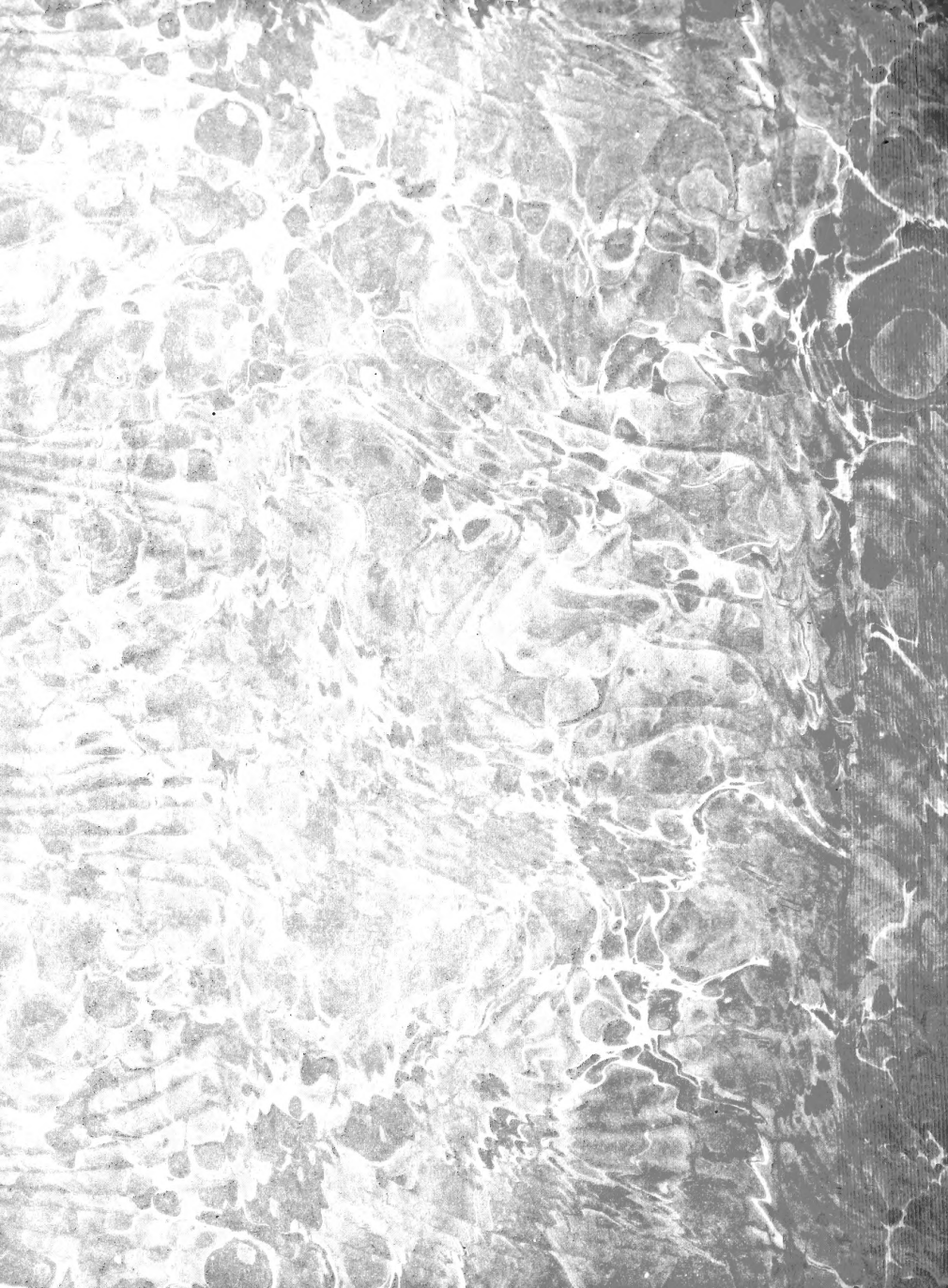


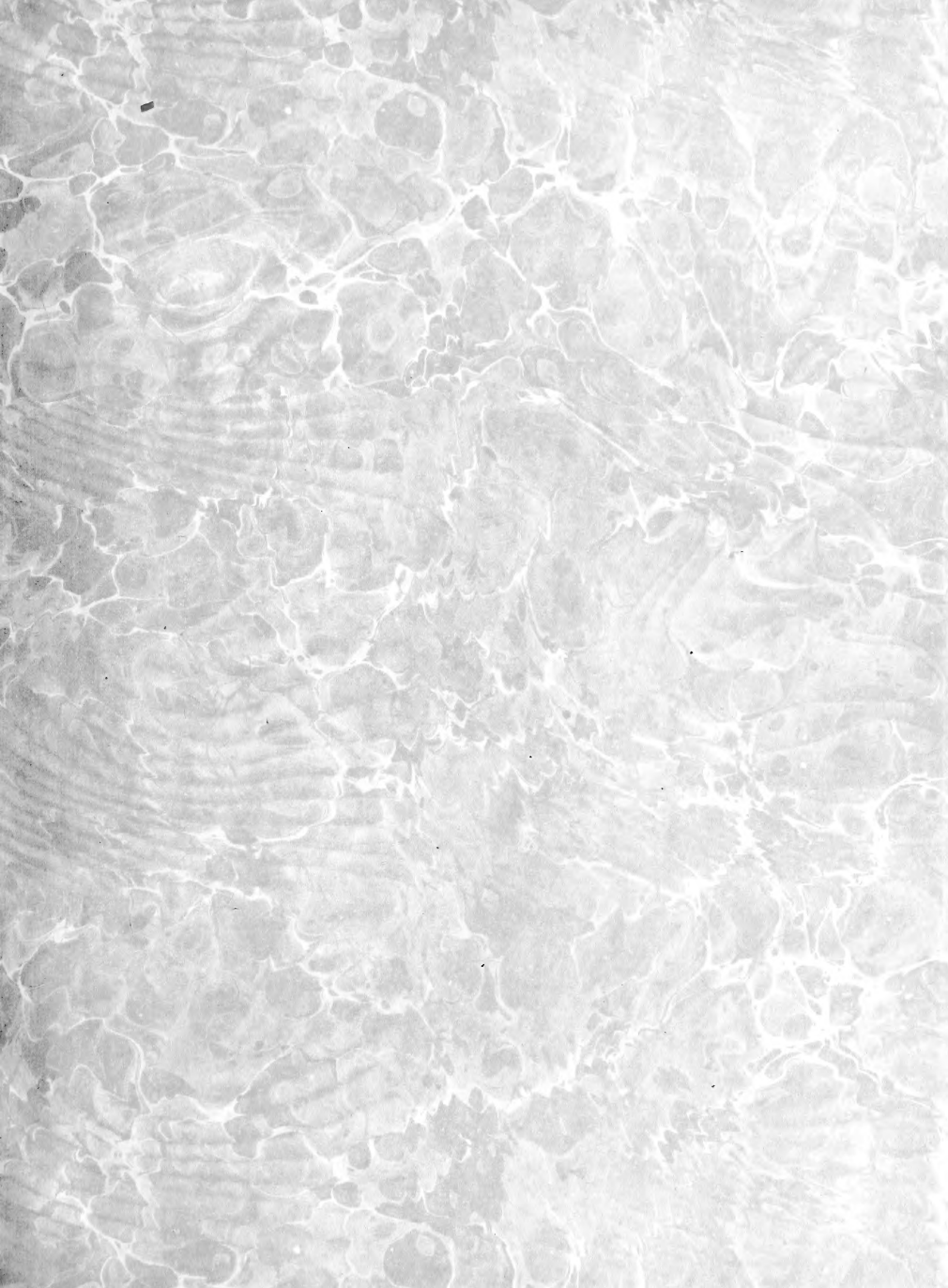
The

LOVER'S
GUIDE

By

JOHN WRIGHT







ODONTOGLOSSUMS.

1. *O. cirrhosum*. 2. *O. Rossi aspersum*. 3. *O. Harryanum*. 4. *O. crispum* (two forms of). 5. *O. triumphans*.



ODONTOGLOSSUMS.

1. *O. Cervantesi*.

2. *O. crispum*.

3. *O. Humeanum*.

4. *O. Halli*.

5. *O. Rossi majus*.



BOUARDIAS

1. Priory Beauty. 2. Dazzler. 3. The Bride 4. jasminiflora. 5. longiflora flammula. 6. Alfred Neuner
 7. President Cleveland. 8. Hogarth flore plena.



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THE
FLOWER GROWER'S GUIDE

BY

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With Coloured Illustrations

BY MISS GERTRUDE HAMILTON AND MISS MARIE LOW

AND

NUMEROUS ILLUSTRATIVE DIAGRAMS BY F. W. BURBIDGE, F.L.S., GEORGE SHAYLER, F.R.H.S.
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THE FLOWER GROWER'S GUIDE.

IXORA.

GROWERS of specimens for exhibition fully appreciate the worth of *Ixoras*, but smaller plants are equally valuable for the decoration of hot-houses, and for affording good supplies of choice cut flowers. The sickly condition in which these plants are too often met with is unfortunate, and all who have insect-infested *Ixoras*, with wretched foliage, are strongly advised to burn them and start afresh with clean, vigorous young stock.

There is quite a long list of species and varieties of garden origin available for cultivation, and a few of the best will be briefly described. *I. coccinea*, East Indies, has bright red flowers in large close heads, *I. c. superba* has deeper-coloured flowers and is more robust in habit. *I. Colei*, produces large round corymbs of pure white flowers. *I. Duffi* (syn. *I. macrothyrsa*) is one of the finest and very distinct. It is of strong growth, with large deep-green leaves, and huge trusses of deep-red flowers. *I. Fraseri* has rosy red trusses. *I. Pilgrimi* succeeds in a somewhat lower temperature than the majority of *Ixoras* require; flowers orange scarlet, shaded with crimson. *I. Prince of Orange* gives fine cymes of cinnabar-red flowers. *I. salicifolia*, as its name implies, has willow-like leaves, and deep orange flowers. *I. Westi* has pinkish, while *I. Williamsi* and *I. regina* (Fig. 1) give fine heads of reddish salmon flowers (see Index for coloured plate).

Ixoras are propagated by cuttings of young, firm, short-jointed shoots in the spring. Insert these singly and firmly in small pots of sandy peat, and plunge in a hot-bed or frame, with bottom heat of about 80°. If kept close and carefully shaded, roots soon form, and after inuring the young plants to more light and air, top them, shifting into larger pots a week later. The soil suitable for this and all later shifts is composed of

two parts fibrous peat, one part each of leaf soil and loam, with a free admixture of silver sand. All pots used should be clean and well-drained, as *Ixoras* fail in sour soil. Pot carefully and firmly. Arrange the young plants on a front, ash-covered stage, watering sparingly at first, and freely after the new soil is becoming well occupied



FIG. 1. IXORA REGINA.

by roots. Shade from bright sun and syringe frequently. Top to make them branch, thereby laying a good foundation. Avoid over-potting, 5-inch and 6-inch pots as a rule proving large enough the first year. Young plants may be flowered late in the season, and then rested for a month, but not by any excessive drying of the roots, before

lightly pruning in February. Start them into growth in a moist atmosphere and temperature of 70° to 80°, increasing from 5° to 10° as the warm weather approaches. Ixoras revel in strong heat, accompanied by abundance of moisture in the atmosphere. Before much progress has been made, examine the roots, carefully picking away any old soil unoccupied by them, adding fresh, sweet compost. In cases where the roots are matted together, some of them may be carefully disentangled before transferring to pots just large enough to admit of the roots being surrounded by fresh soil. When the flowering period is reached, apply liquid manure at every second or third watering. After flowering, rest in a temperature of 55° to 65°, and the following February prune and otherwise commence a round of treatment much as advised for young plants. Little or no training is needed, as the growths can be regulated by pruning and topping.

Ixora Duffi requires to be treated differently from the rest. Plants that flower freely in one season will not do so the following summer, and for this reason, two sets of plants should be kept going, each flowering in alternate years. Those who grow specimens of Ixoras, generally, for exhibition, ought not to wait till their finest plants are showing signs of failing before commencing to raise others to take their place. The best foliage and most gorgeous heads of flowers are produced by the younger specimens.

Mealy bug and thrips are insect pests that largely contribute towards ruining numerous Ixoras. The plants must be kept free of all insect enemies by methods previously given, supplemented by daily or bi-daily syringings during the growing season.

LASIANURA (PLEROMA).

Although frequently classed as greenhouse plants the less robust Lasiandras are only seen at their best in warmer structures, known as cool stoves or intermediate houses. *L. elegans*, long known as *Pleroma elegans*, from the Organ Mountains, is well adapted for training over trellisses, and for furnishing pillars; flowers rich blue, abundant during May and June. *L. macrantha* attains a great size, and is only fit for large, well-heated conservatories, where it may be either trained against walls or allowed to form a large head. Flowers rich deep violet-purple; winter. *L. m. floribunda* (Fig. 2), Brazil, is not nearly so vigorous in growth and succeeds best grown in pots to develop naturally, without topping the growths. Flowers large, rich violet-blue. Lasiandras may be propagated by cuttings of firm side shoots,

3 inches long, any time from February to September inclusive. Insert them singly in small pots of sandy soil, and cover with glass, in a temperature of 70° to 80°. When more root room is required by the plants, shift them into larger pots, employing two parts fibrous loam to one each of peat and leaf soil, with a little charcoal and silver sand.



Fig. 2. LASIANDRA (PLEBOMA) MACRANTHA FLORIBUNDA.

The drainage should be perfect, and the soil made moderately firm. Care must be taken not to sour the soil by over-watering, this especially in the case of the more delicate species. All are evergreen, and should never be quite dry at the roots. Prune the non-trained plants into a good form in February, and re-pot a fortnight or three weeks later.

MARANTA (CALATHEA).

Less value is attached to Marantas, or Calatheas as some of the species are termed by the more scientific classifiers, than formerly. Where, however, noble plants with imposing, handsomely blotched, marbled or striped leaves are appreciated, room ought

to be found for Marantas, some of the dwarf species being equally beautiful if less striking in appearance. A long list of species and varieties could be given, all more or less beautiful, but reference can only be made to a few of the more popular. These are :—*M. Bachemiana*, Brazil, leaves silvery with green lines, and blotches ; *M. Baraquini*,

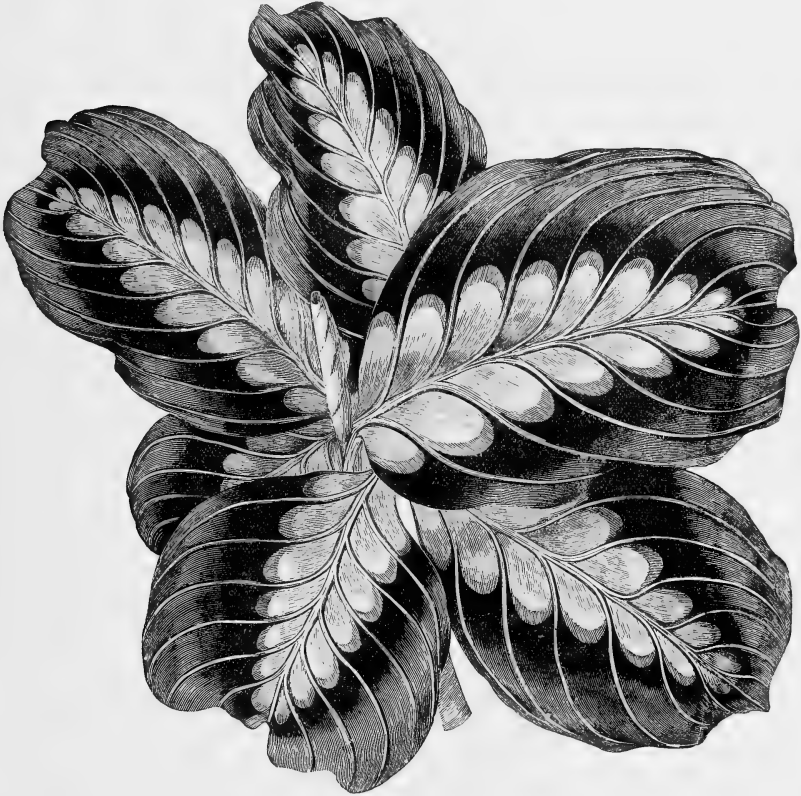


Fig. 3. MARANTA (CALATHEA) MASSANGANA.

Amazons, leaves bright green, relieved by bands of silvery-white ; *M. fasciata*, Brazil, leaves green with broad bands of white running across the mid-rib to the margin, under side tinged with purple, dwarf ; *M. illustris*, Ecuador, leaves bright pea-green, streaked with transverse bands of a deeper green, mid-rib pink with two irregular blotches of

white traversing the leaves from base to point, under side purple ; *M. Kerchoviana*, Brazil, leaves greyish-green with a row of purplish blotches on each side of the mid-rib, dwarf ; *M. Lindeni*, Peru, leaves deep green, with blotches of yellowish-green on each side of the mid-rib, under surface purplish-rose, through which the markings of the upper side are visible ; *M. major*, leaves on long footstalks, various shades of green, promises to become exceedingly serviceable for house decoration ; *M. Makoyana*, Tropical America, leaves outer margin dark-green, central portion semi-transparent, beautifully blotched with creamy-yellow and white ; *M. Massangeana* (Fig. 3), Brazil, leaves olive-green, beautifully blotched with velvety-maroon, dwarf ; *M. ornata*, Columbia, and its varieties *albo-lineata majestica* and *regalis* ; *M. prinseps*, Peru, leaves rich dark-green, broadly margined with yellowish-green, purple beneath, tall growing ; *M. Veitchi*, Tropical America, leaves rich glossy-green, marked along each side the mid-rib with crescent-shaped blotches of yellow, under side light-purple, tall growing, and a desirable species ; and *M. zebrina*, Brazil, leaves long, broad and velvety, light-green, on the upper side, barred with greenish-purple ; a free grower, and the best known *Maranta* in cultivation.

Propagation is effected by division in the spring, taking care that each crown is well furnished with roots. Place the divisions in pots just large enough to conveniently hold the rhizomatous stems, using a mixture of equal parts of loam, peat, and leaf soil, adding sand freely. A somewhat shady position in an ordinary plant stove, is suitable for *Marantas*. When the young plants have become strongly established in small pots, give them a shift into larger sizes. Avoid overwatering before root action is free, or the new soil may turn sour ; but when the pots are filled with active roots, supply water copiously, also weak liquid manure to the strong growers, gradually reducing the supplies in the autumn and applying very little in January and February.

Early in March old plants may have the balls of soil and roots considerably reduced before returning them to much the same size of pots they were in previously. Large pots ought to be heavily drained, and the compost employed should be broken up coarsely.

MEDINILLA.—Of this genus of flowering shrubs four species are considered worthy of cultivation in the larger plant stoves, where, if properly treated, they make a grand display at different periods of the year. *M. amabilis*, India, forms long broad leaves, and in the spring produces large, erect, branching panicles of rosy-pink flowers ; *M. Curtisi*, Sumatra, has white flowers with purple anthers in terminal panicles ; *M. javanensis*, Java, flowers, flesh colour, with dark-purple anthers. *M. magnifica*, Manila,

height 3 feet, leaves large, flowers rosy-pink, borne in very large terminal, pendulous racemes in May, is one of the grandest flowering plants in cultivation.

Propagation is effected by cuttings of firm, young side-shoots, 3 to 4 inches long, in spring or summer, in sandy peat and leaf soil, in a temperature of 75° to 85°, covering with glass and shading carefully. Pot the young plants in a mixture of two parts fibrous loam to one part each of peat and leaf soil, with half a part of sharp sand, employing a similar mixture, but in a coarser state, when shifts are given into larger pots. Keep newly-potted plants somewhat close and shaded till well recovered from the check, and afterwards arrange them in a sunny position in the hottest part of the house. Top to make them branch, but not after a good foundation is laid, as only strong, well-developed growths flower satisfactorily. During the growing and flowering seasons apply water freely, assisting those coming into flower with liquid manure, and syringe twice daily. From November to February rest the plants in a temperature of 65° to 75°, only giving water to keep the plants fresh in appearance. In February cut back all irregular branches, and when fresh growth commences, re-pot. *Medinillas* must have abundance of heat, accompanied by much moisture in the atmosphere, and should be kept scrupulously clean without the aid of strong insecticides.

MEYENIA.—*M. erecta* (syn. *Thunbergia erecta*), West Africa, is an evergreen shrub, producing blue flowers with a rich orange throat and pale yellow tube; of this *M. e. alba* is a variety with white flowers and yellow tube. Both were cultivated more generally by previous generations of gardeners, and ought not to be wholly discarded at the present time. Propagation is effected by inserting cuttings of firm young shoots 2 to 3 inches long, from February to June, in a mixture of peat, leaf soil, and sand, covered with glass in a temperature of 75° to 85°. Arrange the plants in a somewhat shady position in an ordinary plant stove, exposing them to the full light only when they are resting during the winter. Re-pot as required, using a mixture similar to that recommended for cuttings, only in a much coarser state, and drain the pots carefully. Prune lightly in February.

MONOCHÆTUM.—A genus of evergreen flowering shrubs, the best of which are worthy of culture in either a warm greenhouse or cool stove. *M. Hartwegianum*, Andes, a dwarf shrub, produces bright, rose-coloured flowers during the winter; *M. Humboltianum*, Carraccas, rich reddish-purple flowers, October to December; *M. Lemonianum*, deep rich violet-rose, winter and early spring, and *M. sericeum multiflorum* (Fig. 4) with rich mauve flowers, freely produced in the spring are

desirable for cultivation. Cuttings of healthy shoots, 2 to 3 inches long, inserted in well-drained pots of sandy peat, covering closely with glass in a temperature of 65° 75°, root freely in March or April. Cultural requirements are of the simplest description. Arrange the plants in a sunny position, top to make them bushy, and shift



Fig. 4. *MONOCHÆTUM SERICEUM MULTIFLORUM.*

into larger pots as more root room is needed, using a compost of two parts fibrous peat, one of leaf soil and one of loam with an admixture of sand. Pot firmly. The plants flower freely during the winter in a temperature of 55° to 65°, and should have their shoots pruned somewhat closely after the flowering is over, re-potting in March. Sunny pits and frames are good positions for *Monochætums* during the summer.

MONSTERA.—*M. deliciosa*, Mexico, in addition to forming large, handsome, much divided and perforated leaves, also produces succulent edible fruit, with the flavour of a

pine-apple. It succeeds best planted on a mound or rock-work, or where the growths can ramble, or against moist back walls of plant stoves, to which the stems attach themselves by their aerial roots. Plants are easily raised from cuttings of the stems, and may be grown in pots if desirable. Plant or pot in equal parts of turfy peat, loam, and leaf soil, with sand. Water copiously all through the hottest part of the year.

MUSA.—Also known as Banana and Plantain-tree, are noble plants for warm conservatories, and large stoves. When the plants reach a certain size some of the species produce large clusters of edible fruit superior in quality to the majority of bananas imported, but in order to be successful in this respect they must have special treatment, as given in *The Fruit Grower's Guide*. *M. Cavendishi*, China, attains a height of 5 to 6 feet, and forms deep green leaves 2 to 3 feet long, and 1 to 2 feet broad. High temperatures are not essential for this species, and it is also the best for fruiting. *M. coccinea*, Cochin China, height 4 feet, has leaves 3 feet long and 6 inches broad, dark-green in colour; flowering spathes scarlet. *M. ensete*, China, attains a height of 13 to 20 feet; leaves very long and broad, bright green with a broad, bright crimson mid-rib. *M. sapientum*, the true banana, Tropics, grows to a height of 20 feet in favourable positions, and the deep green leaves attain a length of 8 feet. *Musas* are constantly pushing up suckers, and these, if carefully detached with roots, potted, and placed in a temperature of 75° to 85° soon become established. If large plants are desired they may be produced in pots or tubs, employing a compost of coarsely broken fibrous loam and decayed manure, with sand and potsherds to keep it porous. Arrange the plants where they can develop rapidly and supply them with abundance of moisture at the roots and in the atmosphere.

MUSSÆNDA.—*M. frondosa*, Tropical Asia, is the only species of this genus generally met with. It is an evergreen, erect flowering shrub, attaining a height of 2 to 3 feet; flowers yellow, but the chief beauty consists in the large white bracts; propagate during May or June by inserting cuttings in sandy soil, under a bell-glass in a temperature of 70° to 80°. Pot in equal parts of sandy loam, peat, and leaf soil, and assign the plants a light position in moist heat. Supply them with abundance of water during the spring and summer months and moderate quantities for the rest of the year.

NEPENTHES.

Few, if any, plants rival *Nepenthes* or Pitcher Plants for the extraordinary structure of the leaf appendages. They are described by botanical authorities as follows:—

“Leaves alternate ; petiole winged at the base, the mid-rib prolonged at the tops and curved, or spirally twisted, and terminating in a second foliaceous expansion, which is hollowed like an urn (the pitcher), to the opening of which is fitted a sort of lid, attached as by a hinge, and capable of being lowered or raised, so that the pitcher is sometimes closed, sometimes open. It is often found to contain a watery liquid before the raising of the lid.”

Nepenthes are not difficult to cultivate ; and well-grown examples, suspended from the roofs of plant stoves are among the most attractive occupants of the house. They can be raised by sowing seeds on the moistened surface of a mixture of fibrous peat and sphagnum moss in a heavily drained pan, covered with a bell-glass, and placed in a moist frame heated to a temperature of 80° to 90°. If the compost is kept moist without dislodging the seeds they should germinate in about a month from the time of sowing. After several leaves appear, carefully place the seedlings singly in small pots, and when the plants are large enough transfer them to baskets, adding a little turfy loam to the above compost.

Cuttings of one-year-old growths of *Nepenthes* produce roots freely if inserted singly in small pots, using the mixture advised for seedlings, and partially plunging the pots in cocoa-nut fibre refuse over a hot-water tank in a propagating case, kept close, and a temperature of 80° to 85° maintained. Some experts have been very successful by a simpler method, namely, inverting empty flower-pots on the warm, damp bed of fibre, into which the rims are slightly pressed down. The lower ends of the cuttings, divested of leaves, are pressed through the apertures of the pots down to the fibre, and the warm, moist air incites the emission of roots from the stems. The plants are then placed in pots, preparatory to establishing them in baskets, for producing bold, healthy leaves with their wonderful marbled terminals—appropriately termed pitchers—which constitute the beauty of the plants, and not the flowers, though these are not without interest, while distinctly serviceable in the production of seed.

For promoting full growth, a porous, yet somewhat more substantial, compost than previously advised is employed. A generally suitable mixture is found in two parts of fibrous loam and one each of turfy peat and sphagnum moss, with the addition of a little broken charcoal and sharp gritty sand. The plants thrive in a warm moist atmosphere with shade from the sun. From March to September copious supplies of tepid water are required for keeping the material in the baskets moist, though it must not be made sour by excess. Syringing is usually necessary twice a day during the summer, reducing the

moisture, both at the roots and in the atmosphere, on the approach of autumn, and still more during the winter. Established plants are usually rebasketed in February or March, removing all inert or ungenial soil, and giving fresh sweet compost. Summer temperature, 70° to 85°; winter, 65° to 75°.

SPECIES AND VARIETIES OF
NEPENTHES.

There are about twenty species in cultivation, while hybrids and varieties are being constantly added to the list, chiefly by Messrs. J. Veitch & Sons.

- N. ALBO-MARGINATA.—Singapore; leaves narrow, 9 to 12 inches long; pitchers light-green below, reddish above, having a distinct white ring towards the mouth; dwarf growing.
- „ AMPULLARIA.—Borneo; leaves broad, oblong, with somewhat oval pitchers; terminal lid small; colour a uniform light green; strong grower. *A. picta* and *A. vittata major* are good varieties.
- „ ATRO-SANGUINEA.—Garden hybrid; leaves stalked; pitchers about 6 inches by 2½ inches, reddish crimson, spotted with yellow; pointed at the base.
- „ BICALCARATA.—Borneo; leaves of a peculiar dark green; pitchers bag-shaped, covered when young with a fluffy, rust-coloured down.
- „ BURKEI.—Philippine Islands; a very variable species. *B. excellens* is richly coloured and distinct.
- „ CHELSONI.—Garden hybrid, between *N. Dominiana* and *N. Hookeriana*, having a habit intermediate between the two.
- „ CINCTA.—Borneo; leaves 12 inches by 3 inches, tapering to a broad dilated base, dark green; pitchers 7 inches to 8 inches by 2½ inches, green flushed with red, and with numerous irregular purple blotches.
- „ COURTII.—Garden hybrid, raised in Veitch's Nurseries by Mr. Court; leaves dark green, tapering

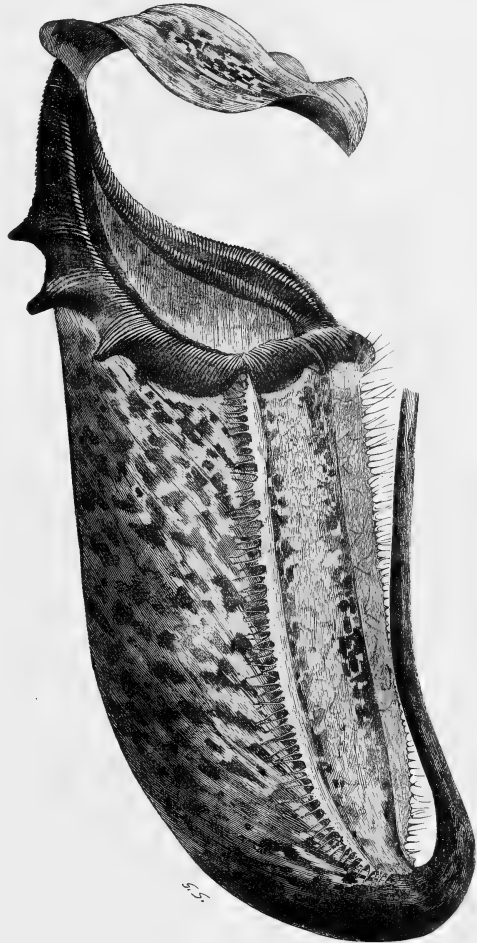


Fig. 5. NEPENTHES MIXTA.

towards the base; pitchers 5 inches by 2½ inches, dull greyish green, spotted with red, distended at the base, and cylindrical above the middle. One of the handsomest.

- N. CURTISI SUPERBA.—A great improvement on the original species; pitchers larger and brighter in their coloration and markings.
- „ DICKSONIANA.—Garden hybrid; pitchers 10 to 12 inches long, sub-cylindric and slightly compressed, of a bright pulvouse green, densely speckled with bright red crimson. Rim of the aperture is the most striking ornament of the pitcher.
- „ DISTILLATORIA. — Synonym Khasiana. — China; leaves 1 to 1½ feet long; pitchers 6½ by 1½ inches, green with purplish markings, wedge-shaped when young.
- „ DOMINIANA.—Garden hybrid; leaves dark green, broad oblong; pitchers deep green and slightly spotted, several inches in height.
- „ HOOKERIANA.—Sarawak; leaves coriaceous, nearly glabrous, acute at both ends; pitchers spotted with red, sub-glabose or sometimes elongated. A handsome species, only differing slightly from *N. Rafflesiana*.
- „ HYBRIDA.—Garden hybrid; leaves deep green, oblong, broad; pitchers about 8 inches long, deep green, winged and ciliated in front. The variety *maculata* has larger pitchers, profusely streaked with reddish purple.
- „ INTERMEDIA.—Garden hybrid; leaves coriaceous, tapering to both ends; pitchers 6 inches by 2½ inches, green, spotted with red.
- „ MASTERIANA.—Garden hybrid; leaves with mid-rib depressed, prominent beneath; pitchers 8 to 10 inches by 2½ inches, deep claret red, thinly hairy, cylindrical. One of the freest and most attractive *Nepenthes* yet raised. Constitution good; plant dwarf, every leaf giving a pitcher.
- N. MIXTA.—Garden hybrid; leaves oblong, acute, with a winged petiole; pitchers 8 inches long, pale yellowish green, blotched with red. The fine ribs surrounding the mouth of the pitcher are of a deep crimson colour. Fig. 5.
- „ MORGANLE.—Garden hybrid; leaves pale green, with red mid-ribs; pitchers 6 to 8 inches long, beautifully mottled with bright red and pale green when young, almost self-coloured and blood red in an adult stage; flask shaped.
- „ NORTHIANA.—Borneo; leaves coriaceous, tapering at the base into a short, broad amplexicant stalk; pitchers huge, 12 to 16 inches in length, and 3 to 5 inches broad; greenish, red striped, and spotted with crimson; cylindrical. A noble species.
- „ RAFFLESIANA.—Singapore; leaves alternate and petiolate; pitchers greenish-yellow, with brown markings. *R. insignis* and *R. nigro-purpurea* are distinct improvements on the type.
- „ RAJAH.—Borneo; leaves coriaceous, tapering at the base; pitchers over 1 foot long, dull purple, slightly hairy, cylindrical.
- „ SANGUINEA.—East Indies; leaves dark green; pitchers 5 to 10 inches long, of a deep blood-red.
- „ SEDENT.—Garden hybrid; pitchers medium-sized, light green, profusely blotched and freckled with brownish crimson.
- „ VEITCHI.—Borneo; leaves stout, tapering at the base; pitchers about 12 inches long, and 3 to 4 inches in diameter, somewhat cylindrical, rich green with a brownish tinge and covered with minute woolly hairs.

NIDULARIUM (Karatas).—A small genus of stove flowering and ornamental leaved plants, a few species of which may well be grown where variety is desired. The following are recommended: *N. cruenta*, Rio Janeiro, leaves spinose and tipped with blood-red, flowers blue and red, February to March; *N. Innocenti*, Brazil, leaves lanceolate, dark-green on the upper side, deep reddish purple beneath, flowers bright orange-red, produced in a nest-like crown; *N. Meyendorffi*, Brazil, flowers blue; *N. Plumieri*, West Indies, leaves long, sharp-pointed and spiny, flowers pink; and *N. spectabile*, Brazil, leaves 1 foot long, strap shape, spiny, flowers blood-red, white, and pale violet-blue in a crowded fascicle. *Nidulariums* are propagated from February to April, by off-shoots inserted singly in small pots of sandy soil, in temperature of 85°. Water carefully till roots are formed, and when the plants require more room, transfer

to well-drained 6-inch pots, using equal parts of fibrous loam, rough peat, leaf soil and silver sand. Pot firmly; arrange the plants in a moist sunny position in an ordinary plant stove. Apply water freely during the greater part of the year, keeping the plants somewhat dry at the roots during the winter. Young, single stemmed, plants are usually preferred to large specimens, and a fresh stock should be raised every spring to take the place of old plants that may be thrown away after flowering.

NYMPHÆA.—This genus not only comprises the common Water Lilies, but also several species that are worthy of a place among stove aquatics. Foremost among these must be placed *N. cœrulea*, syno. *N. stellata*, Tropical Asia; leaves nearly entire; flowers blue, delicately scented and produced abundantly during the summer. The flowers of *N. c. cyanea*, India, are also blue; while those of *N. c. zanzibarensis*, Zanzibar, are of a still deeper shade of blue; this is considered “one of the freest flowering and most beautiful of all the Water Lilies.” *N. Lotus*, Egyptian Lotus, once sacred to Isis, a goddess of the ancient Egyptians, has peltate, sharply serrated leaves; flowers large, red or white, with the sepals red at the margins. *N. L. dentata* is a large pure white form, *N. L. rubra* forming a good red companion. All are propagated by seeds, which should be sown thinly in pots of rich soil, and immersed 8 to 12 inches deep in water kept warmed to a temperature of 65° to 75°. If the seedlings are early reduced to one in a pot, and given a liberal shift when they require it, they will grow strongly and flower the same season. When the leaves die down the temperature of the water should be lowered 10°, the plants surviving till the spring, even if the water is drawn off altogether. In February or March, free the roots of old soil and return them to either large pots or tubs, filled with two parts rich fibrous loam to one part of well decayed manure. Immerse 8 to 12 inches deep in the water, warmed as before. Nymphaeas should have all the sun and light possible.

ORANGES AND CITRONS.—See CONSERVATORIES.

OUVIRANDRA, or Lattice-leaf Plant, so called from the peculiar formation of the leaves; an aquatic perennial, allied to *Aponogeton*. *O. fenestralis*, Madagascar, forms leaves 6 to 18 inches long, and from 2 to 4 inches broad, these spreading out nearly horizontally on the surface of the water. They are merely a network of vascular tissue resembling a lattice window. Flowers, greenish-white, the flower stem splitting at the top into two spikes. Plants are raised by sowing fresh seed in small pots of loamy soil, immersing them in water heated to a temperature of 75°. Increased by division of the roots in February or March. Grow the plants in small pots of loam

and leaf soil, immersing them 12 to 18 inches deep in a tub or tank of water, kept at about 70°, and changed occasionally. Re-pot in February or March.

PANAX.—A genus of plants with ash-like leaves, and of a fairly ornamental character. *P. fruticosum*, India, of which *P. f. bipinnatum* is a good form, is of a freely branching, elegant habit of growth; and the same may be said of *P. Victoriæ*. The latter has finely-cut, silvery variegated leaves, and in a small state is a good table plant. Propagation is effected by cuttings of the roots in light sandy soil, and a temperature of 80°, in March or April. Short lengths of stem may also be rooted in brisk heat. Not much pot room is needed, and the plants should be allowed to grow naturally. Pot in equal parts of loam, peat, and leaf soil, with a little sand.

PANCRATIUM.

Of the many elegant, sweet-scented white flowers so extensively used in bouquets, wreaths, and other decorations, few are more effective and pleasing than those of *Paneratium*. Not only are the flowers light and pure white, but they are also delightfully fragrant. *Paneratium* (or *Hymenocallis*) *fragrans* is one of the most extensively cultivated, the plants forming stout broad leaves, and producing strong flower scapes during the summer, from medium sized to large bulbs. *P. amœnum* (syn. *Hymenocallis amœna*), Guiana, has leaves 10 inches long, with a thick fleshy mid-rib; flowers sweet-scented, tube greenish; remainder of the flower white. *P. speciosum* (syn. *Hymenocallis speciosa*), West Indies; leaves very dark green, 18 to 24 inches long, and from 3 to 4 inches broad; flowers pure white, most fragrant in the evening; scape shorter than the leaves.

*Paneratium*s are increased by division, or the removal of offsets from the old bulbs when potting in March. Place the offsets singly in pots just large enough to properly hold them, using a mixture of two parts loam to one of leaf soil and decayed manure, adding a little silver sand. Plunge in a gentle hot-bed in a brisk heat and moist atmosphere, and shade the plants from the sun. The following March transfer all that have well filled their pots with roots into larger sizes, employing a compost similar to that recommended for the offsets, only coarser. Bottom heat, in the form of hot-beds, can be dispensed with after the plants become well established. They succeed well under the conditions that agree with *Eucharis* (see page 331, Vol. II.). Stove species ought not to be treated as deciduous, but rather as evergreen bulbous plants.

