy could hasten them. At other times I have found them enveloped in a fluid of mucilaginous consistence, which seems to act as a solvent, the insects being

more or less consumed in it. This circumstance has suggested the possibility of the insects being made subservient to the nourishment of the plant, through an apparatus of absorbent vessels in the leaves. But as I have not examined sufficiently to pronounce on the universality of this result, it will require further observation and experiment on the spot, to ascertain its nature and importance. It is not to be supposed, however, that such food is necessary to the existence of the plant; though, like compost, it may increase its growth and vigour. But however obscure and uncertain may be the final purpose of such a singular organization, if it were a problem to construct a plant with reference to entrapping insects, I cannot conceive of a form and organization better adapted to secure that end, than are found in the *Dionœa muscipula*. I therefore deem it no credulous inference, that its leaves are constructed for that special object, whether insects subserve the purpose of nourishment to the plant or not. It is no objection to this view that they are subject to blind accident, and sometimes close upon straws as well as insects. It would be a curious vegetable, indeed, that had a faculty of distinguishing bodies, and recoiled at the touch of one, while it quietly submitted to violence from another. Such capricious sensitiveness is not a property of the vegetable kingdom. The spider's-net is spread to ensnare flies, yet it catches whatever falls upon it; and the ant-lion is roused from his hiding-place by the fall of a pebble: so much are insects, also, subject to the blindness of accident." *

Around the sides of the Fernery, including both compartments, are arranged *Begoniæ* and *Tillandsiæ*, chiefly. The former are well known for their delicate waxen blossoms, acid juices, and their large leaves, which are always one-sided, whence they are sometimes called Elephants' ears. The latter deserve a more minute description.

They are all natives of tropical America and its archipelago, where, under the name of Wild-pines, they are exceedingly common on almost every tree in the woods. They are parasites, springing from

* 'Comp. to Bot. Mag.' ii. 5.

the trunk, from the forks, and from the greater branches, which they adorn by their singular tufts of rigid-sheathing leaves, and by their gorgeously-brilliant flowers.

Many of these may be seen in blossom even in the depth of winter. We have just been charmed (at the end of January) with the glories of *Bilbergia amœna*, with broad hoary leaves banded transversely with shades of grey, and so sheathed as almost to make a tube, out of which projects a bunch of bud-like flowers, resplendent in crimson, carnation, and purple hues. Then there is *Æchmea fulgens*, a magnificent cluster of blossoms resembling berries, the flowers and stalks of fiery scarlet, tipped with the most lovely purple. And to name no more, though we might enumerate many, there is perhaps the finest of all, *Tillandsia lingulata* from Jamaica, the individual flowers of which are large, expanding, rigid, highly polished, and of a brilliant crimson hue.

The sheathing bases of the leaves in these plants form natural reservoirs for water; the rains and dews accumulating there in considerable quantities, and forming a resource for thousands of birds, and even for man himself, in the season of drought, and affording retreats, always moist and cool, for those arboreal reptiles that respire through the skin, the numerous species of Tree-toad that fill the nocturnal air with unearthly shrieks and groans.

Before we quit this house, we must notice a plant that belongs to the *Orchideæ*, a tribe to which

more than one house is appropriated, and which we shall presently consider in detail. It is the Vanilla (*V. aromatica*) of Brazil, which yields that exquisite aromatic oil that is imported into Europe to flavour liqueurs, sweetmeats, and especially chocolate. It is here seen luxuriantly trained around a frame of iron-work, well displaying its polished leathery leaves and fantastic white blossoms.

At the discovery of America, the Indians were in the habit of using vanilla for the purpose of flavouring their chocolate. As chocolate became an article of use in Europe, a demand was made upon America for this aromatic substance, although little or nothing was known of the plant that produced it till 1703, when it was described by Plumier. At the present day it forms an important article of export with the Mexicans, amounting to 30,000 or 40,000 dollars per annum.

The fruit is the only part of the plant that is used. It has a balsamic odour, and a warm agreeable flavour. For these properties it is indebted to a peculiar volatile oil, and to a considerable quantity of benzoic acid. When the fresh fruits are opened, they contain a black, oily, balsamous liquid, in which an immense number of small granules are seen floating. Before the fruit comes into the market it undergoes a preparation by which it is rendered dry. According to Aublet, the fruit is gathered when it turns yellow, and it is first allowed to ferment for two or three days; it is then laid in the sun to dry, and when about

half dried it is rubbed over with castor oil or that of cocoa: it is again exposed to the sun to dry, and oiled again a second time. The fruit is then collected in small bundles, and wrapped up in the leaves of the Indian reed, called *Canna*.

Professor Morren, of Liege, has succeeded in bringing the fruit to perfection in Europe. There had been previously a difficulty in the fruiting of the plant, owing to a physiological peculiarity of much interest. According to this botanist, the flower has this peculiarity, that the retinaculum is highly developed, so that this organ forms a curtain suspended before and above the stigmatic surface; thus separating it completely from the anther, which, in its turn, encloses in two cavities, naturally short, the pulverulent masses of pollen. From this structure, it results that all approximation of the sexes in orchideous plants is naturally impossible. It is thus necessary either to raise the curtain or to cut it, when the plant is to be fecundated, and to place in direct contact the pollen and the stigmatic surface. The fecundation never fails, and we may be convinced of its success by observing the flower some hours after the operation. If impregnation has been effected, the sepals and petals reverse inwardly, and the flower droops instead of remaining erect. So soon as the following day the ovarium elongates. The process here pointed out is a beautiful illustration of the application of physiological principles to the cultivation of plants. The process which in these climates is

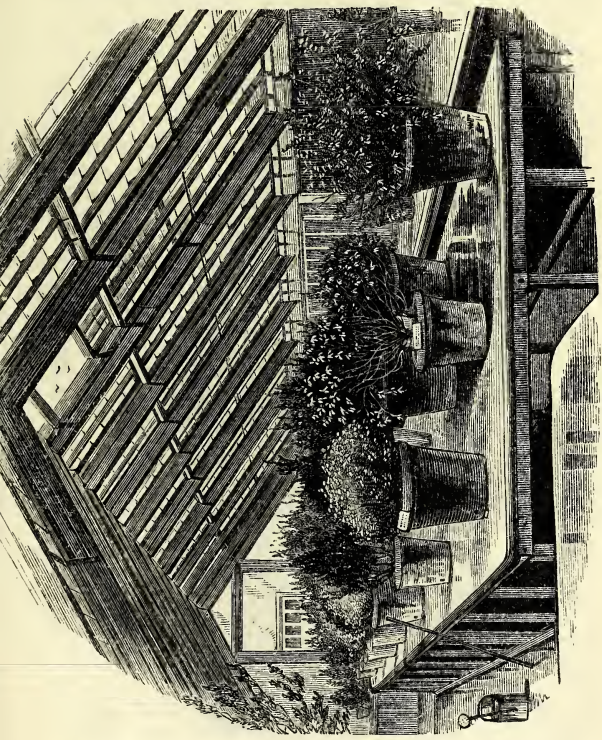
obliged to be performed artificially, is done naturally, by insects, in countries where the plants grow·

TEMPLE OF THE SUN.

On leaving the Fernery by the western door we see before us a handsome ornamental building,

surrounded by a circle of Corinthian columns, and known as the Temple of the Sun.

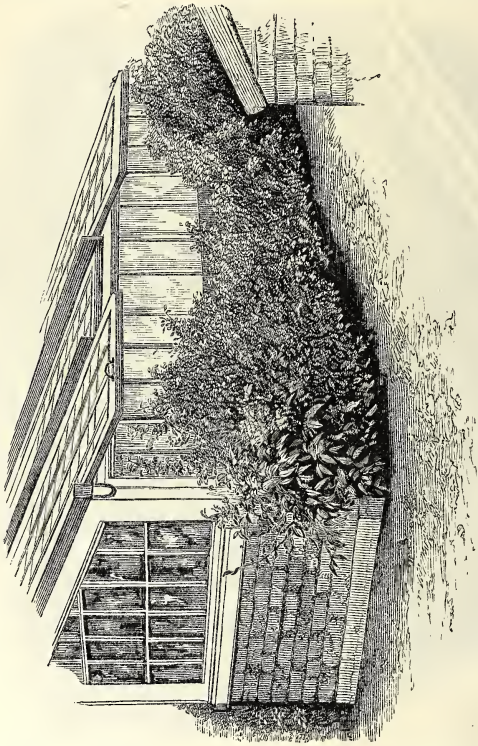
We turn to the left, and enter a greenhouse of a



CAPE HEATHS.

triradiate form, whose tables are covered with a fine collection of the Heaths (*Erica*) of the Cape of Good

Hope. That region is the great metropolis of the genus, whole tracts of country being covered with them, in all the beautiful variety of form and



TEA SHRUBS.

colour which we are now familiar with. Few plants are more generally cultivated than the Cape

Heaths, and perhaps none are more beautiful, taken as a whole. Their tubular and vase-like blossoms of membranous texture, and of the most delicate tints, are always elegant. Indeed the whole order to which they belong is beautiful, including, as it does, the *Andromedœ*, the *Menziesiœ*, the *Gaultheriœ*, the *Kalmiœ*, the *Azaleœ*, and, above all, the *Rhododendra*, which we shall have occasion presently to notice more at large, when we come to the house devoted to the exquisite plants of this genus, from the Sikkim Himalaya.

On the south side of this house, in the open air, is a row of Tea-plants from China, including the three species cultivated, *Thea viridis*, *T. bohea*, and *T. sasanqua*.

CHAPTER XII.

THE ORCHIDEOUS HOUSES.

Returning now to the stove No. 5, which we passed over in our examination of the southern group of small stoves, we may go through it; and then, passing by the Museum, proceed to another small house on the south-east of the latter, which is numbered 17. Both of these stoves are well filled with the extraordinary plants belonging to the order *Orchideæ;* and as many species are to be seen in each, and as there is no attempt to arrange them according to any plan (botanical or any other) in the two houses respectively, we may conveniently consider the two collections as one, and shall speak of them accordingly.

The finest species, and almost all without exception that (as we shall presently describe) are epiphyte in their manner of growth, are tropical, adorning for the most part the wildest glens, the gloomiest forests, the most tangled jungles, the hot and humid banks of rivers, the overhanging margins of cataracts, with their magnificent spikes of strange and vividly-coloured blossoms, and often shedding abroad a fragrance that is distinctly perceptible for many yards around.

Travellers had spoken in high terms of the

splendour of these flowers, and public curiosity was excited to possess them; but it was not till about thirty years ago that any species were successfully cultivated. At the present time it is probably no exaggeration to say, that from 1500 to 2000 species are cultivated in this country, and that upwards of 1000 species exist in more than one private collection.