They may succeed for a time if annually dried off in the autumn, the bulbs shaken clear of soil, and re-potted in March, but sooner or later they will fail under this treatment, the *Eucharis* mite having something to do with this.

After the plants have flowered and completed their growth, still keep them supplied with water more or less, according to the time of year, and rest them during the winter in a temperature of 55° to 65°. A portion of the plants may be introduced into a higher temperature and moist atmosphere earlier than the rest, the excitement causing them to produce flower scapes well in advance of those not so treated. Another portion may be retarded, so as to have them in flower in August and later, by moving them into a warm greenhouse in May.

About every third season is often enough to re-pot strong *Pancratium* bulbs. Bursting the pots is a healthy sign. Unless large specimens are desired, 10-inch pots are the largest size that need be used; when these are crowded with bulbs and roots, turn them out in March, divide freely, and re-pot the bulbs either singly or in groups of three or more, according to their size. Those not recently re-potted must have abundance of water during the growing season, and clear soot-water frequently. The foliage should be kept free from insect pests, notably thrips.

PANDANUS.

One species, *P. Veitchi*, is met with in most plant stoves. All are of comparatively easy culture. A limited collection might well include *P. graminifolius*, height 2 feet, leaves 12 to 18 inches long, three to four inches wide, spines minute; *P. javanicus variegatum*, Java, leaves 3 to 6 feet in length, slightly pendulous, armed with white spines, ground colour bright green, with bands of pure white extending from base to apex; *P. utilis*, Madagascar, leaves glaucous, erect, 1 to 3 feet long, armed with red spines, tall growing; *P. Veitchi*, Polynesia, 2 feet long, leaves broad, pendulous, of a dark green in the centre and bordered with broad bands of pure white; and a recent introduction, *P. Sanderi*, green and yellow, very handsome.

Pandanuses are easily propagated by offsets detached in the spring, each with a few stout roots attached. Place these singly in small pots of light sandy soil, arrange them in a moist warm position, watering very carefully till fresh roots have formed. Offsets without roots may be inserted singly in small pots, and given the benefit of brisk bottom heat till well rooted. Care must be taken not to bury the hearts, and the offsets are also liable to decay if given much water before roots are formed.

P. Veitchi in a small state makes one of the best of table plants, but not if the start is made with large coarse offsets. Select the smallest offsets with elegant, prettily-striped leaves; establish these first in small pots, and then shift into the 5-inch size, arranging the plants in a light position. Even these selected plants are liable to degenerate when grown to a large size. A great amount of root room is not needed by Pandanus, especially if they are grown in a moist position. They may be shifted into larger pots in the spring, and thrive in a mixture of two parts loam to one of leaf soil, with a little sand for porosity. Good drainage must be provided, and copious supplies of water ought to be given to well established plants during the summer. An ordinary stove temperature suits Pandanus.

PANICUM.—For fringing the fronts of plant stages, groups of plants, and for house decoration, large quantities of *P. variegatum* are grown. This native of Tropical Asia is an elegant little variegated perennial grass, with leaves striped with pink and white. It can be readily propagated by cuttings. Five or six cuttings placed in a well-drained 4-inch pot filled with a mixture of loam, peat, leaf soil and sand, kept somewhat close and shaded, watered carefully till rooted, and then freely exposed to light and sunshine, will quickly develop into dense tufts whether topped or not.

PASSIFLORA.—As a rule Passifloras, commonly termed Passion Flowers, grow too strongly and require too much space for many of them to be grown in plant stoves. They are better adapted for planting in lofty structures, and will be referred to under the heading “Conservatory Climbers.” Exceptions may be made in favour of *P. Decaisneana*, a hybrid between *P. alata* and *P. quadrangularis*, flowers about 4 inches in diameter, sepals and petals brilliant carmine on the inside, rays of the corona purple and white; *P. Kermesina* (syn. *P. Raddiana*), Brazil, flowers nearly all blood colour and very freely produced; and *P. prinseps* (syn. *P. racemosa*), Brazil, flowers deep red or scarlet, in pendulous racemes. *P. Buonaparteana*, *P. Madonna*, and *P. Bijou* are hybrids, and are handsome stove climbers. Passifloras may be raised by sowing seeds in sandy soil in a temperature of 65° to 75° at any time. They are increased by cuttings of young shoots 4 to 6 inches long, inserted in sandy soil, under a bell-glass in a temperature of 65°, from April to September. First establish the young plants in small pots, and then, before they become stunted, move them into either large pots, tubs, or beds of loam and peat. Train up pillars, over archways, girders and trellises. Every February prune the laterals or loosely hanging growths nearly back to the main stems, the flowers being produced from the fresh growth resulting. Passifloras are gross feeders,

that is to say, they must have abundance of water and liquid manure after they have well occupied the soil with roots. Rich top-dressings should be applied to those appearing to need extra assistance. Syringe freely every day during the growing period, to keep them free of their worst insect enemy—the mealy bug.

PAULLINIA.—*P. thalictrifolia*, a species from Rio de Janeiro, with elegant thalictrum-like leaves and small pink flowers in clusters, is rightly described as a beautiful stove evergreen twiner. It is propagated by cuttings of firm shoots] 2 to 3 inches long, inserted in small pots of sandy soil, under a bell-glass in a temperature of 75° to 85°, at any time. Pot in equal parts of loam and leaf soil, with a little sand. Train the plants round a wire trellis or up pillars. Prune lightly in February, and soon after give the plants larger pots. Syringe daily, and keep the plants well supplied with water, especially during the growing and flowering seasons.

PAVETTA.—Two species of this genus of evergreen shrubs are recommended for culture in plant stoves. *P. borbonica*, Isle of Bourbon, is cultivated solely for the beauty of its leaves. These are 6 to 10 inches in length; ground colour olive green, thickly studded all over the surface with white spots, midrib bright salmon-red. *P. indica*, India, is a flowering species, producing white *Ixora*-like flowers in terminal panicles. For cultural instructions see *Ixora*, page 1.

PELLIONIA.—Included among Pellionias, a genus of stove creeping herbs, are two species with claims to attractiveness. *P. Daveauna*, Cochin China, flowers green, leaves dark bronzy green slightly tinted with violet, is a charming creeper. *P. pulchra*, Cochin China, has creeping stems dull purplish in colour, and leaves blackish on the upper surface, delicate purplish underneath. They are propagated by cuttings of creeping shoots, inserted in sandy soil in small pots, covering with glass in a temperature of 75° to 85° in spring; also by division of the plants in March or April. Plant on the surface of beds or rockeries under staging, or in pans of loam and leaf soil.

PENTAS.—Room ought to be found in most stoves for a few plants of Pentas. They are evergreen sub-shrubs, which can be had in flower throughout the greater part of the year. The flowers are not particularly showy, but they are distinct in colour and fairly attractive. *P. carnea*, South Africa, is of compact growth, 12 to 18 inches high; flowers flesh-coloured, in numerous large, cymose heads. *P. c. kermesina* differs from the type only in the colour of its flowers—a lively carmine-rose. Cuttings of young shoots, 2 to 3 inches long, inserted in pots of sandy peaty soil, in a propagating frame with a temperature of 70° to 80°, root freely. When commencing growth, top the young



Fig. 6. PENTAS CARNEA.

plants, and soon after place them singly in small pots. Assign them a light position, top the young shoots, and shift into 6-inch pots a week later. When strongly rooted, apply water copiously, and liquid manure occasionally. Prune closely in the spring, and when fresh growth is forming, reduce the old balls of soil and roots and re-pot. Soil suitable—loam, peat, and leaf soil in equal parts, adding sand freely, and pot rather firmly. (See Fig. 6.)

PEPEROMIA.—Pepper-Elder. Stove herbaceous perennials, with ornamental leaves of a succulent character. *P. arifolia argyrea* (syn. *P. Saundersi*), Brazil, has leaves variegated with green and grey. *P. maculosa*, Tropical America, forms leaves bright shining green in colour, with petioles beautifully spotted with purple. *P. metallica*, *P. prostrata*, and *P. brevipes* are also catalogued. Peperomias are increased by cuttings of either shoots or single joints with a leaf attached, inserted in sandy peat; the pots plunged in bottom heat of 65° to 75°, but not covered with glass, or damping may ensue. The erect species should be grown in small pots, and those of a creeping habit of growth in pans or planted out. They thrive in equal parts of loam and peat, with a free admixture of sand; shade from bright sun, and be careful not to over-water, keeping the soil dry rather than otherwise.

PHILODENDRON.—There is a considerable number of species belonging to this genus of evergreen plants of diverse habit. *P. Andreanum*, *P. crinipes*, *P. Lindenii*, and *P. Selloum*, form a good selection. They are easily propagated by cutting the stems into lengths of about three joints and inserting the portions in pots of light soil, in a temperature of about 75°. Tall plants may be cut down and have their tops made into cuttings. The tall-growing species ought to be planted against walls or pillars for training up them, the dwarf kinds succeeding well in large pots. Compost suitable—equal parts of loam, peat, and leaf soil, with silver sand. They should be syringed daily, and must have abundance of water at all times.

PHRYNIUM.—*P. variegatum* (Fig. 7) has rapidly gained in favour as a serviceable, fine-foliaged plant. It is allied to *Maranta*, and of easy culture. The leaves have erect foot-stalks about a foot high, with spreading blades 6 to 9 inches long, and 2 to 4 inches broad. They are bright pale green, beautifully variegated with cream-white, the marking being of a very diversified character. Plants can be employed for house and warm conservatory decoration, and are worthy of extended cultivation. For cultural instruction see *Maranta*, page 6.

PHYLLANTHUS.—Of this extensive genus a few species are cultivated in plant stoves

for the ornamental character of their growth. Their leaves are entire, generally distichous, and so arranged in opposite rows along the smaller branches as to give them the appearance of pinnate leaves. The species principally grown are *P. Chantrieri*,



Fig. 7. *PHEYNIMUM VARIEGATUM*.

P. myrtifolius, *P. nitosus*, and *P. roseo-pictus*. They are increased by cuttings of firm shoots 2 to 3 inches long, inserted singly in small pots of sandy soil in the spring, and covered with glass in a temperature of 70° to 80°. Young plants ought not to be topped, *Phyllanthus* being the most ornamental when grown with a single straight stem. Arrange them in a shady part of the stove, and shift into larger pots as required, employing a compost of equal parts sandy loam and fibrous peat, adding broken bricks, charcoal, cow manure in a dry powdery state, and sand. During the spring and summer syringe morning and evening and apply water freely, giving less of this during the winter, but not keeping the soil in a dust dry state.

PILEA. — Sometimes termed Artillery Plants, owing to the peculiar behaviour of the flower buds, when damped, bursting open suddenly and throwing off pollen like little whiffs of smoke. *P. muscosa* (syn. *P. microphylla*) is the species principally grown; herbaceous, and of a much branching yet compact habit of growth; flowers minute, but abundantly produced all over the upper surface of the plants. Raised by seeds sown on the surface of pans of light soil, in a temperature of 65° to 70°, in the

spring, and increased by cuttings of young shoots in a brisk heat at any time, or by division of the plants in February or March. Grow the plants in small pots in a partially shaded position, using a mixture of loam, leaf soil, and sand.

PLUMBAGO.—The blue and white forms of *P. capensis* are admirably adapted for clothing pillars and walls in conservatories and greenhouses, but *P. rosea* is from the East Indies, and requires more heat. This species rarely exceeds a height of 2 feet and produces long terminal spikes of rosy-scarlet flowers during the winter. *P. r. coccinea superba* is a distinct improvement on the type, this giving larger and more brightly coloured flowers. Cuttings of side shoots 2 to 3 inches long, inserted singly in small pots of sandy peat, in a temperature of 60° to 70°, root freely during spring and summer. Top the young plants to make them branch, and transfer to larger pots before they become root-bound and stubborn in growth. They may be flowered in 8-inch pots. Pot firmly in a compost of two parts fibrous loam to one of peat, with a little sand. The plants should be arranged in shallow pits or frames during the summer, and ought to be kept well supplied with water, varied by liquid manure occasionally. Early in September move them to a light position in a temperature of 55° to 65°. After they have ceased flowering cut them down, and when fresh growth commences turn all the plants it is intended to preserve out of the pots, reduce the ball of soil and roots, and re-pot in the same size as before. They can be grown to a comparatively large size by the autumn.

POINSETTIA.

What are popularly termed Poinsettias are, strictly speaking, Euphorbias, but there are no signs of their ever being generally recognised other than under the old familiar name. *P. pulcherrima* (Fig. 8), Mexico, has long been a favourite plant for warm conservatory, house, and room decoration during the early part of the winter, and for showiness and brilliancy of colouring it has no rival at that period of the year. The flowers are greenish yellow, and comparatively insignificant, but surrounding them are numerous long, broad scarlet floral leaves or bracts, which retain their colour and freshness long after the flowers are over, and not infrequently survive the leaves of the plants also. There is an early flowering form with shorter stems, more elegant leaves, and bracts of a duller scarlet than the type. This should be grown for flowering in November, the original species being at its best in December. *P. p. alba* gives

creamy white bracts, but neither this nor the so-called double variety, *P. p. plenissima*, is often seen in attractive condition.

Propagation may be effected by cutting the firm old stems into short lengths of two joints, and inserting the sections nearly their whole length in sandy soil, plunging the



Fig. 8. POINSETTIA PULCHERRIMA.

pots in a hotbed in February or March. The more common method is to start the previously dried off and rested plants into growth, not cutting them down, in April or May, and as they produce side shoots, converting them into cuttings. The cuttings ought to be 2 to 3 inches long when taken, and detached with a heel. Stop the cuttings from bleeding by thrusting the wound into fine dry sand, then quickly insert singly

in fine gritty soil, surfaced with sand, in 2-inch pots, plunging these in a bottom heat, 85°, in a frame, and guard against damping by drying the glass every morning. Cuttings should be rooted in succession, with a view to having a large stock of plants of various heights when in flower. The newly-rooted cuttings should be shifted into 4-inch pots soon after their removal from the propagating frame, and arranged where they will receive the benefit of a gentle bottom heat, and yet not be unduly forced. From the 4-inch pots the plants may be transferred to others two or three sizes larger. Soil suitable: loam three parts, one part each of leaf soil and decayed manure, and sand. After being kept long enough in heat to become well established in these, their flowering pots, they ought to be arranged in shallow frames or pits for the rest of the summer. They must be kept well supplied with water, and should have the sashes well blocked up on hot days, shading with thin canvas or cotton blinds from 11 a.m. to 3 p.m.

About the second week in September transfer the plants to a house where they can be grouped together in a light airy position on a close stage, maintaining a temperature of 55° to 60°, increasing to 60° to 70° in the course of a fortnight or three weeks. Sudden changes of temperature have to be avoided, as these are liable to cause the leaves to lose colour and fall prematurely. Nor ought there to be a sudden change from the moist atmosphere of pits and frames to dry surroundings. When the flower-heads are forming, apply weak clear liquid manure to the roots frequently. The plants will retain their foliage and floral "leaves" longest in a dry heat, rather than in a cool damp conservatory.

Many persons fail to grow Poinsettias satisfactorily the first season owing to not being able to give them a good start, but succeed well with older plants. Those who would imitate them should give their young plants, after flowering, a thorough baking, laying them on their sides for about three months in a temperature of 45° to 50°. They may subsequently be made to give cuttings after the manner already indicated, or, late in April, have the stems shortened severely. On being introduced into a moist heat, top growth will quickly commence, and the plants should then have their roots shaken nearly free of soil, shortened, returned to pots just large enough for holding them, arranging the plants in a position not far from the glass, in a temperature of 65° to 75°. Syringe twice daily, and before the soil becomes dust give a thorough watering. Top and root growth will both be rapid, and a shift into 8-inch pots must be given before the roots become matted together. During the summer, and again after housing early in September, treat the old plants as advised in the case of those

newly raised. If kept for a third season, the growths at pruning time should be cut back to the second joint from the main stems. Poinsettias may be planted in beds at the foot of the sunny back walls of lean-to and three-quarter span-roofed plant stoves, and if trained thinly, also attended to properly, they will produce grand bracts. After flowering, keep them perfectly dry at the roots, till they are pruned severely in April. If the borders are narrow, lift and re-plant the Poinsettias when they commence growing in May.

Should seed-pods form on any of the plants, save the seed, and sow singly in small pots early in April in a brisk heat. It will germinate in a few days, but unless the seedlings are early moved to a shelf near the glass they will quickly become tall and weak. Treat them similarly to plants raised from cuttings. A few of the seedlings will differ from the rest, and in some instances prove superior to the type, especially as regards the breadth and substance of the bracts. Mealy bug is the principal insect enemy to Poinsettias. Keep the young plants clean, and there will not be much further trouble.

POSOQUERIA.—Although comparatively little known, a few species of this genus are worthy of being added to collections of stove plants. They are evergreen flowering shrubs. *P. longiflora*, French Guiana, attains a height of 5 feet, and produces terminal corymbs of white flowers with long tubes during the summer. *P. multiflora*, Brazil, is also white-flowered and fragrant. They are propagated by cuttings of firm young side shoots 2 to 3 inches long, inserted from January to April in pots of sandy peat, and covered with a bell-glass in a temperature of 75° to 80°. Top the young plants and soon after establish them singly in small pots, removing to larger sizes when the roots require more room. Posoquierias also succeed well planted in narrow beds. For either pots or beds, equal parts of loam, peat, and well-decayed manure, with sand and charcoal, form a suitable rooting medium. Pot or plant firmly. Keep the plants steadily moist at the roots, and during the growing season syringe twice daily. In February or March prune into a good form, and re-pot a fortnight later. If these old plants are properly attended to they will greatly surpass the younger, both in the quality and quantity of the flowers produced. Feed those established in pots with liquid manure.

PSIDIUM.—*P. Cattleianum*, The Guava, Brazil, is cultivated principally for its fruit, which is both ornamental and edible. The plant is evergreen, of a shrubby habit of growth, flowering in May and June. Propagation is effected by cuttings of firm young

shoots 2 to 3 inches long, inserted in pure sand, under a bell-glass, in a temperature of 75° to 80° in spring or summer. The plants may be grown in either pots, tubs, or narrow borders, in a compost of two parts fibrous loam to a half part each of powdered cow manure and sand. Train the growths to back walls of ordinary plant stoves or warm greenhouses. Keep the soil moist and syringe the plants daily till the fruit commences to ripen. In February prune rather closely, and soon afterwards either give a shift or top dress with fresh compost.

REIDIA. — *R. glabrescens*, Java, is an elegant plant, admirably adapted for table decoration. It is nearly allied to *Phyllanthus*, is propagated in the same way and requires the same treatment. See page 19.

REINWARDTIA TETRAGYNUM. —Cool stove or warm greenhouse. For culture see *Linum trigynum*, page 204, Vol. II.

RIVINA.—Among berry bearing plants of an ornamental character, *R. humilis* (Fig. 9) is quite a gem. It is a native of the Caribbee Islands, attains a height of 1 to 2 feet, branches naturally and freely, forming neat heads on a clear stem, and produces racemes of small red currant-like berries abundantly, which ripen in the autumn. Plants can be increased by cuttings of young shoots, inserted in small pots of sandy soil in a temperature of 65° to 75° during the spring; but seedlings, which should be



Fig. 9. *RIVINA HUMILIS*.

raised annually, are much preferable. Sow the seeds in pots or pans of sandy soil during February or March, in a temperature of 55° to 65°. From 2-inch pots, in which the plants are early established, give a final shift to 5-inch or slightly larger pots, using equal parts of loam and leaf soil, with sand. Grow them in a light position in gentle heat till June, when frames or shallow pits are the best places for them. They must have free ventilation, careful watering, and feeding with liquid manure. Arrange them in a light position in a plant stove in September.

RONDELETIA.—Specimen *Rondeletias* are to be met with occasionally in the



Fig. 10. *RONDELETIA (ROGIERA) GRATISSIMA.*

exhibition tent, and arrest attention. They are hard-wooded stove evergreen flowering shrubs, neither difficult to propagate nor cultivate. *R. cordata* (syn. *Rogiera cordata*), Guatemala, produces terminal cymes of pink flowers in the summer. *R. gratissima*, Fig. 10 (syn. *Rogiera gratissima*), Mexico, gives pinkish sweet-scented flowers in terminal cymes, and is a very desirable species. *R. speciosa* (odorata), Cuba, produces terminal compound cymes of sweet-scented bright vermilion flowers in the late summer and autumn months, and of this *R. s. brilliantissima* and *R. s. major* are improved forms, well worthy of cultivation for decorative purpose, and affording bright, neat flowers for cutting. *Rondeletias* are propagated by cuttings of firm shoots inserted in pure sand, under a bell-glass in a temperature of 75° to 85°, in spring or summer.

The young plants should be placed singly in 2-inch pots, using peaty soil, and grown in a position where they will not suffer from undue dryness in the surroundings. Topping will cause them to produce side shoots, and they ought to be transferred to 4-inch pots before they become root-bound. For this and subsequent shifts employ equal parts of loam and peat, adding lumps of charcoal and silver sand. Pot firmly. Arrange the plants on an ash-covered front staging, keep the soil in the pots uniformly moist, taking care not to give too much water at first, syringe daily and shade from bright sun. Train the young shoots round light stakes and they will then branch

naturally. After flowering they may be lightly pruned, merely removing loose growth, and if the soil is well occupied with roots, give a small shift in February or March. In this way large plants can be kept in good health many years, as they do not require much pot room.

RUELLIA.—A genus of perennial herbs and shrubs, some few of which are cultivated in plant stoves for the beauty of their flowers. The best of them are *R. Baikiei*, West Africa, flowers in terminal panicles, scarlet, winter; *R. macrantha*, flowers a rosy-purple colour; and *R. rosea*, Brazil, flowers rose-coloured, summer. They are propagated in spring and summer by cuttings inserted in light sandy soil, covering with glass, in a temperature of 75° to 80°. Pot in a mixture of equal parts of loam, peat, and leaf soil, with a little sand, and grow the plants in a shady part of an ordinary plant stove.

RUSSELLIA.—*R. juncea*, Mexico, is the only species met with in private gardens. It forms erect growths, with pendulous rush-like branches, and produces scarlet flowers in loose racemes in the summer. It is propagated by cuttings, inserted in light sandy soil in a brisk heat, or by layering. Pot in equal parts of loam and leaf soil and a little sand. Grow the plants in a sunny position, and keep them well supplied with water in the summer, reducing the quantity considerably during the winter months.

SANCHEZIA.—A small genus, usually represented in collections of stove plants by a single species—*S. nobilis variegata*. This plant attains a height of 2 feet, and forms long, broad leaves showily striped with yellow. It is increased by cuttings of young shoots, inserted during spring and summer in light sandy soil, in an ordinary propagating frame. From small pots give a liberal shift, using a mixture of loam, peat, leaf soil, or well-decayed manure, and sand. A somewhat shady position is suitable for the plants, and a few strong shoots will be found more imposing than a greater number of weakly ones. They may be cut down in March, have their roots partially freed of soil, and be potted into the same size of pot they were in before; affording a shift if desirable about six weeks later.

SCUTELLARIA.—To about three species of *Scutellaria* the hackneyed expression, “they are not so much grown as they ought to be,” may safely be applied. A few plants, in good condition, serve to brighten a plant stove or warm greenhouse during several months of the year. *S. Moccuriana*, Mexico, attains a height of 18 inches, and during the winter produces spikes of bright scarlet flowers from the point of almost every shoot. *S. pulchella* (syn. *S. grandiflora*), Altaian Alps, produces spikes of purplish flowers with the greatest freedom; while the flowers of *S. villosa*, Peru, are scarlet

borne in terminal racemes. All propagation is effected by cuttings of half-ripened shoots, in a warm frame, in the spring or summer. Top the young plants, repeating this operation till neat bushes are formed, and gradually shift them into 6 or 8-inch pots, using a mixture of two parts loam to one each of leaf soil and decayed manure,



Fig. 11. SOLANDRA GRANDIFLORA.

not omitting sand. Pot rather firmly. Up to June they should be grown in a light position in gentle heat, but during the summer sunny pits and frames are the best positions for them. Early in September move the plants to a light house, having a temperature of 55° to 65° , and assist them with liquid manure. After flowering, or in February, they may be cut down, and a fortnight later should have the roots shaken nearly free of soil, pruned, and returned to smaller pots than they were in previously. Top any growths taking an undue lead, and transfer the plants to larger pots as more root-room is required.

SOLANDRA.—Visitors to the Madeira Islands are usually impressed with the beauty of *S. grandiflora* (Fig. 11). It belongs to a genus of tall climbing stove shrub, and produces large

trumpet-shaped, greenish white flowers, which only last about three days. Propagation is easily effected by cuttings inserted in light sandy soil, and placed in a temperature of 65° to 75° in the spring. Potted in two parts of loam to one each of peat and powdered cow-manure, adding a little sand, the plants, if well attended to, grow

rapidly, and should be trained up rafters in the full sun. In the autumn gradually withhold water to the extent of causing the loss of all the leaves. After this "baking" flowers will be developed freely by all the short stumpy growths, and at the



Fig. 12. SOLANUM WENDLANDI.

points of stronger shoots if these are woody. The plants may be trimmed into shape before fresh growth is formed.

SOLANUM.—Out of the numerous and widely differing species comprised in this genus, two are selected as meriting the attention of growers of stove plants. *S. Seaforthianum*, West Indies, is a stove evergreen trailer, which produces numerous

cymes of pink flowers in August. *S. Wendlandi* (Fig. 12), Costa Rica, described as a climbing glabrous stove shrub, with large leaves, flowers profusely for about three months, commencing in August, or earlier; colour, lilac-blue. They are propagated in spring by inserting cuttings of young shoots. First establish the young plants in small pots, and then plant in tubs or narrow borders and a moderately rich loamy soil. If they must be kept in pots these should be of large size, and liquid manure, in addition to abundance of water, must be supplied during the growing and flowering periods. Train the plants up pillars and rafters, allowing them to branch and trail freely. Shorten these loose flowering growths severely in February or March, and soon after either top-dress or place fresh compost about the roots. *Solanums* fail if starved at the roots. Syringe freely to keep down red spider.

SONERILA.—A few of these plants may well be grown for the beauty both of their foliage and flowers. They are stove perennials, flowering during the summer. *S. Margaritacea*, East Indies, grows to a height of 8 to 10 inches, and has prettily-spotted leaves, while the flowers are rose-coloured and produced in corymbs. *Hendersoni argyrea*, *marmorata superba*, *Madame Alesch*, and *Alfred Mame* are attractive varieties of *S. Margaritacea*. They may be raised from seeds, in a mixture of fine peat, chopped sphagnum and sand, in a temperature of 75° to 85°; January to April. Also increased by cuttings of shoots inserted singly in small pots of sandy peat, under a bell-glass in strong heat. Move the young plants into larger well-drained pots, surrounding the roots with a mixture of fibrous loam, chopped sphagnum, nodules of charcoal, potsherds and sand. When growing freely they should have copious supplies of water, also abundance of moisture in the atmosphere, and must be shaded from bright sun. What re-potting is necessary ought to be done in February or March.

STEPHANOTIS.

Very little need be said in praise of *Stephanotis floribunda*. It is a general favourite and deservedly so. Properly treated well-established plants are capable of producing large numbers of clusters of pure white, waxy, sweet-scented flowers annually, the season extending from May to November inclusive. *S. floribunda* is a native of Madagascar, and was introduced to this country in 1839. The *Elvaston* variety of it is supposed to be more floriferous than the type, quite small plants flowering freely, though this may be due to superior cultivation. Occasionally large egg-shaped pods of seed are

saved, and this when sown germinates freely ; but seedling plants, as a rule, grow more vigorously than is desirable, and fail to flower with any approach to profusion.

Stephanotis is best propagated by cuttings of short growths of the previous year, inserted singly in small pots of loam, peat, and sand, covering in a bell-glass, in a temperature 65° to 75°, in spring. When well-rooted and slightly hardened, place the young plants into 6-inch pots and arrange them in a sunny position not far from the glass in ordinary stove temperature. Do not top them, but train a single strong growth either round stakes, or up the roof. If started very early in the year and strongly, a second move may be given into 9-inch pots. Syringe twice daily, and when the soil is fully occupied by roots water copiously. Shade from sun during the hottest part of the day. If young plants are desired to flower the same season as propagated, keep them in 5-inch pots, and feed them at the roots after flower buds appear. Plants large and small should have less water in the autumn and winter, and the greater portion of the growth will then harden and ripen satisfactorily.

Early in February prune away the weakly, soft ends, and if the plants are to be kept in pots for exhibition purposes, train the reserved portion round stakes to cause them to break at as many joints as possible. This will take place quickly in brisk heat and a moist atmosphere, then, before much growth is made, move the plants into larger pots. A suitable compost for Stephanotis is formed of equal parts of fibrous loam and peat, one part each of leaf-mould and well-decayed manure, charred soil and sharp sand. Ample drainage must be afforded, the plants requiring copious supplies of water during the growing and flowering season. Raise the plants well to the light, and train the young growths thinly over wires near the glass. When the shoots are flowering, with many more clusters of bloom to follow, they can be taken down and carefully trained over neat, balloon-shaped trellises. The treatment in succeeding years may be similar in character, only more wood will have to be removed at pruning time to prevent crowding, too many young growths weakening and spoiling each other. If wanted for exhibition take the flowering growths down from the roof and train them sufficiently early to admit of the flowers and leaves assuming a natural position before the date of the show.

When planted in small borders, pits, tubs, or large pots of suitable soil, and trained thinly to wires attached to the roofs of plant stoves, the Stephanotis flowers the most profusely and continuously. A pit, 2 feet square, formed with loose bricks, answers well for the soil, and when more space is needed the rooting area can be enlarged to

3 feet square. The loose brick walls can be taken down each spring, returning them after some of the old exhausted soil has been removed, and fresh compost substituted. It is unwise to allow the plants to grow promiscuously. The wires for them should be strained across the rafters not less than 1 foot apart, and the growths trained along, not across, them. Thus arranged, the pruning, cleaning, and other operations can be carried out expeditiously with a minimum amount of injury



Fig. 13. STEPHANOTIS FLORIBUNDA.

to the plants. Train long, strong, well-matured growths round stakes, to make them break regularly, and subsequently take them straight up the roof—either at one end or in the centre of the house, and train the lateral growths along the wires.

Two methods of pruning are open to growers of *Stephanotis*. Some prefer to shorten the old flowering growths severely in February, with the result that long, strong shoots are formed, which do not commence flowering till they have made

considerable progress. Hard-pruned plants usually produce the finest flowers, and are not infrequently cleaner than are those lightly pruned. The other plan is to merely thin out the growths where crowded, removing the weaker. Late autumn-formed flower buds often remain stationary till the spring, and these, if the growths are not shortened, develop early in the season, or by Easter, when they are the most valuable. Long lengths of well-matured stems will, if reserved, push shoots from many of the joints, and these frequently commence flowering at once, presenting a beautiful appearance when trailing in large numbers from the roof. What may be termed a combination of the two systems is likely to prove the most profitable in the end.

Stephanotises should be shaded during the hottest part of the day from April to August inclusive, and ought to be syringed every morning, and again when the house is closed during those months. The water must be applied forcibly if the growths are infested with mealy bug. The plants ought never to flag through want of water, but should have abundance, with clear soot water or other weak liquid manure, when the soil is crowded with roots. Apply only enough water during the winter to keep the wood plump and the leaves fresh, further resting the plants in a temperature of 55° to 65°. The best time to clean plants is when they are resting, or directly after pruning, by washing them thoroughly, yet carefully, with the petroleum solution advised on page 263, Vol. II.

STIGMAPHYLLON.—*S. ciliatum*, popularly termed the Golden Vine, is a native of Brazil, and one of the most beautiful climbers we have. Unfortunately it requires more space to ramble in than can be afforded in the average plant stove, and rather more heat than is usually maintained in conservatories. The growth is somewhat slender, the leaves small and elegant, and the charming yellow flowers produced abundantly on branchlets in the summer and autumn. It is propagated by cuttings of firm shoots, inserted singly in small pots of sandy soil, covering with glass in a temperature of 65° to 75° in spring or summer. Plant or pot in a mixture of equal parts of loam, peat, leaf soil and sand, pressing down firmly. Train the plants up pillars and rafters, or over archways and trellises, and keep the roots moist. January is the month to prune away all weak growths, and shorten the strong ones moderately, giving those plants which require it more root-room a month later.

STRELITZIA.—A small genus of cool stove or warm greenhouse perennials, from South Africa. They produce handsome leaves and showy flowers in a spathe. *S. augusta* is

a noble plant, with dark green leaves, supported on petioles 3 to 6 feet long, and produces nearly pure white flowers in March. *S. Nicolai* much resembles it; but *S. Reginae*, flowering rather later, is distinct and the most beautiful of all. The leaves are large and imposing in appearance; and the flowers, orange and purple in colour, freely produced, are borne on scapes nearly as tall as the leaves. Plants can be raised by sowing seeds in spring, when procurable, in a mixture of loam, peat, leaf-soil and sand, in a temperature of 65° to 75°; also by offsets or division of the old plants in February or March. The plants succeed in well-drained pots or beds, in a compost of two parts of loam and one of peat, with abundance of sand. A sunny position is desirable, and water must be supplied in large quantities from April to September, gradually reducing the amount, and keeping the roots dry during the winter.

TABERNÆMONTANA.—A moderately large genus of stove evergreen flowering shrubs, of which two or three species only are considered worthy of general cultivation. *T. Barteri*, Western Tropical Africa, attains a height of 4 to 6 feet, and produces white flowers in summer. *T. coronaria*, East Indies, grows 4 feet high, branching freely; flowers white, sweet-scented, and abundant in the summer. It is not often met with, but the double-flowering form, *T. c. flore pleno*, is very popular. Propagation is effected by cuttings of firm shoots, inserted singly in small pots filled with sand, which must be kept moist, in a propagating frame, and a temperature of 65° to 75°, in February. When well rooted, establish the young plants in 5-inch pots, and grow them in a light position, not crowded among other kinds of plants. Winter them in a temperature of 65° to 70°, and keep the soil moist. The flowers will expand during the following spring in rather strong heat, accompanied by plenty of moisture in the atmosphere. Those plants requiring more root room should have a shift in March or April, using a compost of two parts of loam and one of peat, with a little sand. What little pruning may be necessary for the regulation of the growth should be done after flowering is over. *T. cymosa flore pleno* (Fig. 14) is handsome, and produces its white flowers very freely.

THUNBERGIA.—In this genus of twining dwarf annual or perennial herbs, are comprised a few species that well repay for good culture. *T. alata*, South Africa, is an annual, twining in habit, freely producing attractive yellow and purple flowers in the summer. *Alba* is a pure white, and *aurantiaca* a rich yellow variety. *T. fragrans* is a perennial climber, with white, sweet-scented flowers. *T. laurifolia* (syn. *T. Harrisii*), India, closely resembles *T. grandiflora*, a moderately strong-growing climbing species,

with smooth leaves and beautiful large blue flowers. *T. alata* and varieties are raised from seeds, sown in sandy soil, in a temperature of 65° to 75°, in March or April. When forming a third leaf the seedlings are first established in 2½-inch pots, keeping them close and warm till they have recovered from the check, subsequently shifting the plants into 5-inch pots, using a rich loamy compost. The growths may either be trained to stakes, allowed to drape over the fronts of stages, or hang down from suspended baskets in a warm greenhouse. They must be kept well supplied with water



Fig. 14. TABERNÆMONTANA CYMOsa FLORE PLENO.

and liquid manure, and syringed frequently to keep them free of red spider. Perennial species are increased by cuttings of firm young shoots 2 to 3 inches long, inserted in peaty soil, under a bell-glass, in a temperature of 75° to 85°, in the spring. From small pots either transfer the plants into larger, or plant in a narrow border, using a mixture of two parts of loam with one each of peat and well-decayed manure, adding a little sand and lime rubbish. The plants are the most effective when trained near to the glass. They enjoy a summer temperature of 65° to 75°, with shade when grow-

ing. Keep them well supplied with water, varied, when strongly rooted, with liquid manure, and syringe daily. Rest them after flowering in a temperature of 55° to 65°, with the soil rather dry. Before they recommence growth, prune the shoots somewhat closely, and re-pot, if necessary, a fortnight later.

THYRSACANTHUS.—*T. rutilans* (syn. *T. Schomburgkianus*), New Grenada, is of stiff, erect growth, and during the winter produces long pendant racemes of crimson tubular flowers. It is propagated by cuttings of young shoots, inserted singly in small pots of sandy soil, under glass, in a temperature of 65° to 75°, from March to July. Gradually shift the plants into 7-inch pots, using equal parts of loam, peat, leaf soil, and sand, and arrange them for the summer in sunny pits or frames. In September remove them to a light house, having a temperature of 60° to 70°. Old plants may be pruned after flowering, and kept for a second season, but well-grown young plants give the best results.

TILLANDSIA and VRIESIA.—*Vriesias* are now grouped with *Tillandsia*, and together form a large genus, comprising many beautiful species. They are Bromeliaceous plants, with upright and frequently arched leaves, and produce spikes of blue, scarlet, yellow, white, and green flowers, also richly coloured bracts. They are propagated by offsets inserted in small pots of sandy peat, in a temperature of 75° to 85°, in spring. When well rooted remove to larger pots, using equal parts of loam, peat, leaf soil, and sand. They delight in high temperatures, as well as a moist atmosphere, and should be shaded on bright hot days. Apply water freely all through the late spring and summer months, also syringe the plants twice daily, but they should be kept drier during the winter; not, however, to the extent of allowing the soil to become dust dry.

TORENIA.—A small genus of annuals and perennials, a few species of which are of good service in beautifying plant stoves and greenhouses during the summer. *T. asiatica*, India, is of a slender trailing habit of growth; the flowers are blue, with dark violet lateral lobes, and produced in June. *T. flava* (syn. *T. Bailloni*), India, like the preceding, is adapted for growing in baskets; flowers yellow with a purple eye. *T. Fournieri*, China, is of a more erect branching growth, attaining a height of 5 to 8 inches; flowers violet shades and yellow. They may be raised from seeds and propagated by cuttings. Sow the seeds in January or February, thinly, in pans of peaty soil, covering very lightly, and place in a temperature of 55° to 65°. When the seedlings have formed a first "rough" leaf, dibble them an inch or two apart in pans or pots of loam, peat, leaf soil and sand, in equal parts, and keep them growing

in brisk heat and moist surroundings. Before they crowd each other, or when about 2 inches high, place them either singly in 5-inch pots, or three in each 6-inch pot, using soil as advised. Top twice, and those plants not required for hanging baskets, or for draping the fronts of stages, should be lightly supported by stakes and strips of raffia. They should have abundance of water, and be shaded from the sun. Torenias may be treated as perennials. Cuttings of young shoots 3 inches long, inserted in sandy soil, in a temperature of 55° to 65°, in the spring or summer, will produce roots freely, and the plants requiring the management as seedlings.

TRADESCANTIA.—*T. discolor* (syn. *Rhœo discolor*), Central America, is a trailing herb, admirably adapted for growing in hanging baskets, draping the fronts of stages, planting under them, or in other warm shaded positions. The varieties *lineata* and *Madame Leguense* are prettily variegated. *T. zebrina* (syn. *zebrina pendula*) forms double leaves striped with white, and of this there is a handsome tricolored variety. All are easily propagated by cuttings of young shoots, inserted in light soil, under a propagating frame, in a temperature of 70° to 80°, at any time of the year. Pot or plant in equal parts of loam, peat, leaf soil and sand. The plants thrive best in a moist, shady position, and are most effective when in a comparatively young state.

TYDÆA.—Tydæas form a link between *Achimenes* and *Gesneras*, and combine in themselves many of the beautiful characteristics of both. Their cultural requirements are identical with, and plants are increased in the same way as, *Gesneras* (see page 341, Vol. II.). *T. amabilis* was the original species, and from this numerous distinct named varieties have been raised—principally on the Continent.

URCEOCHARIS.—*U. Clibrani* (Fig. 15, next page) originated from a cross between *Eucharis grandiflora* and *Urceolina pendula*, the flowers bearing a resemblance to both parents; they are pure white, and borne in umbels on strong stalks, similar to *Eucharis*, nearly erect at first, drooping slightly when developed. The leaves are broad, and as vigorous as those of the *Eucharis*. Propagation and culture are the same as recommended for *Eucharis* (page 331, Vol. II.).

URCEOLINA.—Though *Urceolinas* are briefly referred to on page 242, Vol. II., *U. pendula*, or the Drooping Urn Flower, must have further attention here as a gem among stove deciduous bulbous plants. The flowers are pendent, as there shown, and many in an umbel, yellow, margined with white, and produced in advance of the leaves. Plants may be raised by sowing seeds in sandy loam, in a temperature of 65° to 70°, in March; and the seedlings, if kept steadily growing, will flower in 4-inch pots in about three

years. A mixture of two parts of fibrous loam to one part of leaf soil, adding a few crushed bones and some river sand, is suitable for the plants, which must be arranged in a light position, and be kept well supplied with water. The stock may be increased by offsets, treating them similarly to the more advanced seedlings. When large enough



Fig. 15. *UREOCHARIS CLIBRANI*.

to flower, gradually withhold water, keeping the plants quite dry through the winter. When the bulbs commence growing, or show their flower spikes, well moisten the soil and apply liquid manure, continuing this treatment till the time again comes round for drying the bulbs. Re-pot about every third year in February. Three bulbs may be placed in each 5-inch pot, sinking them two-thirds of their depth in the soil.

VINCA. — Periwinkle. This genus comprises a stove species, *V. rosea*; there are also white forms—*alba* and *ocellata*. It is a sub-shrub, easily raised from seed and increased by cuttings in brisk heat in the spring. Top the young plants to make them bushy, and shift into larger pots as required, using good loamy soil. Rest the plants by giving little water in the winter, prune them in February, reduce the old soil and give fresh

in smaller pots, subsequently shifting into larger for flowering. Water the plants carefully yet sufficiently during the summer, and weak liquid manure acts beneficially when the pots are crowded with roots.

ORCHIDS.

THE Orchid family is one of the most important of cultivated natural orders, and one that, during the last half-century, has attained great popularity. The reason is not far to seek, for the plants combine marked individuality with marvellous variety, and among them may be found some of the most beautiful of Nature's products. The earliest record of their culture goes far back into the eighteenth century, though at that time their requirements were not in the least understood, and the earliest attempts at their culture were very disappointing. Knowing little about their habits or habitats beyond the fact that they came from tropical countries, cultivators of a century ago were sadly handicapped; the houses, too, that they possessed were quite unsuitable for orchid cultivation. Little wonder that for many years orchids were looked upon as almost impossible plants for cultivation.

The first species cultivated in England appears to have been *Bletia verecunda* (Fig. 16), which was sent home from the Bahamas, and first flowered in 1732. Another very old

kind is the *Vanilla*, and of this we find mention in old gardening works as being in cultivation at Kew and the Apothecaries' Garden at Chelsea in 1768. Among the



Fig. 16. *BLETIA VERECUNDA*.

References:—1, column; 2, scape (flower stem), 4 to 5 feet high; 3, leaf, 2 to 3 feet long; 4, flower with perianth forced back; 5, lip; 6, pollen mass magnified.

earlier introductions were several species of epidendrum, such as *E. cochleatum*, *E. fragrans*, and others, and these we find were expected to grow in a compost consisting of decayed wood and leaves, the pot containing them being plunged in tan, as in the case of pines in structures, kept at a great heat. Even at this length of time one feels sorry for the orchids exposed to such unnatural conditions.

Time after time orchids of various kinds were sent home from the West Indies, from India and China, by people who, seeing them growing naturally, had been struck by their beauty, and wished to see them cultivated in this country. But usually they came only to die, for no one had found out a way to establish them, and as fast as they were imported they were doomed to confinement in these stuffy overheated stoves, where an end was soon put to their existence.

About the beginning of the present century Messrs. Loddiges, a then famous firm of nurserymen at Hackney, took up their culture with considerable spirit, so much so that for very many years they were considered the chief authorities upon them. One of their earliest introductions was the beautiful *Aërides odoratum*, a lovely orchid, and though not exactly a popular species now, yet a useful one, and a good deal grown. From this time onward many other fine kinds were introduced by this famous firm and others, including Mr. Bateman, who, at Knypersley Hall, in the "thirties," was getting well known as a cultivator. The Duke of Devonshire, too, was forming his collection about that time, or at all events largely increasing it, and in 1837, or thereabouts, many very fine species were sent home by his collector, Mr. Gibson. But in such bad odour were orchids getting, as cultivated plants, that it seemed as if their requirements would never be understood.

The many collectors in various parts of the world sent home glowing descriptions of their discoveries and were naturally not a little disappointed at the non-success of cultivators. The Messrs. Veitch were possibly somewhat later in the field of orchid-collecting, but when their travellers, the brothers Lobb, were sent out they found many choice and lovely species, but whether the plant came from the Alpine regions in Peru or the Brazilian mountains, the stifling heat of the jungles in India, or the more temperate Himalayas, all on arrival were subjected to the same treatment as to temperature. The effect, as may be expected, was that some of the stronger heat-loving kinds came through the ordeal fairly well, but the majority at once succumbed to the unnatural conditions. The change to a more rational mode of culture was a very slow one, for the idea that orchids, one and all, needed a great amount of heat, was very firmly rooted.

One of the cultivators to leave the beaten track was Mr. (subsequently Sir Joseph) Paxton, at that time gardener to the Duke of Devonshire at Chatsworth, who appears to have been among the first to use houses of different temperatures for orchids coming from various altitudes and localities. His success incited considerable interest among eminent botanists and horticulturists at the time, and many who had the opportunity followed his lead and took advantage of his writings in various periodicals in which he was interested.

To trace the history of these plants from that time onward to the present would be to find a record such as few other families could show, while to mention a tithe of those who as cultivators or writers, collectors or dealers have contributed to this, would take up far more space than is at disposal in a work of this description. From being the expensive luxuries of a few, orchids have become so cheap as to be within the means of any one who aspires to a greenhouse, however small. Their culture is thoroughly understood as regards some of the more beautiful, and though there are even yet refractory kinds, these amount to a very small minority.

One thing is absolutely certain, and that is that low as the prices of the more ordinary kinds have become, they will be lower yet as long as collectors continue to send such huge quantities of these home. There is plenty of room for new and striking varieties, as witness the high figures paid when any particularly rare kind is offered, while of many species and varieties long since introduced, but now very rare and valuable, there is still a lack, but to send consignments of species that our nurseries and private collections are full of, in quantities far exceeding the demand, is as wrong as it is wasteful.

Costly orchids having been referred to, a few examples may be given. *Aërides Lawrenceæ* realised 210 guineas in the public sale-room. Two small plants of *Cattleya*

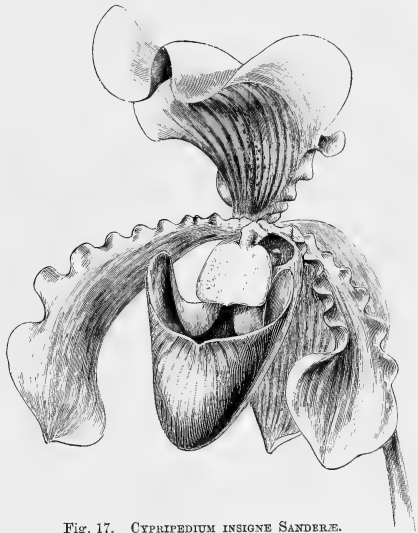


Fig. 17. *CYPRIPEDIUM INSIGNE* SANDER.E.

labiata gaudavense recently sold for 130 guineas each. Mr. R. I. Measures purchased a form of *C. labiata* for 7s. 6d., and subsequently sold four pieces off the plant for 180 guineas. *Odontoglossum Wilckeanum Pittiæ*, sold for 150 guineas, speedily doubled in value. Three forms of *Od. crispum* were recently sold for £900. *Cypripedium insigne Sanderæ*, however, perhaps realised more money than any other orchid. Messrs. Sander introduced the first plant. This they divided into two, one-half being publicly sold for 70 guineas, Mr. R. H. Measures, of Streatham, obtaining the other. This he grew and divided into four parts, selling three of them. Mr. Sander bought one for £250, and the original plant therefore soon grew into the value of £1,000. It is a remarkable form of *C. insigne*, and a flower is represented in Fig. 17, preceding page.

Reverting to the wholesale destruction of orchids in their native haunts, this is greatly to be deprecated. Though doubtless it takes many years to quite exterminate a species, it can be done in time, and whatever new or improved forms might have sprung from the crossing of these in a wild state are for ever lost. The field for orchid-collecting, though still large, is narrowing, and it will be a bad day for all interested when the last wildling of a novel character reaches us. Hybridists at home are doing good work—of which more anon—but there is an interest and romance connected with a species never before seen under cultivation and straight from its habitat, that is, in the estimation of many persons, wanting in the very best of artificially raised kinds.

Respecting the habitats of orchids, these differ widely, and although having a certain bearing on their cultivation, a knowledge of the conditions under which they grow naturally is not so important as has been thought by some. A species may be planted by Nature on the top of some tall tree where it is exposed to a tropical sun by day in summer, and in winter to frost of more or less severity. If, by providing a lesser range of temperature and giving the plant a firmer root-hold and suitable atmosphere, we can improve it under cultivation, it is wiser to do so than to follow Nature too closely.

Many of these plants are true epiphytes in their habitats, but under cultivation are found to do best, not on a bare block of wood as would be most natural, but in a prepared compost that conserves the moisture about the roots and enables the plants to produce larger growths and more flowers. Yet the knowledge of climatic and other conditions obtaining in the habitat of a plant is to some extent a guide to its requirements under cultivation, and the more fully these are described by collectors and others who know, the better it must be for cultivators.

How beautiful a well-furnished orchid house is may be seen by the illustration, Fig. 18. It is taken from Burberry's "Orchid Guide" (Blake and Mackenzie, Liverpool), and used by special permission of the Right Honourable Joseph Chamberlain.

Although it is not necessary to have any special class of structure for the accommodation of orchids, yet substantial and well-heated houses that can be adequately venti-



Fig. 18. MR. CHAMBERLAIN'S SHOW HOUSE.

lated, and allow plenty of light, are essential. For the purpose of this work it will be sufficient to describe the three principal structures used for orchids; namely, the East Indian house, the Cattleya house, and the Cool house. In the former will be grouped the majority of the distichous-leaved section; that is, those plants having the foliage springing from the side of a main stem in a distichous manner (in two rows), and including vandas, aërides, saccolabiums, angræcums, and phalænopsis; also the prin-

cipal species of dendrobium, thunia, many cyripediums, calanthes, and other less-known genera, principally from the Old World.

The Cattleya house will be used for the majority of Brazilian plants, and in this case for the Mexican species of *lælia*, the general run of oncidiums, epidendrums, brassias, and others, besides the bulk of the cattleyas and their congeners, the Brazilian *lælias*.

Odontoglossums from Peru, Ecuador, and New Grenada, the lovely little *masdevallias* and *pleurothallises*, cool oncidiums, and the glowing *disas* from the Cape, will be the principal genera in the cool house, though there are others in each section, as will be mentioned in due course.

Span-roofed houses, running north and south, are best for the first two sections, and the size will naturally depend upon the number of plants to be grown. A house 60 feet long and 18 feet wide, with a central and two side stages, will hold as many plants as most amateurs will possess, and this should have a partition across the centre.

Respecting the heating, there ought to be two coils of 4-inch piping, one under each side stage, with four pipes in each, and each of these coils should have an independent flow from the boiler governed by a good screw valve on the flow pipe. The East Indian house may have, in addition, a flow and return in the centre of the house, the boiler being kept as low as possible, so that all necessary connections can be made below the floor level. The plan of running the hot water-pipes through water-tanks to heat the water sufficiently for use in winter has much to recommend it. Valves must of necessity be allowed, so that the heat may be turned on or off at pleasure, for if the pipes were always warm the evaporation from the tank would cause a saturated atmosphere, which in winter would be productive of harm.

Flat, shallow tanks with pipes in them for raising moisture in the atmosphere are in use in many private establishments; also a few pipes of small diameter close under the roof to prevent or to reduce drip. Both are useful for the purposes indicated, but the latter plan necessitates the feed cistern of the apparatus being much higher than is usually convenient. It must be above the level of the highest pipes.

The cool house may be span-roofed or lean-to; if the latter, it should face the north, but must not be shaded by trees or other buildings. This would be an advantage rather than otherwise in summer, but in winter the orchids cannot have too much light, and therefore an open position is desirable. The width of the house is not

important, and the length must obviously be according to the quantity of plants grown. Being mostly of a dwarf habit, a large number of cool orchids may be arranged in a comparatively small house. When a uniform design is wanted the three compartments may be built in one house, and in this case the cool house would have the same aspect as the others. This will necessitate very heavy shading in the summer, but from the abundance of light that reaches the plants from all sides the position would be perfect for the winter treatment of the plants. Not more than half the above mentioned quantity of piping need be allowed for the cool house, and fire heat is only necessary during the coldest weather.

With regard to the class of boiler required, this depends upon the size of the houses and the nature of the soil in the neighbourhood. Where there is no fear of water finding its way to the stokehole the upright tubular boilers are excellent, but some kind of saddle boiler should be used where water has to be contended with (see illustrations pp. 251 and 252, Vol. II.). There is nothing more troublesome than a wet stokehole, so if there is the least fear of water, means must be provided to drain it away.

With regard to timber for orchid houses many are now built with teak, one of the most enduring of woods, but far more costly than the best description of deal. Red deal, as it is known in the trade, is very largely used in horticultural building, and is excellent when carefully picked clean deals are selected, free from sap, large and dead knots, and perfectly dry or seasoned. Although a lasting wood, pitch pine is not suitable for orchid houses. It does very well for sills and wall plates, ridge cappings and purlins, but is not so well suited for running lights, sashes and bars. A far better timber is close-grained easily worked yellow deal, which in the moist heat of the structure lasts well and is free from the unsightly exudations of turpentine and resin so common in other foreign timbers.

All sashes, doors, and lights must be very loosely fitted in their frames, otherwise they swell and are difficult to open or shut, this leading to broken glass and hinges. A quarter of an inch clearance is not too much, and if the inner stops or beads are properly fitted there is no danger of draughts. In fact these are more frequently caused by close-fitting sashes not properly shutting than in any other way.

Ventilation should be continuous and on each side of span-roofed structures. The lights must however work independently, for with a cold east wind blowing it would be dangerous to ventilate from that side, though some air will be needed. It is in this way that the lantern system of top ventilation falls short of perfection. The

side lights may be arranged to open simultaneously or separately, and the advantage of the latter plan is that there are often plants in a house perhaps freshly potted that do not require air, while in small collections there is a distinct advantage in being able to keep one end of the house cooler than the other. For tropical houses the screw system of gearing or the ratchet levers are more suitable than the lever-and-pin arrangement, for the simple reason that unless very carefully fitted and fixed it is impossible to put on that little chink of air which is so effective and yet so safe in bright cold weather with the latter system.

For suspending plants grown in baskets a light iron or brass rod should run the whole length of the house, this plan being far preferable to screwing hooks into the rafters. The latter plan necessitates the plants being directly underneath the rafters, and consequently in the line of drip.

Blinds must be fitted to each house, the material used for these being strong but not too closely woven. Tiffany is often used, but a much superior article is the white "garden netting," a covering that is most useful for many other purposes besides shading. The best of all blinds, however, for orchid houses are what are termed lath-roller blinds, an arrangement something in the style of a Venetian blind, but the laths are rolled up, instead of being drawn closely together. The laths when the blinds are down are about half-an-inch or a little more apart, and through these chinks a broken light reaches the plants with no fear of scorching. This will be further referred to under "Shading."

The three houses adverted to will be afterwards known by an initial letter descriptive of the temperatures of each, viz., (H.) the first division, which will be the highest temperature; (I.) the second, or intermediate; and (C.) the coolest. It is not wise to adhere too closely or exactly to set figures, but the undermentioned in each case will be a guide:—

SUMMER TEMPERATURE.				WINTER TEMPERATURE.			
	Day with Sun.	Dull Day.	Night.		Day.	Night.	
H.	80°	70° to 75°	65°	H.	65°	60°	
I.	75°	70°	60°	I.	60°	55°	
C.	60° (if possible)	60°	55°	C.	55°	50°	

GENERAL REQUISITES IN ORCHID CULTIVATION.

Pots.—These are largely used for all the terrestrial orchids, the majority of the pseudo-bulbous division, and the stronger-growing of the distichous-leaved groups. It is

important that they are well, but not over, burnt, and if fresh from the kiln should be thoroughly soaked in water previous to use. Generally, pots that have been used before are preferable to new ones, and in any case they must be thoroughly cleansed inside and out before use. They are obtainable in many different kinds: the ordinary flower pot, as used for greenhouse plants generally, the small pan pierced at the rim for suspending, and the pot with perforated sides. Others have loose bottoms to facilitate turning the plants out, and almost every maker of pots in the country has some invention for "assisting" orchidists. Before purchasing such, beginners in orchid culture will do well to see them in actual use by an experienced grower, and hear his opinion, for money may be frittered away on useless fads that only lead to disappointment.

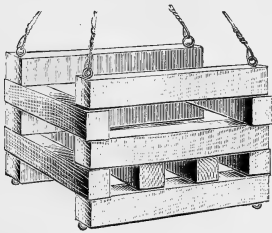


Fig. 19. ORCHID BASKET.

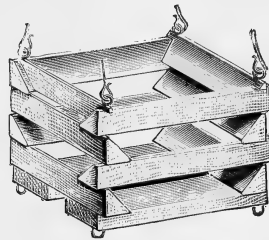


Fig. 20. WEST'S PATENT BASKET.

The suitability of the various classes of pots for different orchids will be discussed under "Potting and Basketing."

BASKETS.—These are made principally of wood or wire. The wood basket, Fig. 19, is the more generally used, and is admirable for most of the weaker-growing epiphytal orchids, while many stronger growers, producing pendant racemes of flower, have also a finer appearance in them than in pots, the baskets being suspended from the roof. West's patent basket, Fig. 20, has bevelled rods; this to catch the water and convey it to the compost, which the inventor claims it does readily. Teak is the best and most lasting wood for baskets, and it is obtainable in rods of different lengths and sizes, so that, if preferred, the baskets may be made at home. The rods should be cut into suitable lengths according to the size of the required basket, placed in a vice, and bored through at the corners, a stiff copper wire being passed through each corner, and turned into a plain loop at the top and bottom. Smaller wires may be passed through the upper loops for suspending. Wire baskets are made in various patterns and sizes,

and may be used for almost any description of orchid. They are especially suitable for stanhopeas and acinetas, that push their spikes downward through the compost. Copper wire only is suitable, iron, even if galvanised, soon rusting in the moist heat of an orchid house.

BLOCKS.—These are either plain or trellised, the latter style being often termed “rafts.” Plain flat pieces of teak are useful for establishing dendrobiums of various kinds upon, while rough pieces of apple, pear, or birch, are advised by some growers. Such plants as the Mexican *lælias*, or the dwarf evergreen dendrobiums, such as *D. aggregatum* or *D. Jenkinsi*, have a natural and pleasing appearance when grown in that way, but the treatment means extra work in watering. Tree-fern stems cut into various lengths make excellent blocks, many orchids that are very difficult to grow in other ways being quite at home upon them. The *lælias*, mentioned above, some of the weaker-growing cattleyas, *oncidiums*, and *zygotelum*s of the *rostratum* section, are a few instances of orchids that do well in that way.



Fig. 21. "IVORINE" LABEL—
WEST'S PATENT.

SUNDRY REQUISITES.—Labels are necessary, and should be as neat and inconspicuous as possible. The “ivoryine” disc label, Fig. 21, is a promising article, and is in every way suited to the requirements of orchidists. Wood labels are often clumsy, and liable to decay. If some descriptions of wood are used they encourage a troublesome fungus that rapidly spreads through the compost, to the serious detriment of the roots. Use good, well-seasoned, red deal or yellow pine. The same may be said of stakes. These should be neat yet strong, and kept out of sight as much as possible when supporting the plants. Murray's patent orchid stand is a very useful appliance, designed for elevating plants where necessary. It is made in various sizes, is neat, strong, and practically indestructible; it insures the free circulation of air about the roots of the plants, and does not encourage fungus or harbour insects. For tying, Cuba bass tightly twisted is superior to raffia, as it lasts much longer in the heat.

COMPOSTS.—The principal materials used for orchid composts are peat, sphagnum moss, loam, and charcoal. The peat should be thinly cut and stacked in a dry place

for twelve months before use. Choose turves full of small fibrous roots in preference to a closer and more earthy class of material that rapidly decays and leaves behind a sour close sediment. The leading horticultural sundriesmen make a speciality of orchid peat, and supply a splendid article—brown, light, and full of fibre. It is prepared for use by beating out all sand and earthy particles, reserving the fibre only for the orchids. It is also obtainable ready prepared for use.

SPHAGNUM.—This is a British moss, found in shady woods in various parts of the country. It usually grows in close proximity to water. It should be obtained quite fresh and green, storing it for use in a cool, moist place, where it will keep growing. Before using, it must be freed from all foreign substances, such as grass, small sticks, leaves, pine needles, or whatever is present. This is tedious work, but it is quite essential. Then the rougher, partly-decayed portions must be separated from the fresh growing points, the former being used for chopping up to mix with the peat and other ingredients, the points reserved for surfacing the compost, as will be noted in due course. The very roughest portions will be found useful for covering the drainage in the pots.

LOAM.—This consists of the upper three or four inches of an old pasture, and varies, of course, according to the soil of the locality. The best for orchids is that of medium texture, not very light or sandy, nor yet of a heavy, clayey character. It should be full of fibre, and must be stacked at least a year before being prepared for use, by breaking it into various sized lumps, according to the size of the plants, and shaking out the loose soil. Good descriptions of loam are obtainable from specialists.

CHARCOAL.—This is used for keeping the compost open, admitting air to the roots, and preventing the other materials from settling down into a close, inert condition, which is fatal to the plants. It also acts as a storer of moisture, taking this up and giving it off again in proportion to the requirements of the roots. It is of the greatest utility, and the roots show their liking for it by clinging to it and ramifying. The best is made by slowly charring hard wood in a half-green state, and it is usually obtainable. Charcoal needs no preparation beyond breaking into suitable sized lumps, and, if very dry, damping it slightly. Cocks are particles of broken pots, and are used, in a clean state, for drainage, also as a mechanical agent in keeping the compost open, in conjunction with charcoal.

Limestone is used, broken in lumps, for some of the bellatulum group of cyripediums, mixed with the compost or used in lieu of cocks for drainage.

Other materials occasionally recommended are Tufa, a volcanic substance used for mixing with the compost for various species; leaf soil, which should be only partly decayed, and used in conjunction with peat for some of the stronger-growing kinds; and polypodium fibre—the roots of the wild polypodium vulgare—is sometimes used for potting odontoglossums and other dwarf orchids. It would be a pity were it to become generally used, as it would mean the rapid extinction of one of our most interesting ferns, and besides, it is not in any way superior to fibrous peat of good quality.

PROPAGATION.

The propagation of orchids is usually a slow and uncertain process, especially in the hands of inexperienced cultivators. Some kinds of orchids can be freely divided, and the young plants grown with ease; others may be grown for many years before any stock of a particular variety can be obtained. All the vandas, aërides, saccolabiums, angræcums, and similar kinds, grow from a central stem, but occasionally push young growths from the base. The latter may be taken off when a few roots have formed and set going on their own account. The tops of such plants, too, are sometimes taken off below the first tier of roots, and potted or basketed.

Barkerias, cattleyas, calanthes, cœlogynes, cymbidiums, lælias, odontoglossums, oncidiums, in fact the general run of pseudo-bulbous orchids, can only be propagated by division. See that every divided portion has a few roots, and one or more young growths (leads), and, if possible, sever the pieces some time before potting them separately.

The long-stemmed section of dendrobiums, including *D. nobile*, *D. crassinode*, *D. devonianum*, *D. pierardi*, and many others, often produce young plants at the ends of the stems, which may be taken off after a season's growth on the parent plant, as shown at the dotted line in Fig. 22. If a more rapid mode is needed, cut off the stems and lay them on sphagnum moss in boxes or pans, when many buds will produce plants, these being taken off, and potted separately, when roots show at the base. *Cypripediums* are propagated by dividing into as many pieces as required, these orchids being among the easiest of all to increase.

For thunias a rapid mode is to cut the old stems into lengths of about 4 inches or 6 inches, and insert them in pots of peat and moss over good drainage, placing the pots over a brisk bottom heat until young roots and growths appear. Skilful cultivators

propagate deciduous calanthes by splitting the pseudo-bulbs vertically into three or four pieces according to size, and placing them over bottom heat, or in a propagating case, until they start into growth.

In all cases, when division is practised, a little more care than usual should be bestowed upon the plants. Both the parent plant and the divided portions should be kept rather closer and more shaded than usual, for if the young plant has to establish itself in a new home, the old one has to push new growth from weak and sometimes partly dried-up buds. Plants of a pseudo-bulbous habit sometimes get bare of young shoots and bulbs in the centre, and in order to induce them to break back and make a better shaped plant, the rhizome is partly cut through to check the flow of sap to the leading buds, and divert it to those which have before remained dormant. In cases of this kind, the beginner should obtain a little experience with plants of no particular value before taking in hand rare or expensive species or varieties, for though skilled cultivators use the knife with little fear, there is always a certain amount of risk attending the operation.

HYBRIDISING.—The raising of orchids by cross-fertilisation is a fascinating pursuit, and to this interesting art we owe some of the most beautiful orchids in existence. Everyone should gain experience in ordinary culture before attempting to raise seedlings, and must even then be prepared for disappointment before success is attained. Still, to those interested, there is in all this pleasurable excitement, quite distinct from ordinary culture, and anyone who will take the trouble to master a few technical points may attempt it with a reasonable prospect of success.

Always use for hybridising species of known merit, and the best varieties obtainable of these species; keep a careful record of all crosses, time of fertilisation, species or varieties used as parents, and time of sowing; unless something really new and distinct results, never name the seedlings. To obtain seed of orchids, it is necessary to place the pollen upon the stigma, this leading to the fertilizing of the ovules and seed production as in other plants. In exotic orchids, as a rule, the pollen consists of waxy masses,

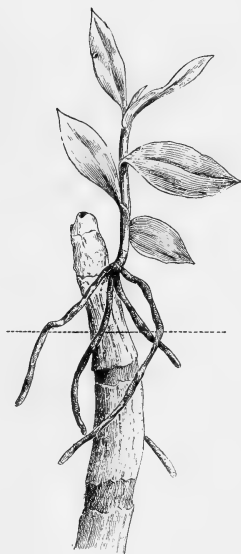


Fig. 22.
PLANTLET ON DENDROBIUM STEM.

varying in number. These are found at the summit of the column, which is a fleshy body in the centre of the flower, and usually on the under side of this the viscid stigma is found. If fertilisation has been properly effected the petals usually fade quickly, and in a few days the ovary at the base of the flower will be observed to swell. It is because of the rapid fading after fertilisation that bees should be excluded from orchid



Fig. 23. *LÆLIA ANCEPS* "SIELLA."

1 1 1, Sepals, or three outer segments of the perianth; 2 2 2, petals, or three inner perianth segments, the lower one changed into the lip or labellum.

The humble bee groping in the lip for nectar hides the column and anthers and spoils the flower.

houses, or the beauty of the flowers which might continue for weeks may vanish in a very few hours. (Fig. 23.)

A great difference in the time necessary for the ripening of the seed pods will be noted, but when fully ripe the pod usually opens slightly, showing the seeds inside, which resemble a mass of fine powder. The seeds may be sown as soon as ripe, the mode usually practised being to sow upon the surface of the compost wherein other orchids are growing. The seeds are usually a long time in germinating, and the young plants

are at first almost invisible to the naked eye. Their subsequent removal and treatment requires the greatest care and watchfulness, for a cold draught of air, an overdose or an insufficiency of moisture, or a bright ray of sunshine, will kill them outright. They must at first be pricked out around the edges of small pots in sterilised compost, and subsequently with great care placed singly in the smallest-sized pots obtainable, these plunged in moss in pans, and the growth of the seedlings continued without check until the flowering size is reached.

Some of the most successful hybridists of the present day are turning their attention to the raising from seed of some of the rare and valuable orchids, and by this means obtaining a large stock; this time-involving process is not worth the trouble, with such as are already plentiful and cheap. The seed is obtained by fertilising flowers with their own pollen or that of another flower on the same plant. Bigeneric hybrids are raised by crossing species of different genera, such as *Lælia cinnabarina*, and *Cattleya Mossiæ*, which gave the beautiful *Lælio-Cattleya Hippolyta*. The genera crossed usually bear some affinity to each other. For instance, cattleyas cross freely with *lælias*, *sophronitis*, or *brassavola*, and the seedlings show the fusion of blood, so to speak. *Epidendrums* cross with *sophronitis* and many other related genera, but no one would expect them to cross with a *cypripedium* or other far-removed genus. There are even species in the same genus that do not freely cross, and for many years it was found impossible to cross a deciduous *dendrobium* with an evergreen one, though this has now been accomplished.

Inexperienced persons who would like to practise the art of pollination should examine carefully the illustrations on page 33, Vol. I., by Mr. F. W. Burbidge, and read attentively the matter that is there to be found on the subject. His sketch representing natural, or insect, fertilisation is repeated on the preceding page, as it is elucidatory of the prominent parts of a typical orchid flower.

POTTING AND BASKETING.

In potting and basketing orchids, quite a different mode is followed from that practised for other plants, and, before describing it in detail, it will be well to consider what an orchid requires in the way of a rooting medium. By far the majority of the species we cultivate are epiphytes; they have their host plants or trees in their native haunts, and to these they fasten themselves by their roots, but it is merely a mechanical support. They are not parasites, and draw no support of a nutritious character from the trees they affect.

The most natural method of treatment would appear to be to fasten the plants to blocks of wood ; could we in our orchid houses produce the ever-changing, yet always suitable atmosphere of their native habitats, and under our artificial surroundings, create the natural moisture that is always present in the vicinity of tropical vegetation, there is no doubt that this would be successful. But no matter how carefully built our houses may be, or how we try to reproduce those natural conditions, it is still a poor and weak attempt, and consequently we have to fit our plants to meet the altered conditions. Hence the need of the composts previously described to retain a due amount of moisture about the roots, and form a medium for their support. This medium will vary according to the habit and liking of various kinds, and a consideration of the different class of roots is also helpful to the cultivator.

Where a general and varied collection of orchids is grown, a quantity of the different ingredients (pp. 49-50) should be got ready, a stock of pots, pans, and baskets of various sizes, and a number of stakes and labels. For pressing the materials about the roots, a couple of strong boxwood dibbers, one large and the other small, will be necessary. The size of the roots is a fairly safe guide as to the quality of the compost they will thrive in. Those kinds having small roots, such for instance as the cool section of oncidiums, odontoglossums, or the deciduous group of dendrobiums, are best in small pans or baskets, in a compost consisting of peat fibre and moss in about equal proportions, a liberal addition of finely broken charcoal and crocks being made thereto. Those having larger roots, such as cattleyas, like more room, and the crocks and charcoal must not be broken so finely. Then there is the large fleshy root characteristic of the vanda section, these liking large pots or baskets, and only sphagnum moss and charcoal as compost.

Besides these, there is a class of orchid that likes a rather more substantial mixture, and here the advantage of loam is seen. For the great bulk of cypripediums, cymbidium, peristerias, and many others, equal parts of loam, peat, and moss form a good mixture ; the size of the pots will depend upon the habit of the species, and a very liberal addition of crocks and charcoal will be needed.

Most pseudo-bulbous orchids are best potted so that the base of the bulbs just rests on the top of the compost, and this must be finished in a convex line from the top of the rim of the pot or basket. The roots will then enter the compost at once, and are out of the way of insects. Right and wrong methods of potting this class of orchid are shown in Figs. 24 and 25. Besides the advantage of the roots entering the com-

post freely, the plant is much more easily fixed when the material is brought well up than when the lead is an inch or two above the compost line. An orchid so insecurely planted that its own weight causes it to rock about, can never be satisfactory.

There is another section of pseudo-bulbous kind, of which deciduous calanthes, thunias, and pleiones, are well-known examples. Their roots die annually, and re-potting takes place just as they are about to grow. They are better potted in the ordinary way, and instead of being elevated above the rims, should have a space of about an inch below them left for water. The roots being dead may all be cut off,



Fig. 24. POTTING ONCIDIUM (correct).
Basal roots within the compost.



Fig. 25. POTTING ONCIDIUM
(incorrect).
Basal roots above the compost.

with the exception of a small tuft to each pseudo-bulb to help to keep it in position until the new roots are formed. Cypripediums, too, are best kept low in the pots, but these must have every root carefully preserved, and spread out, working the compost down between them with the small dibber.

All species having persistent roots must be carefully handled, and, while cutting out every decayed root and removing all sour compost, disturb the healthy ones as little as possible. Wrap a little compost round the roots, if the plants are small; if large, place them in the proper position and fill up with the compost previously prepared.

When finished to the proper height, trim off all ragged ends of peat, or moss, with a pair of strong scissors or shears, and with a small dibber bed a few green points of sphagnum in around the rim of the pot or the rods of the basket. Never take orchids to a cold or draughty shed for potting, and return the plants as soon as possible to the growing quarters.

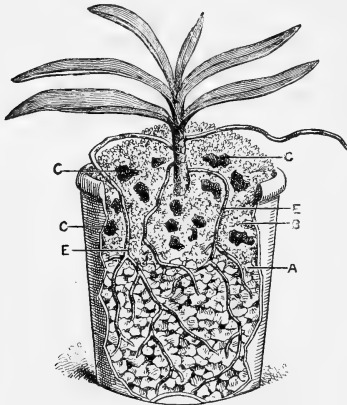


Fig. 26. POTTING DISTICHOUS ORCHID (*AERIDES*).

References.—*a*, corks for drainage; *b*, moss; *c*, charcoal; *e*, roots passing through drainage.

on the top it rushes through quickly, and in its passage draws plenty of fresh air with it to the roots. The cut in which the *aerides* (Fig. 26) is shown differs from the *cœlogyne* (Fig. 27) only in this detail, as of course no moss is needed as a film when no peat, loam, or other earthy substance is used in the compost.

Respecting the time of carrying out these details of potting and basketing, only general rules can be given. In a large number of instances growth precedes root action, notably in the case of the deciduous *dendrobiums*, and the aim of the grower must be to just anticipate this flush of roots. Instances to the contrary—that is, of root action preceding growth—may be found in plenty among *vandas*, *saccolabiums*, and *angræcums*. Here the cultivator must watch for the first signs of root action, and give the plants immediate attention. *Odontoglossums* and other cool orchids are usually re-potted in autumn for the same reason—viz., that at this time root action is vigorous; but even among these there will be instances to the contrary, such as the beautiful *O. grande*, which requires attention early in the new year.

Some kinds of orchids need re-potting oftener than others, as will be noted in the

directions given under the headings of the respective genera. Occasionally the need for disturbance may be deferred for a time, by giving the plants a surfacing only of new material, first removing a little of the old to make room for it. Avoid injury to the roots in doing this, and never let surfacing take the place of-repotting or re-basketing when this is necessary.

Frequent renewals of the surface are misleading, as the top compost dries more rapidly than the older material beneath, making it difficult to determine whether or not the plant is really in need of water. Observation is the best teacher, and a year or two spent among these beautiful plants enables the amateur grower to tell at a glance whether any individual specimen needs re-potting or not. Never let a plant get out of health before attention is given, or it will be so weakened as to suffer badly, and then the disturbance is blamed when previous neglect was really in fault.

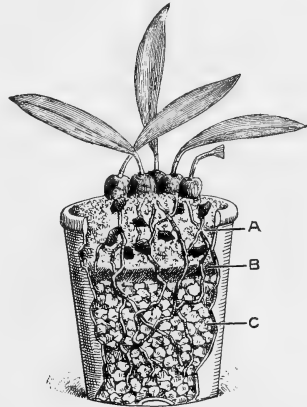


Fig. 27. POTTING PSEUDO-BULBOUS ORCHID (CERLOGYNE).

References:—*a*, compost; *b*, layer of moss to protect drainage (*c*).

ROUTINE MANAGEMENT.

As success in the cultivation of orchids very largely depends on the intelligent manner in which certain essential practices are carried out, it is necessary that the chief factors in routine be explained, in order that the significance of the details enjoined under each of them may be comprehended. The structures may be in every respect suitable for the plants, the temperatures correct for the respective kinds, and the composts the best procurable, yet it is impossible that satisfactory cultural results can be obtained in the absence of sound judgment and attentive care in the routine operations of watering, syringing, shading, and ventilation. As these are primary elements by which success is achieved, intending cultivators should study carefully the remarks under each sectional heading.

WATERING.

Few plants other than aquatics need more water both at the roots and in the atmosphere than do healthy orchids while growing. The nature of the compost advised above is such that water, when applied, drains rapidly away, and a fresh supply

becomes necessary. The mound of peat and moss standing above the rim of the pot makes it difficult to moisten the bulk of material thoroughly by watering in the ordinary way through the spout of a watering-can. A better way is to use a syringe with a fine rose fitted, holding it above the plant and forcing the water, so to speak, into the compost. In doing this, avoid wetting the foliage and pseudo-bulbs, especially during the winter, as it is apt to cause spot and decay.

The condition of the roots of an orchid is in many instances a guide as to the amount of water needed. When the plants are growing freely, it is a sign that moisture is being actively searched for, and although it is not always wise to wait for this sign, it is well to be observant of it. The majority of species love distinct resting and growing seasons, further particulars of which will be found in the classified list on another page. While at rest, most orchids may be kept rather dry with advantage, but not so dry as to cause shrivelling of the pseudo-bulbs, or foliage, as the case may be. An exception to this rule may be noted under "*Odontoglossum citrosmum*."