The *Orchideæ* are the most curious, the most abnormal of all plants; the whole tribe is, so to speak, out of rule. They are not dwellers on the earth as other plants are; they scorn to draw their sustenance from the vulgar mould (the few exceptions are more apparent than real, in the opinion of the best botanists), but, adhering by their roots to the branches of living trees, they spread their fleshy leaves and wave their fantastic flower-spikes high in the air, deriving their nourishment from its rains and dews alone. Hence they are commonly called Air-plants, and by botanists *Epiphytes*, indicating this mode of growth *on other plants*.

No plants are greater favourites with cultivators than these: houses are built expressly for their culture, and collectors are sent to thrid the deep jungles of Demerara, Brazil, and the great Indian Isles, to procure new species for men who spend princely fortunes on them. Their peculiar charm lies in their singular and fantastic forms, often most strangely imitative of other objects, as well as in their beauty, their fragrance, and their unusual manner of growth.

"Accustomed as we are," says Mr. Bateman, in his magnificent work on the Orchideæ of Guatemala, "to look upon the animal and vegetable kingdoms as altogether distinct, our astonishment may well be awakened, when we see the various forms of the one appropriated by the flowers of the other; and yet, such encroachments are but a part of the liberties which these *Orchidaceæ* are perpetually taking; for, as if it were too simple a matter to imitate the works of *Nature* only, they mimic, absolutely mimic, the productions of *art!* But not content to rest even here, they display a restless faculty of invention, fully equal to their powers of imitation, and after having, like Shakspeare, "exhausted worlds," like him, too, they seem to have "imagined new;" and thus we find their flowers exhibiting a variety of strange and unearthly objects, such as bear no resemblance to created things, nor yet to any of the works of man. Such a host of examples of their freaks in all these departments are on record, that we scarcely know where to commence our selection; perhaps, however, it may be well to take, first, a few of the more prominent cases in which they have adopted, as their models, sundry kinds of insects, birds, beasts, fishes, and reptiles. We will begin, then, with the insects; not only because they are the class most frequently imitated, but because we may draw a portion of our illustrations from the meadows and pastures of our country, where, at the proper season, flies, bees, drones, and spiders may be seen, which really present us with very striking likenesses of the originals. From the tropics we have grasshoppers, mosquitoes, dragon-flies, moths, &c., in the greatest variety, and we have also the gorgeous vegetable butterfly of Trinidad, whose blossom, poised at the extremity of their long elastic scapes, wanton gaily in the wind, and seem impatient of that fixture by which they are differenced in kind from the flower-shaped Psyche that flutters with free wing above them. We come next to the birds, from which the *Orchidaceæ* have borrowed their swans, eagles, doves, and pelicans, to say nothing of a large assortment of wings, feathers, beaks, and bills. From the beasts they have not copied quite so freely as from the birds; yet resemblances may be traced to tigers, leopards, lynxes, bulls, rams, and monkeys, and even to man himself. In the catalogue of reptiles we find an endless variety of snakes, lizards, toads, and frogs. Of shells, likewise, there are many kinds. Then follows a mixed multitude of masks, cowls, hoods, caps, and helmets; swords, spurs, crests, spikes, arrows, and lances; whiskers, eyelashes, beards, bristles, tails, horns, and teeth; combs, slippers, buckets, towels, pouches, saddles, &c. Nor is this mimicking propensity confined to the flowers alone, being equally conspicuous in their leaves and

pseudo-bulbs, which have been likened to onions, cucumbers, bamboos, and palms; tongues, and mousetails; hooks, whips, straps, swords, and needles, &c. Of some, the leaves are inscribed with Arabic characters, of others, the roots are cased in coral."*

Vivid and playful as are the expressions of this princely cultivator, they scarcely exceed the sober truth, as his own splendid illustrations of the order prove, and as our readers will see for themselves, as they wander with observant eye through these green alcoves; especially in the first opening of spring, when the majority of species are pushing into flower. Specimens may indeed be seen in blossom, on any and every day in the year.

In order to understand the structure of these singular flowers, a word or two of explanation may be requisite. In the simplest forms we see three radiating petals (as we should call them from their shape and colour), which are, however, considered as the divisions of the calyx. Above these are three others, likewise radiating, in the interspaces of the former; of these two are frequently similar in shape, colour, and markings to the sepals, but are sometimes very diverse from them. The third, however, is always peculiarly developed; often expanded, frequently cut into various forms, twisted or rolled upon itself, so as to form a tube or cup, furnished with appendages, and formed into an immense variety of shapes; this petal is called the *lip*. The stamens and pistil are united into a thick body called the *column*, which springs from

* Bateman's 'Orchidaceæ,' Introd. p. 5.

the base of the lip, and faces its middle. The top of this *column* is (in general) occupied by a great two-lobed anther.

Let us now look at some of these wondrous objects a little more closely. Though most of them are dangling in the air, not a few are so far terrestrial that they spring from the surface of the earth, as these lovely Slippers (*Cypripedium*), one of which, the Lady's Slipper of our Cumberland woods (*C. calceolus*), is among the most beautiful of British plants. Its beauty is, however, greatly exceeded by many of the species displayed here; this exquisite one (*C. barbatum*), for instance, from Malacca. How exquisite are the leaves! in which the nerves and cross-nervures form a network pattern of dark-green upon a light-green ground. Then the flower, with its standard petal of white, striped with green and purple, wings studded with purple tubercles along their edges, and the slipper or lip of a livid purple hue. It is evidently a favourite, from the number of specimens here.

Equally beautiful is the *Phajus Tankervilliæ*, which grows wild in China and in the mountain-woods of Jamaica.* In the stove it flowers early in February, sending up from bulbs, which are partly imbedded in the earth, a noble spike of blossoms, of which the sepals and petals are white on the under surface and brown on the upper, and the elegant trumpet-shaped lip is white with a purple mouth.

* Gosse's 'Sojourn in Jamaica,' p. 137.

As we walk along the avenues we cannot but be struck with the shallow baskets of wire which are suspended overhead. These are filled with moss and turf, out of which spring many rather coarse, ovate, strongly-ribbed leaves. But what is this piercing through the bottom? It is a mass of compacted buds. Here in the next specimen these are fully expanded into a spike of large and most curious flowers, hanging downward through the bottom of the basket, where you would expect to see the roots. But what flowers! one would think them to be fantastic Indian figures modelled in wax, and representing gnomes bearing away other uncouth beings. There are several species, all of fine colours. They belong to the genus *Stanhopea*. *S. aurea* is of a golden-yellow; *S. oculata* is wax-white, the petals marked with purple rings running in lines, like some Hindoo or Tamul specimen of writing.

The magnificent *Sobralia macrantha* arrests us, for it is in flower almost through the year. This genus is one of the most remarkable in the order, with its lofty reedy stems, large lily-like flowers, and stiff plaited leaves, which resemble those of the smaller kinds of palm-tree. It is found in Peru, in Brazil, and in Mexico, where the species are among the most stately inhabitants of the bush. They are thus spoken of by Pöppig, who found four species in the first of these countries:—

"They consist of terrestrial, perennial plants, with simple roots, and stems not uncommonly growing three times as high as a man,

very rarely branched, thickly clothed with leaves. Their inflorescence consists of terminal racemes which are straight or flexuose, sometimes axillary and bifid, and loaded with snow-white, pink, crimson, or violet flowers. The lip of all the species is wrapped round the column, whence it appears as if funnel-shaped, and is bordered by a lacerated fringed edge. The species inhabit dry, sunny, rocky, and very hot places, where they often form extensive thickets."*

The prevailing species here is *S. macrantha*, which was introduced from Guatemala about a dozen years ago; it is a very free grower, and has consequently increased much, so that we see here several large "thickets" of the slender arching stems, with alternate willow-like leaves, enabling us in some measure to imagine those of which the botanist just quoted speaks. But thickets of such flowers as these! Flowers eight inches long, and as many wide, of the richest purple-crimson, and of the most elegant shape conceivable! Truly to penetrate a "cane-brake" of such reeds as these must be a thing to be remembered!

This is a subterrestrial plant, as is another of large size and luxuriant growth, the *Peristeria elata* of Mexico. It grows three or four feet high, bearing a spike of large, somewhat globular flowers of a delicate white, which look as if modelled in wax, the petals being thick and fleshy. Within the blossom the column forms a very remarkable and perfect resemblance of the head of a dove looking downward; and at each side appears a purple and spotted wing, spread and extended forward, so that

* 'Nov. Gen. et Sp.' i. 54.

the dove seems brooding over the centre of the flower. The figure is very striking indeed, and

DOVE PLANT.

has given rise, in its native country, Mexico, to a name, at which, however we may be shocked by

the profanation, yet, when we consider the superstitious nature of their religion, we cannot wonder; it is there called Espirito Santo, or, the Holy Spirit. A gentleman (Mr. Barclay) who has travelled there says that he has seen in the city of Mexico hundreds of young girls in procession on holy days, each carrying an elevated spike of these singular flowers, as a very sacred and venerated emblem. This gentleman was the means of introducing the plant into England in a rather singular manner; the leaves grow out of large, oval, fleshy bulbs, something like eggs, but green; two of these he brought across the Atlantic in his coat-pocket, hardly supposing that they would survive; but on his arrival their vegetative power was not extinct—they grew and flourished, and were soon in full blossom. The identical specimens we had the pleasure of seeing, soon after their introduction, in the magnificent collection of Mr. Loddiges at Hackney, from whom we received the above anecdote. There is another species (*S. pendula*) much resembling this, but the similitude of a dove is lost in that of an ape standing with arms stretched forward, and its colour is less pure, being spotted with purplish-brown; its odour, also, is most offensively fetid.

A great majority of Orchideæ produce bulbs (pseudo-bulbs) of the kind above mentioned. They are enlargements of the stem, and are commonly marked with diagonal lines, which are the remains of decayed leaves. These bulbs vary

greatly in form: sometimes they are oval, as just noticed; at others globular; often flattened; sometimes spindle-shaped, club-shaped, cylindrical, and occasionally constricted, so as to form a bead-like series of balls. Their use is, doubtless, to retain a stock of nourishment for the plant, during the long season of drought, when the exposed situation, at least of the epiphyte and rock-growing kinds, might otherwise exhaust the vital juices.

CATTLEYA.

The long cylindrical form of the bulb is well seen in the genus *Cattleya*, of which many species

are large and beautiful. *C. Mossiæ* is a fine example of the genus; its noble flowers in form and colour resemble those of *Sobralia macrantha;* the plant is, however, low, and the long bulbs, which are wrinkled when dry, are furnished each with one fleshy leaf.

The Oriental genus, *Dendrobium*, is one of the handsomest of the order, and many of its numerous species worthily represent it here. Perhaps the finest of all is *D. nobile*, of which the sepals and petals are greenish-white, tipped with rich purple, and the downy tube-like lip is of the same regal hue in the interior, with a pale-yellow margin. *D. moschatum*, too, is worthy of admiration; it displays a cluster of beauteous blossoms, somewhat like those of the *Cypripedium*, of a pale fleshy buff, with a rich dark interior. Its habit is somewhat reedy, but it emits bundles of roots at the joints.

The *Maxillariæ* are remarkable for the size and profusion of their flattened bulbs. Of this American genus the finest (one of the most magnificent of plants) is the *M. Skinneri* of Guatemala. The flower is seven or eight inches in diameter, consisting of three enormous sepals of white, slightly tinged with carnation; the petals much smaller, rosy white; the lip lobed with a fleshy tongue between, and of a deep crimson.

We have already alluded to the superstitious names and uses which the Spanish inhabitants of South America give to some of these flowers. But many species partake of these religious

honours. The churches, the altars, the candlesticks, the shrines in the streets, those who march in processions, and the objects which they carry, are profusely adorned with flowers, a large proportion of which are selected from this lovely order. Some of them have names assigned to them indicative of the peculiar ceremony to which they are dedicated; perhaps in some measure dependent on the concurrence of the particular festival with the season of flowering of the species. The very elegant blossoms of the Mexican *Lælice* are great favourites; the *L. autumnalis* is the Flor de los Santos, and the *L. grandiflora* is the Flor de Corpus. We have just been admiring the beauteous *L. anceps* in full flower in January, with large patent blossoms of a lovely purplish-rose colour, the lip having a yellow centre, with dark lines. The name, *double-headed*, doubtless alludes to the peculiarity of each long slender stalk, bearing the blossoms at its extremity.

Later in the season you may see the exquisite *Huntleya violacea* of Demerara. It has broad, wavy petals of the most soft but rich violet hue, "varying in intensity from deepest sapphire to the mild iridescence of opal." Sir Robert Schomburgk, who first found the species, thus speaks of it and of the scenery in the midst of which it grows, and connects its history with the lamented death of his fellow-traveller, Mr. Reiss:—

"I discovered the *Huntleya violacea* for the first time in October 1837, then on my ascent of the river Essequibo. The

large cataract, Cumaka Toto, or Silk-cotton Fall, obliged us to unload our corials, and to transport the luggage overland, in order to avoid the dangers which a mass of water, at once so powerful and rapid, and bounded by numerous rocks, might offer to our ascent. While the Indians were thus occupied, I rambled about one of the small islands, which the diverging arms of the river formed in their descent, and the vegetation of which had that peculiar lively appearance which is so characteristic in the vicinity of cataracts, where a humid cloud, the effects of the spray, always hovers around them. Blocks of syenite were heaped together; and while their black shining surface contrasted strongly with the whitish foam of the torrent, and with the curly waves beating against the rocky barriers—as if angry at the boundary which they attempted to set to the incensed element—their dome-shaped summits were adorned with a vegetation at once rich and interesting. *Heliconias, Tillandsias, Bromelias, Ferns, Pothos, Cyrtopodiums, Epidendrums, Peperomias,* all appear to struggle for the place which so small a surface afforded to them. The lofty mountains, Akaywanna, Comuti, or Taquia, and Tuasinki, recede and form an amphitheatre, affording a highly interesting scene, and no doubt the most picturesque of that part of the river Essequibo. I was attracted by a number of *Oncidium altissimum* which covered one of the rocky piles, and astonished me by their long stems and the bright colour of their flowers, when my attention was more powerfully attracted by a plant, the appearance of which, although different from the pseudo-bulbous tribe, proclaimed, nevertheless, that it belonged to that interesting family the *Orchideæ*. The specimens were numerous; and clothed almost, with their vivid green, the rugged and dark trunks of the gigantic trees, which contributed to the majestic scene around me. It was not long before I discovered one of these plants in flower. It was as singular as it was new to me. The sepals and petals of a rich purple and velvet-like appearance; the helmet, to which form the column bore the nearest resemblance, of the same colour; the labellum striated with yellow.

"In the sequel of my expeditions, I found it generally in the vicinity of cataracts, where a humid vapour is constantly suspended, and where the rays of the sun are scarcely admitted through a thick canopy of foliage. I traced the *Huntleya* from the sixth parallel of latitude to the shady mountains of the Acaria chain near the equator; but in its fullest splendour it appeared at one of the small islands among the Christmas cataracts in the river Berbice. There is a melancholy circumstance connected with the plant, which its appearance never fails to

recall to my memory. Their singular beauty at this spot induced my friend Mr Reiss, who accompanied me as a volunteer during the unfortunate expedition up the river Berbice, to draw and paint it on the spot. He was yet occupied with this task when the last of our canoes was to descend the dangerous cataract. He arose from his occupation, desirous to descend with the Indians in the canoe, although against my wish, but he persisted. The canoe approached the fall—it upset—and of thirteen persons who were in it at the time, he was the only one who paid the rash attempt with his life. He is now buried opposite that island, the richest vegetable productions of which it was his last occupation to imitate on paper and in colours.

"It appears easy of cultivation, although the first plants which I sent to England, to Messrs. Loddiges, appear to have perished. I was more fortunate with other transports; and I saw lately among the splendid collections of my kind friend, Mr. George Barker, at Springfield, *Huntleya* in blossom, the flowers of which could boldly vie with any in their native country. A humid atmosphere and shade are the distinguishing features of their habits." *

Mention is made in the preceding extract of *Oncidium altissimum*, a species remarkable for its thick, large, fleshy leaves, and for the enormous length to which its flower-stem extends, frequently eight or ten feet, with an immense panicle of loose blossoms. The flowers are yellow, spotted and blotched with orange-brown, as are very many of this great American genus; the petals are generally broad, twisted and wrinkled, the lip especially.

But the most celebrated of this genus is the Butterfly-flower of Trinidad (*Oncidium papilio*). The leaves, springing as usual from pseudo-bulbs, are large and oval, beautifully marbled with red and green; slender-jointed flower-stalks stretch up to the length of six feet from amidst the leaves,

* Lindley's 'Sertum Orchid.' pl. xxvi.

bearing a flower of most singular shape. It is called Papilio (Butterfly), and the general resemblance, as the flower waves and flutters at the end of its long vibrating stalk, is sufficiently true; but when examined, the similitude in form is much greater to one of the curious flat Bugs of the genus *Coreus*. The thorax and dilated abdomen of these insects are perfectly represented, and two long petals answer for wings extending diagonally from the thorax. Two long filamentous petals serve wondrous well for antennæ, and there is a central one (the upper sepal) which must either be considered supernumerary, or else represent the sucker extended forward, as it sometimes is. The colour of this flower is bright lemon-yellow mottled with orange.

There is another plant, which bears the name of the East Indian Butterfly (*Phalænopsis amabilis*). This is a native of Manilla, and is a very lovely object. The petals and sepals are broad and pointed ovate, and being of the purest white, they resemble a delicate white moth or nocturnal butterfly.

The *Odontoglossum grande*, from Guatemala, is much like an *Oncidium*, but far more noble. The plant is rather small, but the blossoms are very broad and appear as if varnished; they are lemon-yellow with orange clouds; the lip is marked with orange crescents, and the column is rich golden-yellow with orange marks. These blossoms, when in perfection, are six inches across, and there are

sometimes thirty flowers on one plant; so that it has a most splendid appearance.

Other species here represent other insects. The *Brassiæ*, with long linear yellow or white petals, radiating and crossing each other in all directions, look like a multitude of long-legged spiders sprawling over each other; and *Spiculæa ciliata*, with its rusty spreading blossoms, may be compared to the same insect—the lip, with a long, solid lamina, looking like the body, while an appendage at the apex, which is moveable, is not unlike the head of the same unwelcome creature.

Darwin fancifully alludes to the petals and lip of the *Cypripedium*, as terrifying the Humming-bird, by their resemblance to the limbs and bloated body of the great spider, which was formerly believed to prey on this tiny bird.

"So where the humming-bird in Chili's bowers,
On murmuring pinions robs the pendant flowers;
Seeks where fine pores their dulcet balm distill,
And sucks the treasure with proboscis-bill;
Fair *Cypripedia*, with successful guile,
Knits her smooth brow, extinguishes her smile;
A spider's bloated paunch and jointed arms
Hide her fine form, and mask her blushing charms;
In ambush sly the mimic warrior lies,
And on quick wing the panting plunderer flies."

'*Botanical Garden*,' i. 204.

In some of the *Epidendrums* of the West Indies, we find the lip taking the form of a shell, marked in its concavity with crimson lines in the sweet-smelling *E. fragrans*, and in *E. cochleatum*, blotched with purple and green.

Perhaps the most successful mimicry in the whole tribe is the representation of a swan, by the genus *Cycnoches*. In some of the species of this American genus, as *C. ventricosum*, the sepals and petals represent the body of a swan with raised opened wings, in the manner of that elegant water-fowl, as described by our immortal poet, when she—

> "—— with arched neck
> Between her white wings mantling, proudly rows
> Her state with oary feet."

And the arched neck itself is given to the life, by the long, slender, curving column, with an enlarged extremity to mimic the fowl's head.

Other species are more fantastic, though less identifiable. Thus, so uncouth is the aspect of *C. maculatum*, that even the sober scientific botanist, Dr. Lindley, is involuntarily betrayed for a moment into such terms as the following, in describing this strange species :—

"Had such a plant as this flowered near London twenty years ago, it would have afforded subject of conversation among botanists and the lovers of botany for a fortnight, which is a long time for anything to retain its interest in London; but now so familiar have become the faces of the strange epiphytes of the tropics, that it only excites a passing glance of admiration, except among *the few*.