The majority of kinds rest during the winter, become more active as the spring comes round, and grow freely all through the summer. Consequently, water will be most needed during the summer months, lessening the supply by degrees to the lowest quantity in the winter, increasing the amount in spring. The dendrobiums, cattleyas, odontoglossums, oncidiums, and most other pseudo-bulbous kinds, also many of the distichous-leaved orchids of the vanda section, require this treatment, though instances may be given in each of these genera to the contrary. A well-known case in point will be found in *Cattleya citrina*. This orchid, as often as not, is in full growth during the winter months, and therefore requires assistance then in the way of moisture. It is good practice for beginners to study the indications, and by them the requirements, of the plants they happen to have in hand. An object-lesson such as these afford is worth pages of written information.

As plants that require abundance of water all the year round, we may instance the popular genus *cyripedium*. These are strictly evergreen, a large number flowering in winter, and consequently the roots must be kept quite as moist as in the summer. They do not need watering so often in the dull season, as evaporation is less rapid than in summer; but the roots must not be allowed to get dry.

Never water orchids in dribblers. If a plant needs water, it must have a thorough soaking—nothing less will do; but if doubtful whether the plant is really dry, let it go another day. No harm will be done by one day's drying, but much of injury

may result from watering when this is not required. Always use the water at the same temperature as that of the house, or a little warmer; cold water applied to a plant in a warm house is bound to occasion a check to the roots. Rain-water is in all cases best for orchids; but if hard water must perforce be used, it is a good plan to let it stand in a tank exposed to the sun if possible.

SYRINGING.

Much that has been advanced respecting root moisture applies with equal force to sprinkling the plants through a syringe. This should never be practised in winter, and only when the weather is bright during the summer. The practice has been a good deal decried, some cultivators going so far as to do without it entirely; but not to use the syringe judiciously is to do away with one of the most useful cultural aids.

For cool-house orchids generally, nothing is so refreshing during the summer as a light dewing several times daily. It keeps insects in check, and creates a congenial atmosphere. For warm-house orchids, too, on bright sunny days at closing time light syringings reduce evaporation from the foliage to a minimum, and freshen the plants after an enervating day. The water must be applied in the form of spray, a heavy douche being quite wrong, and doing more harm than good. Spraying is done by keeping the first finger of the left hand over the nozzle of the syringe. Even this form of applying moisture is injurious when carried to an extreme extent, and should not be practised with *phalænopsis* or any of the orchids grown for the beauty of their foliage, as *anæctochilus* and others. *Cattleyas* and *lælias* are impatient of much overhead moisture, and especially when they are at that stage of growth when the young leaf forms a cup that holds water, *i.e.* when about half-grown.

The syringe is very useful in keeping up the requisite amount of moisture in the atmosphere, and should be freely plied about the pots, stages, and floors during hot weather. From May until August it is impossible to keep the atmosphere too moist for orchids; indeed, if the houses are properly ventilated the cultivator must be continually "damping down," as it is termed. Later, when the days are short, and nights long, less atmospheric moisture is needed; but it is a well-known fact among orchidists that as a general rule orchids, both summer and winter, of evergreen or deciduous kinds, are overdone with root moisture, but not sufficiently watered through the atmosphere. The most care is needed in the vicinity of large towns, and especially the Metropolis, where the sulphurous atmosphere descends upon the houses in the form of

"fog," working sad havoc among the lovely flowers, and being very distasteful to the plants.

SHADING.

This is a very important detail in orchid culture, and the work requires a good deal of attention. Permanent shading of any kind is unsuitable, but there are many kinds of movable blinds that may be used. The first place in order of merit belongs undoubtedly to the lath-roller blind system, the illustration of which is furnished by Messrs. Richardson & Co., Darlington, in Fig. 28. They are made in widths to suit the houses for which they are required, and it is a decided advantage to have them in narrow widths, one to each light or sash, this allowing of certain parts of a house being shaded, while other parts are not. This plan is especially useful where—as is the case in small collections generally—several distinct kinds are grown in one house.

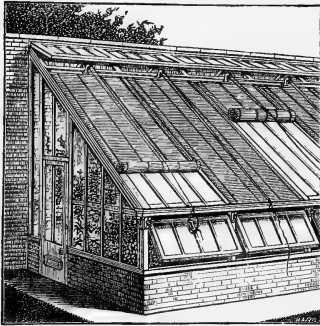


Fig. 28. LATH-ROLLER BLIND.

When plants are freshly potted, they need more shade than usual, and unless some such arrangement is provided, the whole of the house would have to be shaded early.

The greatest advantage of the blinds advised, however, lies in the fact that though the direct rays of the sun are effectually broken by them, a chink of light reaches the plants between the

laths. This does not stay upon one plant very long, as the light is constantly changing, so that scorching of the foliage is practically impossible. When drawn down at night the blinds prevent the radiation of heat in severe weather.

In the absence of lath blinds, a very good material is provided in the white garden netting now so much used for shading and the protection of fruit blossom. It is made in several qualities, the wider mesh being preferable for warm-house orchids generally, while for odontoglossums and other cool-house species, the closer mesh is better, a denser shade being thrown thereby. Narrow widths of this class of blind are not advisable, as the "sagging" of the netting leaves a wide opening between the margins, admitting more sunlight than is desirable. Thin tiffany blinds are used in the same way as shown in Fig. 29 and sectional view Fig. 30.

For the roof the blinds are best hung on rollers, and the simpler the form of these the better. A pulley-and-cord arrangement will be needed, an easy and effective way being shown in Fig. 29. A light boxing may be provided on the ridge for protection, or the blind may be fitted with hooks, and the ridge with screw-eyes for taking the roller and blind down in the autumn. In all

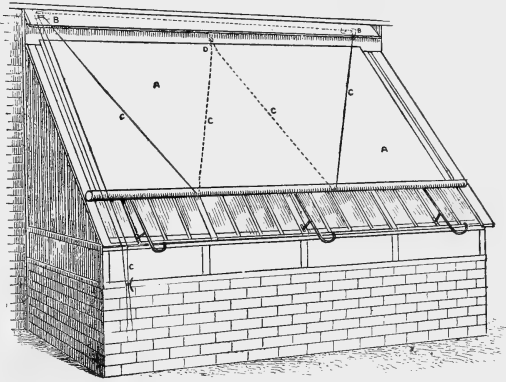


FIG. 29. TIFFANY ROLLER BLIND.

References:—*a*, blind; *b*, pulleys; *c*, cord; *d*, strong screw eye in ridge.

cases blinds of this nature should be raised above the roof, to allow a current of air beneath them. In the section (Fig. 30) this is shown, the material used for the support being $\frac{1}{2}$ -inch round iron turned up at the end to receive the roller. Several other kinds of materials are used for shading, including bunting and linen; but those mentioned are the best of all. It will be necessary to shade the ends of the house as well as the roof, and for this light wooden frames may be made to fit the glass, and covered with netting or whatever may be used.

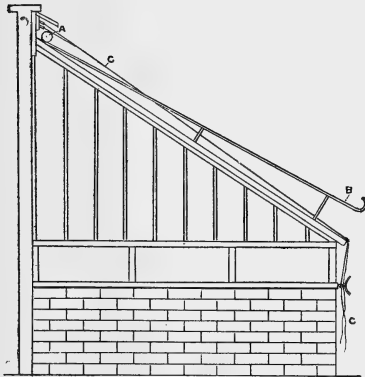


FIG. 30. TIFFANY ROLLER BLIND
(Sectional View).

References:—*a*, roller blind; *b*, light iron rod to elevate the blind; *c*, draw cord.

It is impossible to give directions for shading that will meet all cases, as orchids from different localities vary in the amount of shade they need. Even the species in one genus cannot all be treated alike. Take *lælias* as an instance. The Mexican kinds, of which *L. anceps* is the best known, require practically no shading, while the Brazilian kinds generally, such as *L. purpurata* and others, must be shaded more or less heavily. All the cool-house species of

orchids from New Grenada and Columbia, including the majority of *odontoglossums*, *masdevallias*, many of the *oncidiums*, *lycastes*, *maxillarias*, *disas*, indeed the majority of those marked (C) in the lists that will follow, can hardly be too heavily shaded during the summer months. The blinds are used, in fact, to keep the temperature down in hot weather, which could not otherwise be done.

All the distichous-leaved class of orchids, such as *angræcum*, *aërides*, *vanda*, and *saccolabium*, require shading, but only so far as this is necessary to prevent injury to the foliage. The same may be said of *cattleyas*, as a rule, and the Brazilian *lælias* above referred to. A very good test for these, as to the amount of shading needed, is to feel the foliage with the hand. When it becomes slightly warm to the touch, the shading must be run down, and remain as long as the sun shines on that part of the house. It is bad practice to lower the blinds at any stated time in the day, as if too early, it will lead to spindly weak growths; if too late, scorching of the foliage will result. Nor ought the blinds to remain down when the sun is not shining, but care and watchfulness must be exercised. *Cypripedium* as a rule must be well shaded during the summer months.

In the winter no shading is needed, but on the contrary the glass should be kept clean and free from all sediment inside and out that prevents the entry of light. This is an important point that needs far more care than is at present bestowed upon it, for orchids of many kinds are found growing naturally in full light where the days are more equal in summer and winter than in this country, where the sun may not show for several consecutive days.

In conclusion, we would warn beginners, and small cultivators generally, not to listen to the advice sometimes offered as to following Nature for certain plants, and leaving the shading off the roof because these individual species grow naturally in the full sun. Those who advance these stupid theories forget that there is a great difference in plants growing under glass and others growing naturally, and free to every wind that blows. They forget, too, that in many instances we can improve on wild specimens by giving them the treatment found to be most suitable, rather than leaving them to fight for a place among many other forms of vegetation.

VENTILATION.

Provided that a cold, dry, or draughty atmosphere is not caused, and that the temperature is not unduly lowered, orchids cannot have too much air. This is the point that should be kept in mind in ventilation, and then no one can go far wrong. It is

the greatest mistake to leave a house of orchids closed until a certain time daily, for such treatment results in failure. Ventilate always in accordance with the state of the weather, but never leave a house shut up until some specified degree of temperature is reached. Open the top ventilators slightly the first thing in the morning in summer, before the sun reaches the house. This leads to a gradual rise in the temperature, much more to the taste of the plant than an upward rush when the sun shines on a closed house. It allows, too, of the shading being kept off the roof longer, and is a decided advantage in every way. Whenever it is possible, a little air should be left on the lower ventilators at night, the houses always feeling much fresher in the morning than when kept close.

In dealing with cool houses in summer, it is sometimes an advantage after early ventilation to keep them rather close by day, because the external air is often a good deal hotter than the interior of the house should be. In this case heavy shading is of more benefit than full ventilation; but the house should be freely opened morning and evening, and have more or less air left on at night, according to the state of the weather.

Tropical houses are opened early, and closed as soon after midday as it is safe to have the blinds up. The moisture from damping down rises and settles on the glass when the house is closed, and prevents scorching of the plants. In early spring, when cold winds are blowing, and the sun is bright at the same time, it is very difficult to properly ventilate the houses. If kept too close, the temperature gets too high, while cold draughts are caused by opening the ventilators. Open the sashes from the side opposite to where the wind is blowing from, and shade a little more than usual, to prevent too high a temperature. A little care in management is well repaid at such times, and is more necessary than in winter, when the majority of the plants are resting, and not so easily injured. The aspect of the house, the position and the method followed in ventilation, have all to be considered, so that it is impossible to give definite instructions that will suit all cases.

It may be noted that some of the finest dendrobiums, cattleyas, and other pseudo-bulbous orchids in the country are grown in houses that are practically never closed entirely at night, more or less air being always admitted, and fire-heat provided to keep up the proper degree of heat. Amateurs, then, should note these few cardinal points on ventilation, and shape their course accordingly. They will find that when a certain plan has been tried and found effective, they are much surer of their ground than when they follow blindly someone else's advice, whether good or bad.

Good ventilation and careless shading, or watering, will not do, but these three essential operations must, so to speak, go hand in hand, and a well-balanced atmosphere and temperature will be the result. Heavy damping in wet weather is as bad as full ventilation when the wind is blowing coldly from the north and east. Observation of the results of various modes is the only sure way to correct management. Orchid culture, easy as it is to thousands of persons, cannot be taught by books alone. They can lay down lines of guidance and point the way, but individual aptitude is necessary for benefiting by the information imparted, and above all, watchfulness in passing through the houses daily, and taking hints from the plants themselves; and than this, there is no more delightful occupation for those who have learned to love these most interesting plants.

DISEASES AND INSECTS.

Every plant, orchid or other, is liable to infection by one or more diseases peculiar to each kind, while all are subject to infestation by insects. It is the duty of the cultivator to, as far as possible, prevent the attacks, and, failing this, to mitigate their effects. It

is observable that the most successful cultivators of plants are those from whom the fewest complaints are heard of the virulence of their attacking foes; this is beyond doubt attributable to their skill and watchfulness, skill in keeping their plants in the best of health, and watchfulness in quickly detecting and promptly subduing any insects which by chance they failed to keep outside the structures.



Fig. 31.
SPOT IN ORCHIDS.

“Damping” and “spot” are the worst diseases that affect these plants. The former is often the result of too much moisture in the atmosphere and at the roots, more especially during the dark months of the year. The remedy is less moisture at the roots and a drier atmosphere; the malady, which is displayed in the form above indicated, “damping,” is largely brought about by injudicious culture, heavy syringings, and careless ventilation, though even in the most carefully-grown collection the disease occasionally makes its appearance.

The cause of “spot” (Fig. 31) is not so easily determined, but there is no doubt that this is also hastened by too much humidity. The disease takes a different form with different orchids; on some it spreads with much greater rapidity than on others; but it is a disfiguring and troublesome disease in any.

The plants most likely to be attacked are those which are sometimes excited by too much heat and moisture, and at other times checked, this alone being sufficient to induce spot. Other causes are decomposed and sour materials in the compost, decayed blocks or baskets, and a stagnant atmosphere.

Plants of good constitution, and otherwise healthy, are seldom troubled with "spot," and should they by careless treatment become affected, they usually overcome it when again properly cultivated. Timely attention to all cultural details, then, is at once the preventive and cure for this disease, which will always run riot in badly managed collections.

INSECTS.

If orchid diseases are few, the insects that attack the plants are many. Perfect immunity from insect pests is a desideratum very unlikely to be attained; but by the use of improved methods of fumigation and insecticides growers are far nearer it than formerly.

APHIS or green fly often appears, especially on plants coming into flower. If so numerous as to make fumigation necessary, use the XL All, or some other of the nicotine vaporisers now on the market. Full directions as to the use of these are sent with the necessary materials, and although the initial cost is rather higher than when the old-fashioned method of fumigating with tobacco paper or rag is practised, the safety and efficiency of these modern methods should insure their universal adoption. If only a few insects are present, they may be easily removed by passing a damp sponge over the flower-spikes, leaves, or pseudo-bulbs, as the case may be.

ANTS are not destructive, but are unsightly and unwelcome in orchid houses. They are attracted in many cases by the presence of aphid and other insects upon which they feed. If their nests can be found, pour very hot water into them. This will kill many of the invaders, and if persisted in will drive the others away; petroleum and camphor are also banishing agents.

THE CATTLEYA FLY.—This attacks cattleyae and laelias, the eggs being deposited by the flies in the soft immature eyes or buds of the plant. The maggots resulting destroy the tissues of the issuing growths, and cause them to become abnormally swollen. The growths when once attacked are quite useless, and should be cut off as soon as seen to be swelling unduly, and burnt forthwith. If this is done early, there is a chance of getting a healthy break from the same pseudo-bulb; if left, the perfect insect pre-

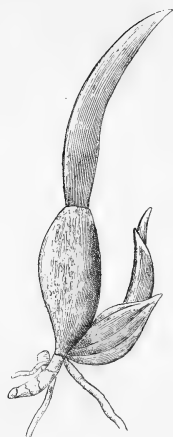


Fig. 32. SWOLLEN CATTLEYA GROWTH.

sently emerges and continues its depredations. Frequent use of the vaporising fumigator is advisable in collections badly attacked, this killing any flies that may be present in the house. Fig. 32 shows attacked swollen growth; Fig. 33 healthy growth.

Coccus or scale, and mealy bug, are frequent visitors. There are many kinds, and only one, the "stock seed" scale, as it is called, is at all likely to succumb to fumigation. This is a black scale with a white or silver lining; it breeds very rapidly, and greatly affects the *barbatum* section of *Cypripediums*. All the other varieties, and there are several, must be carefully sponged off. Make a pailful of soapy water, a lump of soft soap as large as a pigeon's egg to a gallon, and dip the head of the plant in this. Then go over it carefully with the sponge and remove every insect. Avoid puncturing the outer skin of the leaves, and when the sponging is finished, syringe the plants thoroughly with soft, tepid water. This practice must be persisted in until every insect is killed, and others may be prevented by the same means promptly resorted to.

COCKROACHES.—These are night marauders, and when present in numbers do an immense amount of harm, especially among the roots of large-growing tropical orchids of the *vanda* section. There are several preparations of arsenic sold under the name of "Beetle Paste," and this must be laid about the houses. Entering an infested house quickly at night with a bright lantern disturbs and frightens the insects, and many may be killed in this way.

SNAILS (small) and slugs work sad havoc among the roots and flower-spikes unless very closely kept under. They are especially attentive to cool-house kinds, and can only be got rid of by trapping in bran, or pieces of potato hollowed out and laid about the house, or by hand-picking at night with the aid of a light.

RED SPIDER AND THRIPS.—Both these are very troublesome insects, and where present it is useless

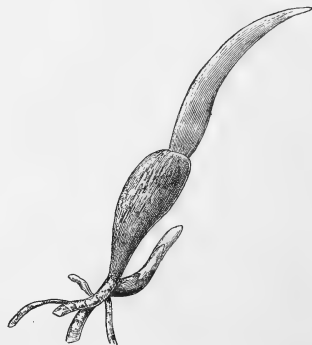


Fig. 33. HEALTHY CATTLEYA GROWTH.

to look for healthy growth. Before the advent of the fumigators mentioned, they were looked upon by orchidists as foes of the greatest danger, but, thanks to these, the insidious pests may easily be kept under. Their presence is known by marks on the foliage. Red spider leaves whitish marks, thrips black ones; but an observant cultivator will note them before the effects in this way are visible. A little dry flowers of sulphur dusted about the young growths is a deterrent, but timely fumigation and sponging, or syringing with clear water, are the best means to effect a thorough clearance.

WOODLICE.—These are the most troublesome in untidy places, and when the houses are well cleaned out daily do not as a rule find comfortable quarters. In dry corners and under wooden stages, they are quite at home, but they abhor dampness. They may be trapped in flower pots filled with dry moss, or in pieces of potato as described for snails, and can be easily killed at night by the aid of a lantern. But keep the houses tidy, allow no rubbish of any kind under the stages, or dry corners, and woodlice will give little trouble to growers of orchids.

SELECTIONS OF ORCHIDS.

In the selections of species and varieties will be found those which are the most generally worthy of cultivation. There are orchids which possess interest because of their peculiarities, but are not of decorative value, and, therefore, are not included in a work of this practical character. The names given are those under which the plants are best known, and not in all cases the latest which it has occurred to botanists to give them. The letters following the descriptions represent: (*h*) Stove species. (*i*) Intermediate species. (*c*) Cool species.

ACINETA.—A small genus of epiphytal orchids, not difficult to grow when well-established. The pseudo bulbs are large, ovate, ribbed, bearing broad, handsome green leaves, and producing pendant racemes of fragrant blossoms. They should be grown in baskets suspended from the roof, these being filled to within a couple of inches of the top with clean crocks and large lumps of charcoal, to allow the spikes to descend easily, the compost consisting of peat and sphagnum moss in equal proportions. While growing freely allow ample atmospheric moisture at the roots, but while at rest keep the plants nearly dry. Re-basket the plants no oftener than is necessary, as they dislike being disturbed, but avoid letting the compost get sour or decayed. Only two species need be described for cultivation: *A. Barkeri.*—Pseudo bulbs, 6 inches high,

on strong plants; good spikes carry a dozen or more flowers, $1\frac{1}{2}$ inch across, golden yellow with a few bright red spots, chiefly about the lip. Mexico, 1837 (*i*). A. Humboldtii.—A beautiful species, bearing fine spikes of flower, 10 inches in length; sepals chocolate purple, petals rosy red, lip having a large deep purple crest. Venezuela, 1841 (*i*).

ADA AURANTIACA.—The only generally cultivated species. A bright and showy orchid, bearing, in late winter and spring, semi-erect racemes of orange-scarlet flowers.

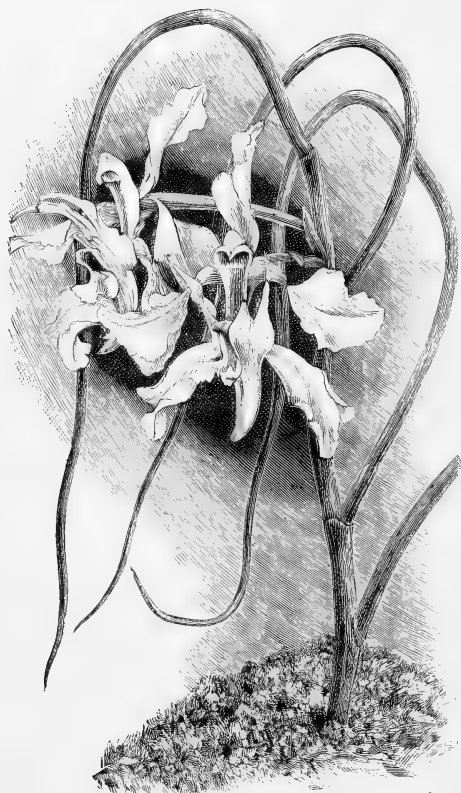


Fig. 34. *AËRIDES VANDARUM*.

These are small individually, and do not open fully, but are very effective in a mass or mixed with *Odontoglossums*. The plants thrive in the coolest house, in a compost of two-thirds peat fibre and one of sphagnum moss, and must be well watered all the year round. The routine is much the same as will be found advised for *Odontoglossums*. New Grenada, 1853 (*c*).

AËRIDES.

This is a noble genus of orchids, highly worthy of cultivation for their beauty and grace. The plants are all distichous-leaved evergreens, and thrive well with ordinary care, except in a few instances. Small plants should be placed in baskets suspended from the roof; large ones may be grown in pots on the stage, when the heads will be at a considerable distance from the glass, yet in a light position. Shading is necessary, but only so far as to prevent the leaves being damaged. A good plan is

to ventilate the house wherein they are grown somewhat freely in the early morning, and to keep the blinds up until the foliage begins to feel warm to the touch through the action of the sun. The compost will consist of live, clean sphagnum moss, with numerous large lumps of charcoal or pottery ballast incorporated, as the potting or basketing proceeds, to prevent closeness and secure abundance of air to the roots.

The best time to re-basket or surface-dress the plants is in early spring. The roots of these orchids are the best indicators of the time to carry out various details of culture. In spring they commence growing, the tip of each root losing the clouded white appearance, and becoming green and soft. This shows that active growth is imminent, and is, therefore, the right time to allow a little more moisture than they have been receiving during the winter. When growth is almost finished for the year these tips cloud over again, indicating the fact that it is time to again reduce the water supply.

Be careful not to unduly disturb the plants when re-potting, do not retain a single decayed root, and avoid breaking or bruising any that are healthy. When old-established specimens are well rooted, both inside the pot and out, it is better to break the pot than to try and force the plants out, this causing great damage to the roots. A long, straight root may often be removed from the pot by well soaking with warm water. It is a good plan when re-potting to cut off the bottom of any plant that may be unhealthy, this preventing decay from spreading to other parts. Syringing is of great benefit to these orchids while growing, provided the weather is fine and the water is not used in too great volume. A gentle spray is better than a heavy douche, and the water should be soft—or, at any rate, not greatly impregnated with lime. Scale is the worst insect enemy, the eradication of which is treated on page 66.

REPRESENTATIVE SPECIES.

AERIDES CRASSIFOLIUM.—A stout, free-growing species, producing long, pendulous racemes of flowers of a bright rosy-purple tint. Moulmein, 1864 (*h*).

A. CRISPUM.—A variable kind, many of the forms having special names, as A. c. Lindleyanum, A. c. Warneri, and others. Stems often tinged with purple; flower spikes on strong plants a yard long; blossoms two inches across, white, with spots of purple. Southern India, 1840 (*h*).

A. FALCATUM.—A popular species, met with under various names. Leaves broad and handsome;

flowers numerous, white, spotted crimson, produced in racemes in summer. Burmah, 1847 (*h*).

A. FIELDINGI (the Fox Brush *Aerides*, so named on account of the contour of the racemes).—A medium grower, but very floriferous; the flowers small individually, but the racemes magnificent; segments white, irregularly spotted with purple. Sikkim, 1850 (*i*).

A. LAWRENCEI.—A grand species; habit strong; spikes large; flowers richly coloured, fragrant, waxy white, with magenta tips; lip spurred, centre lobe amethyst. Mindanao, 1883.

- A. LOBBI (also known as *A. multiflorum* Lobbi, in commemoration of a very successful orchid collector).—A closely-leaved plant, bearing long, many-flowered pendant spikes of richly-tinted blossoms; segments spotted rich amethyst. Moulmein, 1851 (*h*).
- A. ODORATUM.—This is the oldest species and the most generally cultivated. A medium grower, floriferous, racemes semi-pendant, white, tipped with rose-purple. India, Cochin China, 1800 (*h*).
- A. QUINQUEVULNERUM.—Much resembles the last-named, but each segment has five crimson spots upon it, from which the species takes its name. It produces very long, graceful racemes. Philippine Islands, 1837 (*h*).
- A. SUAVISSIMUM.—A strong growing, free-flowering species, with pale green foliage, and racemes of great length. In form the flowers are much like those of *A. odoratum*, the colour varying, usually pale lilac on the outer segments; lip yellow in front, with a rosy-purple suffusion. Straits of Malacca, 1848 (*h*).
- A. VANDARUM.—Distinct from all other species here described, having cylindrical leaves, and spikes of white flowers; sepals and petals reflexed, lip spurred, toothed in front. The most satisfactory method of culture is to affix the plant to a piece of tree-fern stem, and grow in a moist, shady corner. It is found on the Sikkim Himalayas, and likes more air than most kinds. 1857 (*i*), Fig. 34, page 68.

ANGRÆCUM.

The majority of this genus are dwarf distichous-leaved orchids, mostly bearing white flowers; a characteristic of many of them is an elongated spur to the lip, this in some of the kinds being a very remarkable feature. The large growing members of the genus will thrive under similar conditions to those described for *Aërides*, but they like even more sun than these, and if there is a dry warm corner of the East Indian house where other species do not succeed, such kinds as *A. sesquipedale* and *A. eburneum* may do so.

The small growers referred to require careful management, thriving best suspended from the roof, or on a very light stage in small pans or baskets, in a hot, moist house. Clean, freshly gathered sphagnum moss and nodules of charcoal and crocks form the best compost, and great care is required in fixing the plants in position so that they cannot rock about. Root moisture must be freely applied all the year round, but the more active the growth the more water will be needed. Syringing or sponging may be practised in bright weather, but must be discontinued when dull or wet days occur in summer, and entirely in winter.

REPRESENTATIVE SPECIES.

- ANGRÆCUM ARTICULATUM.—A neat dwarf species, the foliage wedge-shaped, about 6 inches long, the spikes having the flowers arranged in a two-ranked manner; the spur of the lip white, the sepals and petals creamy white. Madagascar, 1870 (*h*).
- A. CAUDATUM.—This is now rare in gardens, though formerly plentiful. A closely-leaved plant, producing spikes from the upper portion containing several flowers; the spurs, 9 inches in length, pale brown, as are the sepals and petals; lip pure white. Sierra Leone, 1834 (*h*).
- A. CITRATUM.—A lovely dwarf species not usually exceeding 5 inches in height, but producing

elegant racemes of white flowers with a yellowish or straw-coloured tinge. Madagascar, 1865 (*h*).

- A. **EBURNEUM**.—A capital plant for amateurs with plenty of room. Very large-growing, with thick, strap-shaped leaves nearly a yard in length, and stiff, many-flowered spikes. The flowers in the

A. **FALCATUM**.—Interesting as being a native of Japan; no other kind is recorded from Asia. A very small-growing plant, bearing racemes of pure white fragrant flowers. Japan, 1813 (*i*).

A. **LEONIS**.—A fine species, with loose spikes of white flowers. Comoro Islands (*h*).

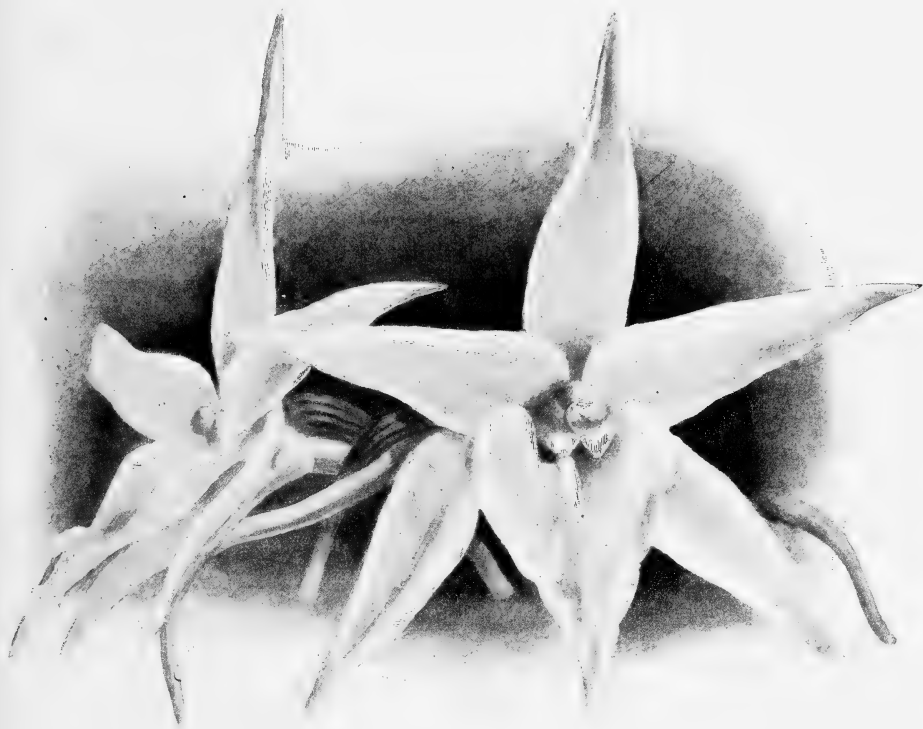


Fig. 35. ANGRÆCUM VEITCHII.

type are greenish on the sepals and petals; the lip heart-shaped, inverted, pure white; var. *superbum* has flowers wholly white, while *virens* is smaller in all its parts than the type. Bourbon and Madagascar, 1832 (*h*).

- A. **ELLISII**.—A large-growing, free-blooming plant, producing arching spikes 18 inches in length, of pure white flowers, varying in size even on the same spike. Madagascar, 1854 (*h*).

A. **MODESTUM**.—A small but lovely kind, bearing pendant spikes of pure white blossoms. Madagascar, 1883 (*h*).

A. **PELLUCIDUM**.—A very fragile and beautiful flower, described as "like melting snow"; creamy white, almost transparent; plant very dwarf. Sierra Leone, 1842 (*h*).

A. **PETUSUM**.—Flowers white; very small, on stems about a foot high. Bourbon, 1840 (*h*).

- A. *SCOTTIANUM*.—Of a different habit to most others in the genus; the stems and leaves cylindrical; flowers 2 inches across on few-flowered peduncles; creamy white. The plant thrives well on a piece of tree-fern stem, lightly mossed and fixed in a flower pot. Comoro Islands, 1878 (*h*).
- A. *SESQUIPEDALE*.—A splendid orchid, growing erect, upwards of a yard high, the stems clothed with leathery green leaves. Racemes few-flowered, the blossoms large, of the purest white, with a spur

to each over a foot in length. Requires great heat and abundance of light, the moss about the roots being kept growing if possible. The largest and best species in the genus. Madagascar, 1855 (*h*).

- A. *VEITCHI*.—A valuable hybrid raised by Messrs. Veitch & Sons from *A. sesquipedale* and *A. superbum*. The flowers, Fig. 35, are satiny white, with medium spurs, and very beautiful.

ANGULOEA.—These are popularly known as Cradle Orchids, owing to the rocking movement of the lips of many of the species. They should be potted in peat, loam fibre, and chopped sphagnum moss, and need not be elevated above the rims of the pots. Growth commences in early spring, and the blossoms appear in the centre of the young shoots. They may be re-potted directly the flowers are past, before the young growths commence rooting if possible. Give plenty of water when re-established until the pseudo-bulbs are finished, then, as the foliage ripens and falls, reduce the moisture by degrees until in midwinter the plants may be kept quite dry at the roots. Insects of many kinds attack these orchids and must be carefully kept under. The three species most worthy of cultivation are:—A. *Clowesi*.—Growth about 18 inches high; pseudo-bulbs roundish; flowers yellow, almost tulip-shaped, very fragrant. Columbia, 1843 (*c*). A. *Ruckeri*.—Habit rather smaller than the last-named; pseudo-bulbs very rough, deep green; flowers brownish externally, yellow inside, spotted with red. Columbia, 1843 (*c*). A hybrid, "*A. media*," was raised between these species a few years ago, and this has also been imported. A. *uniflora*, the oldest species in the genus, bearing white flowers, tinted with rose-pink on the inside of the segment. Discovered in the eighteenth century. Peru, 1843 (*c*).

ANECTOCHILUS.—A genus of orchids grown chiefly for the sake of their beautiful foliage, but owing to the amount of care necessary for their culture they are not recommended to beginners. The gradation of tints on the leaves, the lovely network of crimson, silver, and gold, on many of the species is unequalled by that of any other foliage plants, but few cultivators bring out their full beauty. To grow them well, bell-glasses or a glazed case in a stove temperature are necessary, and the plants should be grown in pots small enough to allow of being partially plunged in damp moss. The best compost for them is finely broken crocks and charcoal, with a little peat and chopped sphagnum moss. They are propagated by cutting through the rhizome and

starting young pieces growing on their own account, leaving the old plants to break again. Avoid wetting the leaves, but maintain a moist atmosphere. There are many species and varieties and all are natives of the Tropics.

ANSELLIA.—A small genus of very fine orchids. *A. africana* and its varieties are principally grown. They are tall plants with leafy stems, at the apices of which large racemes of flowers appear. Most of them are of some shade of yellow, with spots of crimson. The plants must be grown in the warmest house, but are better rested in a cooler temperature. Grow them in pots of fair size, drained thoroughly, and use a compost of peat and leaf mould or loam fibre, adding, in either case, sufficient finely-broken crocks to prevent the earthy materials running too closely together. The plants root with much greater freedom than most orchids, and it is not at all unusual to see a quantity of roots pushed out over the pot, or upwards into the congenial atmosphere of the orchid house. Such plants always like plenty of moisture, and these are no exception; few, indeed, require more so long as growth is active, but when at rest in the cooler house the roots may be kept proportionately drier. The most critical time is when the fresh young shoots are a few inches in length, as they then form cups that hold moisture, and this must be avoided as it is apt to cause them to decay. When rather more advanced, syringing with soft water is advantageous. *Ansellia africana* is a native of Sierra Leone.

ARPOPHYLLUM.—Only one species need be described: *A. giganteum*—a vigorous-growing orchid, with thin, stem-like pseudo-bulbs, each bearing a single leaf, from the base of which the flower racemes issue. These are rosy-purple, and consist of a very large number of flowers closely set. The plant grows well in the coolest part of the Cattleya house, and should be placed in a fairly large pot in the ordinary way, not elevated. It must have abundant light and air all the year round, or flowers will be looked for in vain. Peat and moss form suitable compost, and a full supply of moisture is necessary during the growing period. Mexico, Guatemala, 1839.

ARUNDINA BAMBUSÆFOLIA.—(Also known as *Cymbidium bambusæfolium*.)—A summer flowering orchid of much beauty, producing its flowers from the tops of the tall, rush-like stems. They are rose-coloured, the lip much deeper than the rest of the flower, and bright yellow veins radiate from a white throat. The plants are essentially heat-loving and require a free-rooting medium. They grow well in good, rough fibrous peat, with a little pounded charcoal intermixed, over three or four inches of drainage in pots proportionate in size to that of the plants. The roots should not be unduly

cramped, and care must be taken not to over-water at first, to sour the peat; but this must not by any means be allowed to become dry, while the atmospherical surroundings ought to be kept moist. When the plants are rooting and growing freely, copious supplies of water are necessary, afterwards gradually, and eventually considerably, decreasing the supply. When the plants get too large for the pots they may be turned out on observing signs of fresh growth, and if the divisions are carefully potted and grown they will soon reach the flowering stage. India (*h*).

BARKERIA.—A genus of small-growing epiphytal orchids, sometimes grouped with Epidendrums; attractive when well grown, but rather difficult of cultivation. They



Fig. 36. BARKERIA ELEGANS.

will not thrive with a large mass of material about the roots, and either small pans, suspended from the roof, or rough pieces of wood placed in baskets, should be used for them. They like abundant moisture, both at the roots and in the atmosphere, and during the summer months can hardly be kept too cool. Give just enough water to keep the stems from shrivelling while at rest. The following suffice for most collections:—*B. elegans*.—A handsome and variable kind, the type being soft yet deep rose, with a large crimson blotch on the lip and several small spots (Fig. 36). Mexico, 1837 (*c*). *B. Lindleyana*.—Rosy-red spikes in the autumn. This also has several varieties. Costa Rica, 1839 (*c*). *B. Skinneri*.—Stems about 6 inches high, peduncles many-flowered, colour magenta, each flower $1\frac{1}{2}$ inches

across. Guatemala, 1835 (*c*). *B. spectabilis*.—A very fine orchid when well grown. Pseudo-bulbs short, producing racemes of flowers, each about 3 inches across, rose-coloured, spotted with purple. Mexico, Guatemala, 1835 (*c*).

BATEMANNIA.—A free-flowering and useful genus of orchids, not very popular. *B. Colleyi*, *B. grandiflora*, and *B. meleagris* are the most generally grown. Having scarcely anything in the way of pseudo bulbs, watering is necessary more or less all the year round. A shady position in the intermediate house suits them best.

BIFRENNARIA.—See *Maxillaria*.