"Surely it is one of the most curious productions of nature in her wildest mood. Did any one ever see such a flower before? Which is the top, which is the bottom? What are we to call that long club-foot? which is cloven too; and what the crooked fingers dabbed with blood, which spread from the middle of one of the leaves, as if about to clutch at something? And what, moreover, *can* they all be *for*? Such knotty points as these we commend most heartily to some of our German friends for their

solution; while we sink back into the accustomed prose which so much better suits the inquiries of science."*

But there is about this genus a marvel and a mystery greater than its imitative powers. The same plant is found to produce, at different times, flowers so unlike, that they had been assigned even to different genera, as described by Mr. Bateman in the following words:—

"Among Mr. Skinner's earliest Guatemala collections, attention was particularly directed to the specimens of a plant which, to the habits of a *Cycnoches*, joined the long pendulous stems of a *Gongora;* and for the possession of which in a living state, no small anxiety was entertained. Some plants were speedily transmitted by Mr. Skinner, but these, on flowering, proved to be merely the old *C. ventricosum*. A mistake was of course suspected; and Mr. Skinner sent over a fresh supply of plants, for the authenticity of which he vouched; but these were scarcely settled in the stove, when flowers of *C. ventricosum* were again produced. Mr. Skinner, being importuned for the third time, and being then on the point of returning to this country, determined to take one of the plants under his special protection during the voyage, which, flowering on the passage, seemed to preclude the possibility of further confusion or disappointment. The specimens produced at sea were exhibited, and the plant itself placed in the stove at Knypersley, where it commenced growing with the utmost vigour. The season of flowering soon arrived, but brought with it a recurrence of the former scene of astonishment and vexation; for the blossoms, instead of those of the coveted novelty, were not distinguishable from the old *C. ventricosum*. These were still hanging to the stem, when the inexplicable plant sent forth a spike of a totally different character, and which was, in fact, precisely similar to the specimens gathered in Guatemala, and to those produced on the voyage."†

Sir R. Schomburgk found in Demerara the flowers of *Monachanthus*, *Myanthus*, and *Catasetum*,

* 'Sertum. Orchid.' pl. xxxiii.
† Bateman's 'Orchid. of Guat.' pl. xl.

three supposed genera, growing on the same spike, and a similar specimen has flowered in the conservatory of the Duke of Devonshire. "Such cases," as Dr. Lindley observes, "shake to the foundation all our ideas of the stability of genera and species; and prepare the mind for more startling discoveries than could have been otherwise anticipated."

In speaking of *Vanilla*, a curious fact was mentioned in connection with the physiology of impregnation. One not less curious, though as it appears less peculiar, was remarked by Mr. Buller, of Exeter, who found that on accidentally bruising the anther of *Peristeria elata*, the Dove-plant above described, the flower drooped at once, and died in two days, though the rest of the blossoms remained fresh for two months.

On the fact thus recorded, Professor Lindley makes the following observations:—

"The circumstance alluded to by Mr. Buller is a singular phenomenon common in the whole Orchidaceous order. He found that when the anther was disturbed, the flower quickly died. This was not because the anther was removed, but because in removing the anther the pollen was brought into contact with the stigma, and thus the act of fecundation was accomplished. In general, from the absence of insects or of those other disturbing causes to which *Orchidaceæ* are exposed in their native places, the pollen cannot come into contact with the stigma; and so as long as this is prevented the flowers of many species will retain their freshness for weeks, as if in expectation of that event for which they were created. But as soon as this act of fecundation is accomplished, that is to say, from twelve to twenty-four hours after the pollen touches the stigma, the flowers collapse, the bright colours become dim, the ovary begins to enlarge, and the beauty of the flower is gone."*

* 'Sertum. Orchid.' pl. xxix.

Among the many plants in this collection which delight the eye by their general effect, very conspicuous is the Air-plant of China (*Aerides*), which in the latter part of winter throws out a great compact spike of the most lovely white blossoms, slightly tinged with carnation.

The continent of Africa presents us with very few plants of this order; there is, however, one of much beauty in blossom at the same unpropitious season, *Ansellia Africana*, whose petals are white, dabbed as it were with blood, with a large yellow lip.

A little plant deserves to be mentioned in this list of beauties, not for its flowers (for these we have never seen), but for its leaves. It is a native of Ceylon, where it is called by the Cingalese the King-plant, and by botanists *Anœctochilus setaceus*. It is a pretty little plant, apparently very delicate, for it is always kept under a bell-glass, even in the hothouse. The two opposite leaves are elegantly heart-shaped, of a deep rich greenish-brown hue, and velvety appearance, with pale-brown nervures, which being numerous and minute, have a very beautiful appearance, somewhat like the pale network in the wings of some black-winged dragon-fly.

One hardly expects to find these inhabitants of hot and humid forests, growing on lofty mountain-ranges; yet Dr. Hooker speaks of the *Orchideæ* of the Himalayas, in terms which almost tempt one to start on a race for the possession of the golden

fleece. Two hundred and fifty kinds he found in the Khasia mountains, outnumbering those of any other natural order, and forming a very large proportion of the flora. The passage is highly interesting, as bearing on the artificial cultivation of these lovely flowers, and as giving hope that we may possibly see them naturalized in our open gardens.

"Near the village of Lernai oak-woods are passed, in which *Vanda cærulea* grows in profusion, waving its panicles of azure flowers in the wind. As this beautiful orchid is at present attracting great attention from its high price, beauty, and difficulty of culture, I shall point out how totally at variance with its native habits, is the cultivation thought necessary for it in England. The dry grassy hills which it inhabits are elevated 3000 to 4000 feet: the trees are small, gnarled, and very sparingly leafy, so that the *Vanda*, which grows on their limbs is fully exposed to sun, rain, and wind. There is no moss or lichen on the branches with the *Vanda*, whose roots sprawl over the dry rough bark. The atmosphere is, on the whole, humid, and extremely so during the rains, but there is no damp heat, or stagnation of the air, and at the flowering season the temperature ranges between 60° and 80°; there is much sunshine, and both air and bark are dry during the day: in July and August, during the rains the temperature is a little higher than above, but in winter it falls much lower, and hoar-frost forms on the ground. Now this winter's cold, summer's heat, and autumn's drought, and, above all, this constant and free exposure to fresh air and the winds of heaven, are what of all things we avoid exposing our orchids to in England. It is under these conditions, however, that all the finer Indian *Orchideæ* grow, of which we found *Dendrobium Farmeri*, *Dalhousianum*, *Devonianum*, &c., with *Vanda cærulea;* whilst the most beautiful species of *Cælogyne*, *Cymbidium*, *Bolbophyllum*, and *Cypripedium*, inhabit cool climates, at elevations above 4000 feet in Khasia, and as high as 6000 to 7000 in Sikkim.

"On the following day we turned out our *Vanda* to dress the specimens for travelling, and preserve the flowers for botanical purposes. Of the latter we had 360 panicles, each composed of from six to twenty-one broad, pale-blue tesselated flowers, three

and a half to four inches across: and they formed three piles on the floor of the verandah, each a yard high: what would we not have given to have been able to transport a single panicle to a Chiswick fête!"

In a note to the above the Doctor adds:—

"We collected seven men's loads of this superb plant for the Royal Gardens at Kew; but owing to unavoidable accidents and difficulties, few specimens reached England alive. A gentleman who sent his gardener with us to be shown the locality, was more successful: he sent one man's load to England on commission, and though it arrived in a very poor state, it sold for 300*l.*; the individual plants fetching prices varying from 3*l.* to 10*l.* Had all arrived alive, they would have cleared 1000*l.* An active collector with the facilities I possessed, might easily clear 2000*l.* to 3000*l.* in one season, by the sale of Khasia orchids."*

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* 'Himal. Journals,' ii. 321.

CHAPTER XIII.

THE RHODODENDRON HOUSE.

One of the many beneficial results to science from Dr. Joseph Hooker's admirable explanation of the Himalaya mountains, has been the enriching of the gardens and conservatories of Europe with a multitude of beautiful and valuable plants before unknown. Of these, none are more conspicuous than the *Rhododendrons*, which this enterprising traveller found constituting a large part of the vegetation of that elevated region.

The old *R. ponticum* has long been a general favourite, being cultivated even in the smoky gardens of London in great abundance; and the true *Rhododendron* (*R. arboreum*) of India, formed a noble object in our conservatories, and a few other species, with hybrids, were esteemed for their beauty. But through the researches of Dr. Hooker, species of far greater loveliness have been introduced, and some sufficiently hardy to endure our northern winters in the open air.

In his interesting Himalaya Journals, this traveller frequently speaks of the prevalence of the tribe before us. Thus when encamped on the

river Zemir, in Sikkim, at an elevation of 12,000 feet, he writes,—

"Rhododendrons occupy the most prominent place, clothing the mountain-slopes with a deep green mantle, glowing with bells of brilliant colours; of the eight or ten species growing here, every bush was loaded with as great a profusion of blossoms as are their northern congeners in our English gardens."*

The following note gives us a *coup d'œil* of the whole splendid tribe, with their associates, as they appear in their own lofty solitudes.

"It was on the ascent of Tonglo, a mountain on the Nepalese frontier, that I beheld the Rhododendrons in all their magnificence and luxuriance. At 7,000 feet, where the woods were still dense and subtropical, mingling with Ferns, *Pothos*, Peppers, and Figs, the ground was strewed with the large lily-like flower of *R. Dalhousiæ*, dropping from the epiphytal plants on the enormous oaks overhead, and mixed with the egg-like flowers of a new magnoliaceous tree, which fall before expanding, and diffuse a powerful aromatic odour, more strong, but far less sweet, than that of the *Rhododendron*. So conspicuous were these two blossoms that my rude guides called out, 'here are lilies and eggs, sir, growing out of the ground!' No bad comparison. Passing the region of tree-ferns, walnut and chestnut, yet still in that of the alder, birch, large-leaved oak (whose leaves are often eighteen inches long), we enter that of the broad-spathed *Arum* (which raises a crested head like that of the Cobra de Capello), the *Kadsura*, *Stauntonia*, *Convallaria*, and many *Rosaceæ*. The paths here are much steeper, carried along narrow ridges or over broken masses of rock, which are scaled by the aid of interwoven roots of trees. On these rocks grow *Hymenophylla*, a few *Orchideæ*, *Begonia*, *Cyrtandraceæ*, *Aroideæ* of curious forms, the anomalous genus *Streptolirion* of Edgeworth, and various *Cryptogamia*; and the *Rhododendron arboreum* is first met with, its branches often loaded with pendulous mosses and lichens, especially *Usnea* and *Borrera*. Along the flat ridges towards the top, the yew appears, with scattered trees of *Rhododendron argenteum*, succeeded by *R. Campbelliæ*. At the very summit the majority of the wood consists of this last species, amongst which, and next

* 'Himal. Journals,' ii. 58.

in abundance, occurs the *R. barbatum*, with here and there, especially on the eastern slopes, *R. Falconeri*. Mingled with these are *Pyri*, *Pruni*, maples, berberries, and azaleas, *Olea*, *Ilex*, *Limonia*, *Hydrangea*, several *Caprifoliaceæ*, *Gaultheria* and *Andromeda*; the apple and the rose are most abundant. *Stauntonia*, with its glorious racemes of purple flowers, creeps over all; so do *Kadsura* and *Ochra*; whilst a currant, with erect racemes, grows epiphytally on *Rhododendron* and on *Pyrus*.

"The habits of the species of *Rhododendron* differ considerably; and confined as I was to one favourable spot by a deluge of rain, I had ample time to observe four of them. *R. Campbelliæ*, the only one in full flower early in May, is the most prevalent, the ropes of my tent spanning an area between them. Some were a mass of scarlet blossom, displaying a sylvan scene of the most gorgeous description. Mr. Nightingale's Rhododendron groves, I thought, might surpass these in form and luxuriance of foliage, or in outline of individual specimens; but for splendour of colour those of the Himalaya can only be compared with the *Butea frondosa* of the plains. Many of their trunks spread from the centre thirty or forty feet every way, and together form a hemispherical mass, often forty yards across, and from twenty to fifty feet in height! The stems and branches of these aged trees, gnarled and rugged, the bark dark-coloured and clothed with spongy moss, often bend down and touch the ground; the foliage, moreover, is scanty, dark green, and far from graceful; so that, notwithstanding the gorgeous colouring of the blossoms, the trees when out of flower, like the *Fuchsias* of Cape Horn, are the gloomy denizens of a most gloomy region. *R. Campbelliæ* and *R. barbatum* I observed to fringe a little swampy tarn on the summit of the mountain,—a peculiarly chilly-looking small lake bordered with *Sphagnum*, and half-choked with *Carices* and other sedges: the atmosphere was loaded with mist, and the place seemed as if it would be aguish if it could, but was checked by the cold climate. *R. barbatum* has almost passed its flowering: it is a less abundant and smaller tree than the last mentioned, but more beautiful in the brighter green and denser foliage, and the clear, papery, light-coloured bark, the whole forming a more picturesque mass."

The magnificent species which is dedicated to Lady Dalhousie (*R. Dalhousiæ*) is the noblest of the genus, and the most aberrant. It is an epiphyte, being always found growing, like the *Orchideæ*,

among mosses and ferns, upon the trunks of large trees, especially oaks and magnolias, at an elevation of from 7000 to 10,000 feet. In this particular, in the fragrance of its noble white blossoms, in its slender habit, in the whorled arrangement of its branches, and in the length of time during which it continues in flower in its native regions, viz., from April to July, it differs from all its fellows of the same genus that inhabit Northern India. The flowers are four inches in length and four in diameter, with a broad trumpet lip. Their colour is pure white, assuming a delicate rosy tinge as they become old, and sometimes becoming spotted with orange. They have an odour which resembles that of the lemon.

Of this and the following species, Dr. Hooker writes from Dorjiling, 7000 feet above the sea :—

"On the branches of the immense purple-flowered magnolia (*M. Campbellii*) and on those of oaks and laurels, *Rhododendron Dalhousiæ* grows epiphytally, a slender shrub bearing from three to six white lemon-scented bells, four and a half inches long and as many broad, at the end of each branch. In the same woods the scarlet Rhododendron (*R. arboreum*) is very scarce, and is outvied by the great *R. argenteum*, which grows as a tree forty feet high, with magnificent leaves twelve to fifteen inches long, deep-green wrinkled above and silvery below, while the flowers are as large as those of *R. Dalhousiæ* and grow more in a cluster. I know nothing of the kind that exceeds in beauty the flowering branch of *R. argenteum*, with its wide-spreading foliage and glorious mass of flowers."*

The latter, which is nearly equal to *R. Dalhousiæ* in the size of its blossoms, and perhaps superior to it in other respects, is another white-flowered

* 'Himal. Journals,' i. 126.

species. It is, as described above, a tree with large massive leaves, of a silvery tint beneath. When young they are exquisitely beautiful, being encased in long flesh-coloured cones of large scales of very ornamental appearance. The flowers are three inches long, forming a compact, globose head. They secrete a large quantity of honey, which is said to be poisonous, as is also that of *R. Dalhousiæ*.

This phenomenon, which is repeatedly mentioned by Dr. Hooker, will remind the classical reader of the fatal effects described by Xenophon in the Retreat of the Ten Thousand. The Greeks, after partaking of honey on the borders of the Euxine, fell, stupefied, in every direction, so that the ground looked like a battle-field covered with corpses. The cause had long ago been traced to the flowers of our common *R. ponticum;* and though *Azalea pontica*, a kindred plant of the same region, may share the infamy, these facts of Dr. Hooker's go far to confirm the first supposition, which has been denied.

Goats browsing on the plant are frequently poisoned, and the very same thing is stated to occur in the Himalaya; for Dr. H. says:—

"In these regions many of my goats and kids had died foaming at the mouth and grinding their teeth; and I here discovered the cause to arise from their eating the leaves of *Rhododendron cinnabarinum:* this species alone is said to be poisonous; and when used as fuel, it causes the face to swell and the eyes to inflame, of which I observed several instances."*

* 'Himal. Journals,' ii. 150.

Another very showy tree, also white-flowered, is *R. Falconeri*. The trunks are often two feet in diameter, and several spring from the same base. The leaves are very striking objects, being a foot in length, and half as wide, with thick footstalks; their upper surface is glossy green, and the whole under side covered with rust-red down, with a reticulation of green nervures. The flowers make a beautiful compact globe. Dr. Hooker considers this one of the most striking of the genus.

R. Aucklandii is a small bush from four to eight feet high, but in the splendour of its patent white flowers it equals, or even excels, *R. Dalhousiæ*. They have, however, no fragrance.

Two others of the white-blossomed group, *R. Maddeni* and *R. Edgeworthii*, are eminently noble in the great size and beauty of their flowers. Both have foliage, with the under surface rusty, a character which, by the agreeable contrasts of colour with the rich green above, perpetually displayed in various modes by the motion of the leaves with the wind, imparts a great charm to plants. In the latter species the effect is greatly heightened by the young branches and twigs, the young leaves and the leaf-buds being clothed with a dense down of a pale yellowish rusty hue; while the flowers, which, in size and form are little inferior to those of *R. Dalhousiæ*, are elegantly streaked and tipped with rose, and are seated on rose-tipped calyces.

Then comes a group with pale-yellow flowers,

of which decidedly the prince is *R. Wightii*, with its fine ball of large straw-coloured blossom, each elegantly bell-shaped, and dotted with crimson, and with whorls of large leathery leaves, deep-green above and pale-red below. It is a small tree.

R. campylocarpum is also beautiful, and Dr. Hooker seems to give it a place above the preceding, for he describes it as "a small bush, averaging six feet in height, rounded in form, of a bright cheerful green hue, which, when loaded with its inflorescence of surpassing delicacy and grace, claims precedence over its more gaudy congeners, and has always been regarded by me as the most charming of the Sikkim Rhododendrons." *R. lanatum* and *R. triflorum* are also yellow-flowered.

Of those which bear red flowers, the colour which we are apt to consider as the proper one of the genus, and which is indeed displayed by the greatest number of species, nothing can exceed the rich splendour of hue in the great campanulate blossoms of *R. Thomsoni*, or the exquisite compact balls of *R. fulgens*. The latter is ornamented, too, by its clusters of fruit-like capsules, which are of a fine plum-colour, and are supported by crimson stalks.

Dr. Hooker describes this species in the following terms:—

"This, the richest ornament of the alpine region, in the month of June, forms a very prevalent shrub at the elevations assigned to it, not yielding in abundance to its constant associates, *R. œrugino-*

sum and *R. Maddeni*, and like the former, pushing forth young leaves of a beautiful verdigris-green in July and August. The foliage is perennial, and gives a singular hue to the bleak, snowy, mountain-faces immediately overhung by the perpetual snow, contrasting in August, in broad masses or broken clumps, with the bright scarlet of the berberry, the golden yellow of the fading birch and mountain ash, the lurid heavy green of the perennial juniper, and the bleak, raw brown of the withered herbage. Whether, then, for the glorious effulgence in spring of its deep scarlet blossoms, which appear to glow like fire in the short hour of morning sunlight, or the singular tint it at other seasons wears, this is amongst the most striking of the plants which lend to these inhospitable regions the varied hues which are denied to the comparatively habitable but gloomy forests of the temperate zone on the same mountains."*

R. Hodgsoni is a very handsome species, with great oval globes of blossoms of a fine roseate hue. It is the most characteristic tree of the lofty mountain region in which it grows, and appears to be the only species of the group that is put to economical use.

"Nowhere," says Dr. Hooker, "can the traveller wander in the limits assigned to the present species, without having his attention arrested by its magnificent foliage, larger than that of *R. Falconeri*, and remarkable for its brilliant deep-green hue. In summer the leaves are broad and spreading all round the plant; in winter rolled up shrivelled and pendulous from the tips of the branches. It is alike found at the bottoms of the valleys, on the rocky spurs and slopes and ridges of the hills, in open places, or in the gloomy pine-groves, often forming an impenetrable shrub through which the explorer in vain seeks to force his way. Nor is this a thicket merely of twigs and foliage that will fall under the knife or cutlass, but of thickest limbs and stout trunks, only to be severed with difficulty, on account of the toughness and unyielding nature of the wood.

"The scentless blossoms expand late in April, and in May and June, but are not very copiously produced in comparison with

* 'Rhod. of Sikkim,' No 27.

the majority of its congeners. Of the wood, cups, spoons, and handles are made by the Bhoteas, and universally the little yak saddle, by means of which the pack-loads are slung on the back of the animal. Easily worked and not apt to split, it is admirably adapted for use in the parched and arid climate of Tibet. Nor is the foliage without its allotted use. The leaves are employed as platters, and serve for lining baskets for conveying the washed pulp of *Arisæma* root (a kind of *Colocass*); and the accustomed present of batter or curd is always made enclosed in this glossy foliage."*

One of the most remarkable of the species is the tiny moss-like Snow Rhododendron (*R. nivale*), which displays its little crimson blossoms to the sparkling skies of the Himalayas, 18,000 feet above the level of the sea. Dr. Hooker thus describes it:—

"The hard woody branches of this curious little species, as thick as a goose-quill, struggle along the ground for a foot or two, presenting brown tufts of vegetation where not half a dozen other plants can exist. The branches are densely interwoven, very harsh and woody, wholly depressed: whence the shrub, spreading horizontally and barely raised two inches above the soil, becomes eminently typical of the arid, stern climate it inhabits. The latest to bloom and earliest to mature its seeds, by far the smallest in foliage, and proportionally largest in flower, most lepidote in vesture, humble in stature, rigid in texture, deformed in habit, yet the most odoriferous, it may be recognised even in the herbarium, as the production of the loftiest elevation on the surface of the globe—of the most excessive climate; of the joint influence of a scorching sun by day, and keenest frost at night; of the greatest drought, followed in a few hours by a saturated atmosphere: of the balmiest calm, alternating with the whirlwind of the Alps. For eight months of the year it is buried under many feet of snow; for the remaining four it is frequently snowed and sunned in the same hour. During genial weather, when the sun heats the soil to 150°, its perfumed foliage scents the air; whilst to snow-storm and frost it is insensible, blooming through all, expanding its

* 'Rhod. of Sikkim,' No 16.

little purple flowers to the day, and only closing them to wither after fertilization has taken place. As the life of a moth may be indefinitely prolonged, whilst its duties are unfulfilled, so the flower of this little mountaineer will remain open through the day of fog and sleet, till a mild day facilitates the detachment of the pollen and fecundation of the ovarium. This process is almost wholly the effect of the winds; for though humble-bees and the 'Blues' and 'Fritillaries' (*Polyommatus* and *Argynnis*) amongst butterflies, do exist at the same prodigious elevation, they are too few in number to influence the operations of vegetable life.