BLETIA.—Interesting and easily-cultivated orchids that deserve more attention than present-day growers give them. They thrive in pots of fairly large size, which must be well-drained. For compost use equal parts of loam fibre, peat and chopped sphagnum or leaf mould. Give water freely when the plants are growing, and keep them in a cool, airy house or frame. When growth is over stand the pots outside for a couple of months, but place them under cover on the approach of frost. *B. hyacinthina* is the most popular, and produces long spikes of rosy-purple flowers. China, 1802 (*c*). *B. Shepherdii* is a tall-growing, vigorous plant, bearing long, branching spikes of purple flowers with yellow lip. Jamaica, 1825 (*c*). *B. verecunda* (see page 39) is the oldest-known exotic orchid; spikes 3 feet high; flowers purple. West Indies, 1731 (*c*).

BOLLEA.—Allied to *Zygopetalum*, this genus comprises a small number of interesting and beautiful orchids, the best of which are mentioned below. Their culture requires skill, as, having no pseudo-bulbs or large fleshy leaves to support them during the winter, great care in watering is necessary. Grow the plants in the shadiest position at command, where the atmosphere is always moist, and, while never allowing the roots to become quite dry, avoid over-watering, even in summer. They grow well in rather flat pans or baskets, these being filled to within an inch with crocks, the remainder taken up by a porous compost of large, rough pieces of charcoal or crocks, peat fibre, and sphagnum moss in equal proportions. Some cultivators grow them well on pieces of tree-fern stems. Among the more popular species in this group are:—*B. cœlestis*.—A beautiful kind, with flowers borne singly; pale blue in the centre, becoming nearly white at the tips of the segments; lip deep violet-purple. Columbia, 1878 (*i*). *B. Lalindei*.—A species bearing rose-coloured flowers, about 3 inches across, the lip golden-yellow, on single-flowered scapes. New Grenada, 1874 (*i*). *B. Patini*.—Very nearly related to the last-named, and similar in colour, though this varies a little in both. New Grenada, 1873 (*i*). *B. Schröderiana*.—A beautiful plant, with flowers of a waxy-white appearance on the outer segments; the lip pink (*i*).

BRASSAVOLA.—There are a few very beautiful plants in this genus, notably *B.*

Digbyana and *B. glauca*, of the pseudo-bulbous section, and *B. lineata*, of the cylindrical-stemmed type. All are natives of South America, and of easy culture, growing freely in pots in a compost of peat fibre and moss in the intermediate house.

BRASSIA.

These are showy evergreen pseudo-bulbous epiphytes from Tropical America, and all are capital plants for amateurs, giving little trouble, and presenting a good flowering



Fig. 37. *BRASSIA BRACHYATA*.

return. All are marked for the intermediate house, but they thrive equally well in the warmer division. Pot culture, in peat and moss, suits them best, and, being very free-

rooting plants, abundance of water is needed while growing. Less suffices in the resting season, but at no time must the plants be dried sufficiently to cause shrivelling. All of them produce drooping, or arching, spikes of flowers that last long in beauty.

REPRESENTATIVE SPECIES.

- B. ANTHEROTES.—A large-growing species with yellow flowers blotched with purple-brown. Brazil, Ecuador, 1879 (*i*).
- B. BRACHEATA.—A handsome species; the flowers are yellowish green, with numerous dark spots (*i*). (Fig. 37).
- B. CAUDATA.—One of the oldest-known kinds; sepals and petals greenish yellow; lip similar, with a few red spots under a white crest. W. Indies, 1823 (*i*).
- B. KEILIANA.—A variable species, having greenish segments, blotched with brown and red in the type, var. *tristis* being deep reddish brown. Columbia, 1825 (*i*).
- B. LANCEANA.—One of the best; flowers on long, showy spikes, golden yellow, with brownish and red blotches. Surinam, 1834 (*i*).
- B. MACULATA.—Sepals and petals greenish yellow, spotted with brown; the lip white, with small dots of purple. Jamaica, 1814 (*i*).
- B. VERRUCOSA.—A pretty species, sepals and petals light yellow, spotted with dark green; lip white with black warts. Guatemala, 1840 (*i*).

BROUGHTONIA SANGUINEA.—A plant that thrives best on a block, or in a small basket suspended in a light and moderately dry house. Water must be freely given all the year round if the plant is grown on a block. Jamaica, 1793 (*h*).

BULBOPHYLLUM.—The plants comprised in this genus are of marvellous structure and very interesting on this account, but not quite suitable for inexperienced amateur cultivators. For this reason they are not described; but when they are cared for they may be grown in small baskets, or on blocks, suspended from the roof, in the warmest house.

BURLINGTONIA.—These are beautiful orchids (grouped with *Rodriguezia*) admirably adapted for small collections, as they take up little room and produce numerous flowers. They do well in baskets or pots of peat fibre and moss, this material being kept well up to the base of the last-formed pseudo-bulb, as they are somewhat straggling in habit and apt to grow away from the compost. The roots are freely produced and each set of young pseudo-bulbs should be pegged down to the compost before they have made much progress. They then enter this freely, at once, while, if allowed to grow in the air, they cannot afterwards be induced to do so. A light surfacing of moss the second year is better than again disturbing the plants, and this conducts the roots to the compost. They are amongst the easiest of orchids to propagate, almost every severed pseudo-bulb making a plant. Selected species: *B. Batemanni*.—Flower white, with a mauve lip, and produced from roundish pseudo-bulbs. Peru, 1830 (*i*). *B. candida*.—Large, fragrant flowers, semi-transparent, white, with a yellow centre to the

lip. Demerara, 1835 (*i*). *B. decora*.—A straggling grower, requiring much care in pegging down, as the pseudo-bulbs occur at a good distance apart on a wiry rhizome. Flowers white, with rosy markings. Brazil, 1851 (*i*). *B. fragrans*.—A beautiful little species, with blossoms of the purest glistening white on pendant scapes. The lip of

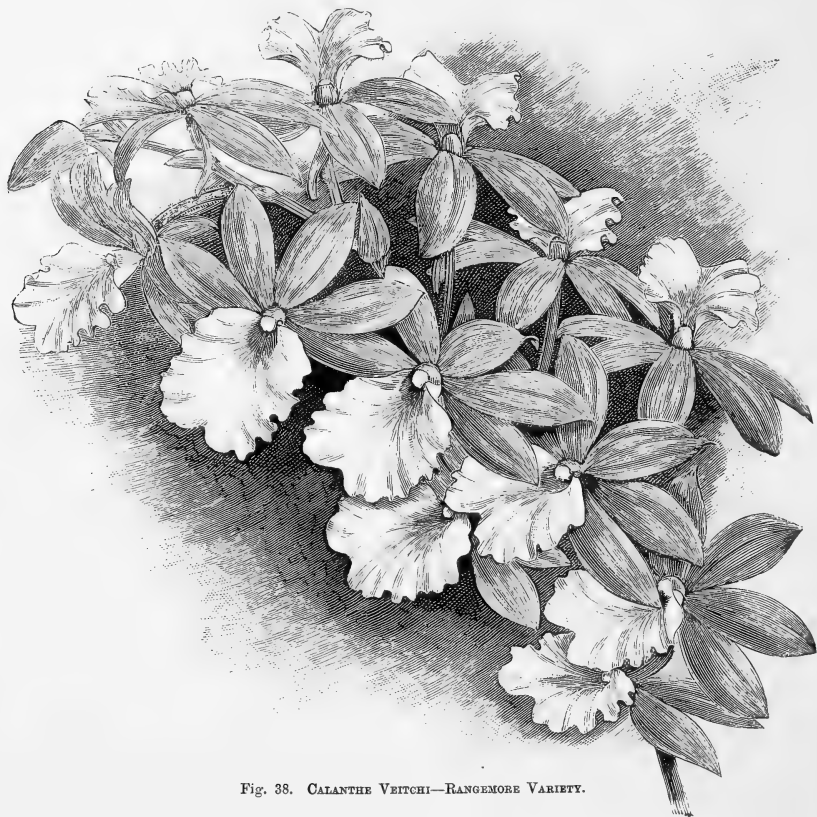


Fig. 38. CALANTHE VEITCHI—RANGEMORE VARIETY.

each flower is a bright golden yellow, this showing off the other segments perfectly. Brazil, 1850 (*i*).

CALANTHE.

EVERGREEN SECTION.—Formerly popular plants, these are now seldom met with, and, compared with the deciduous species and hybrids, are of less value as decorative plants.

They are grown in many places where stove plants, independent of orchids, are cultivated, and thrive best in a compost of equal parts of peat fibre, loam, and chopped sphagnum moss, enough finely-broken crocks and charcoal being added to insure porosity of the whole and aëration. The pots may be of good size, or, say, allowing about 3 inches clear of the plant, and must be quite half-filled with drainage material. There is no need to elevate the plants above the rims; give plenty of water while growth is free, and never, in winter, allow the leaves or rootstocks to shrivel. The foliage is handsome on well-grown specimens. Insects are often troublesome, especially red spider, and must be kept under.

The following species are mostly grown: *C. Masuca*.—Very fine, with spikes a yard in height; the flowers pale mauve with red markings. Northern India, 1842 (*h*). *C. natalensis*.—Spikes of large flowers about a foot and a half high, the individual flowers pale lilac. Natal, 1885 (*h*). *C. Textori*.—Spikes 2 feet high, the flowers almost pure white, the lip being tinged with mauve and purple. Japan, 1877 (*i*). *C. veratrifolia*.—The type species of the genus and the oldest known. Flower spikes tall, bearing on the top a pyramidal column of pure white flowers. Distributed naturally over an immense geographical area, 1823 (*i*).

DECIDUOUS CALANTHES.

These are among the most popular of orchids, largely grown for cutting and decoration. The pseudo-bulbs should be potted, after the flowers are past, in suitable-sized pots, either singly or as many together as will make a good specimen. Three medium-sized pseudo-bulbs may go in a 6-inch pot. Drain the latter thoroughly, and use similar compost to that described for the evergreen kinds. Set the stems just deeply enough to hold them steady, a little of the old root being left on to facilitate this. Give no water until the young shoots are growing freely and commencing to root on their own account. Then give a thorough soaking and gradually increase the quantity as growth proceeds. Grow in a good clear light, shading as little as possible; allow plenty of room between the plants, and keep the foliage clear. The leaves turn colour and drop off in the autumn, when again reduce the water supply. The plants may be used for indoor decoration during their flowering season, but avoid standing them in cold or draughty rooms and passages, for a low temperature is very injurious to them. Besides those named below, there have been many grand hybrids raised by crossing and intercrossing, but these are far too numerous to mention here. Sufficient to say

that they produce some of the most useful and beautiful flowers in existence, though, naturally, many are very rare and costly.

REPRESENTATIVE SPECIES.

- C. *VESTITA*.—A lovely species, bearing tall spikes of pure white flowers, with the exception of a yellow blotch on the lip. This is known as *C. v. luteo-oculata*, while *var. rubro-oculata* has a red eye. Moulmein, 1848 (*h*).
- C. *VESTITA GIGANTEA* (syn. *C. oculata gigantea*).—Larger than the type; the flowers white, with a red eye. Not strictly deciduous, and as the roots are generally alive at potting time more care is necessary than with the other kinds.
- C. *VESTITA NIVALIS*.—A pure white form of the type.
- C. *VESTITA REGNIERI*.—Flowers white or very pale rose on the sepals and petals, the lip purple.
- C. *VESTITA TURNERI*.—Late flowering, in the way of *var. rubro oculata*.
- C. *VEITCHI*.—A garden hybrid, raised in 1856, by crossing *C. vestita* and *Limatodes* (*Calanthe*) *rosea*. It is stronger growing than *C. vestita*, and produces very large spikes of most useful and beautiful rosy-pink flowers. It has now become thoroughly well-known, and there are many fine varieties, including *C. V. alba*, pure white; *C. V. Sandhurstiana*, deep crimson; *C. V. Rangemore* variety, Fig. 38, and many others (*h*).
- C. *WILLIAMSII*.—A lovely plant, with tall spikes of white flowers with a deep crimson lip. Cochin China, 1885 (*h*).

CAMOROTIS PURPUREA.—Only this species is generally cultivated, though others are known. The plants should be grown in small baskets or pots in a mixture of sphagnum moss and charcoal, making this fairly firm and setting the plants rather low, as they produce many stem-roots. A good light is necessary, affording shade only during the hottest part of the day in summer. Give abundance of water when growth is most active, and never let the roots be absolutely dry. It is an erect-growing, distichous-leaved plant, producing from the upper part of the stems loose racemes of rosy-tinted flowers, with a deeper coloured lip. Khasia Hills, 1837 (*h*).

CATASETUM.—As a general rule these are more interesting than showy, but two or three should be included in all collections. They are marked for the warmest house, but it is only fair to add that some cultivators have had good results by growing the plants in an intermediate temperature. They like plenty of light when growing, a moist atmosphere and abundance of water at the roots. While at rest they must be kept quite dry unless signs of shrivelling are apparent, when water must be given to remedy this. Care is necessary that water does not find its way into the heart of the young growth or damping ensues. The plants lose their foliage while at rest. For further cultural instructions see *Dendrobiums*. The following are generally grown: *C. Bungerothi*.—Pseudo-bulbs 8 or 9 inches high; flowers white, when fully developed, about 4 inches across. Tropical America, 1885 (*h*). *C. Christyanum*.—A stout grower with large pseudo-bulbs; spikes containing about 10 flowers, dull brown on the sepals, lip purple

and green. Brazil, 1840 (*h*). *C. longifolium*.—Pseudo-bulbs pendant, greyish green, scaly; spikes many-flowered; sepals dull red; lip crimson-spotted with greenish yellow. Demerara, 1836 (*h*). *C. scurra*.—A small-growing plant with very pretty flowers, yellowish white. Demerara, 1872 (*h*). *C. tridentatum*.—The easiest of all to grow; sepals and petals greenish-spotted with brown; lip brighter in colour, also spotted. Trinidad, 1822 (*h*).

CATTLEYA.

One of the most important genera in the order, comprising many extremely beautiful orchids. Their free-flowering propensities, and the gorgeous yet delicate colouring, have led to their almost universal cultivation, so that wherever orchids are grown Cattleyas are sure to be included. With few exceptions, they thrive best in the intermediate house, and so ubiquitous are they that this is usually styled the "Cattleya house." The larger and more roomy the structure the better the plants thrive as a rule, freedom of air, an unchanging temperature, and clear light being of the utmost importance in their culture.

Root moisture is necessary all the year round, more or less, and though the plants will often stand for weeks in winter without showing any signs of distress when kept dry, mischief is done all the same and will be apparent later on in shrivelled pseudo-bulbs and weak flower spikes. The reason of this is that the flower buds are forming at the expense of the stored-up nutriment in the pseudo-bulbs, and this sapping of the supply becomes so rapid, as the flowers approach their development, that no amount of watering afterwards can make it good.

To let any orchid shrivel—with only a very few exceptions—is decidedly wrong. With Cattleyas it is much more harmful than with many others. The species vary in the amount of water they take, so much so that to treat all alike is to court failure. Experience shows what kinds require the most, and it may be stated as a general rule that the larger-growing the plant the more water will be needed. And so with regard to potting: to place a plant, say of *Cattleya dolosa*, into the same sized pot as one of *C. Trianae*, or any other strong-growing kind, is obviously wrong, and disregard of this simple axiom has been the first step towards the death of many a good plant.

Let the size of the pot or basket, then, and the quality of the compost be dependent upon the habit of the plant. Let the drainage material for small plants come nearly up to the rim of the pot; but for larger, stronger specimens allow a little more room for

compost. This will in most cases consist of equal parts of peat and sphagnum moss with a liberal addition of rough crocks and charcoal. Cattleyas are not especially liable to insects, their worst enemy being scale. This must be kept under by frequent sponging.

REPRESENTATIVE SPECIES.

CATTLEYA ACLANDLÆ.—A charming species of moderate growth suitable for baskets, as it likes a good light. The sepals and petals are olive green, with spots and blotches of purple, the lip bright purple, with veinings of a deeper hue. This often



Fig. 39. *CATTLEYA CITRINA*.

flowers twice in the season, though it is not advisable to encourage the plants to do so. Bahia, 1839 (†).

- C. ALEXANDRÆ.**—Stems 18 inches high, with tall loose panicles of flowers. Sepals and petals green, with brown spots, the lip violet. Brazil, 1890 (†).
- C. AMETHYSTOGLOSSA.**—Growth tall, erect. Flowers large and plentifully produced; sepals and petals light rose, lip deep purple. A very variable kind. Brazil (†).

C. BICOLOR.—A free-growing and profuse-flowering species, the flowers very distinct; sepals and petals brown, tinged with green; lip rosy-purple, with no side lobes. Minas Geraes, 1838 (†).

C. BOWRINGIANA.—A very useful and beautiful autumn-blooming species, tall-growing and with large spikes of rose-purple blossoms, with deeper tinted lip. Requires more water than most species. British Honduras, 1884 (†).

C. CHOCOENSIS.—A pretty, sweetly scented, winter-blooming orchid. Sepals and petals white; lip purple and yellow. Choco, 1873 (†).

C. CITRINA.—Quite distinct from all other Cattleyas, and remarkable in growing with its head downwards. Pseudobulbs roundish, with two or more glaucous green leaves. Flowers beautiful bright yellow, with a white fringe to the lip; very fragrant. Grows best on a block of Tree Fern stem or a trellised raft. (Fig. 39.) Mexico, 1838 (c).

C. CRISPA (syn. *Laelia crispa*).—Rosy-white flowers, with crimson front lobe veined with purple. An old plant, but still worth every attention, as it is a strong grower and very free-blooming. Brazil, 1826 (†).

C. DOLOSA.—Does best on a block or in a small pan. Habit dwarf. Flowers rosy-magenta, with yellow centre and red margin to the lip. Minas Geraes, 1872 (†).

C. DOWIANA.—A most gorgeous and beautiful Cattleya. In the type the sepals and

petals are bright nankin-yellow, suffused with crimson; the lip broad and spreading, deep rich crimson, with streaks and veinings of golden yellow. It requires more warmth than the majority of Cattleyas, and great care is necessary that it does not grow out of season. Costa Rica, 1865 (†).

C. D. AUREA.—A lovely and popular variety of the above, even brighter and better than the type, and thriving under similar conditions. There are several sub-varieties of this, varying in the

intensity of their colour, of which Mrs. Fred Hardy (Fig. 40), is one of the most pleasing. Antioquia, 1868 (*t*).

- C. ELDORADO.—A useful *Cattleya*, the flowers of medium size, rosy-white on the outer segments; lip with a yellow centre and crimson front lobe.

siderably in colour; one of the best of the labiata forms. Venezuela, 1883 (*t*).

- C. GIGAS.—One of the very finest species, the habit rather tall, the flowers of immense size, varying in colour; the sepals and petals usually pale rose, the lip deeper, and having always a couple of

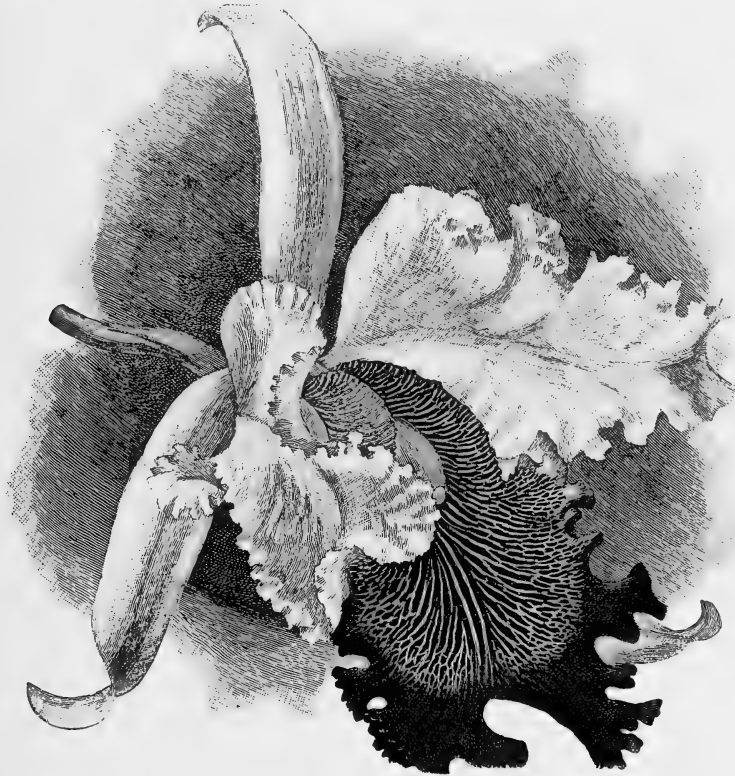


Fig. 40. *CATTLEYA DOWIANA AUREA*—MRS. F. HARDY.

Of this there are many named varieties, including *crocata*, *ornata*, *splendens*, and the lovely pure white *virginialis* or *alba*. Rio Negro, 1866 (*t*).

- C. FORBESI.—Flowers yellow, with purple markings about the lip. Brazil, 1823 (*t*).
- C. GASKELLIANA.—Flowers pale rose on the outer segments, the lip tinged with yellow, white, and crimson. They are 6 inches across, and vary con-

eye-like whitish blotches in the throat. New Grenada, 1870 (*t*).

- C. GRANULOSA.—A useful old species, but not showy, having olive-green flowers spotted with brown; lip white, with crimson spots. Not very free-flowering. Guatemala, 1840 (*t*).
- C. GUTTATA.—A strong-growing, easily cultivated, free-flowering, and very variable kind. Flowers yel-

- lowish, spotted with crimson in the type. Brazil, 1827 (t).
- C. **HARDYANA**.—A natural hybrid between *C. gigas* and *C. Dowiana aurea*, and one of the grandest orchids extant. Flowers very large, purple-rose; the lip crimson-purple, veined with gold. New Grenada (t).
- C. **HARRISONIANA**.—A free-flowering, erect-growing species; flowers rose, with yellow centre to the lip. There are several varieties. Rio de Janeiro, 1836 (t).
- C. **INTERMEDIA**.—Stems erect, flowers pale rosy-lilac; lip with a deep violet-purple blotch in front. An old but beautiful species. Brazil, 1824 (t).
- C. **LABIATA**.—The type-species of the genus, a beautiful form introduced many years ago, but almost lost to cultivation till recent importation has made it perhaps the most popular species in the genus. It is one of the most variable in colour, the tint ranging from pure white to the deepest rose, the colouring on the lip being in all cases very beautiful. Brazil, 1818 (t).
- C. **LAWRENCEANA**.—A showy plant, the flowers in the better forms being rich rosy-purple, the lip having a white centre. A very sunny moist position suits it best, and it must not be over-potted. British Guiana (re-discovered 1884) (h).
- C. **LEMONIANA**.—Very similar to *C. labiata*.
- C. **LEOPOLDI**.—The showiest of the *guttata* varieties, and a capital decorative orchid; the flowers deeper in colour than the type, with a beautiful velvety-purple lip. Santa Catherina, 1850 (t).
- C. **LOBATA**.—Dwarf habit; flowers rich rose, with deeper front lobe to lip. Brazil, 1847 (t).
- C. **LODDIGESI**.—Stems erect, about a foot high; flowers rosy-lilac, lip stained yellow. Brazil.
- C. **LUTEOLA**.—A small but attractive species; flowers yellow, lip marked with purple. Brazil, 1850 (t).
- C. **MAXIMA**.—Fine species, flowers variable in colour, the type rose on the sepals, the lip having a yellow centre. New Grenada, 1842 (t).
- C. **MENDELI**.—One of the most beautiful of the *labiata* group, similar in habit to *C. Trianae*. Flowers of various colours, the type being rosy-white on the outer segments, the lip rich crimson-purple in front, with a yellow centre. There is a lovely albino form, also many named coloured varieties, such as *Princess May* (Fig. 41). U.S. Columbia 1870 (t).
- C. **MOSSLE**.—The best-known and most variable *Cattleya* in existence, the colours ranging from the purest white (*C. M. Wagneri*) to deepest rose, the lip in all cases beautifully marked. La Guayra, 1836 (t).
- C. **PERCIVALIANA**.—A pretty *Cattleya*, remarkable for the rich tint displayed on the lip; the type is rose on the segments. Venezuela, 1882 (t).
- C. **REX**.—Fine species, flowers white, with a very beautiful lip. Andes of Peru, 1890 (t).
- C. **SCHILLERIANA**.—Not unlike *C. Aclandiae*, but with bronzy-red foliage and pseudo-bulbs. Flowers reddish brown, lip streaked with dark red. Brazil, 1857 (t).
- C. **SCHOFFELDIANA**.—Habit as in *C. guttata*. Flowers brownish yellow, suffused with purple; lip bright purple. Brazil, 1881 (t).
- C. **SCHRÖDERÆ**.—Rosy-white, in the way of *C. Trianae*; very sweetly scented. New Grenada (t).
- C. **SKINNERI**.—An attractive small flowering plant, about 8 blossoms on a spike. The colour varies from rosy-purple to white. Guatemala, 1836 (t).
- C. **SPECIOSISSIMA**.—Flowers large, pale purplish-rose, with deeper lip. Venezuela, 1854 (t).
- C. **SUPERBA**.—Very fine species, with large brightly coloured flowers; sepals and petals rosy-red; lip deeper in colour. Requires a very sunny position. British Guiana, 1838 (h).
- C. **TRIANÆ**.—A beautiful and justly popular species, varying greatly in colour and markings. The ground is usually some tint of rose or lilac, the lip often having blotches of deep crimson in front. Of this there is an albino *C. T. alba*. New Grenada, 1860 (t).
- C. **VELUTINA**.—A pleasing species with pale yellow flowers irregularly blotched with purple; lip veined with purple, the lines radiating from the centre. Brazil, 1870 (t).
- C. **WALKERIANA**.—A richly coloured and showy *Cattleya*, remarkable in producing its flowers from a separate growth to the pseudo-bulb, this withering after the flowers are past. The colour is a bright rose, the lip having a yellow stain in the centre. Brazil, 1839 (t).
- C. **WARNERI**.—A very fine *Cattleya* in the way of *C. labiata autumnalis*, but flowers in spring instead of autumn; it is very similar in colour and markings. South Brazil, 1859 (t).

Besides the above, this genus contains a large number of artificially raised hybrids, many of these being very beautiful, some fairly well known, others extremely rare,

while some again are absolutely unique, being represented by single plants only. These and many other orchids are raised by hybridising or cross-fertilisation. (See page 31, Vol. I.)

CHYSIS.—A genus of epiphytes with beautiful flowers produced from large, fleshy pseudo-bulbs. They thrive in a light position not far from the roof glass, but the foliage



Fig. 41. CATTLEYA MENDELI—PRINCESS MAY.

must be shaded from bright sunshine. Free pot room may be allowed, as the roots on healthy plants are very strong and persistent. For compost use peat fibre, sphagnum moss and loam in about equal proportions, leaving out the latter when dealing with weak plants. Drain the pots thoroughly and re-pot immediately the flowers are past.

Commendable species: *C. aurea*.—Pseudo-bulbs about 9 inches high; flowers yellow, tipped with crimson. Venezuela, 1834 (*h*). *C. bractescens*.—A fine orchid, larger growing than the last-named, and producing white flowers with a yellow centre to the lip. Mexico, 1840 (*i*). *C. chelsoni*.—A hybrid between *C. Limminghi* and *C. lævis*; colour yellowish on the outer segments; lip white and violet. Mexico, 1840 (*i*). *C. Limminghi*.—Growth like *C. aurea*, the flowers white, with purple tips to the sepals; lip yellow and purple. Tabasco, 1857 (*i*). *C. Sedeni*.—Hybrid between *C. bractescens* and *C. Limminghi*.

CIRRHOPETALUM.—A curious and neat epiphytic plant, small, with roundish pseudo-bulbs. The flowers are produced in whorls at the apex of an erect spike. The plant thrives best in small baskets, or pans, suspended from the roof, and enjoys heat and moisture while growing, with long rest in a cooler, dry house afterwards. They are hardly to be recommended for amateurs. The best species are: *C. Cumingi*, *C. Medusæ*, *C. picturatum*, and *C. Thouarsi*. All are natives of the Old World.

COCHLIODA.—Bright and beautiful little plants, growing freely in the cool house, in small pots, as will be advised for Peruvian and New Grenadan *Odontoglossums*. *C. Noezliana*, *C. rosea*, *C. sanguinea* and *C. vulcanica* are the most frequently grown.

CÆLIA.—Of this genus only two species are much grown: *C. macrostachya* and *C. bella*. They are not particularly showy, and do best potted in peat fibre and sphagnum, in the intermediate house. They come from Guatemala and Mexico.

CÆLOGYNE.

A genus of popular and beautiful epiphytal orchids, pseudo-bulbous, usually with handsome foliage. *C. Massangeana* and *C. Dayana* do best in baskets suspended from the roof, while the distinct *C. pandurata* may be grown on large trellised blocks or rafts. The rest thrive planted in fairly wide pots, in a compost of peat fibre and sphagnum moss. Good drainage is very necessary, with a free addition of rough crocks and charcoal mixed with the compost. The majority of cælogyne do not take kindly to root disturbance, and great care is necessary when dividing them. The best time to do this is directly the flowers are past, and if propagation is desired it is easily effected by cutting through the rhizome in as many places as young plants are desired, and setting the divided portions going on their own account. All are subject to attacks from insects, especially red spider and scale, and, in order to keep them clean, sponging

must be frequently resorted to. Give water freely while growth is active, but less while the plants are at rest. In summer a light dewing with tepid water is beneficial.

REPRESENTATIVE SPECIES.

- CÆLOGYNE ASPERATA*.—Pseudo-bulbs large, flower spikes pendulous, containing many flowers. These are white on the sepals and petals, the lip marked with chocolate and yellow. Syn. *C. Lowi*. Borneo, 1845 (*h*).
- C. BARBATA*.—Habit rather tall. Flowers on erect spikes pure white, excepting a brown centre to the lip. Northern India, 1837 (*g*).
- C. CORRUGATA*.—Grows about 6 inches high, the flowers pure white, with a yellow centre to the lip. Neilgherry Hills, 1863 (*c*).
- C. CORYMBOSA*.—About a foot high, flowers on horizontal racemes, pure white with singular markings about the lip. Moulmein, 1866 (*i*).
- C. CRISTATA*.—One of the most popular and useful orchids in cultivation. The pseudo-bulbs and leaves pea-green, the flower spikes containing about 7 or 8 flowers, pure white with yellow crest on the lip in the type. The form *alba* or *hololeuca* has blossoms entirely white, while the *Chatsworth* variety, also *Lemoniana* and *maxima*, are all more or less distinct. Northern India, 1837 (*g*).
- C. CUMINGI*.—Dwarf habit, flower spikes erect; clouded white flowers with a yellow disc to the lip. Singapore, 1840 (*h*).
- C. DAYANA*.—A large-growing plant, producing splendid pendant racemes of flowers. The sepals and petals are yellow, the lip red, disc brown with white. Borneo, 1884 (*h*).
- C. ELATA*.—Pseudo-bulbs 2 inches apart on a wiry rhizome; scapes erect, flowers white with orange blotch on the lip. Nepal, 1889 (*i*).
- C. FIMBRIATA*.—Interesting as being the first cultivated species, but of no value as a garden plant. China, 1824 (*i*).
- C. FLACCIDA*.—Of medium habit, the flowers creamy white with reddish-brown markings. Nepal, 1829 (*i*).
- C. FÖRSTERMANNI*.—A rare species, bearing white flowers, stained on the lip with brown. Sunda Isles, 1887 (*h*).
- C. GARDNERIANA*.—A fine species, with flask-shaped pseudo-bulbs, and racemes of white flowers with yellow centre to the lip. India, 1837 (*g*).

- C. MASSANGEANA*.—A splendid species when well grown, producing long pendant spikes of yellow flowers, the lips streaked with reddish brown. Assam, 1879 (*i*).
- C. OCELLATA*.—Much like *C. corymbosa*, but some varieties, at least, bear larger flowers; these are



Fig. 42. *CÆLOGYNE PANDURATA*.

- white, with yellow lip markings. Khasia Hills, 1838 (*g*).
- C. ODORATISSIMA*.—Flowers pure white on the outer segments, lip marked with yellow and very sweetly scented. Neilgherry Hills, 1864 (*c*).
- C. PANDURATA*.—A most striking and beautiful orchid, very quick-growing, and bearing flowers with green sepals and petals, the lip being marked with a perfectly black blotch. Sarawak, 1852 (*h*). (Fig. 42.)
- C. SANDERÆ*.—Habit strong, the flowers like those

of *C. cristata*, but larger; one of the finest in the genus. Sunda Isles, 1887 (*h*). (Fig. 43.)
C. SPECIOSA.—A strong-growing plant, producing very large flowers, these being brownish green, with

an exquisitely beautiful fringed lip. Salak Mountains, 1846 (*h*).

C. TOMENTOSA.—A very distinct species, with reddish flowers. Borneo, 1873 (*h*).

COLAX JUGOSUS (for culture see *Lycaste*).—A pretty, though not showy, plant, the flowers having white sepals and petals, the latter marked with purple, as is the lip. Brazil, 1840 (*i*).

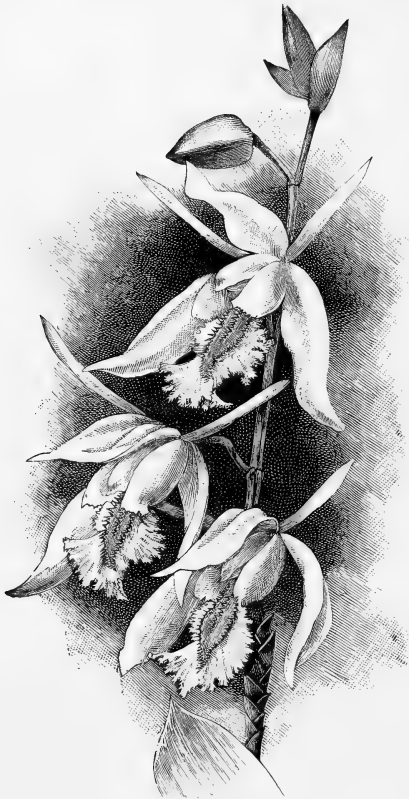


Fig. 43. *CELOOZYNE SANDERII*.

COMPARETTIA.—Pretty, dwarf, epiphytal orchids, liking a shady, moist position in the intermediate house. They thrive best in pans of peat and moss, and must be kept moderately moist all the year round. As the flowers last a long time in good condition, they should be removed from weak plants soon after expansion, otherwise they are apt to distress them. There are only a few species, and the following may be selected. *C. coccinea*: Pseudo-bulbs, small, bearing deep-green leaves, the flower spikes usually containing about half-a-dozen bright-scarlet and orange blossoms. Brazil, 1837 (*i*). *C. falcata*: Pseudo-bulbs, one-leaved, the flower spikes very slender; flowers purplish-crimson. Ecuador, 1835 (*i*). *C. macroplectron*: Very bright and attractive, but not so brilliant as the last-named; the flowers are large, the lip very prominent, bright rose and purple. New Grenada, 1878 (*i*). *C.*

speciosa: A dwarf, but showy plant, with spikes containing nearly a dozen flowers; these are bright orange-scarlet on the lip; sepals rather paler. Ecuador, 1877 (*i*).

CORYANTHES.—A genus of orchids of marvellous structure and great interest to the lover of quaint and beautiful plants. They are nearly related to the Stanhopeas, and to these we refer the reader for culture generally. The Coryanthes, however, require more heat and moisture even than the Stanhopeas, and a hot sun shining on the plants does no harm, provided they are thoroughly moist at the roots, and the atmosphere of



Fig. 44. *CYRNOCHES CHLOROCHILON.*

the house is also heavily charged with moisture. A very peculiar property in the flowers is the habit the outer segments have of decaying at once when these open, leaving only the hollow lip, which secretes a sweet fluid eagerly sought for by insects, who play their part in the fertilisation of the flower. They last a very short time in good condition. The most worthy of cultivation are *C. macrantha*: Flower spikes containing

about three flowers, these being bright yellow with red spots, the upper portion of the lip brownish yellow. Caracas, 1836 (*h*); and *C. maculata*: Flowers paler yellow than those of the preceding, spotted with crimson; the colours are variable. Demerara, 1831 (*h*).

CYCNOCHES.—An interesting genus, popularly known as “Swan Orchids,” on account of the column and pollen masses resembling the curved neck and head of a swan. Though not particularly showy, one or two at least of the species should be included in all collections. The pseudo-bulbs, which are green and fleshy, usually grow erect,



Fig. 45. *CYMBIDIUM HOOKERIANUM* (GRANDIFLORUM).

with rather thin-textured foliage, that drops in the autumn. They require a fair amount of light, but shade from bright sunshine is necessary, and during the growing season water must be freely applied. Avoid syringing heavily, but light dews are helpful. The compost may consist of equal parts of peat, loam and sphagnum moss, firmly placed in pots or baskets. The species recommended

are: *C. aureum*.—Very handsome flowers, bright yellow on drooping racemes; they are usually spotted with purple. Central America, 1852 (*i*). *C. chlorochilon*.—The most popular kind, producing large flowers, pale greenish yellow, with an almost black blotch on the lip. The larger the flowers the fewer are produced on a scape; the colour also is variable. Demerara, 1838 (*i*) (Fig. 44). *C. ventricosum*.—Pale green flowers on some plants, on others small blackish ones, the one male, the other female. Guatemala, 1842 (*i*). *C. Warscewiczii*.—Also a bisexual orchid, and a very beautiful one; flowers pale green or white. Guatemala, 1879 (*i*).

CYMBIDIUM.

An old-world genus, containing a large number of species and a few very distinct and beautiful hybrids. Some are splendid garden orchids, others are mere botanical curiosities; the latter are left out of the accompanying list. Their culture is not difficult when the plants are well established, and they thrive in a sound, substantial compost consisting of equal parts of peat, loam, and chopped moss, plenty of crocks being added to insure aëration. Apply water freely all the year round, but especially when the plants are in active growth.

REPRESENTATIVE SPECIES.

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| <p>CYMBIDIUM EBURNEUM.—A lovely orchid, and not excelled in the genus; the flowers are pure white, large, fragrant, and produced freely. China, Burmah, 1846 (c).</p> <p>C. GIGANTEUM.—A strong-growing handsome plant; leaves deep green, arching; flower spikes containing a number of large blooms; sepals and petals brown; lip pale yellow, brown and crimson. Northern India, 1837 (c).</p> <p>C. HOOKERIANUM.—Like <i>C. giganteum</i> in habit; flowers greenish yellow, lip marked with crimson and purple. Sikkim Himalayas, 1866 (i) (Fig. 45).</p> <p>C. LOWLANUM.—Similar to the last two in habit; flowers yellowish green, with lovely maroon</p> | <p>lip. One of the best of orchids for exhibition, lasting three months in good condition. A very popular plant. Burmah, 1878 (c).</p> <p>C. MASTERSI.—A variable and beautiful species, with rather small flowers; these are white, with a yellow throat and crimson purple spots. Burmah, 1841 (i).</p> <p>C. PENDULUM.—Stout-growing species, with purple, white and crimson flowers, on long pendulous spikes. Northern India, 1848 (i).</p> <p>C. TIGRINUM.—Dwarfer in habit, the flowers green, brown, and purple, very sweetly scented. Tenasserim, 1864 (i).</p> |
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CYPRIPEDIUM.