"The odour of the plant much resembles that of Eau de Cologne. Lepidote *scales* of a bright ferruginous-brown wholly conceal the twigs, foliage, &c. The *leaves* are one-eighth to one-sixth of an inch long, pale green, the blossom one-third of an inch across the lobes. The nearest allies of this species are *R. setosum* and *R. Lapponicum*, from which latter it differs in its smaller stature and solitary sessile flowers.

"This singular little plant attains a loftier elevation, I believe, than any other shrub in the world."*

We cannot dismiss these beautiful plants without one more extract from Dr. Hooker's Journals, that the reader may form some definite notion of the region in which they were procured, with its grandeur and its privations, and of the toils incurred in such a journey, with its joys and sorrows. The scene is the limit of perpetual snow, 16,000 to 18,000 feet in elevation, on the frontiers of Tibet.

"We reached the boundary between Sikkim and Tibet early in the afternoon; it is drawn along Kongra Lama, which is a low flat spur running east from Kinchinjhow towards Chomiomo, at a point where these mountains are a few miles apart, thus crossing the Lachen river: it is marked by cairns of stone, some rudely fashioned into chairs, covered with votive rags on wands of bamboo. . . . .

"We were bitterly cold; as the previous rain had wetted us

* 'Rhod. of Sikkim,' No 29.

through, and a keen wind was blowing up the valley. The continued mist and fog intercepted all view, except of the flanks of the great mountains on either hand, of the rugged snowy ones to the south, and of those bounding the Lachen to the north. . . . .

"After two hours I was very stiff and cold, and suffering from headache and giddiness, owing to the elevation; and having walked about thirteen miles botanizing, I was glad to ride down. We reached the Phipun's about 6 P.M., and had more tea before proceeding to Tongu. The night was fortunately fine and calm, with a few stars and a bright young moon, which, with the glare from the snows, lighted up the valley, and revealed magnificent glimpses of the majestic mountains. As the moon sank, and we descended the narrow valley, darkness came on, and with a boy to lead my sure-footed pony, I was at liberty uninterruptedly to reflect on the events of a day, on which I had attained the object of so many years' ambition. Now that all obstacles were surmounted, and I was returning laden with materials for extending the knowledge of a science which had formed the pursuit of my life, will it be wondered at that I felt proud, not less for my own sake than for that of the many friends, both in India and at home, who were interested in my success? . . . .

"A sudden bend in the valley opened a superb view to the north, of the full front of Kinchinjhow, extending for four or five miles east and west; its perpendicular sides studded with the immense icicles, which are said to have obtained for it the name of 'jhow'—the 'bearded' Kinchin. Eastward a jagged spur stretches south, into another splendid mountain, called Chango-khang (the eagle's crag), from whose flanks descend great glaciers, the sources of the Tunguchoo. . . . .

"On the top of these hills, which, for barrenness, remind me of the descriptions given of the Siberian steppes, I found, at 17,000 feet elevation, several minute arctic plants, with *Rhododendron nivale*, the most alpine of woody plants. On their sterile slopes grew a curious plant allied to the *Cherleria* of the Scotch Alps, forming great hemispherical balls on the ground, eight to ten inches across, altogether resembling in habit the curious *Balsam-bog* (*Bolax glebaria*) of the Falkland Islands, which grows in very similar scenes.

"A few days afterwards I again visited Palung, with the view of ascertaining the height of perpendicular snow on the south face of Kinchinjhow; unfortunately, bad weather came on before I reached the Tibetans, from whom I obtained a guide in consequence. From this place a ride of about four miles brought me to the source of the Chachoo in a deep ravine containing the termina-

tions of several short, abrupt glaciers, and into which were precipitated avalanches of snow and ice. I found it impossible to distinguish the glacial ice from perpetual snow; the larger beds of snow, where presenting a flat surface, being generally drifts collected in hollows, or accumulations that have fallen from above: when these accumulations rest on slopes, they became converted into ice, and, obeying the laws of fluidity, flow downwards as glaciers. I boiled water at the most advantageous position I could select, and obtained an elevation of 16,522 feet. It was snowing heavily at this time, and we crouched under a gigantic boulder, benumbed with cold. I had fortunately brought a small phial of brandy, which, with hot water from the boiling-apparatus kettle, refreshed us wonderfully."*

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* 'Himal. Journals,' ii. 80—91.

CHAPTER XIV.

THE CACTUS HOUSE.

Eminently characteristic of the arid plains and rocky hills of tropical America, are the singular plants of the *Cactus* tribe. Scarcely any feature of the landscape more forcibly reminds the intelligent traveller that he is far from home, than the vegetation of these sunburnt districts, so totally unlike every form that we are familiar with in Europe. The Palm and the Tree-fern, the Wild-pine and the Orchid, are all strange to the eye; but all of these may be compared with accustomed phases of vegetation, but the very forms of the great Cacti, whether they occur in the huge barrel-like masses of the *Melocactus*, or the fluted pillars of *Echinocactus*, or the angular snake-like withes of the climbing *Cerei*, or the hoary hair-covered bulbs of *Pilocereus*, or the oval flattened joints of *Opuntia*, are so unwonted, that the visitor might almost fancy himself transported to another planet, instead of another continent. Some of these forms are now, it is true, so commonly cultivated in our conservatories, and even in our parlours and cottage-windows, that their essential characteristics are sufficiently familiar;

but these herbaceous specimens are so different from the gigantic dimensions and metamorphosed

CACTUS-HOUSE (*interior*).

conditions in which the plants appear in adult age

in their native climes, as scarcely to diminish the strangeness of the spectacle we allude to.

The whole tribe is eminently suited to the hot and dry regions where they are found, and where the ordinary form of vegetation could not exist. They illustrate the beneficence and providential care of the All-wise Creator, who, in every case, displays his infinite wisdom by the adaptation of his creatures to the respective situations to which He has assigned them. The *Cacti* are natives of regions where rain falls in copious torrents at certain seasons, but where, for long periods, uninterrupted drought prevails, with a burning, brazen sky, unchequered by a passing cloud, and unrefreshed by a single shower.

In such situations, where neither grass nor water exists, the cactus often affords the means of supporting life to the brute animals, and even to man himself.

"Their stems are filled with an abundant, insipid, wholesome fluid, and their fruit is succulent, and in many cases superior to that of European gooseberries. In the fevers of their native countries they are freely administered as a cooling drink; and being bruised they are esteemed a valuable means of curing ulcers. For the sake of such their uses, because of their rapid growth, and especially on account of the numerous spines with which they are armed, the *Opuntias*, or *tunas*, as the Spanish Americans call them, are much planted round houses as fences, which neither man nor animals can easily break through. They are not unfrequent in the dry forest lands of Brazil, but are said never to occur in the damper parts of the country. In stature they vary greatly, many of them having small creeping stems which seem to crawl upon the ground among the dead branches of the surrounding trees, with whose grey colour their deep green shoots form a singular contrast. Others rise like candelabra, with many angular

ascending arms, while a few elevate their tall and deeply-channelled leafless trunks far above the stunted vegetation of the sterile regions they inhabit; reaching sometimes the height of thirty or forty feet.

"To enable them to endure the excessive drought to which they are naturally exposed, they are furnished with an unusually tough skin, the evaporating pores, or *stomates*, of which are few in number, and very often, to all appearance, merely rudimentary. This contrivance prevents their losing the scanty moisture which they collect from the burning soil, and enables them to sustain the full ardour of the brightest equinoctial sun without inconvenience; in this respect resembling the succulent fruits of Europe, such as the plum, the grape, the peach, &c., which, by the absence of *stomates* from their tough skin, are equally enabled to bear the powerful action of the bright sun that is necessary for ther maturation."*

The whole tribe may be considered as leafless, for the thin flattened laminæ of some of the species that we cultivate for the sake of the beautiful flowers that spring from their margins, are not leaves, but merely expansions of the stem, as are also the flat oval pieces which spring from each other, in the Prickly Pears. Yet structurally they bear leaves: whatever form the stem may assume, it usually produces upon its surface little tubercles with minute leaves, which at a very early period fall away, and are succeeded by tufts of hair or spines hooked backwards at the tips.

If the stem is not flattened it is usually grooved, with many or few angular ridges between the grooves; and in many instances divided off by what appear like joints at irregular intervals, by the contraction of the succulent mass around the central woody axis. As the plant acquires its

* 'Penn. Cycl.;'—Art. CACTACEÆ.

mature dimensions, however, the angles fill up, and the joints disappear, by the slow increase of the woody axis, so that after a number of years all the branches, however angular or articulated or compressed they may have been when young, take the form of thick, round, woody stems. Hence botanists find great difficulty in identifying the specimens which travellers have described in this their adult condition, with species which we know only in their youthful state by the small and herbaceous specimens of European conservatories. In the magnificent collection before us we have an opportunity of rectifying our impressions by many specimens of almost their native gigantic dimensions.

Nothing is more observable in these plants than the formidable spines with which they are armed. In many species these organs, which are considered as the representatives of leaves, occur in vast numbers.

"It has been mentioned as something remarkable, that one of M. Ehrenberg's *Echinocacti* had upwards of 2,000 spines. By counting first the number of spines, then that of the bundles of each rib, and ultimately that of the ribs of every individual, I arrived," says Sir W. Hooker, "at the following result: An *Echinocactus Wislazenii*, in the possession of Frederick Scheer, Esq., was found to have 8,360 spines, and the *E. visnaga*, in the Royal Gardens, 17,600. There was formerly at Kew a specimen of the latter, which was at least three times larger than the present, and which cannot have had less than 51,000. Those Cacti, whose bundles consist of a greater number of spines, present results still more surprising. The tallest *Pilocereus senilis*, at Kew, having thirty in each bundle, has a total number of 72,000. Yet these plants, giants as they appear in European conservatories, are but pigmies amongst their kindred at home. And if these

small specimens have such a number, how many may a full-grown plant possess, and how great may be the number of spines produced in Mexico, a country where a man may travel for days without seeing any other vegetation, save vast groves of Cactuses!"*

Sir William Hooker has some interesting observations concerning this "Old Man" of the Mexican Plains. In speaking of the travels of Dr. Engelmann, he says,—

"During this route, assuredly the most remarkable plants met with were the *Cacti*, and of them the most striking is called by Dr. Engelmann *Cereus giganteus*. It is represented in several of the views, sometimes simple and sometimes branched, and is described as being from twenty-five to sixty feet in height, and two to six feet in circumference. The figures assuredly represent the well-known *Cereus senilis*, of which the Royal Gardens of Kew boast two specimens, fourteen to sixteen feet, and they did possess one, which died, eighteen feet in height. A beautiful, and we can well conceive a most characteristic plate of a gigantic branched one is given by the artist at p. 94, with a horseman at the foot, who looks quite a pigmy in proportion to it. We searched in vain for a figure or description of its flowering state; but we are assured by a correspondent in Mexico, from whom we received our specimens of *C. senilis*, that this species, when large enough and old enough to bear flowers, is crowned with that enormous woolly mass, which many of our readers well recollect as formerly being in the possession of Mr. Lambert (after his death purchased by the British Museum), and known under the name of the '*Muff Cactus*.' If this statement be correct, and we have no reason to doubt it, this portion of the plant is analogous to the cushion-like crown upon the *Melocactus communis*, and that upon the *Echinocactus visnaga*,—a receptacle, as it were, for the flowers."†

The genus *Echinocactus* derives its name from the resemblance which it derives from these formidable spines, combined with its globose shape, to the sea urchins of our rocky coasts. The two large specimens of *E. visnaga*, above mentioned, are no longer inhabitants of the Garden, both of them

* 'Journ. of Bot.' iv. 123. † 'Journ. of Bot.' i. 93.

having died, but Sir W. Hooker has preserved some interesting records of them. They were both sent to England by Mr. F. Staines, from San Luis Potosi, in the interior of Mexico, having to be dragged to the coast with immense labour by teams of oxen. The weight of the one was 713 pounds, and this survived its emigration for several years, in health and vigour, until at length it sickened and died in the winter of 1851-52.

The other, however, a far more magnificent specimen, had in the mean time been received. It was thrice the size and weight of the former, the monster and wonder of the Garden. It was planted, and for a little while appeared likely to thrive; but it had received an injury in its toilsome and perilous transit, which soon manifested itself as an external bruise. Decay speedily set in, and extended throughout the whole of the enormous mass; which tainted the air with a putrid fetor, until it was finally destroyed.

The trivial name, *visnaga*, signifies a toothpick in the Spanish language, and is applied to this species because of the use to which the Mexicans apply its stiff and acute spines. In other parts of South America, the stouter spines, which sometimes possess great strength, are used instead of pins, to fasten the *poncho*, or cloak, about the neck.

The wild horses of the Pampas often obtain a refreshing draught from the clear and tasteless sap held, as in a skin-bottle, within the tough rind of the *Melocactus*. These natural reservoirs instinct

teaches them to break open by a violent blow with the hoof; yet so well are they fortified by their *chevaux-de-frise* of radiating spines, that the animals often wound their feet desperately, and even become lame for life. The accompanying engraving, from a daguerreotype, displays these genera as they are seen in the house. The two tall fluted specimens are *Echinocactus Stainesii;* the more globose ones in front, with the dense downy brush-like knobs on the summit, in which the tiny crimson flowers appear, are *Melocacti.* Species of *Opuntia* are seen behind and above these.

Fine examples are here seen of the *Cereus pentagonus* and *C. Peruvianus*, species which grow into tall, erect, angular columns, and which, under the name of Dildoes, are planted in the West Indies, and the dry parts of South America, for fences. This purpose they well subserve, their spinous array forbidding intrusion; and though they are certainly inelegant, they have the advantage of being cheaply and quickly propagated. Nothing more is necessary than to chop up a branch into a number of short pieces, which, after a few days' drying in the shade, are buried in a shallow trench pretty close together. A stout stem shoots up from every piece, and the whole quickly forms an impenetrable palisade.

Perhaps it is of these, or some allied species, that travellers speak, when they describe, in the arid plains of Cumaná and New Barcelona, Cacti thirty feet or more in height, whose upright and angular

stems appear in the distance like massive columns. Especially striking is their aspect at sunset; for the brilliant glow of the western horizon imparts

ECHINOCACTI AND MELOCACTI.

a corresponding hue to these tall vegetable pillars, which cast their lengthening shadow over the ground; and one who for the first time beholds the spectacle, may easily fancy that he sees the fluted columns and massive obelisks of some colossal piece of architecture, surrounded as they are by

angular blocks of grey stone, which assume the regular forms of masonry, and by other stately *Cacti*, whose curving branches mimic the form of candelabra intended to light up the supposed palace of departed greatness.

In the spring, when the majority of the plants in this collection are in flower, the effect is very gorgeous. The beauty of many of the species is well known, as the crimson and scarlet blossoms of the *Cerei* are the most splendid ornaments of our greenhouses. What can exceed in royal magnificence a well-grown specimen of *C. speciosissimus*, with its immense flowers of scarlet, each adorned by its pencil of drooping white stamens? The only regret is that they are shortlived; not one of them survives twelve hours. Hence there is one species, and that of great magnificence, which is never beheld by daylight; for invariably opening at early night, it fades and dies before morning, like the *Nyctanthes* of the East, which the poet of similitudes describes as

> "—— The sweet night-flower,
> When darkness brings its weeping glories out
> And spreads its sighs like frankincense about."
> '*Lalla Rookh*.'

It is thence called the Night-blowing Cereus (*C. grandiflora*), and we remember that some years ago the late Mr. George Loddiges invited a party of friends to a nocturnal soiree in his noble orchideous store at Hackney, expressly to witness the expanding of this fine tropical flower. Specimens

are cultivated in the stove we are examining; but as the Gardens are not opened to the public by night, few of our readers can hope for an opportunity of beholding the beauty of this flower, or of inhaling its powerful fragrance, which resembles that of the carnation or clove. We shall, therefore, quote the observations of a naturalist who enjoyed both in its native regions:—

"The long trailing stems of that gorgeous Cactus, the Night-blowing Cereus, are very commonly seen in the lowlands of Jamaica, sprawling to a great length over the stone fences, hanging in irregular festoons from the forks and limbs of the trees, the great Cotton-tree in particular, and intertwining their tough and prickly vines among the shrubs, helping to give the woods that formidable, repellent, impenetrable character which a tropic *bush* is known to present. The magnificent flowers are, however, rarely seen: the plant seems to be a shy bloomer; and when the blossoms do meet the eye, it is in nine cases out of ten either as unexpanded buds, or in that miserable, drenched condition which the flowers of a Cactus always assume when fading, looking exactly as if they had been dragged through boiling water. In order to see it in perfection, one must make it open in the house, or visit it at midnight, which is inconvenient. I have several times marked a maturing bud, and when it appeared nearly ready to burst, cut a few inches of the stem on each side, and brought it within doors. Soon after dark it begins to open, and towards midnight expands in its noble beauty, a disk six inches in diameter, very 'double,' the exterior rows of petals of a yellowish-brown hue, gradually paling in tint to the centre, where the petals are of the purest white. Meanwhile the delicious clove-like perfume is diffused in such abundance, that a delicate person can scarcely sit in the room, and the very house is filled with it from one end to the other. In the morning, beauty and fragrance are both gone; and the blossom, lately so gorgeous, possesses no more of either than may be pretended to by a boiled cabbage."*

The fruits produced by many of this tribe are of excellent qualtity. That of our common *Cereus*

* Gosse's 'Sojourn in Jamaica,' p. 176.

speciosissimus is green, about twice as large as a gooseberry, and exceedingly delicious, but it does not ripen with us. The closely-allied *C. triangularis*, that sprawls on every tree and fence in the West Indies, bears a berry of exquisite flavour, called the Strawberry-pear. The curious *Pereskia aculeata*, the only one of the race that is furnished with permanent leaves, bears a fig-like fruit, provincially known as the Barbadoes gooseberry.

But the fruit which is best known and most eaten is that called the Prickly-pear, the produce of various species of *Opuntia*. These are generally pear-shaped and of considerable size, filled with crimson juice of an agreeable subacid taste, very cooling and wholesome. These fruits, covered with a delicate bloom and of a rich purple hue, may be seen in the summer on many specimens of *Opuntia* in this house.

Here you may see a species of the same genus, which is of more value than all the fruits yielded by the whole tribe combined. It is the Cochineal plant, or Nopal (*Opuntia coccinellifer*), which has, since the discovery of America, yielded a dye far more brilliant than the renowned Tyrian purple, or any other that was known to the ancients.

This and some other species are very extensively cultivated in Mexico, expressly for the cochineal, which is imported into Europe. It is yielded by small insects, which feed on the Nopal (*Coccus cacti*), the females of which are wingless, and are alone valuable. A goodly number (still increasing) of

these insects are seen dotting the plants here before us, looking like specks, about as large as a split pea of white down; if we crush one of these in our fingers, we find it filled with a liquid of the deepest crimson hue, which is *cochineal*.

OPUNTIÆ.

A *nopalerie*, as a cochineal plantation is called, is laid out with the regularity, and kept with the neatness of a garden. It requiries very little care, a single Indian being able to tend more than an acre. When the plants are a year and a half old, they are "sown" with the insects, which are collected from old plants, and conveyed in folded

leaves, to the young, to which they are fastened by a thorn. They multiply rapidly, and need no renewing for six years.

The insect-harvest is gathered every year. A blunt knife is passed gently between the skin of the nopal and the clusters of cochineals with which it is covered, causing the latter to fall into the dish or basket which the left hand holds ready to receive them. A child of ten years old may thus gather ten pounds of insects in a day, which being killed and dried will yield about three pounds and a half of cochineal. The best method of killing the insects is by pouring boiling water on them, and allowing it to remain one, two, or three minutes. The water is preserved, as it necessarily has some of the colouring matter of the insects; the latter are spread out to dry in the sun and wind, being turned occasionally by hand. Ten persons, it is said, can thus prepare two hundred pounds of cochineal in two days.

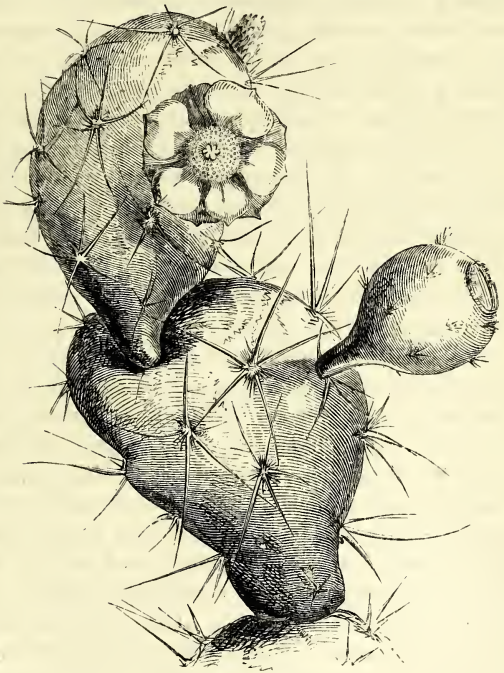
The Spanish colonists long guarded the possession of the cochinal insect with the most jealous care, forbidding the exportation of the living insect, or the communication of the mode of culture, under severe penalties. Several ineffectual attempts were made by foreigners to evade these precautions; but M. Thierry de Menonville, a French gentleman, at length succeeded, by a device, of which, if we may approve the patriotism and the ingenuity, we cannot but denounce the hypocrisy and falsehood.