This is a large and important genus, containing a great number of species, and a still greater number of hybrids. So numerous, in fact, have the latter become that the attempt to classify and name them all would be out of the question here. Nor is it necessary, as some are so rare that they are not likely to pass into the hands of the ordinary orchid grower for many years, while very little difference exists between many of them. The species are widely distributed naturally, some few coming from cool countries, and one being indigenous to Britain; but the majority are natives of the tropics of both hemispheres. No orchids are more easily cultivated, as they will grow freely in any ordinary stove if placed in pots of peat, moss, and loam fibre.

A few forms are more difficult to cultivate, and these are comprised in what is known as the "bellatulum" group, of which the principal members are *C. bellatulum* (Fig. 46), *C. niveum*, *C. concolor*, and *C. Godefroyæ*, a lovely class when well grown. They are

found growing naturally on limestone rocks, and cultivators have found great benefit to accrue from mixing with the compost rough lumps of limestone, or using this material in lieu of crocks.

All tropical *Cypripediums* like a shady, moist position, abundance of water at the roots and a temperature as near in accordance with their native haunts as possible. In the following list we have taken no notice of modern methods of classifying into subgenera of unpronounceable and far-fetched names, the old designation of Linnæus being far simpler and more euphonious.

REPRESENTATIVE SPECIES AND VARIETIES.

- CYPRIPEDIUM ALBOPURPUREUM*.—A hybrid raised by crossing *C. Schlimii* and *C. Dominicanum*; strong-growing with fine spikes of rosy-red and white flowers.
- C. AMANDUM*.—Hybrid from *C. insigne* and *C. venustum*, combining in a pleasing way the characters of its parents.
- C. ARGUS*.—Leaves 8 inches long, prettily tessellated, flowers white, green and purple, with fine dorsal sepal. Philippines, 1873 (*h*).
- C. ARTHURIANUM*.—Cross between *C. insigne* and *C. Fairrianum*, showing well the drooping petals of the latter rare kind; the colours are very much like *C. insigne*.
- C. ASHBURTONLE*.—Raised from *C. barbatum* and *C. insigne*; a showy and popular hybrid, very variable in colour.
- C. BARBATUM*.—Well known and popular; flowers with the white upper sepal lined with green and purple; the petals similar in colour, hairy; the lip purple. Malay, 1840 (*i*).
- C. BELLATULUM*.—Leaves very thick, deep green, marbled with grey, and purple reverse; flower white, spotted with purple. Cochin China, 1888 (*h*). (Fig. 46.)
- C. BOISSIERIANUM*.—Very large flowers, yellow, tinged with white and green. Peru, 1876 (*i*).
- C. BOXALLI*.—A variable kind, nearly related to *C.*

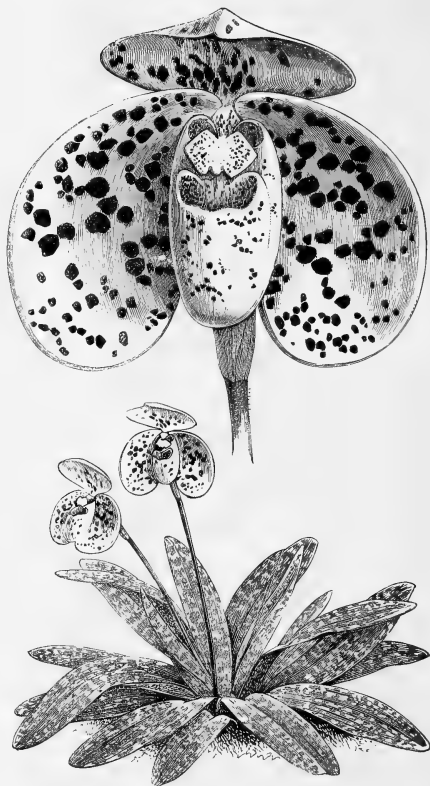


Fig. 46. *CYPRIPEDIUM BELLATULUM*.

villosum; upper sepal heavily marked with purple of varying shades; lip and petals brown, tinged with purple. Burmah, 1877 (*i*).

- C. CALLOSUM*.—Leaves prettily tessellated; flowers white, green, and purple, with black callosities on the sepals. A lovely and rare form of this is *C. c. Sanderae*. Siam, 1887 (*i*).

- C. CALOPHYLLUM.—Cross between *C. barbatum* and *C. venustum*; intermediate between its parents. Very fine foliage.
- C. CALURUM.—Very pleasing, hybrid between *C. Sedeni* and *C. longifolium*.
- C. CARDINALE.—Raised from *C. Sedeni* and *C. Schlimii*, the flowers like a large form of the latter. One of the prettiest hybrids known.
- C. CARICINUM.—A very distinct and singular species, with sedge-like leaves and erect spikes of pale green flowers, these being marked with rosy-pink and rich brown, the pouch bright green, with black dots at the throat. Peru, 1863 (c).
- C. CAUDATUM.—A remarkably beautiful plant, with stiff, deep-green leaves and erect flower spikes; the flowers are large, the dorsal sepal bent forward, and the petals 18 inches or more in length, narrow and ribbon-like; the colour is yellow and reddish-brown; a lovely kind, rather variable in colour and markings. Chiriqui, 1847 (i).
- C. CHAMBERLAINIANUM.—A very distinct species of vigorous growth, producing a large number of flowers successively on the scapes, each with its attendant bract, giving it a very quaint appearance; the flowers are white, purple, and rose, the petals having a peculiar twist. A very beautiful plant. New Guinea, 1892 (h). (Fig. 47.)
- C. CHARLESWORTHII.—A popular kind, with a very beautiful dorsal sepal, which varies considerably in colour; it is usually some tint of rosy-purple, broad and spreading; petals yellow, tinged with brown; lip similar in colour. East Indies, 1892 (i).
- C. CILIOLARE.—Foliage variegated; flowers purple, white, and green. Philippines, 1882 (h).
- C. CONCOLOR.—A dwarf and pretty species; the leaves deep green, with grey-green mottlings, purple below; the spike is short; the flowers wholly of a clear, creamy white, passing to yellow, a few spots being about the base of the segment. Moulmein, 1864 (h).
- C. CROSSIANUM.—See *C. amandum*.
- C. CURTISI.—A popular and showy species, bearing large, handsome flowers; the upper sepal is white, green, and purple; the petals similar in colour; lip deep purple. Sumatra, 1882 (h).
- C. DAYANUM.—Very beautifully marked foliage and large flowers, which are white, purple, and green; not very showy. Borneo, 1860 (h).
- C. DOMINIANUM.—A lovely hybrid from *C. caudatum*

and *C. caricinum*, intermediate in form and colouring between its parents (i).

- C. DRUEYL.—A very distinct species; the flowers of medium size, greenish-yellow, the dorsal sepal and petals having each a distinct purple stripe running down the centre. The plant does not bloom very freely. Travancore Mountains, 1875 (h).
- C. ELECTRA.—A very beautiful hybrid of doubtful parentage; supposed to be from *C. insigne* Maulei and *C. Harrisonianum* (i).

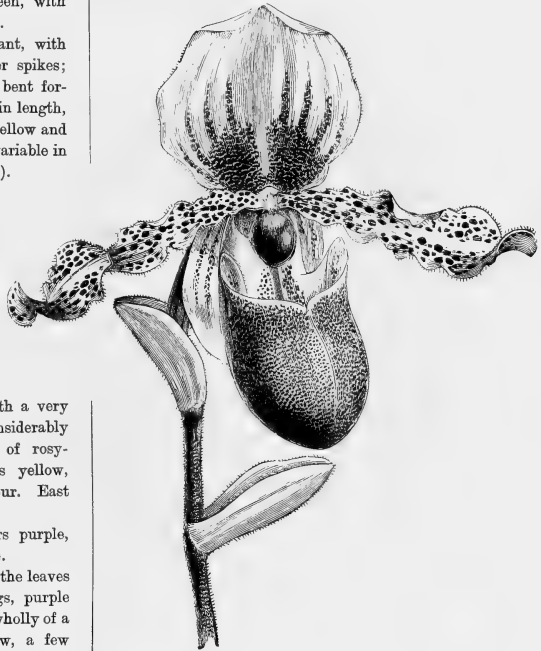


Fig. 47. CYPRIPEDIUM CHAMBERLAINIANUM.

- C. ELLIOTIANUM.—Stout grower; flower spikes about a foot high; flowers white and crimson. Philippine Islands, 1888 (h).
- C. EURYANDRUM.—An attractive hybrid from *C. Stonei* and *C. barbatum*; flowers white, crimson, and purple; leaves slightly variegated (i).
- C. EXUL.—A very distinct and beautiful *Cypripedium* in the way of *C. insigne*, but more showy; dorsal

sepal white, with greenish-yellow base and purple spot. Siam, 1892 (i). (Fig. 48.)

- C. FAIRRIANUM.—A rare *Cypripedium*, very distinct and beautiful; the dorsal sepal is white, marked with yellow and purple; the petals drooping, similar in colour; the lip purple. Rather a weak grower. Assam, 1857 (i).
- C. GODEFROYÆ.—Allied to *C. niveum* and *C. concolor*. Flowers white, heavily spotted with chocolate-purple; attractive. Asiatic Islands, 1883 (h).
- C. GRANDE.—A magnificent hybrid from *C. caudatum* and *C. longifolium*. Very strong grower, with

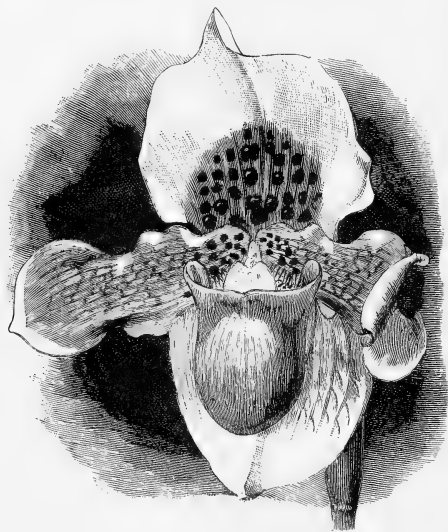


Fig. 48. *CYPRIPEDIUM EXUL*.

flowers of great beauty like *C. caudatum*; colours white, yellow, and crimson (i).

- C. HARRISIANUM.—An old and valuable hybrid, very variable in colour, and with a large number of named varieties. It was raised from *C. villosum* and *C. barbatum*.
- C. HAYNALDIANUM.—A showy, large-flowering kind, with spikes 2 feet high; flowers green, rose, and brown. Philippines, 1873 (i).
- C. HIRUTISSIMUM.—An excellent, easily grown, free-flowering plant; flowers reddish-purple and yellow. Assam, 1857 (i).

C. HOOKERÆ.—Very lovely foliage, and fine handsome yellow and purple flowers. Borneo, 1862 (h).

- C. INSIGNE.—Possibly the best-known species in existence, and a remarkably useful garden plant; flowers variable, the vars. *Chantini* and *Maulei* being the best of the older ones, while the lovely yellow forms, such as *C. insigne Sandere* (Fig. 17, page 41), are amongst the rarest and best in existence. India, 1820 (i).
- C. T'ANSONI.—Hybrid from *Rothschildianum* and *Morganæ*. The colour is cream, green, brown, and crimson (h). (Fig. 49, next page.)

C. LATHAMIANUM.—A hybrid, between *C. villosum* and *C. Spicerianum*, with flowers almost exactly intermediate. One of the best (i).

C. LAWRENCEANUM.—Very handsome, large-flowering species. Scapes often twin-flowered; flowers variable in colour. Borneo, 1878 (h).

C. LEEANUM.—One of the best-known and most beautiful hybrids raised from *C. insigne* and *C. Spicerianum*. The flowers favour the latter most and are rather variable (i).

C. LONGIFOLIUM.—A useful and beautiful old species. Foliage green; flower spikes tall; the colours pale yellow, green and rose. Central America, 1870 (i).

C. LOWI.—A curious and showy kind of large growth; flowers green, yellow and purple. Sarawak, 1846 (h).

C. MASTERSIANUM.—An old species recently reintroduced, but not good enough to obtain great popularity. Flowers green, white and red. Malay Archipelago (h).

C. MORGANÆ.—A very beautiful hybrid from *C. Stonei* and *C. superbiens*. The plant is a strong grower; the flowers white on the upper sepal; the petals beautifully spotted; lip mauve (i).

C. NIVEUM.—A lovely species with small snowy white blossoms, slightly spotted with crimson at the base of the petals. Malay Archipelago, 1868 (h).

C. OENANTHUM.—A beautiful hybrid from *C. Harrisianum* and *C. insigne Maulei* (i).

C. PHILIPPINENSE.—A handsome species, with white, green and yellow flowers. Philippines, 1863 (h).

C. PRÆSTANS.—Strong-growing species, somewhat like *C. Stonei*; flowers white, yellow and purple. New Guinea, 1886 (h).

- C. PURPURATUM*.—A pretty species from the Malay Archipelago, related to *C. barbatum*, 1836 (i).
- C. ROTHSCHILDIANUM*.—One of the most showy and beautiful of this genus; large spikes, with flowers white, yellow, and spotted with crimson. New Guinea, 1888 (h).
- C. SALLIERI*.—A natural hybrid that has also been raised under cultivation by crossing *C. insigne* and *C. villosum*; habit, strong; flowers intermediate between its parents. Burmah (i).
- C. SANDERIANUM*.—A fine species, related to *C. Stonei*; flowers purple. Malay Archipelago, 1888 (h).
- C. SAUNDERSIANUM*.—A valuable hybrid between *C. caudatum* and *C. Schlimi*.
- C. SCHLIMI*.—A lovely species, with green leaves and spikes of rosy-white flowers, but rather weak-growing, and not always a success under cultivation. New Grenada, 1866 (i).
- C. SEDENI*.—A very popular and beautiful hybrid from the last-named and *C. longifolium*; a continuous blooming plant, producing strong spikes of rosy red-and-white flowers (i).
- C. SELLIGERUM*.—A fine hybrid, between *C. philippinense* and *C. barbatum*; flowers white, crimson, and purple (i).
- C. SPICERIANUM*.—One of the finest and most beautiful; the upper sepal is white, with a very distinct purple line down the centre; petals greenish, lip purple. Assam. 1878 (h).
- C. STONEI*.—In its best forms this is a really magnificent orchid, the leaves 12 to 15 inches in length, the flowers large and white, marked with purple and reddish-brown. Sarawak, 1860 (h).
- C. SUPERBIENS*.—A fine species in the way of *C. barbatum*, but a great improvement on this in every way. Java, 1835 (i).
- C. SWANIANUM*.—A distinct and pretty hybrid from *C. Dayanum* and *C. barbatum*.

- C. TAUTZIANUM*.—A beautiful hybrid, from *C. niveum* and *C. barbatum*.
- C. TESSELLATUM*.—Raised from *C. concolor* and *C. barbatum*; a rare and lovely plant.
- C. VENUSTUM*.—An old but beautiful species with handsome foliage and very quaint flowers, green, white, and purple; the lip prettily venated. Sylhet, 1819 (i).



Fig. 49. CYPRIPEDIUM T'ANSONI.

- C. VEXILLARIUM*.—Hybrid from *C. Fairrianum* and *C. barbatum*; flowers intermediate showing their affinity to the former in the drooping petals, the latter in the lip.
- C. VICTORIA MARIE*.—Similar to *C. Chamberlainianum*, but of stronger habit and producing looser spikes. New Guinea, 1895 (h).
- C. VILLOSUM*.—An old but handsome species; flowers yellow, brown, and greenish purple. Moulmein, 1833 (i).

CYRTOPODIUM.—Plants of this genus are not generally grown, their large habit and shy-flowering character rendering them unsuitable for amateurs' collections. A strong heat while growing and a rich compost are best for *C. Andersoni*, *C. cardiochilum*, and *C. punctatum*, the three species most grown.

DENDROBIUM.

This is an extensive and very important genus, containing some of the most beautiful orchids in cultivation. The loveliest shades of yellow and orange are to be found among the evergreen kinds, while the deciduous section and the nigro-hirsute (hairy-stemmed) group contains many remarkably fine plants.

To take the deciduous group first. These should be grown in small pans, or baskets suspended from the roof in the warmest house. A suitable compost will consist of peat fibre and sphagnum moss, and the baskets or pans must be thoroughly clean and well drained. The object of keeping them near the roof of the house is to afford them all the light and sun possible. A free amount of moisture, both in the atmosphere and at the roots, is required until the plants have completed the season's growths. They should then be taken from the warm house and placed in a light, airy structure, keeping them comparatively dry until the flowers are showing; then give a little more moisture and warmth. This must not be overdone at first, or it is apt to cause the plants to produce more growth than flowers; but the temperature may be sensibly increased as soon as the flower buds show plainly. Great care is necessary in watering at first, as the young growths are very tender and easily injured by excess of moisture or sunlight.

The evergreen kinds require a more regular temperature throughout the year, and usually rather less heat than the deciduous species. As a rule they make their growth very quickly, and it is not at all unusual for them to produce two sets of growths in a year. Such as *D. densiflorum*, and its ally *D. thyrsofolium*, and others, will often make a new pseudo-bulb, or set of pseudo-bulbs, as the case may be, in about six weeks; so, naturally, they do not need so much encouragement as such deciduous kinds as *D. superbum*, that has to produce and perfect growths a yard or more in length.

The pots for the evergreen kinds may be rather larger, and the compost rougher, than for the last-named set. The nigro-hirsute group is rather more difficult to deal with, and amateurs should gain some proficiency in cultivating the other members of the genus before attempting their culture. As a rule, their seasons are not so constant as are those of the other classes, and often they are in full growth during winter. So, too, with

the Australian kinds generally. It is best to let them have their way and not to try and force them to rest or into growth, but when they seem inclined to do either, encourage them with more heat and moisture, or *vice versa*.

All *Dendrobiums* are apt to be attacked by insects, and especially thrips and red spider. The instructions given for the destruction of these pests at p. 65 should be carefully followed. Hybrids in this genus are now very numerous, and comprise some lovely plants, the best known of which are noted below. Only those that are useful decorative species or varieties are mentioned, botanical curiosities being not of general interest.

REPRESENTATIVE SPECIES AND VARIETIES.

DENDROBIUM AGGREGATUM.—A pretty, dwarf-growing evergreen form, thriving on a rough block of wood or in small pans of peat and moss; the flowers are of two shades of yellow. Burmah, 1834 (*h*).

D. AINSWORTHII.—A lovely hybrid, between *D. nobile* and *D. aureum*, with white sepals and petals, and a flaked blotch on the lip of crimson-purple. *D. Ainsworthii roseum* is a variety with rose-coloured flowers. Habit as in *D. nobile*; culture similar (*h*).

D. ALBO-SANGUINEUM.—Stems rather short; flowers creamy-white, with blood-red markings on the segments. Moulmein, 1851 (*h*.)

D. AMÆNUM.—Stems pendant, about 2 feet in length; flowers whitish, each segment tipped with purple. Nepal, 1874 (*h*).

D. APOLLO GRANDIFLORA.—Hybrid from *nobile*, *pulcherrinum* and *splendidissimum*. This is superb. Sepals and petals waxy-white, shading to rosy-purple; the lip is white, with a deep violet-crimson centre (*h*). (Fig. 50.)

D. AUREUM.—Not a showy kind, but remarkable as the parent of some of the very finest hybrids; flowers yellow, with a purple blotch on the lip; fragrant. Assam, 1837 (*h*).

D. BENSONLE.—A neat deciduous species, with white flowers; the lip blotched with maroon and yellow. Burmah, 1866 (*h*).

D. BIGIBBUM.—Stems 18 inches high; flowers on

terminal racemes magenta-purple. A very beautiful species. Australia, 1824 (*h*).

D. BOXALLI.—Attractive, and a supposed natural hybrid between *D. Devonianum* and *D. crystallinum*. Moulmein, 1873 (*h*).



Fig. 50. *DENDROBIUM APOLLO GRANDIFLORA*.

D. BRYMERIANUM.—A remarkable and beautiful species, with golden-yellow flowers; the lip very deeply fringed. Burmah, 1874 (*h*).

D. CHLOROSTELE.—Hybrid between *D. Linawianum* and *D. Wardianum*. Flowers more like the latter species.

D. CHRYSANTHUM.—A very handsome species, flowering on the unripened stems. Flowers golden-yellow, with maroon blotches. Suitable for baskets. Burmah, 1828 (*t*).

D. CHRYSOTOXUM.—Evergreen species, with golden-

yellow flowers in racemes from near the top of the bulb. Burmah, 1847 (t).

- D. *CLAVATUM*.—A pretty evergreen kind, related to *D. fimbriatum*; flowers yellow. Eastern India, 1851 (t).
- D. *CRASSINODE*.—One of the showiest and most delightful of *Dendrobiums*; stems 18 inches in length, distinctly knotted; the flowers rosy-white, each segment tipped with purple. There is a richly-coloured variety, *D. c. Barberianum*, and a pure white, *D. c. albiflorum*. Moulmein, 1869 (h).
- D. *CRUENTUM*.—A distinct species, with greenish flowers marked with red. Malay, 1884 (h).
- D. *CRYSTALLINUM*.—An attractive form, with slender



Fig. 51. *DENDROBIUM LEECHIANUM*.

stems and white, yellow, and amethyst-purple flowers. Arracan Mountains, 1867 (h).

- D. *DALHOUSIANUM*.—Fine, large-growing species, requiring a long season of growth; flowers whitish yellow, with large, deep maroon blotches on the lip. India, 1837 (h).
- D. *DEAREI*.—One of the most useful and free-flowering species in existence; the blossoms are pure white, with a tinge of green on the lip; this species requires a very moist atmosphere. Mindanao, 1832 (h).
- D. *DENSIFLORUM*.—A favourite evergreen kind, producing handsome racemes of golden-yellow flowers. Burmah, 1830 (t).
- D. *DEVONIANUM*.—A lovely and popular species,

with slender stems, and flowers white, magenta and golden yellow. Khasia, 1837 (h).

- D. *DOMINIANUM*.—Hybrid between *D. nobile* and *D. Linawianum*; flowers rosy-purple and white (h).
- D. *DRACONIS* (*eburneum*).—Lovely white flowering nigro-hirsute species. Moulmein, 1862 (h).
- D. *ENDOCHARIS*.—A pleasing hybrid from *D. japonicum* and *D. nobile* (t).
- D. *FALCONERI*.—A beautiful species, rather difficult to grow; it thrives best on a long piece of tree-fern stem, so that the roots emitted from each little stem or pseudo-bulb have something to support them; the flowers are pure white, tipped with amethyst; the lip golden yellow in the centre, and rich maroon in ground colour. Assam, 1856 (h).
- D. *FARMERI*.—A beautiful evergreen kind; flowers rosy-white, with a yellow lip on fine, showy racemes. Moulmein, 1847 (t).
- D. *FIMBRIATUM*.—A fine, tall-growing evergreen species, with rather loose racemes of yellow flowers; the variety *oculatum* has a maroon centre to the lip, which in this and the type is fringed. India, 1832 (t).
- D. *FINDLAYANUM*.—A species of remarkable habit, the stems yellowish green, very much swollen at the nodes; the flowers are white-tipped rose. Burmah, 1877 (h).
- D. *FORMOSUM*.—The finest of the nigro-hirsute group; flowers large, pure white, with a yellow centre. India, 1837 (h).
- D. *FUSCATUM*.—An uncommon species, related to *D. chrysanthum*; flowers yellow, lip spotted maroon. Khasia Hills, 1848 (t).
- D. *FYTCHIANUM*.—A very beautiful species in the way of *D. barbatulum*, but with a little more colour on the lip, and slightly different habit. The variety *roseum* has rosy-tinted flowers. Moulmein, 1863 (h).
- D. *GIBSONI*.—A neat species very much like *D. fimbriatum*. Khasia Hills, 1836 (h).
- D. *GOLDEI*.—See *D. superbiens*.
- D. *GRIFFITHIANUM*.—A larger, brighter form than *D. densiflorum*. Moulmein, 1877 (t).
- D. *HARVEYANUM*.—A very striking and beautiful plant in the way of *D. Brymerianum*, but having the petals deeply fimbriated as well as the lip. The colour is a clear, bright yellow. Burmah, 1883 (h).

- D. **HOOKERIANUM**.—A strong grower, the stems a couple of yards in height; the flowers bright golden yellow. Sikkim, 1868 (*h*).
- D. **INFUNDIBULUM**.—A beautiful species, bearing pure white flowers with orange centre to the lip. Moulmein, 1862 (*v*).
- D. **JAMESIANUM**.—Botanically considered a variety of *D. infundibulum*, but sufficiently distinct as a decorative plant. Moulmein, 1869 (*v*).
- D. **LASIOGLOSSUM**.—A small-flowering, but pretty, species; flowers white and purple, with yellow hairs on the lip. Burmah, 1861 (*h*).
- D. **LEEANUM**.—Showy and handsome species; flowers rosy-crimson. New Guinea, 1890 (*h*).
- D. **LEECHANUM**.—A large and bright form of *D. Ainsworthi*. (Fig. 51.)
- D. **LEUCOPHOTUM**.—A winter flowering species; flowers white. Malay Archipelago, 1881 (*h*).
- D. **LITUIFLORUM**.—A neat species, with trumpet-shaped lip; similar to *D. nobile*. Burmah, 1856 (*h*).
- D. **LODDIGESI** (pulchellum of gardens).—Stems very small, deciduous, creeping, and very free-flowering. Does best in a flat pan or on blocks of tree-fern stems, as advised for *D. Falconeri*; flowers rosy-lilac. India, 1832 (*h*).
- D. **LOWI**.—A distinct and beautiful species; flowers yellow, stained with red. Borneo, 1860 (*h*).
- D. **LUTOLUM**.—Flowers yellow, the lips streaked with crimson. Moulmein, 1863 (*h*).
- D. **MACCARTHEI**.—A beautiful plant, but rather difficult to grow, requiring a long season, and a lot

of sunlight in autumn; the flowers are pale rosy-purple, with a very deep amethyst blotch on the lip. Ceylon, 1855 (*h*).

- D. **MACFARLANEII** (Johnsoniæ).—One of the most beautiful in the genus, but very difficult to grow; flowers large, pure white, except a few purple markings on the lip. New Guinea, 1882 (*h*).



Fig. 52. AN AMATEUR'S DENDROBIUM NOBILE.

- D. **MOSCHATUM**.—Very strong-growing plant; flowers large, pale yellow, but lasting a few days only. Moulmein. 1825 (*v*).
- D. **NOBILE**.—The best-known and most useful in the genus, and none is more beautiful. The typical form has rosy-white sepals and petals, and a rich maroon-crimson blotch on the lip. There are many varieties, including the novel and rare

albino forms, also the highly-coloured *D. n. nobilius*, *Cooksoni*, *pendulum*, *elegans*, *Ballianum*, *Amesianum*, and very many others. Northern India, 1836 (*h*). (Fig. 52.)

D. OCHREATUM (Cambridgeanum).—Rather a dwarf plant, flowering on the unripened stems, and not easy of cultivation. The flowers are pale yellow; lip blotched maroon. India, 1837 (*i*).

D. PHALENOPSIS.—A lovely orchid, quite the best in the genus when well cultivated. The varieties include almost every tint of colour, from pure



Fig. 53. *DENDROBIUM VENUS*.

white to the deepest crimson purple. New Guinea, 1880 (*h*).

D. PIERARDI.—A pretty species of the deciduous section, its stems growing a yard or more in length, and covered with pale rosy-mauve blossoms. Burmah, 1815 (*h*).

D. PRIMULINUM.—Stems very stout; flower mauve and primrose. Nepal, 1857 (*h*).

D. RHODOSTOMA.—Very pretty hybrid, between *D. superbum* and *D. sanguinolentum*.

D. SANGUIOLENTUM.—Stems pendant and leaves evergreen; flowers pale yellow and purple. Not common. Ceylon, 1842 (*h*).

DENDROCHILUM. See *Platyclinis*.

D. SPECIOSUM.—A stout-growing species with long racemes of small flowers spotted with purple. The var. *Hilli* has paler flowers than the type. Both these plants require a long season of cool, dry rest to induce them to flower; but the variety *Bancroftianum*, which is of weaker growth, and the most beautiful of all, must not be treated quite so harshly. Queensland, 1824 (*i*).

D. SPLENDIDISSIMUM.—A greatly improved and slightly-altered form of *D. Ainsworthi*.

D. STRATIOTES.—Rather an uncommon plant of great beauty; the stems grow erect, and the flowers are white, yellow, and purple, with very peculiarly-twisted petals. Sunda Islands, 1885 (*h*).

D. SUAVISSIMUM.—A sweetly-scented variety of *D. chrysoxum*.

D. SUPERBIENS.—Stem about 30 ins. high; flowers rich crimson, purple, and white. Torres Straits, 1876 (*h*).

D. SUPERBUM.—Long pendant stems, and large rose-purple flowers; a very fine species, requiring a long growing season. Manilla, 1840 (*h*).

D. THYRSIFLORUM.—One of the finest evergreen species; the flowers produced on large pendant racemes, white, with yellow lip. Burmah, 1864 (*i*).

D. TORTILE.—A pretty species, remarkable for the twisted sepals; colour, rosy-lilac. Moulmein, 1847 (*h*).

D. VENUS.—A lovely hybrid, between *D. Falconeri* and *D. nobile* (*h*). (Fig. 53.)

D. WARDIANUM.—A lovely and popular plant; flowers large; the sepals white, tipped with purple, the lip blotched with yellow and mauve. It is a native of Assam and Burmah, the Burmese form being much the better. 1856, 1875 (*h*).

D. WILLIAMSIANUM.—Beautiful and very distinct species, growing about 18 inches high, and producing white flowers, with a mauve and crimson-tinted lip. New Guinea, 1886 (*h*).

DISA.—An interesting genus of terrestrial or ground orchids, about half-a-dozen kinds of which are in cultivation. They all require quite cool treatment, and should be potted in peat fibre and chopped sphagnum moss. The size of the pots used must be in accordance with that of the plants. They are easily propagated when healthy by means of buds from the root stocks, but they are not so easy to cultivate as many other orchids. A liberal supply of water at the roots, frequent syringings, and a moist atmosphere are required in the summer, but much less moisture suffices in the winter. *D. Barrelli* is a fine crimson variety of *D. grandiflora*, which is the brightest and most popular of all. Flowers large, reddish orange, with rather tall scapes. Table Mountain, 1825. *D. crassicornis* has whitish flowers, spotted with purple, and is rare in cultivation. South Africa, 1879. *D. graminifolia* has narrow leaves and blue flowers. Cape of Good Hope. *D. racemosa* is more easily grown than *D. grandiflora* and produces more flowers on a spike. Rose crimson and yellow. South-east Africa, 1887. *D. tripetaloides* is an easily-grown species, producing white flowers, tinged with pink and purple. South Africa, 1889. *D. Veitchi* is a beautiful hybrid raised from *D. grandiflora* and *D. racemosa*, producing large and richly coloured flowers. 1891. *D. Clio* is a new hybrid from *D. grandiflora* and *D. Veitchi*. The colour ranges from soft salmon-rose to brilliant scarlet. (Fig. 54.)



Fig. 54. *DENDOBBIUM CLIO*.

EPIDENDRUM.

This is probably the largest genus numerically of all orchids, and is the one to which Linnæus referred all exotic orchidaceous plants. This led to much confusion in nomenclature, but this is now much reduced. Epidendrums are extremely variable plants, and though many are almost worthless, others are highly worthy of cultivation. Their culture, in most instances, is not difficult. A noteworthy exception, however, is found in *E. bicornutum*. The plants may make good progress for a few years after

importation and flower freely, but after this degenerate and fresh ones have to be obtained. A thin compost, abundance of heat and moisture, with a free circulation of air, are the conditions most likely to be productive of good results.

Species with a Cattleya-like habit, such as *E. ciliare*, *E. fragrans*, *E. cochleatum* and others do best in peat and moss, over good drainage, in pots of medium size. The long-stemmed section, such as *E. radicans*, *E. xanthinum*, and others of this class, require ample room, and thrive best in a large house where they can extend and yet have their heads a good distance from the glass. The smaller-growing species of the *E. vitellinum* type may be grown in a thin compost of peat and moss in differing temperatures, as noted below.

The genus is widely distributed over the American continent and islands, and is to the New World what *Dendrobiums* are to the Old.

REPRESENTATIVE SPECIES.

- EPIDENDRUM ALATUM*.—Flowers fragrant, on many-flowered peduncles, yellow and brownish purple. Honduras, 1837 (*t*).
- E. ARACHNOGLOSSUM*.—Long cylindrical stems. Flowers crimson, with a yellow disc to the lip. New Grenada, 1876 (*t*).
- E. ATROPURPUREUM* (*macrochilum*).—A handsome species. Flowers yellow and brown on the sepals, the lip white and crimson. Venezuela, 1836 (*t*).
- E. BICORNUTUM* (*syn. Dacrium bicornutum*).—A lovely species, with pure white flowers, very lightly dotted on the sepals, with purple in some cases. Trinidad, 1833 (*h*). (Fig. 55.)
- E. CILIARE*.—A common but pretty species, sepals and

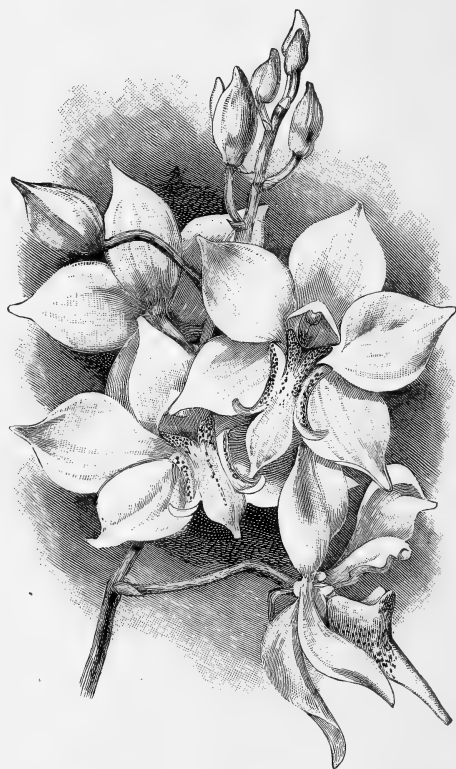


Fig. 55. *EPIDENDRUM (DACRIUM) BICORNUTUM*.

- petals yellow, lip white, very prettily fringed. West Indies, 1790 (*t*).
- E. CINNABARINUM*.—Stems slender, a yard or more high. Flowers bright red. Bahia, 1840 (*i*).
- E. COCHLEATUM*.—Flowers yellow and reddish purple. West Indies, 1787 (*t*).
- E. ENDRESI*.—A rare, but lovely little orchid.

- Flowers white, spotted with violet. Costa Rica, 1873 (*h*).
- E. FALCATUM*.—A distinct plant with pale yellow sepals and orange lip. Mexico, 1839 (*c*).
- E. FRAGRANS*.—Flowers variable, sepals whitish, lip striped purple. West Indies, 1778 (*i*).
- E. GODSEFFIANUM*.—A fine species. Flowers light green and brown; lip white, with rosy purple lines. Brazil, 1892 (*i*).
- E. IBAGUENSE*.—An attractive plant. Flowers bright orange red and yellow. New Grenada, 1867 (*c*).
- E. LEUCOCHLUM*.—Growth 2 feet high; the flowers yellowish green and white. Caracas, 1842 (*i*).
- E. MYRIANTHUM*.—A rare and brilliant flowering kind; colour, rosy purple. Guatemala, 1863 (*i*).
- E. NEMORALE*.—A fine orchid; the ground colour rosy mauve, the lip streaked with a deeper tint. Mexico, 1843 (*i*).
- E. O'BRIENIANUM*.—Bright and showy hybrid, between *E. evectum* and *E. radicans*.
- E. OCHRACEUM*.—A small-flowered species; the colours brown and yellow. Mexico, 1838 (*c*).
- E. PHENICEUM*.—Flowers of varying shade of purple and crimson. Cuba, 1840 (*i*).
- E. PRISMATOCARPUM*.—A pleasing and popular kind; sepals yellow, spotted with purple; lip yellow. Chiriqui, 1849 (*i*).
- E. RADICANS*.—A tall, loose-growing species, with panicles of scarlet flowers. Guatemala, 1859 (*c*).
- E. SCHOMBURGI*.—Stems nearly a yard high. Flowers bright red and yellow. British Guiana, 1837 (*h*).
- E. STAMFORDIANUM*.—Pseudo-bulbs erect. Flowers on large racemes; yellow and white, with red spots. Guatemala, 1837 (*i*).
- E. TOVARENSE*.—Plant dwarf and attractive. Flowers white and pink. Tovar, 1850 (*c*).
- E. VITELLINUM*.—A beautiful and popular species. Flowers orange-red, with yellow lip; one of the best of the genus. Mexico, 1830 (*c*).
- E. WALLISI*.—A pretty, large-growing species. Flowers yellow and white, spotted with purple. New Grenada, 1874 (*i*).
- E. XANTHINUM*.—Very fine plant, producing large balls of golden-yellow blossoms. Minas Geraes, 1837 (*i*).

GALEANDRA.—These plants thrive best in fairly large pots of peat and moss, requiring a large amount of water during active growth, and much less while at rest. The flowers occur at the apex of growth. Great care is necessary in keeping down insects, especially thrips and red spider. Four species are named for cultivation:—*G. Baueri*, stems a foot high; flowers in drooping racemes, sepals olive-brown, lip white and purple; Guiana, 1850 (*h*). *G. Devoniana*, attractive, flowers white with purple stripes; Rio Nigro, 1840 (*h*). *G. flaveola*, stems less than a foot high, flowers yellow; Brazil, 1887 (*i*); and *G. nivalis*, a pretty species with brownish sepals and white lip, Tropical America, 1882 (*h*).

GRAMMATOPHYLLUM.—These are large-growing plants, for the most part producing striking and handsome flowers; but as they take up much room, and in some instances do not flower very often, their culture is by no means general. They should be grown in large pots, encouraged by adequate warmth and moisture, and afterwards allowed a rather sharp resting season by keeping them cooler, and withholding water. Three of the best species are: *G. Ellisi*, a beautiful and easily managed plant; the flowers are yellow, reddish-brown and white, produced on long racemes; Madagascar, 1859 (*h*). *G. Fenzlianum*, flowers pale yellow, with brown spots; Amboyna (*h*); and *G. speciosum*, a large-growing plant that produces its immense spikes at too long intervals; flowers, 6 inches in diameter, yellow, spotted with reddish-purple; Java, Cochin China, 1837 (*h*).