In 1777 this gentleman sailed from St. Domingo, with the object of procuring the living insect from Mexico, and, eluding the jealousy of the authorities under pretence of sickness, managed to reach Guaxaca.

At a village within a short distance he saw, for the first time, the cochineal feeding on the nopal. He saw a garden full of nopals, and not doubting that they were laden with cochineal insects, he sprang from his horse, and, under pretence of adjusting his stirrups, entered into conversation with the Indian proprietor of the garden. He asked him, with apparent indifference, what was the use of those plants, and was answered that they were for the cultivation of *grana*. Feigning surprise, de Menonville asked to be permitted to see this *grana*, and he was really astonished when the insect was brought to him, for he had supposed it red, and it was, in fact, covered with a white powder. "My doubts," he says, "were tormenting, but I suddenly thought of the expedient of crushing one upon white paper, when what did I see?—the true purple of kings!" Full of delight and anticipation, the traveller now set forward towards the spot where he might hope to make himself acquainted with the culture of the precious insect, and purchase a store for transportation.

At Guaxaca, he acted with caution, and did not betray any undue anxiety respecting the cochineals. Yet he provided himself with chests large enough for their conveyance, together with the plants on

which they fed. Under pretence of buying flowers, he went into a garden where there was a beautiful nopalerie, and while they were making



COCHINEAL CACTUS.

up the bouquet he had ordered, he took the opportunity of observing the arrangement of the nopals. They were planted four feet apart, in lines, the

lines being six feet asunder. The nopalerie belonged to a negro, and it was here that a purchase might in all probability be effected. On another occasion, therefore, de Menonville took two Indian servants, each bearing a large hamper, and repaired very early in the morning to the garden. He left his servants at the gate, and entered alone. The negro proprietor had scarcely risen, but he came forward in a frank and agreeable manner. De Menonville then told him that, being a physician, he was anxious to make an ointment of his own invention for the cure of gout, and for this purpose wished to purchase some branches of nopals laden with cochineal, for which he was willing to pay whatever the owner should demand, provided he might make his own selection of the branches suitable to his purpose. The negro willingly complied, and accordingly the hampers were brought in, and eight fine branches, each two feet high, and so loaded with cochineals as to be quite white, were speedily cut, packed, and covered with cloths. He then asked him how much he had to pay; the negro answered, that he could not possibly sell them for less than two *reals*. Our traveller fully believed him, and would have purchased them, if necessary, at a much larger sum. That the negro might not think him dissatisfied with the bargain, he gave him a piaster (value eight reals), telling him he had no change, and therefore he should give him the rest to drink his health. The good

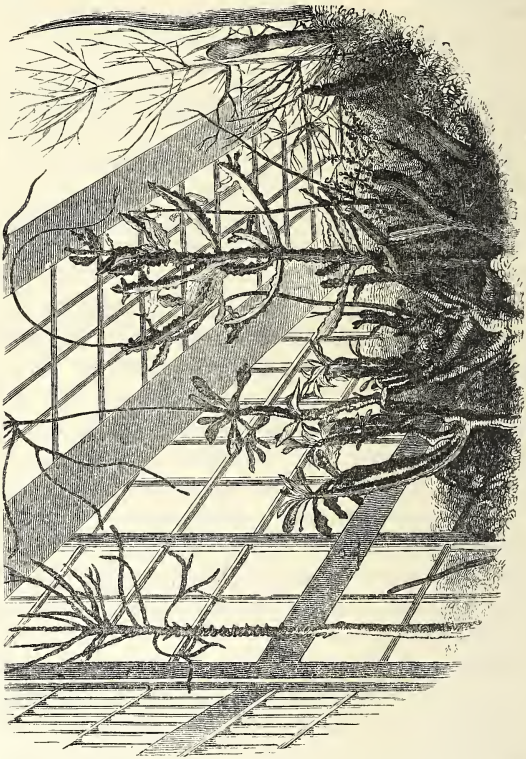
old negro rubbed his eyes, thinking he was still dreaming, and then loaded de Menonville with thanks, while the latter brought in his two Indians, gave them the hampers to carry, and then set off as fast as possible.

"My heart," he says, "beat quickly, for it seemed to me that I had carried off the golden fleece, but might yet be pursued by the furious dragon who kept guard over it. All along the road I kept saying, 'At last they are in my power;' and I could willingly have sung for joy if I had not been afraid of being heard. I arrived at my inn quite out of breath, without having met a single person in the streets; it was about sunrise; no one was awake in the house, and I crept quietly to my room, where I arranged my nopals, with inexpressible delight, in the caskets I had purchased for that purpose."

After innumerable difficulties and dangers, this traveller reached St. Domingo in safety, but with only a small part of his insects living. These, however, he was successful in rearing and multiplying, until a flourishing nopalerie was established. At the revolution this was quite destroyed, but meanwhile the culture had spread to the British Colonies, St. Vincent's in particular, where it was fostered by the scientific care of the late Lansdowne Guilding. More recently, it has been introduced into Spain, and into the French colony of Algeria.

Besides the true *Cacti*, there is here a collection of those succulent plants which somewhat resemble them in appearance, the *Euphorbiæ*. We have already had occasion to notice fine specimens of some of these in the Palm House, where we have spoken briefly of their character. We shall,

therefore, merely say that here are the *E. Canariensis*, from the Canary Islands; *E. cærulescens*, from the Cape of Good Hope; *E. grandidens*, and *E.*



tetragona, likewise African in origin. All these are succulent, angular, leafless, and spiny; but

there is among them a shrub of a totally different character, *E. Jacquiniflora*, not at all succulent, but a small tree with leaves and branches, much resembling a slender willow, and studded with elegant scarlet blossoms of exquisite form and hue.

Here, then, we have finished our round of the Conservatories at Kew; and sauntering along the north-east boundary of the Garden, we may pause a moment beneath a weeping willow (*Salix Babylonica*), possessing some extrinsic interest, since it was raised from a cutting that was taken from the celebrated tree that waves over the tomb of Napoleon at St. Helena. Such an association must always charm the thoughtful mind, though the scene itself is robbed of its honours, the conqueror who once slept there now reposing in the country of his renown.

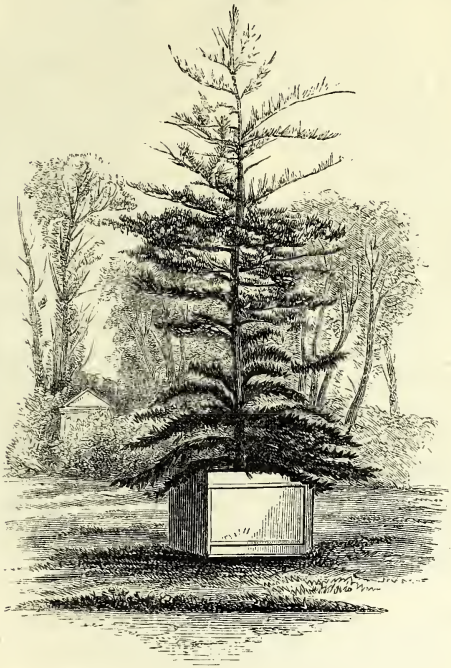
Or, if we have half an hour to spare before sunset, we may wander through the groves and avenues, enjoying the delightful coolness of an English summer's evening—not the less pleasing by the contrast of its freshness and breezy gales with the hot and teeming atmosphere of some of the tropical houses that we have left. The squirrels are chasing each other over the grassy lawns, so verdant and so neatly shaven, or play at bo-peep among the branches of the pine-trees; blackbirds are seeking worms beneath the shrubs, celebrating their successful researches in mellow

notes from the bushy covert; the green woodpecker, with his scarlet cap, is rattling away on

NAPOLEON WILLOW.

yonder ancient hornbeam; and scores of smaller birds are warbling forth their evening carols, pre-

paratory to putting their heads behind their little wings. The hum of the bee falls on the ear as he sails heavily along towards his distant hive, loaded



PINE-TREE.

with spoils from yonder beds of mingled blossoms; and the fragrance that floats to us from the same quarter almost tempts us (only that we have the

dread of Sir William before our eyes) to go there, and lie down, and roll, and revel among the sweet flowers, just as the bee has been doing.

The noble forms of many of the trees, and the blossoms that ornament some, especially of the foreign ones, put in a claim to admiration. Here is that fine group of lofty elms, called, in allusion to the daughters of George III., the Seven Sisters; and yonder massive lime-trees, how noble they look as the sun illumines with horizontal rays their green foliage, casting it into broad lights and shadows! There is the Tulip-tree of North America, of stately form, and bearing its lily-like flowers of yellow and scarlet; and in another direction stands an illustrious foreigner from the opposite side of the globe, *Sophora* of Japan, a magnificent tree, especially when loaded with its clusters of white papilionaceous flowers. Finally, near the gate there is placed that most elegant of trees, the Weeping Yew of New Zealand (*Dacrydium cupressinum*), whose leaves hang perpendicularly, like fringes of cord, from the gracefully pendent boughs.

Well, we have seen much to admire, much to please our sense of what is lovely and beautiful and graceful; much to move our wonder and instruct our reason; much to excite our thankfulness in seeing how deeply we are indebted for luxuries, comforts, and necessaries, to the vegetable world. But let not our feelings

WEEPING YEW OF NEW ZEALAND.

stop short of the Great First Cause: it is God who originally made "the earth to bring forth grass, the herb yielding seed, and the fruit-tree yielding fruit after his kind, whose seed is in itself upon the earth;" who "made to grow out of the ground every tree that is pleasant to the sight, and good for food." (Gen. i. 11; ii. 9.) And here, in such a delightful garden as this, surrounded by the choice productions of earth, our thoughts may well revert to that original Paradise, which the Creator himself planted for the recreation and enjoyment of his unsinning creature. Far better, far lovelier than this, indeed, was that garden; and far purer, too, for holiness was its element; no unholy passion, no disturbing emotion marred the calm delight, till the Tempter came, and disobedience closed the gate of Eden on ejected man. We may think of this with sorrow and with humble shame, yet not with desponding and unavailing regret; for an Atonement has been made, and a Ransom has been found for lost man, in the blood of Jesus, and He is gone to prepare a place with more than earthly delights, for all who believe in Him. And to us, struggling with the temptations and sorrows of this present world, He sends by his Spirit this encouraging promise: "To him that overcometh will I give to eat of the tree of life, which is in the midst of the Paradise of God." (Rev. ii. 7.)

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