HABENARIA.—Many of the exotic species of this genus are very beautiful orchids, but their culture is not easy. The growth appears in spring and after flowering dies down, and during the winter the plants are apt to be forgotten. They should be kept slightly moist and no more. There are several hardy and half-hardy kinds, these

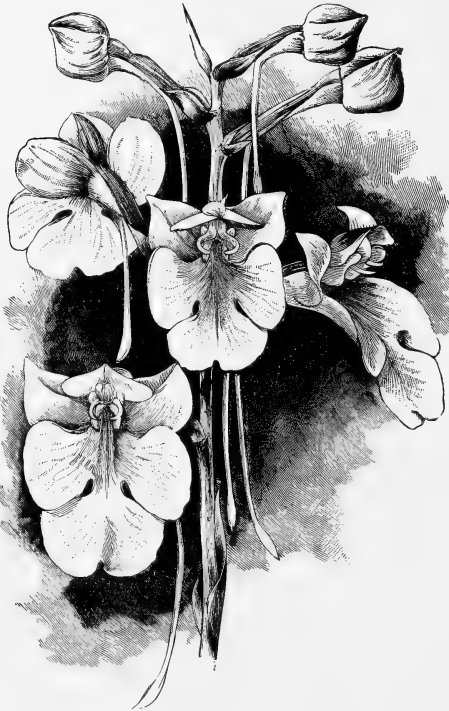


Fig. 56. *HABENARIA CARNEA*.

H. picta, large flowers, cinnamon red, marked with yellow and purple; New Grenada (*c*).

thriving well in a moist soil and shady position. One of the most beautiful of this section is our native *H. bifolia*, a plant that in moist shady wood fills the air with fragrance in June and July. The best of the exotic kind are *H. carnea*, pink, Singapore (Fig. 56); *H. militaris* and *H. Susannæ*, greenish-white, India, 1834.

HOULLETTIA.—A genus of orchid that deserves more general attention, as the flowers are very elegant, and the plant easily grown and propagated. They are closely allied to *Stanhopea*, and may be treated similarly, except that they require less heat. Three species are recommended for cultivation, namely: *H. Brocklehurstiana*, a handsome and showy kind, with reddish-brown spotted flowers; Brazil, 1841 (*i*). *H. odoratissima*, flowers large, purple with a white lip; Colombia, 1851 (*c*); and

LÆLIA.

This genus includes some of the most beautiful of orchids, and is a justly popular one. The affinity of *Lælia* to *Cattleya* is shown by the fact that many fine hybrids (*Lælio-Cattleya*) have been raised between the two genera. In habit *Lælias* vary a

great deal. Many are of vigorous growth, such as *L. superbiens*, and *L. purpurata*; and through many intermediate forms they reach a small state in such as *L. pumila*. The former are in strong plants, upwards of 4 feet in height, while the latter are hardly as many inches. The reader is referred to directions under *Cattleya* for the culture of



Fig. 57. *LÆLIA ANCEPS* MRS. DE BARBI CRAWSHAY.

the Brazilian kinds that will be named, while the Mexican species require rather different treatment.

If no Mexican house is at command, the plants should be arranged at the cooler and lighter part of the intermediate or *Cattleya* house. Hardly any shading is required by all such as *L. anceps*, *L. autumnalis* and allied kinds. They do not like much

compost to grow in. Fine specimens have been produced on long trellised blocks with only a little moss about the roots. The dwarf section as represented by *L. pumila* and its varieties do well in small pans suspended from the roof in the *Cattleya* house. The Mexican kinds require a very free supply of water when in active growth, and this should be gradually diminished when the pseudo-bulbs are fully developed, placing the plants in a cool house when quite at rest, and withholding the water entirely for a few weeks.

REPRESENTATIVE SPECIES.

LÆLIA ACUMINATA.—Pretty species, with rosy-white flowers in the type, but there are many varieties. Very nearly allied kinds, if not actually synonyms,

beautiful species, also very extremely variable. Mexico, 1836 (*t*).

L. CINNABARINA.—One of the most showy and distinct; flowers very bright red in fine terminal racemes. Minas Geraes, 1836 (*t*).

L. CRISPA. See *Cattleya crispa*.

L. DORMANIANA.—Distinct species of slender habit; flowers brown and purple. Rio de Janeiro, 1879 (*t*).

L. ELEGANS.—A lovely and variable species that should strictly be called *Lælio-Cattleya elegans*, as there is no doubt it is a natural hybrid between *Lælia purpurata* and either *Cattleya intermedia* or *C. Leopoldi*. There are many varieties, and every one good. Santa Catherina, 1847 (*t*).

L. FLAVA.—A pleasing but rather shy-flowering species of dwarf habit, bearing yellow flowers. Minas Geraes, 1839 (*t*).

L. FURFURACEA.—A dwarf species; flowers rosy-purple and white. Mexico, 1832 (*t*).

L. GRANDIS.—Flowers nankeen-yellow, with lip veined with purple. The variety *tenebrosa* is very beautiful and popular. Brazil, 1849 (*h*).

L. HARPOPHYLLA.—Bright orange-scarlet flowers on slender stem-like pseudo-bulbs. An excellent and distinct kind. Brazil, 1865 (*t*).

L. JONGHEANA.—Beautiful and rare. Flowers rosy-purple; lip white and yellow, with violet margin. Brazil, 1854 (*t*).

L. MAJALIS.—Certainly the finest of the Mexican *Lælias*. Habit dwarf; flowers large, rosy-pink; lip veined with purple. Should be placed outside in summer, after the growth is complete, and taken in before frosty nights are imminent. Mexico, 1810 (*t*).

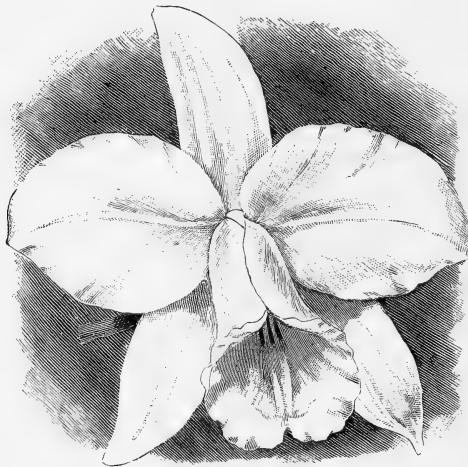


Fig. 58. *LÆLIA PRESTANS ALBA*.

are *L. peduncularis* and *L. rubescens*. Mexico, 1840 (*t*).

L. ALBIDA.—A lovely plant, but very difficult to grow. Flowers white on the outer segments; lip marked purple. Mexico, 1832 (*t*).

L. ANCEPS.—One of the most useful of winter-flowering orchids. Colour ranges from deepest rose (*Barkeriana*) to pure white (*alba*). A very beautiful form is named *Mrs. de Barri Crawshaw* (Fig. 57). Mexico, 1835 (*t*).

L. AUTUMNALIS.—Nearly related to *L. anceps*; a

L. MONOPHYLLA.—Habit tufted; stems about 6 inches high, producing on each a single orange-scarlet flower. Jamaica, 1882 (†).

L. FERRINI.—Stems 6 inches high; flowers rosy-purple; lip marked with yellow. Rio de Janeiro (†).

spikes of richly-coloured flowers, usually rose on the sepals, with a blotch of crimson-purple on the lip. There are many-named varieties. Santa Catherina, 1847 (†).

L. SUPERBIENS.—A strong-growing species, requiring



Fig. 59. LÆLIO-CATTELEYA DIGBYANA-TRIANÆ.

L. FUMILA.—A beautiful small - growing species; flowers rose, with a deep blotch on the lip. There are several fine varieties, including præstans, præstans - alba (Fig. 58), Dayana, and others. Essequibo, 1838 (h).

L. PURPURATA.—The grandest of all Lælias, growing a yard high in some cases, and bearing large

much room. Stems 5 feet high. Flowers rose and yellow. Guatemala, 1839 (†).

L. XANTHINA.—A distinct and somewhat rare species, with buff-yellow flowers. Among best-known hybrid Lælias are Amesiana, callistoglossa, Canhamiana, Dominiana, exoniensis, flammea, Pilcheriana, Sedeni, and Veitchiana.

LÆLIO-CATTLEYA.—A genus founded for the reception of bigeneric hybrids between *Cattleya* and *Lælia*, and containing many lovely and rare forms. These will not be detailed in the present work, as most of them are too rare and expensive for general cultivation as yet. Most of them were raised by Messrs. James Veitch & Sons, Limited, Chelsea, and may be found in the principal trade collections. *L.-C. Digbyana-Trianæ* (Fig. 59) will convey an idea of the remarkable beauty of some of the bigeneric hybrids. Other bigeneric orchid hybrids are classed by botanists in *Sophro-Cattleya* *Epi-Lælia*, *Zygo-Colax* and others, the names of which are sufficiently descriptive of their origin. (See *Hybridising*, Vol. I.)

LYCASTE.—Very ornamental and useful cool-house orchids, that should find a place in all collections. They are all of the easiest culture, thriving in pots of peat fibre, loam, and chopped sphagnum moss, over good drainage. The flowers of most of the species last a very long time in good condition, and this without detriment to the plants, provided they are healthy. Apply water freely all the year round. The following species are highly worthy of cultivation:—*L. aromatica*, very free, the flowers yellow and delicately scented; Mexico, 1828 (*c*). *L. Deppei*, petals white, sepals green, lip yellow and crimson; Mexico, 1828 (*c*). *L. Harrisoniæ*, a beautiful and fragrant old species, with whitish outer segments, and a purple and yellow lip; Brazil, 1828 (*c*). *L. plana*, sepals and petals red, lip white with crimson spots; Bolivia, 1840 (*i*); and *L. Skinneri*, the best known of all, and the handsomest; flowers of various tints of rose, the lip prettily spotted with crimson (Fig. 60). *L. S. alba* is pure white, with the exception of a yellow stain on the lip; Guatemala, 1842 (*c*).

MASDEVALLIA.

A genus of structurally interesting and very beautiful orchids, which may be roughly divided into three sections: the showy-flowered kinds, such as *M. amabilis*, *M. Harryana* and *M. Veitchi*; the *Chimæra* section of wonderfully quaint and singular forms; and the smaller-flowered group, such as *M. triaristella*, and *M. tridactylites*. In an amateur's collection all may be grown, as they are of easy culture, the first set being best in small pots of peat fibre and moss, the others in baskets suspended from the roof. Cleanliness, both of leaves and roots, is of the utmost importance, and no season of rest, such as many orchids like, is necessary. Water must be given them most freely when growth is the most active, and in winter only enough to keep the compost

moist, and to prevent shrivelling. Having no pseudo-bulbs a moist atmosphere is always necessary, with heavy shading in summer and all available light in winter. No

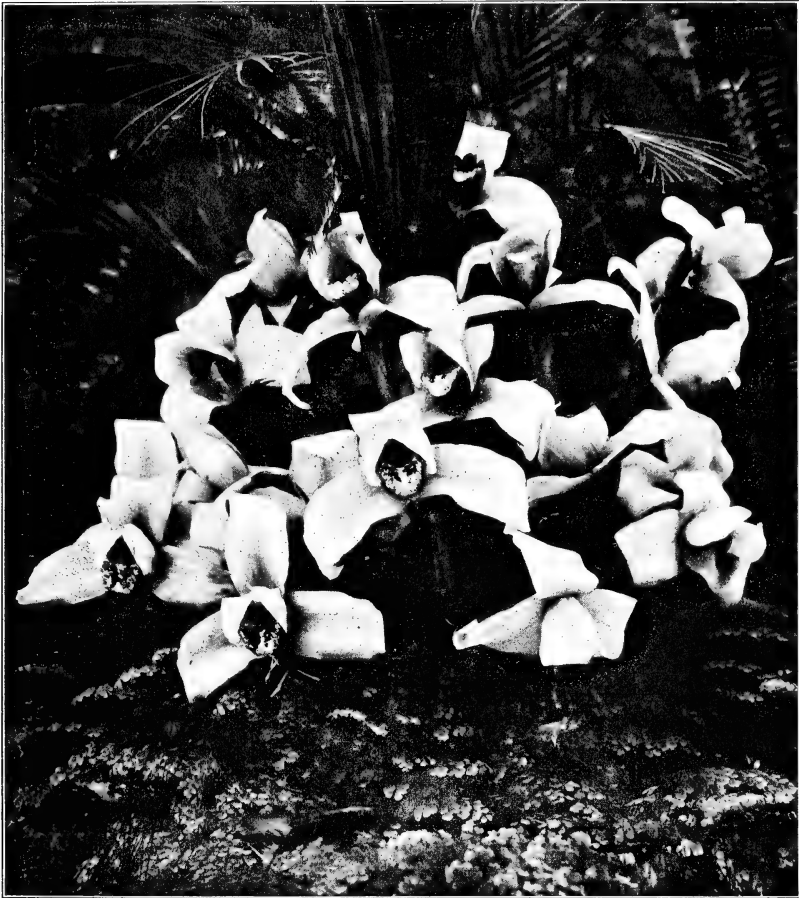


Fig. 60. *LYCASTE SKINNERI*.

attempt is made to include every species in this list, but only those that are suitable for general culture.

REPRESENTATIVE SPECIES.

- MASDEVALLIA AMABILIS.**—Flowers variable; usually orange and crimson. Peru, 1850 (c).
M. ARMINI.—A very attractive species; flowers crimson purple and white with yellow tails. New Grenada (c or $\frac{1}{2}$). (Fig. 61.)
M. BACKHOUSIANA.—Variety of *M. Chimæra*.
M. BELLA.—Allied to *M. Chimæra*. Flowers pale-

- M. CHESTERTONI.**—Related to *M. Chimæra*; flowers yellow, black, and purple. New Grenada, 1863 (c or $\frac{1}{2}$).
M. CHIMÆRA.—This and its allies are the most remarkable orchids known, their shape and appearance being beyond description. The name is mythological, and as the supposed creature it is named

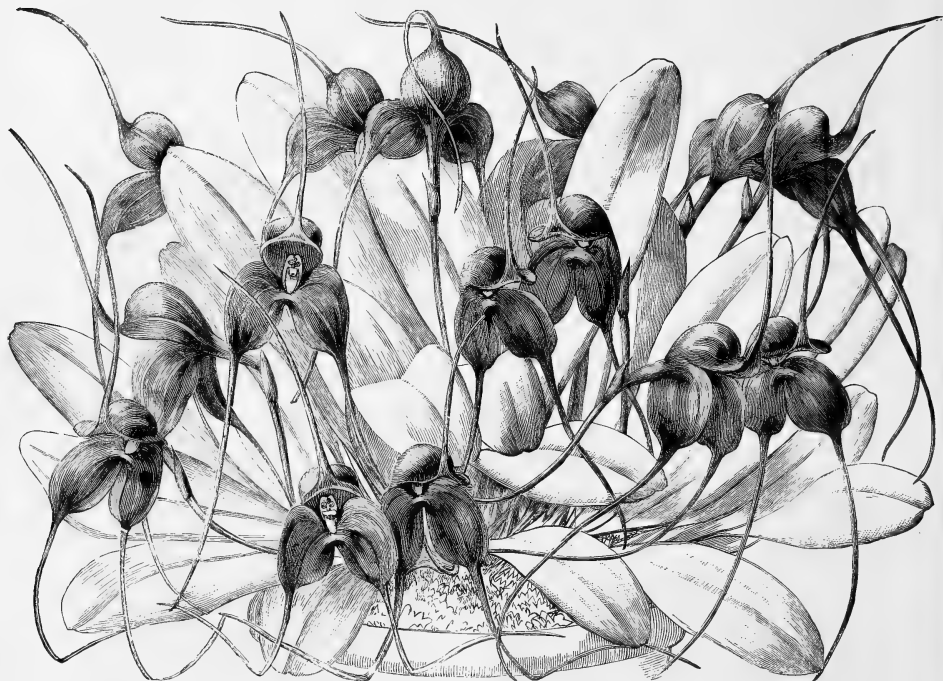


Fig. 61. MASDEVALLIA ARMINI.

- yellow, spotted with crimson. New Grenada, 1877 (c or $\frac{1}{2}$).
M. CANDIDA.—See *M. tovarensis*.
M. CARDERI.—Small-growing but pretty species; flowers yellow, white, and purple. Columbia, 1883 (c).
M. CHELSONI.—A very beautiful hybrid between *M. Veitchi* and *M. amabilis*.

after had the head of a lion and the tail of a dragon, and was in the habit of breathing fire, one is naturally prepared for something extraordinary in the shape of the flowers. A detailed description would be out of place here, and we may only mention that the sepals are creamy white, thickly spotted with reddish brown, and the lip white. New Grenada, 1877 ($\frac{1}{2}$ or c).

- M. COCCINEA.**—Flowers bright magenta crimson. Pamplona, 1842 (c).
- M. DAVISI.**—A lovely and distinct species, with yellow flowers. Peru, 1875 (c).
- M. EPHIPIUM.**—Distinct species, with purple and yellow flowers. New Grenada, 1875 (c).
- M. ESTRADÆ.**—A most lovely little species, with violet, purple, white, and yellow blossoms of remarkable form. New Grenada, 1874 (c).
- M. GELENIANA.**—A beautiful hybrid from M. Shuttleworthi and M. xanthina. The colour is bright yellow. (Fig. 62.)
- M. HARRYANA.**—A beautiful popular and variable form, having many named varieties of almost every tint of purple, crimson, and scarlet. New Grenada, 1869 (c).
- M. IGNEA.**—A showy species related to *M. coccinea*, orange-red and crimson. New Grenada, 1871 (c).
- M. INFRACTA.**—A lovely little species with yellow, white, and purple blossoms. Brazil, 1837 (i).
- M. LINDENI.**—Like *M. Harryana*, but not so showy; colours, magenta and white. New Grenada, 1870 (c).
- M. LOWI.**—An elegant and uncommon species; flowers white, with purple spots. U. S. Colombia, 1890 (c).
- M. MACRURA.**—Free-growing, handsome species; flowers yellow and purple. New Grenada, 1870 (c).
- M. MOOREANA.**—Strong-growing plant; the flowers white and purple. Venezuela, 1884 (i).
- M. MUSCOSA.**—Though rather uncommon, this species is included as an interesting example of a *Masdevallia* with a sensitive lip, this organ on being touched closing up to the column immediately. Stems woolly; flowers whitish, with a maroon lip. New Grenada, 1874 (c).
- M. NYCTERINA.**—A pretty little species allied to *M. Chimæra*; flowers yellow, spotted with red and purple. New Grenada, 1872 (c).
- M. PERISTERIA.**—An interesting species from the fact that the column and petals bear a very striking resemblance to those of the Dove Orchid "*Peristeria elata*." Colour purple, brown and tawny yellow. New Grenada, 1873 (c).
- M. POLYSTICTA.**—Flowers in racemes, white, spotted with purple. Peru, 1874 (c).

- M. RACEMOSA.**—Racemes of orange-red and crimson flowers. New Grenada, 1833 (c).
- M. RADIOSA.**—A distinct and attractive species, with very fine tail-like points to the segments. Colour purple. New Grenada, 1873 (c).
- M. ROEZZI.**—Purplish brown flowers. Closely related to *M. Chimæra*. New Grenada, 1880 (c or i).
- M. ROSEA.**—Pretty species, with rose-coloured flowers. Peru, 1880 (c).
- M. SHUTTLEWORTHI.**—A dwarf, but fairly large-flowered species, the flowers yellowish, white, and red. New Grenada, 1878 (c).
- M. TOVARENSIS.**—A beautiful species, and remarkable



Fig. 62. MASDEVALLIA GELEENIANA.

- as the only pure-white flowered one in the genus. New Grenada (Lovar) 1865 (c).
- M. TRIARISTELLA.**—This is a beautiful species, and is one of a number of small kinds that cannot here be described in detail; they combine the most beautiful colouring with a quaintness of form that is very attractive. New Grenada, 1876 (c).
- M. VEITCHI.**—A showy plant of beautiful purplish red tint; one of the very best of the showy kinds, the variety grandiflora being especially good. Peru, 1868 (c).

MAXILLARIA.

A genus of orchids closely allied to *Lycaste*, consisting for the most part of fine, showy species. The geographical area over which the genus is spread is a very wide one, and the altitude of their habitat varies greatly. They cannot on this account be all treated exactly alike as to temperature, but attention to the classified list will insure healthy plants, other points of culture being correct. They thrive best in pots of peat fibre and sphagnum moss, over good drainage, while rough crocks and charcoal must

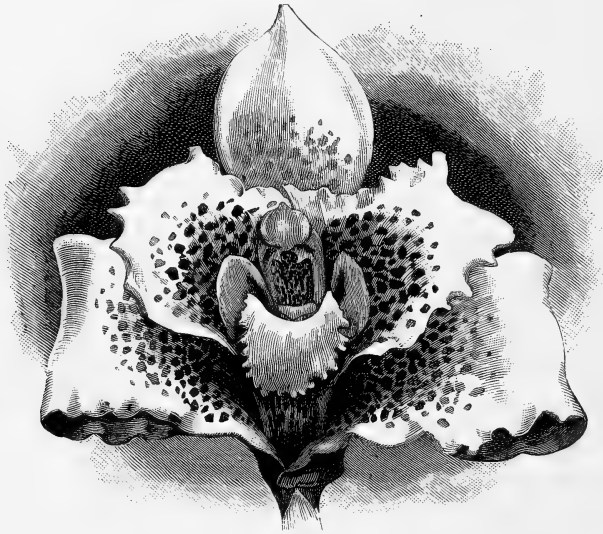


Fig. 63. MAXILLARIA SANDERIANA XANTHOGLOSSA.

be added to the compost. The amount given will vary in accordance with the size of the individual plant and the habit of the species. Adequate moisture, both in the atmosphere and at the roots, is required all the year round, reducing the supply, however, a little when the plants are at rest.

REPRESENTATIVE SPECIES.

M. ACUTIPETALA.—Pseudo-bulbs about 2 inches high ;
flowers orange-yellow and red. Central America,
1843 (†).

M. CROCEA.—Small-growing plant ; sepals and petals
yellow ; lip reddish brown. Rio de Janeiro,
1833 (†).

- M. FUCATA*.—Flowers yellow, white and reddish brown. Ecuador, 1886 (*?*).
- M. GRANDIFLORA*.—A beautiful species, the flowers pure white in the outer segments; the lip marked with yellow and purple. Merida and Paraguay, introduced early in the nineteenth century (*c*).
- M. LUTEO-ALBA*.—A large-growing and free-flowering species; flowers yellow, white and purple. Venezuela, 1842 (*?*).
- M. MARGINATA*.—Segments orange-yellow, margined with red. Rio de Janeiro, 1830 (*?*).
- M. NIGRESCENS*.—Flowers very deep, vinous red, very useful. Merida, 1842 (*c*).
- M. PICTA*.—Flowers light yellow and white, spotted with crimson. Brazil, 1831 (*c*).
- M. SANDERIANA*.—The finest and most beautiful in the genus, sepals and petals white, with almost black crimson markings, lip very finely tinted. Ecuador, 1883 (*c*). A superb variety named *xanthoglossa* is represented by Fig. 63.
- M. TENUIFOLIA*.—Peculiarly habited, the rhizomes, erect at first, by their weight becoming scandent, with small pseudo-bulbs at intervals. Flowers red and yellow. Vera Cruz, 1837 (*?*).
- M. VARIABILIS*.—Very similar to the last-named in habit. Colour variable. Mexico, 1837 (*?*).
- M. VENUSTA*.—Flowers yellow and white; lip marked with crimson. Merida, 1881 (*c*).

MESOSPINIDIUM. See COCLIODA, page 86, Vol. III.

MILTONIA.

A beautiful genus containing a large number of species. They are very closely related to *Odontoglossum* and *Oncidium*, many of the species mentioned below having been known as members of both these genera. Miltonias are not difficult to cultivate, but on account of their varying habit, it is not possible to lay down conditions that suit them all. With slight variations as to habit, the majority thrive in pots of medium size, with a thin compost of peat and moss. Any of the species with creeping rhizomes, such as *M. anceps*, *M. spectabilis*, *M. Moreliana*, and others of the same nature, are better in baskets or on rafts, as they are not so liable to outgrow their receptacles. Water must be given in accordance with the state of growth, but at no time must the roots be really dry. While liking abundance of light, the foliage is easily injured by direct sunlight. The beautiful *M. vexillaria* likes a position in a warm, moist house while growing freely, but if the plants seem inclined to rest after flowering they may be placed for a month or two in the cool house, and just kept moist enough to prevent shrivelling at the roots. Attention to the proper temperature, as indicated below, is very necessary, or healthy plants are out of the question.

REPRESENTATIVE SPECIES.

- MILTONIA ANCEPS. — Pseudo-bulb 2 inches high; flower, 2 inches across, yellowish green, with purple streaks on the lip. Brazil, 1838 (*?*).
- M. BICOLOR*.—A large-growing and flowering species; white, with purple on the lip. Brazil (*?*).
- M. BLEUANA*.—A beautiful hybrid, raised in France by crossing *M. Roezli* and *M. vexillaria*. One of the most charming varieties is *virginalis*, which, as the name implies, is white. Fig. 64.
- M. BLUNTI*.—Supposed to be a natural hybrid between

M. spectabilis and *M. Clowesii*, and the flowers and habit confirm this. Brazil, 1879 (*t*).
M. CANDIDA.—A pretty species; sepals and petals

lip of different shape to the condida, but of similar colour. Brazil, 1838 (*t*).
M. CUNEATA.—Sepals and petals deep chestnut, tipped



Fig. 64. MILTONIA BLEUANA VIRGINALIS.

chestnut, with yellow markings; lip white, blotched with purple. Brazil, 1837 (*t*).
M. CLOWESII.—Sepals and petals brown and yellow;

with bright yellow; the lip white, often tinged with rose. Brazil, 1844 (*h*).
M. ENDRESII.—A rare and lovely species related to *M.*

vexillaria. Sepals and petals white, barred with rose; lip white, with a yellow crest. Veragua, 1873 (*h*).

M. JOICEYANA.—A supposed natural hybrid between *M. Clowesi* and *M. candida*. 1893. (Fig. 65.)

M. PHALÆNOPSIS.—A very beautiful species of small habit, but free growing if kept clean; flowers white, crimson and rose. New Grenada, 1850 (*h*).

M. REGNELLI.—An attractive species; sepals and petals white; lip, rosy pink, striped with a deeper tint. Santa Catherina, 1855 (*g*).

M. ROEZLI.—Beautiful and variable species, now very popular. The flowers in the type are white, with blotches of yellow and purple, but in the var. *alba* the latter is entirely wanting. Antioquia, 1873 (*h*).

M. SCHRÖDERIANA.—A very rare and handsome species, with fragrant flowers, brown, white and rose-purple.

M. SPECTABILIS.—A well-known and useful species; flowers large; sepals and petals rosy white; lip deep purple, varying a good deal in intensity. The variety *Moreliana* is deeper in colour, and a superior orchid often classed as a distinct species; this, too, has many sub-varieties. Brazil, 1835 (*g*).

M. VEXILLARIA.—A truly magnificent orchid, and one that should be included in every collection, however small. The leaves are greyish green, the blossoms large, flat and rosy white in the type, but from this there are literally hundreds of

variations. The beauty of the flowers is quite beyond description, but most amateurs are familiar with them, the species being one of the most popular. New Grenada, 1873 (*g*).

M. WARSCEWICZI.—A quaint species, with very fine spikes of flower when well grown; the colour is



Fig. 65. MILTONIA JOICEYANA.

dark brownish purple on the sepals and petals, the lip deeper with a rosy margin. The colour varies considerably. New Grenada, 1868 (*g*).

NANODES MEDUSÆ.—A most singular yet very interesting and beautiful orchid. From the top of a leafy stem it produces a weird-looking blossom or blossoms, in colour brown, green, and reddish purple, with a deeply-fringed lip. It should be grown in almost bare baskets, in a cool, airy and shady house, and watered with care all the year round. Ecuador, 1867.

ODONTOGLOSSUM.

This is deservedly the most popular genus of cool-house orchids, for the species and varieties are of great beauty, and form splendid decorative plants. Millions of plants of such as *O. crispum* have been imported, and though in the earlier days of orchid culture many of these were sacrificed to the "roasting" treatment then in vogue, they are now easily and well grown.

The New Grenadan and Peruvian kinds can be managed in one house, and should

be potted in fresh sphagnum moss and peat in equal proportions, using small pots, thoroughly drained. The Mexican and Guatemalan species like rather more warmth than the coolest house affords, and may, if no intermediate temperature is at command, be wintered in the Cattleya house. Only one species—*O. citrosimum*—needs drying off, though the singular and distinct *O. Londesboroughianum* requires little water, and plenty of sunlight when at rest. The remainder must be well watered while growth is active, and have sufficient moisture to prevent shrivelling during winter.

Though *Odontoglossums* are very floriferous, and the blooms last for a considerable period, it is a mistake to allow weak or badly established plants to flower too freely, or carry the blossoms too long, as this is very weakening. The compost should be used in a rough, open state for all, but especially for those having large roots, such as *O. grande*, *O. Insleayi*, and *O. Schlieperianum*, the pots for these, too, being somewhat larger than for the generality of kinds.

REPRESENTATIVE SPECIES.

ODONTOGLOSSUM ANDERSONIANUM.—A variable species, some forms being of medium quality, but



Fig. 66. *ODONTOGLOSSUM CERVANTESI DECORUM*.

others of great beauty. It is doubtless of hybrid origin, and its suggested parents are *O. crispum* and *O. gloriosum*. New Grenada (c).

- O. ASPERSUM*.—A very beautiful *Odontoglot*, and possibly a hybrid. Sepals and petals yellow, the former heavily spotted; lip white. Mexico (c).
O. BAPHICANTUM.—Flowers pale yellow, with purple blotches. New Grenada, 1876 (c).

O. BICTONENSE.—An old, not very showy, but interesting species, and the first *Odontoglot* introduced. Flowers yellow, with rosy-lilac heart-shaped lip. Guatemala, 1835 (t).

O. BLANDUM.—A lovely small-growing species. Flowers white, spotted with purple. New Grenada, 1871 (c).

O. CERVANTESI.—A most beautiful little plant. Flowers white, transversely streaked with chocolate-red. A charming variety named *decorum* is represented in Fig. 66. Mexico, 1847 (c).

O. CIRRHOSUM.—Flowers on beautiful arching spikes, pure white, with spots of crimson or maroon. Ecuador, 1875 (c).

O. CITROSIMUM.—A fine popular kind, bearing pendant spikes of whitish flowers, with a variously tinted lip. Guatemala, 1840 (t). (NOTE.—This species should be strongly grown in baskets or suspending pans. When the pseudo-bulbs are quite complete a long dry rest is necessary, and even if the pseudo-bulbs shrivel, it does not matter, as they soon plump up again. As soon as the young spike shows itself in the centre of the new growth, water must again be gradually supplied.)

O. CONSTRICTUM.—Not very showy, but worth growing; yellow, spotted with reddish-brown. La Guayra, 1843 (c).

O. CORADINEI.—Flowers pale yellow, blotched with chestnut-brown. New Grenada, 1872 (c).

O. CORDATUM.—Easily grown, variable species, usually

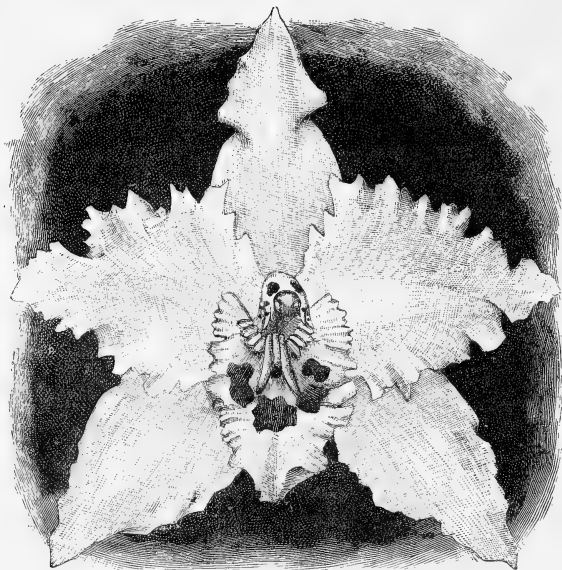
- with elongated segments; yellow, with chocolate spots, and heart-shaped lip. Guatemala, 1837 (c).
- O. **CORONARIUM**.—Rather a difficult plant to grow, but some varieties are very beautiful. Requires a large pan or flat basket. Flowers on erect racemes, brown margined with yellow. New Grenada, 1847 (c).
- O. **CRISPUM**.—One of the finest and most popular orchids in existence, of which there are a great number of fine varieties differing greatly in colour, size, and substance. The typical form has white sepals and petals, with spots of chestnut brown; the lip white, with a golden yellow crest, and often spots similar to those on the outer segments. Besides the type, we have yellow, rose-colour, and other shades, and one pure white variety. These cannot be mentioned and described in detail, but all the following are good: aureum, Chestertoni, giganteum, Purity, guttatum, nobilius (Fig. 67), reginæ, roseum, Veitchianum, virginalis, and Prince of Wales (Fig. 68). New Grenada, 1841 (c).
- O. **CRISTATUM**.—Dwarf habit; flowers yellow, with spots of purple. Peru, 1867 (c).
- O. **CROCIDIPTERUM**.—Flowers yellow, with orange-brown spots; crest white. New Grenada, 1870 (c).
- O. **EDWARDI**.—A very distinct species of strong habit, producing large branching spikes of rosy-purple flowers, fragrant, but rather small individually. Ecuador, 1880 (c).
- O. **ELEGANS**.—A supposed natural hybrid between *O. cirrhosum* and *O. cristatum*. Ecuador (c).
- O. **GRANDE**.—A striking and beautiful species, with very large, yellow flowers, boldly spotted and barred with brown, the whole surface shining as if varnished. Of this there are many varieties. Guatemala, 1837 (c).
- O. **GLORIOSUM**.—A well-known kind, very nearly related, if not a synonym of *O. odoratum*.

- O. **HALLI**.—A variable plant, but very beautiful in all its forms. Spike a yard or more high; flowers yellow, with spots of brown. Nigrum (Fig. 69) is a handsome variety. Ecuador, 1864 (c).
- O. **HARRYANUM**.—Very distinct in colour, and a beautiful plant. Sepals and petals variable, usually chocolate brown, with yellow markings; lip white, yellow, and purple. U.S. of Colombia, 1886 (f).
- O. **HASTILABIUM**.—An old-fashioned, but pretty



Fig. 67. *ODONTOGLOSSUM CRISPUM NOBILIUS*.

- species. Sepals white and brown; lip white and deep rose. New Grenada, 1843 (i).
- O. **HEBRAICUM**.—Flowers whitish or yellow, streaked with reddish-brown. New Grenada, 1879 (c).
- O. **HORSMANNI**.—Probably a natural hybrid between *O. Pescatorei* and *O. luteo-purpureum*. New Grenada, 1879 (c).
- O. **HUMEANUM**.—A pleasing natural hybrid, between *O. Rossi* and *O. cordatum*, or *O. maculatum*. Mexico, 1876 (c).

Fig. 68. *ODONTOGLOSSUM CRISpum* PRINCE OF WALES.

- O. INSLEAYI*.—A beautiful species, very like *O. grande*. The lip markings in some varieties are very beautiful. Mexico, 1840 (*v*).
- O. KRAMERI*.—An attractive dwarf species, with purplish flowers. There is also a white variety. Costa Rica, 1868 (*v*).
- O. LINDENI*.—A stout-growing, but very shy flowering species; yellow. New Grenada, 1871 (*c*).
- O. LINDLEYANUM*.—Attractive by its yellowish and brown-spotted flowers, but extremely variable. New Grenada, 1863 (*c*).
- O. LONDESBOROUGHIANUM*.—A beautiful species, but difficult to grow. Flowers on large spikes, the sepals and petals yellow, with lines of brown; lip spotted with red. Should be grown on pieces of tree-fern stem, or on long blocks lightly dressed with moss, and placed in a light, sunny position. Mexico, 1876 (*v*).
- O. LUTEOPUREPUREUM*.—Variable and beautiful; flowers yellow, spotted and barred with chestnut-brown. New Grenada, 1842 (*c*).
- O. MACULATUM*.—An easily grown and beautiful species, never failing to flower annually if strong

enough. Flowers variable; usually yellow and brown. Mexico, 1838 (*c*).

- O. MAXILLARE (MADREUSE)*.—Rare and pretty species; sepals and petals yellow; lip white. Mexico, 1872 (*v*).
- O. NÆVIUM*.—A lovely little plant, bearing erect or arching spikes of white flowers, freckled with reddish-purple. New Grenada, 1842 (*c*).
- O. NEBULOSUM*.—Fine species; flowers white, the base of the segments spotted with brownish red. Mexico, 1856 (*c*).
- O. NEVADENSE*.—A rare and beautiful *Odontoglossum*. The flowers have brownish sepals, marked with yellow; lip white, with spots or stripes of chestnut-brown. Venezuela, 1868 (*c*).
- O. ODORATUM*.—Fragrant and attractive; variable in

Fig. 69. *ODONTOGLOSSUM HALLI NIGRUM*.

colour and markings; not so broad in the segments as many others; colour, yellow spotted brown. Bogota, 1863 (c).

- O. OERSTEDI.—One of the prettiest of dwarf orchids; flowers pure white, except a blotch of yellow at the base of the lip. Costa Rica, 1872 (c).
- O. PARDINUM.—A rather large-growing and handsome species, with spikes a yard high; yellow flowers. Quito, 1867 (c).
- O. PESCATOREI.—Certainly the most beautiful of all cool species in its best forms. The blossoms vary a good deal in size and colour, and many named varieties exist. The type has white sepals and petals, a yellow crest, and purple markings to the lip. The most valuable varieties are those having

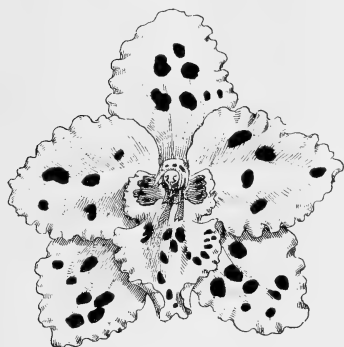


Fig. 70. *ODONTOGLOSSUM PESCATOREI* DUCHESSE OF WESTMINSTER.

large, regularly-spotted flowers, such as Duchess of Westminster (Fig. 70). New Grenada, 1851 (c).

- O. POLYXANTHUM.—Pretty bright yellow flowers, about 3 inches across. Ecuador, 1877 (c).
- O. PRENITENS.—A good deal like *O. triumphans*, but even brighter in colour and smaller. New Grenada, 1874 (c).
- O. PULCHELLUM.—A very beautiful species, producing erect racemes of fragrant white flowers, with a tinge of yellow on the lip. Guatemala, 1840 (c).
- O. RAMOSISSIMUM.—Old but distinct species, white spotted with purple. New Grenada, 1843 (c).
- O. ROSSI.—One of the most distinct and useful; flowers variable. In the type the sepals and petals are rosy-white, spotted brown; the lip white. Mexico, 1842 (c).

- O. RUCKERIANUM.—Very like *O. crispum*; the segments margined with purple.
- O. SANDERIANUM.—Flowers pale yellow, with reddish spots. Caracas, 1881 (c).
- O. SCHLIEFERIANUM.—Much like *O. grande*, but paler in the markings on the segments. Costa Rica, 1856 (z).
- O. TRIPUDIANS.—Flowers yellow and brown, lip white. New Grenada, 1869 (c). (This is useful, as flowering when few others of its section are in bloom.)

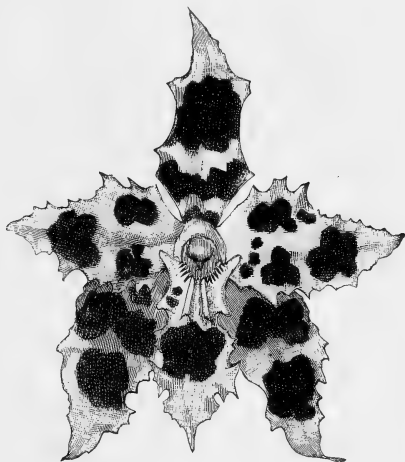


Fig. 71. *ODONTOGLOSSUM WILCKEANUM* PITTE.

- O. TRIUMPHANS.—One of the brightest and freest blooming of the yellow-flowered species. New Grenada, 1867 (c).
- O. URO SKINNERI.—A stout-growing plant bearing tall spikes of flowers, the individual blossoms being 3 inches across; sepals and petals brown and green; lip, rose and white. Guatemala, 1854 (i).
- O. WALLISI.—A large-grower; flowers 2 inches across; cinnamon brown, and yellow. Sierra Nevada, 1868 (c).
- O. WILCKEANUM.—Beautiful orchid; a supposed natural hybrid between *O. crispum* and *O. luteo-purpureum*; the ground colour is pale yellow, regularly blotched with chestnut brown; lip whitish. The variety Pitte (Fig. 71) is one of the best. New Grenada, 1878 (c).

ONCIDIUM.

This is a very large genus numerically. We have not attempted to describe it in its entirety, but from the large number of species named a very interesting and beautiful collection of plants can be selected, and they may be said to be the cream of the genus. The habit of the plants varies considerably, and as they are found growing naturally over a very wide range of temperature, their culture differs also. They cannot, in fact, be collectively treated, as will be seen by the temperatures given below, but much may be learnt by studying the habit of the species.

The small-growing species marked for the cool house, such as *O. concolor*, *O. cucullatum*, and *O. cheirophorum*, may be grown in small pots or pans, as advised for *Odontoglossum crispum*. Those of a more rambling habit, such as *O. Marshallianum*, *O. crispum*, *O. Forbesi*, *O. curtum*, and others of the same nature, like rather larger receptacles, thriving well in baskets or on rafts close to the light in their respective houses.

The non-pseudo-bulbous kinds, such as *O. Cavendishianum*, *O. Lanceanum*, *O. luridum*, *O. hæmatochilum*, and others, thrive in a very rough open compost over good drainage, and may be treated generally as pot plants. The best growers are in the section which includes *O. incurvum*, *O. ornithorhynchum*, and *O. tigrinum*, as being of a tufted pseudo-bulbous habit. *O. Papilio* and *O. Kramerianum* do well on rough cork blocks with a little moss about the roots, and the singular *O. Jonesianum* may be somewhat similarly treated.

Where not otherwise stated, the flowers of oncidiums are yellow, more or less spotted with brown or red, this combination of colour occurring very frequently in the genus. The sameness of colour is rather against them, but the blendings and contrasts in the individual species are so beautiful and bright that one can easily overlook this.

REPRESENTATIVE SPECIES.

- | | |
|--|--|
| <p><i>O. AMPLIATUM</i>.—Pseudo-bulbs large, almost round, sometimes spotted with purple, producing vigorous spikes of showy flowers. Central America, 1832 (i).</p> <p><i>O. ANTHROCRENE</i>.—A handsome and rare species, producing arching spikes a yard in length. New Grenada, 1872 (c).</p> <p><i>O. BARBATUM</i>.—Scapes many-flowered, the sepals and petals twisted, and lip three-lobed with a large crest. Brazil, 1819 (i).</p> | <p><i>O. BATEMANIANNUM</i>.—Scapes 4 feet long, many flowered. Mexico, 1839 (c).</p> <p><i>O. BICALLOSUM</i>.—A non-bulbous species, producing short spikes. Guatemala, 1837 (i).</p> <p><i>O. BIFOLIUM</i>.—Two-leaved pseudo-bulbs, and scapes about a foot high. Montevideo, 1812 (i).</p> <p><i>O. BRUNLEESIANUM</i>.—A very beautiful but rare species; the flowers bright-yellow on the outer segments; the front lobe of the lip deep maroon crimson. La Plata, 1879 (i).</p> |
|--|--|

- O. CANDIDUM (Palumbina candida).—A small-growing species with creamy-white flowers tinged with yellow. Guatemala, 1840 (*v*).
- O. CARTHAGINENSE.—Produces large leaves 15 inches or more in length, and immense panicles of small flowers, these being white spotted with purple. Central America, 1804 (*v*).
- O. CAYENDSIANUM.—Handsome, non-bulbous kind, with large vigorous spikes of flowers. Guatemala, 1835 (*v*).
- O. CHEIROPHORUM.—A sweetly-scented and beautiful little plant, with golden-yellow blossoms. Chiriqui, 1848 (*c*).
- O. CHRYSODIPTERUM.—Produces long scandent spikes of yellow-brown and purple flowers. South America, 1891 (*v*).
- O. CONCOLOR.—Beautiful little species, bearing spikes of self-coloured clear yellow blossoms. Organ Mountains, 1837 (*c*).
- O. CORNIGERUM.—Pseudo-bulbs 3 inches high; flower spikes 18 inches, branched. Brazil, 1829 (*v*).
- O. CHRISPIUM.—A popular species with bright, shining brown flowers on tall scapes. Brazil, 1830 (*v*).
- O. CROËSUS.—Small-growing plant with yellow flowers, and a large purple blotch on the lip. Brazil, 1872 (*v*).
- O. CUCULLATUM.—A variable kind; the flowers small; rosy-purple and white in the type. There are several named varieties. Ecuador, 1841 (*c*).
- O. CURTUM.—Fine species, bearing tall spikes that last long in beauty. Brazil, 1847 (*v*).
- O. DASYTYLE.—Flowers very small, yellow with large purple blotch on the lip. Brazil, 1873 (*v*).
- O. DIVARICATUM.—A vigorous grower with many-flowered spikes. Brazil, 1826 (*v*).
- O. EXCAVATUM (aerosum).—Spikes a couple of yards in length; flowers very bright. Peru, 1839 (*c*).
- O. FLEXUOSUM.—The individual flowers are small, but the light and elegant spikes are very beautiful. Brazil, 1818 (*v*).
- O. FORBESII.—One of the finest of the crispum section; very free-flowering, on tall scapes; flowers brown, shining, with a very beautiful yellow margin. Brazil, 1837 (*v*).
- O. GARDNERI.—A fine species, closely allied to the last named. Organ Mountains, 1843 (*v*).
- O. GRAVESIANUM.—One of the latest additions to the *O. crispum* set, producing branched spikes of flowers 2 inches across. Brazil, 1891 (*v*).
- O. HEMATOCHILUM.—Very like *O. lanceanum*, and a pretty species with large leaves dark green, spotted with brown. The flowers are 2 inches across, greenish-yellow, spotted with brown; lip crimson. Guatemala, 1847 (*v*).

- O. HARRISONIANUM.—A neat, small-flowering species, with greyish foliage and erect spikes of yellow and red flowers. Brazil, 1832 (*v*).
- O. HASTATUM.—A singular old species, remarkable for its colour, chocolate brown, yellow green, and dark red, being peculiarly contrasted in its flowers. Mexico, 1837 (*v*).
- O. INCURVUM (albo-violaceum).—A pretty and free species, bearing long arching spikes of rosy-white and purple flowers. There is also a white variety. Mexico, 1840 (*v*).
- O. INSCULPTUM.—A strong-growing kind, with scan-



Fig. 72. ONCIDIUM MACRANTHUM.

- dent flower spikes 10 feet long. Flowers brown, margined yellow; lip greyish-blue, an unusual tint in *Oncidium*s. Ecuador, 1872 (*v*).
- O. JONESIANUM.—Leaves terete. Flowered spikes drooping; flowers whitish or cream, with chestnut-brown spots; lip white. Paraguay, 1878 (*h*).
- O. KRAMERIANUM.—One of the Butterfly Orchids, the blossoms occurring singly on a tall, wiry scape, which must not be removed when the flower fades as they produce blossoms successively for many years, five or six in a season. It bears some resemblance to a butterfly, the sepals being brown,

the lip bright yellow, with a red-brown margin.
Central America, 1852 (*h*).

- O. *LAMELLIGERUM*.—A fine species of the *O. macranthum* set. Ecuador, 1875 (*c*).
- O. *LANCEANUM*.—Beautiful non-bulbous species, with

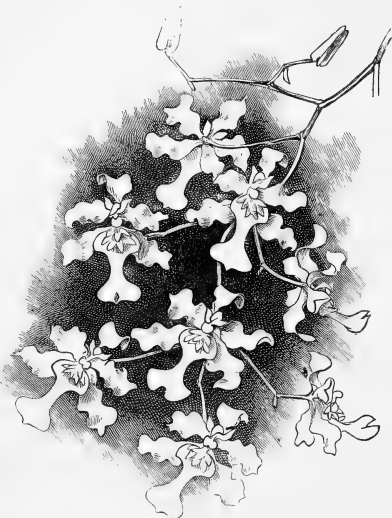


Fig. 73. *ONCIDIUM ORNITHORHYNCHUM ALBUM*.

green, dark-spotted leaves, and large erect scapes of flowers; the sepals and petals are greenish-yellow, marked with brown; the lip usually some shade of purple-violet or rose. Surinam, 1834 (*h*).

- O. *LEUCHOCHILUM*.—Sepals and petals yellowish-green, spotted with brown; lip white. Mexico, 1835 (*c*).
- O. *LONGIPES*.—Very similar to, if not synonymous with, *O. Croësus*.
- O. *LURIDUM*.—A non-bulbous species. Flowers deep chestnut-brown, with a few markings of yellow; variable. Tropical America, 1823 (*i*).
- O. *MACRANTHUM*.—A popular and beautiful species, bearing long, scandent spikes of large flowers. Sepals yellow and brown, petals brown; lip violet-purple and white. This, and similar kinds, like large pots, with rough, open compost and good drainage. New Grenada, 1868 (*c*), (Fig. 72).
- O. *MARSHALLIANUM*.—One of the most beautiful and

showy of all cool orchids, having long, branching, many-flowered scapes. Habit and treatment as *O. crispum*. Brazil, 1865 (*c*).

- O. *OBRYZATUM*.—Spikes about 4 feet long, many-flowered. Peru, 1852 (*c*).
- O. *ORNITHORHYNCHUM*.—A neat, small-flowering species, having long, many-flowered spikes. Flowers white in the variety *album* (Fig. 73), rosy-lilac in the type; lip yellow. Mexico, 1836 (*c*).
- O. *PAPILIO*.—Very similar to *O. Kramerianum*, but flowers larger. The treatment needed is identical. Trinidad, 1824 (*h*).
- O. *PHYMATOCHILUM*.—A very beautiful plant, with large, elegant, branching spikes. Flowers pale yellow and white, with reddish spots. Brazil, 1840 (*i*).
- O. *PRETEXTUM*.—A fine species, very like *O. crispum*. Brazil, 1873 (*i*).
- O. *PUBES*.—Tapering pseudo-bulbs, about 3 inches high; spikes 18 inches in length. Minas Geraes, 1824 (*i*).
- O. *PULCHELLUM*.—A very pretty little species, with rosy-white flowers. Demerara, 1827 (*i*).



Fig. 74. *ONCIDIUM SPLENDIDUM*.

- O. *PULVINATUM*.—An attractive kind; flowers on long branching spikes. Brazil, 1838 (*i*).
- O. *PUMILUM*.—A small and quaint species, with crowded spikes of yellow flowers. Brazil, 1825 (*i*).
- O. *SARCODES*.—One of the best and brightest of *Oncidium*s. Flowers 2 inches across, on arching racemes. Brazil, 1849 (*i*).

- O. SERRATUM.**—Habit and inflorescence very like *O. macranthum*. Peru, 1850 (c).
- O. SPHACELATUM.**—A very easily grown and showy species, producing large panicles of flowers. Mexico, 1840 (i).
- O. SPLENDIDUM.**—Flowers exactly as in *O. tigrinum*, but of entirely different habit, the pseudo-bulbs and leaves being a bronzy green, the latter thick and leathery in texture. Guatemala, 1870 (h), (Fig. 74).
- O. SUPERBIENS.**—Of rather stronger habit than *O. macranthum* (similar to *O. undulatum*). Flowers white, yellow, chocolate, and purple; the lip very deeply tinted. New Grenada, 1847 (c).
- O. TETRAPETALUM.**—Very small but extremely pretty. Yellow, chestnut, and crimson. A difficult plant to cultivate. Tropical America, 1832 (i).
- O. TIGRINUM.**—One of the very best of cool orchids. Blossoms as fragrant as violets; lip yellow; sepals and petals streaked with brown. Mexico, 1839 (c).
- O. VARICOSUM.**—Very bright and showy; a well-known species. The variety *Rogersi* is much larger than the type and a very fine orchid. Brazil, 1846 (i).
- O. WARSCEWICZII.**—Distinct species, with flowers uniformly yellow. Costa Rica, 1870 (i).
- O. WENTWORTHIANUM.**—A neat, small-flowering species, with the habit of *O. incurvum*. Guatemala, 1839 (c).
- O. ZEBRINUM.**—Very attractive, with pseudo-bulbs occurring at 3 inches or more apart on a creeping rhizome. Flowers on very long spikes, each about 1½ inches across; pure white in ground, with zebra-like stripes of reddish brown on the sepals and petals; lip white with red spots. Venezuela, 1847 (c).

ORCHIS.—A genus of hardy terrestrial orchids that obviously gave the name “orchid” to the family. There are several species indigenous to Britain, and all thrive in a cool, moist and shady part of the garden in light loamy soil. The commonest British kinds are *O. mascula*, *O. maculata*, *O. latifolia*, and *O. pyramidalis*, while good for naturalising in this country are—*O. foliosa*, *O. spectabilis*, *O. purpurea*, *O. Robertiana* and many others. Most of the species may be procured at nurseries as dormant roots in the autumn and early winter, and this is the most suitable time to make plantations.

ORNITHOCEPHALUS GRANDIFLORUS.—A plant that succeeds in small pans or on a block of wood in the *Cattleya* house. It is known as the Bird’s Head orchid, and has greenish and white flowers (h).

PACHYSTOMA THOMSONIANA.—A tropical African orchid with pure white flowers, except the lip, which is purple. It thrives in the warmest house in a shady position, and should be grown in rather small pots in a compost of peat fibre and moss over good drainage (h).

PAPHINIA.—In habit the plants in this genus resemble *Lycastes* in a small state, and their structure is very similar. They thrive best in small suspended pans or baskets, where they will be protected from direct sunlight, this being injurious to the foliage. They are subject to insect attacks, and require great care to keep them clean. The species most generally grown are: *P. cristata*.—Flowers white, heavily spotted and blotched with chocolate-brown. Trinidad, 1834 (h). *P. grandis*.—Large flowers, sepals and petals creamy-white spotted with chocolate-purple; lip almost black-purple

at the base, lighter in front. Brazil, 1883 (*h*). And *P. rugosa*.—Flowers 3 inches across, white spotted with purple. New Grenada, 1879 (*h*). All are classed by some authorities as species of *Lycaste*.

PERISTERIA.—This is not a large genus, only about three or four species being at all generally grown. They are robust-growing plants with drooping or erect spikes of flowers, and should be cultivated in baskets and pots respectively, in a compost of equal parts of peat fibre, loam, and sphagnum moss, with abundance of charcoal and potsherds. A plentiful supply of water is necessary while growth is active, but when the plants are at rest much less suffices. Light syringings are beneficial in hot weather, and an occasional

application of very weak liquid manure may be given. Only three species need be described for cultivation, namely: *P. cerina*. Spikes pendant, containing a large number of golden-yellow blossoms. In some varieties these are spotted with crimson. Mexico, 1835 (*i*). *P. elata*.—A lovely orchid, the column and lip bearing a strong resemblance to a pure white dove, hence the popular name of "Dove Orchid." Spikes erect;

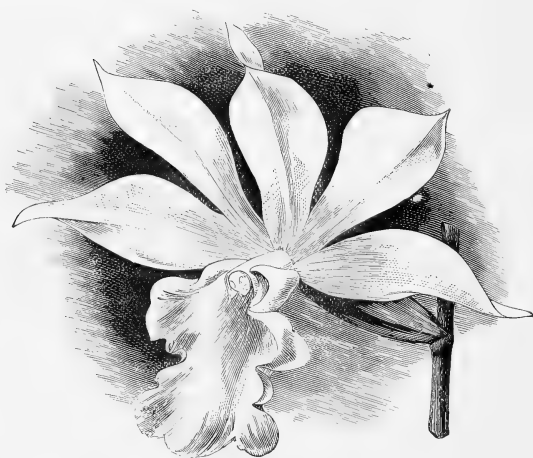


Fig. 75. PHAIOS-CALANTHE SEDENIANA.

flowers white, except a few spots about the lip. Mexico, Panama, 1826 (*i*). And *P. pendula*.—Flowers on pendant racemes, pale yellow tinged with rose and purple. A shy-flowering plant not often met with. Demerara, 1855 (*i*).

PESCATOREA.—For culture see the allied genera *Bollea* and *Zygopetalum*, under which, however, the following species are not enumerated in this work:—*P. Backhousiana*.—Flowers white, tipped with purple; lip yellow and brown. Ecuador, 1877 (*i*). *P. cerina*.—Flowers of differing shades of yellow and purple. Chiriqui, 1851 (*i*). *P. Dayana*.—Flowers variable in colour, usually white tinged with purple. New

Grenada, 1873 (*i*). *P. Klabochorum*.—A beautiful species; flowers pale yellow or white and chocolate purple. Ecuador, 1879 (*i*). *P. Lehmanni*.—Beautiful but difficult to grow. Flowers white and purple with deep purple lip. Ecuador, 1879 (*i*). And *P. Wallisi*.—Flowers creamy white with violet and purple markings. Ecuador, 1869 (*i*).

PHAIO-CALANTHE.—A genus formed for the reception of hybrids between *Phaius* and *Calanthe*, of which *P. irrorata* and *P. Sedeniana* (Fig. 75) and their varieties are the best known.

PHAIUS.

Terrestrial plants, the majority of which are easily grown as advised for *peristerias*, but all should be in pots. The most difficult to grow is *P. tuberosus*, and this has greatly puzzled cultivators. It does best in a thin compost of sphagnum moss and a little peat, over abundant drainage, and must be kept moist all the year round. It is subject to the attacks of thrips, and if ever these insects get a firm hold on the plants they are difficult to eradicate.

REPRESENTATIVE SPECIES.

PHAIUS BICOLOR.—Handsome, large-growing species; flower spikes 5 feet high; flowers red brown, whitish and rose. Ceylon, 1837 (*h*).

P. BLUMEL.—A variable plant, with flower spikes a yard or more high; flowers brown and yellow. Java (*h*).

P. COOKSONLE.—A beautiful hybrid, raised from *P. Humbloti* and *P. grandifolius*. Flowers buff, purplish-rose, and yellow. (Fig. 76.)

P. GRANDIFOLIUS.—A well-known and useful old species, of considerable beauty. Flowers brownish-red, with silvery white reverse, on tall spikes. China, 1778 (*i*).

P. HUMBLOTI.—Very beautiful, with large rose-purple blossoms and a crimson and purple lip. Madagascar, 1880 (*h*).

P. HYBRIDUS.—The result of a cross between *P. Wallichi* and *P. grandifolius*.

P. MACULATUS.—An attractive old species, with spotted foliage and yellowish and brown flowers. India, 1823 (*i*).

P. PHILIPPINENSIS.—Flowers reddish-brown, yellow, and white, that do not expand fully. Mindanao, 1879 (*h*).

P. TUBEROSUS.—White sepals and petals, the lip yellow and white, with many spots of crimson.—A lovely plant, but difficult of cultivation. Madagascar, 1880 (*h*).

P. WALLICHI.—Flower spikes 5 feet high; the large flowers white on the outside, yellow within; lip spotted with brownish-purple. Khasia Hills, 1837 (*i*).



Fig. 76. *PHAIUS COOKSONLE*.

PHALÆNOPSIS.

An important genus of very beautiful orchids, requiring careful culture. Many modes are practised, such as in baskets and pots, also on rafts and blocks, and all are more or less suitable. The strongest growers, such as *P. amabilis*, *P. Schilleriana*, and others, are best in ordinary baskets or pots; the smaller weaker-growing kinds succeed best on blocks or in small pans. One species, *P. Lowi*, seems especially adapted for blocks owing to its small stature; being deciduous in habit, it requires very great care and not too much root moisture in winter. For the rest, more depends on a well-balanced temperature, freedom from draughts, and extremes of heat or moisture, than on any special treatment.

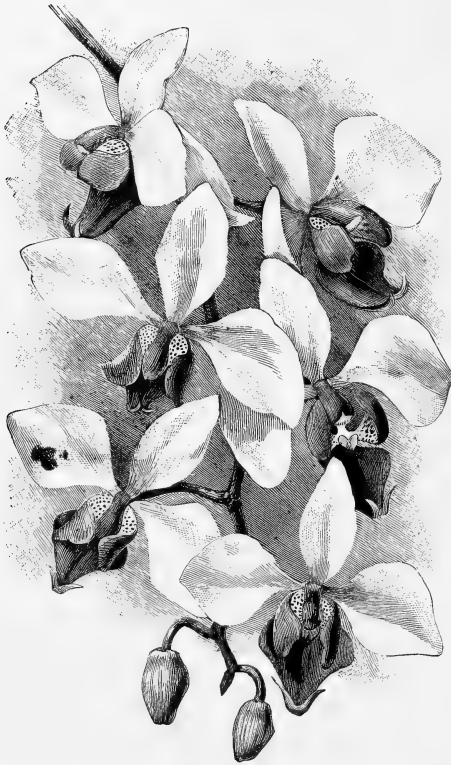


Fig. 77. PHALÆNOPSIS INTERMEDIA PORTEL.

Very little in the way of compost is needed, sphagnum moss and charcoal sufficing. The roots will not push into anything sour or decayed, so the material used should be of the best. Long cylindrical baskets are often used for the plants, and the roots run over the rods and thrive; but for the stronger-growing kinds the free ramification of the roots about the crocks and charcoal is the more satisfactory.

Although phalænopsis delight in abundant atmospheric moisture, watering over the foliage is not admissible. An occasional light dewing may do no harm, but it is better

left alone than in the least overdone. Damping the house with soot water to create a little ammonia in the atmosphere is a great help to the plants. Cleanliness is of the utmost importance, the very sensitive foliage being easily injured by insects. The rise of the temperature in spring and the fall in autumn must be gradually brought about, anything like a sudden change being detrimental.

(Besides the species named below this genus now contains several lovely hybrids, some raised in this country and others natural hybrids, which in detail cannot here be described).

REPRESENTATIVE SPECIES.

- PHALÆNOPSIS AMABILIS.—A magnificent kind; racemes from the base of the upper leaves semi-pendant, containing a large number of flowers. Sepals and petals pure white and spreading; lip white, beautifully marked with rose-pink and yellow. Java and the Philippine Islands, 1846 (*h*).
- P. AMETHYSTINA.—Small-growing but attractive; scapes few-flowered, sepals and petals white, lip purple. Sunda Island, 1870 (*h*).
- P. APHRODITE.—This is usually labelled *P. amabilis*, and is a very similar plant, but differs in the form and colour of the lip. Philippine Islands, 1837 (*h*).
- P. CORNU-CERVI.—Leaves bright green; flowers yellow, white, and brown. Burmah and Java (*h*).
- P. DENTICULATA.—A pretty species; flowers white, with brown spots (*h*).
- P. ESMERALDA.—Dwarf in growth, bearing erect spikes of beautiful flowers of various shades of rose or purple, with deeper-coloured lip. Cochin China, 1874 (*h*).
- P. GRANDIFLORA (syn. *P. amabilis*).
- P. INTERMEDIA.—A natural hybrid between *P. amabilis* and *P. rosea*; flowers white, spotted with rose. There are several varieties, one of which, known as *Portei*, is depicted in Fig. 77. Philippine Islands, 1867 (*h*).
- P. LOWI.—A small but handsome species, difficult to grow; succeeding best on blocks. Flowers $1\frac{1}{2}$ inches across; sepals and petals white, flushed with purple; lip deep violet. Burmah, 1862 (*h*).
- P. LÜDDEMANNIANA.—Rather a stiff-growing plant; flowers 2 inches across, pale yellow, with transverse streaks of brown; lip white, stained with amethyst. Philippine Islands, 1864 (*h*).
- P. MACULATA.—A small plant; flowers white, with red-brown spots. Borneo, 1880 (*h*).
- P. MANNI.—Flowers golden yellow, with chestnut-

brown markings; the lip marked with purple. Assam, 1868 (*?*).

- P. MARLE.—A pleasing species; flowers white marked with purple. Mindanao, 1878 (*h*).
- P. PARISHI.—Flowers white; lip yellow, spotted with purple. Assam, 1864 (*h*).
- P. ROSEA.—A small-flowered species; sepals and petals

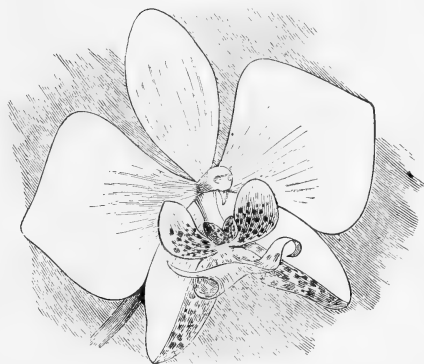


Fig. 78. PHALÆNOPSIS STUARTIANA.

- rosy white; lip marked with violet. Philippine Islands, 1848 (*h*).
- P. SANDERIANA.—Fine species, with large racemes of flowers individually about 3 inches across. These are pale rose or nearly white; lip marked with bright red. Mindanao, 1882 (*h*).
- P. SCHILLERIANA.—One of the most beautiful of cultivated orchids. It produces handsome

marbled foliage, and immense spikes of flowers somewhat variable in colour, but usually some shade of purplish rose; the lip spotted with red. Philippine Islands, 1858 (*h*).

- P. SPECIOSA.**—Flowers pale purple, shaded with yellow. Malay Archipelago, 1881 (*h*).
- P. STUARTIANA.**—Very beautiful flowers, nearly white on the sepals and petals; the lip spotted

with red, and having two curved filaments in front. Mindanao, 1881 (*h*). (Fig. 78.)

- P. SUMATRANA.**—Flowers creamy-white, with bars of reddish-brown. Sumatra, 1864 (*h*).
- P. VIOLACEA.**—A chaste small-growing species; the flowers white and deep violet-purple. Sumatra, 1859 (*h*).

PLATYCLINIS (DENDROCHILUM).—Pretty dwarf epiphytal orchids, requiring a position close to the roof-glass in the warmest house. Grow in well-drained pots or baskets in a compost of peat-fibre, sphagnum, and charcoal, elevating the plants a little above the rims. Re-pot directly the flowers are past, and water freely while growth is active. *P. Cobbiana*, *P. filiformis*, and *P. glumacea* are the best-known kinds. All are natives of the Philippine Islands, and all bear arching racemes of yellow flowers, those of the last-named being sweetly scented.

PLEIONE.—A genus of dwarf orchids, popularly known as “Indian Crocus” from the brilliancy of the flowers. The plants are easily grown. The pseudo-bulbs should be re-potted annually in a compost of equal parts peat, loam, and chopped sphagnum moss. Grow in pots or pans according to convenience, and in taking the plants from the pans shake all the old soil from the roots; cut these as advised for deciduous *Calanthes*, and, after potting, water very carefully until new roots form. Increase the supply as the young growth develops, but keep the compost quite dry after the bulbs are complete and the foliage falls. Re-pot immediately the flowers are past. Several plants are grown together in pots or pans near the glass for insuring sturdy growth and making an effective display. The following species are chiefly cultivated:



Fig. 79. *PLEIONE LAGENARIA.*

- P. Hookeriana.*—Pseudo-bulbs purplish; sepals and petals bright-rose; the lip white, blotched red. Himalayas, 1878 (*c*).
- P. humilis.*—A late-flowering kind, with a very beautiful lip. The flowers are rose-lilac

and yellow, and have the appearance of being frosted. Nepal, 1850 (*c*). *P. lagenaria*.—A bright and popular species. Flowers large; rosy-lilac; marked on the lip with yellow and crimson. Himalayas, 1850 (*c*). (Fig. 79.) *P. maculata*.—Flowers white, blotched with crimson, principally on the lip. India, 1850 (*c*). And *P. præcox*.—Much like *P. lagenaria*, but later flowering. Himalayas, 1840 (*c*).

PLEUROTHALLIS.—This genus contains a large number of species, few of which are suited for general cultivation; but many are of considerable botanical interest, and one, *P. Barberiana*, is called the “Gnat Orchid,” on account of the flowers appearing like a cloud of these insects. The plants are recommended to those who like something quaint and structurally interesting. The culture is precisely the same as for *Masdevallias*, and they are all natives of various parts of South America, Mexico, and the West Indies.

PROMENÆA.—There are several other species besides those given below, but these are the more useful decorative kinds. They all thrive treated as advised for *Odontoglossums*. All are dwarf-growing epiphytes, and very interesting. *P. citrina*.—Flowers small; pale lemon yellow, streaked and spotted with red on the lip. Brazil, 1838 (*c*). *P. Rollissoni*.—Flowers larger than the last; similar in ground colour, with purple markings. Brazil, 1838 (*c*). And *P. stapelioides*.—Flowers greenish yellow, with bands of purple or brown; lip deep purple. Brazil, 1830 (*c*).

RENANTHERA.—A genus of large-growing distichous-leaved plants, the stems in some cases growing 5 or 6 yards high, and producing large spikes of showy flowers. They require moist, tropical treatment, and something that their aerial roots can cling to, such as a pole or long piece of Tree-Fern stem. Very little shading is necessary, and though requiring abundance of moisture when growing, the plants should be kept much drier during the resting season. They are most suited to large houses, and those named below are the best for cultivation: *R. coccinea*.—Flowers on immense branching panicles, bright reddish-crimson and orange; lip marked with white. Cochin China, 1816 (*h*). *R. Lowi*.—A showy plant not very common. Flower spikes three or more yards in length, and singular in having two descriptions of flowers. Those at the base of the spikes are yellow, with a few dots of crimson, while those higher up are yellow with narrow sepals and petals blotched with rich brown. Borneo, 1846 (*h*). *R. matutina*.—A smaller growing and a beautiful species. Flowers crimson, changing to yellow. Java, 1846 (*h*). And *R. Storei*.—A fine species, allied to *R. coccinea*, but even showier. Flowers bright crimson. Philippines (*h*).

RESTREPIA.—Not unlike *Masdevallias* in general appearance, and thriving under



Fig. 80. *RESTREPia STRIATA*.

similar conditions of culture. The structure of the flowers is very remarkable and interesting, and the following species are worthy a place in the smallest collections: *R. antennifera*.—Flowers from the base of the leaf. The upper sepal and petals narrow and thread-like, purple and yellow; lower sepals yellow, with spots of crimson purple. New Grenada, 1869 (*c*). *R. elegans*.—Very similar to the last-named in shape and structure, but much smaller. A lovely little orchid. Caracas, 1850 (*c*). And *R. striata*, dorsal sepal maroon, lower sepals yellow striped maroon. New Grenada (*c*). (Fig. 80.)

RODRIGUEZIA SECUNDA.—An attractive orchid, with silvery-rose flowers, produced as in Burlingtonia, which see for culture. Trinidad, 1818 (*i*).

SACCOLABIUM.

These are noble orchids, and at one time were more popular than at present.

Some are small-growing, others large, and in cultivation their habit is one of the first points to be studied. All the dwarf species grow well in small pans or baskets suspended from the roof, the larger ones doing better in large pots on the stage. They should all be grown in a good light, never shading until there is a risk of the sun damaging the foliage. The compost is the same for all: clean sphagnum moss, with a liberal amount of rough charcoal and crocks mixed with it over good drainage. Water must be freely applied when growth is active, and even while at rest the roots should never be very dry. Light syringing is advisable in hot weather, but must be discontinued when dull or damp. See also instructions under "Aërides."

REPRESENTATIVE SPECIES.

- SACCOLABIUM AMPULLACEUM.**—Dwarf in growth, the flowers produced in erect racemes; colour bright rosy carmine. Sylhet, 1847 (*h*).
- S. BELLINUM.**—Plant of dwarf habit, with few flowered spikes; sepals and petals yellow, blotched with brown; lip white, marked with red and purple. Burmah, 1873 (*h*).
- S. BLUMEI.**—A distinct and handsome species of fairly strong growth, and producing elegant pendent racemes of rose and white flowers. Java, 1838 (*h*).
- S. CELESTE.**—Flowers attractive, white, tipped with blue; growth very stiff and erect. Siam, 1885 (*h*).
- S. CURVIFOLIUM.**—A dwarf-growing plant bearing racemes of cinnabar red flowers. East Indies, 1862 (*h*).
- S. GIGANTEUM.**—A large-growing species, producing in winter fine spikes of white and rose blossoms that last well. Burmah, 1862 (*h*).
- S. HENDERSONIANUM.**—Pleasing rose-coloured flowers, with a white lip, produced on erect racemes. Borneo, 1874 (*h*).
- S. MINIATUM.**—Very near *S. curvifolium*, but smaller in all its parts. Java, 1846 (*h*). Fig. 81.
- S. RETUSUM.**—A fine, easily grown species, allied to *S. Blumei*. The flowers are variable in colour, and produced on fine cylindrical racemes. Java (*h*).
- S. VIOLACEUM.**—A stout-growing and valuable species. Racemes over a foot long; flowers white, spotted with pale violet; deepest about the lip. Philippines, 1840 (*h*).
- S. v. HARRISONIANUM.**—Though considered a variety of the last-named, this is very distinct, the flowers being pure white. Pulo Copong, 1863 (*h*).



Fig. 81. SACCOLABIUM MINIATUM.

SCHOMBURGKIA.—These plants should only be included where a representative collection is aimed at, for, though some are interesting, the amount of flowers produced is not great in comparison with the room they take up. They may be grown in pots of peat fibre and moss over good drainage, and are very free-rooting when

healthy. Copious supplies of water are required during the growing season, but less when the plants are at rest; syringing is seldom resorted to with advantage. The following trio will suffice to begin with: *S. Lyonsi*.—Stems a foot high; flowers 2 inches across; sepals white, spotted with purple; lip white, yellow and purple.



Fig. 82. *SCHOENBURGERIA SANDERIANA*.

Honduras, 1853 (*h*). *S. Thomsoniana*.—Sepals and petals pale yellow; lip purple and white, prettily crisped. Honduras, 1886 (*h*). And *S. Sanderiana*.—Spikes very tall; sepals and petals rosy-purple; lip rose veined deep purple. Tropical America. (Fig. 82.)

SCUTICARIA STEELI.—This is the only species generally grown, but there are several others in the genus. It is commonly known as the "Whip Orchid" owing to the long, cylindrical leaves. The plants succeed when wired to large blocks and hung in a hot, moist, and light house.

Tree-Fern stems are the best for blocks, and moisture in abundance must be allowed. Brazil, 1851 (*h*).

SOBRALIA.—A genus of orchids with tall reed-like stems, producing handsome flowers that last a short time only in good condition. The plants thrive in a compost of loam, peat, and chopped sphagnum moss in equal proportions placed in large, well-drained pots. The strong roots require a good supply of water all the year round. The species most generally cultivated are: *S. leucoantha*.—Stems 2 feet high; flowers large; sepals and petals pure white; lip white, deepening to golden-yellow in the throat; a lovely species. Costa Rica, 1885 (*i*). *S. macrantha*.—The best known of all. Stems 8 feet or more high, the large flowers rosy-purple with a yellow throat. Of this there are several varieties, including *nana*, very dwarf; *Kienastiana*, an albino, and several others. Guatemala, 1842 (*i*). *S. sessilis*.—Stems 2 feet high; flowers white, with a yellow and rose-tinted lip. British Guiana, 1840 (*h*). And *S. Lucasiana*.—White tinged with rose; lip soft rosy-purple; very handsome. Tropical America. (Fig. 83.)

SOPHRO-CATTLEYA.—A genus founded for the reception of hybrids between *Sophranitis* and *Cattleya*, of which *S. Batemaniana* was the first raised. It is a cross

between *C. intermedia* and *S. grandiflora*. *S. eximia* resulted from a cross between *S. grandiflora* and *C. Bowringiana*. The colour is purplish-rose. (Fig. 84.)



FIG. 83. SOBREALIA LUCASIANA.

SOPHRONITIS.—Small-growing but very brightly-coloured plants, requiring for their successful culture small pans and very little compost, this consisting of peat fibre and sphagnum in equal proportions. *S. violacea* grows best on blocks of Tree-Fern stems. No resting or drying-off season is necessary, but atmospheric moisture and a good supply of air are essential. We select for cultivation: *S. cernua*.—Type species of the genus; pseudo-bulbs very small and growing closely together; peduncles 3 or 4

flowered, small, bright scarlet; lip yellow. Rio Janeiro, 1826 (*c*). *S. grandiflora*.—A beautiful species, also one of the finest and most popular cool-house orchids. The



Fig. 84. *SOPHRO-CATTELEYA EXIMIA*.

blossoms are large in comparison with the small pseudo-bulbs; bright scarlet and crimson. Organ Mountains, 1837 (*c*). (Fig. 85.) And *S. violacea*.—Not a popular plant, but very attractive, the blossoms only about an inch across; magenta-violet with a paler centre. Organ Mountains, 1840 (*c*).

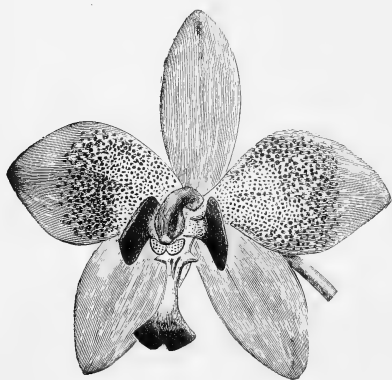


Fig. 86. *SPATHOGLOTTIS AUREO-VEILLARDII*.

SPATHOGLOTTIS.—Very pretty terrestrial orchids, and the following species are deserving of more attention than they receive from orchidists: *S. aurea*.—Flowers 3 inches across, bright yellow, more or less spotted with purple and brown. Mount Ophir, 1850 (*h*). *S. Fortunei*.—Spikes 1 foot high; flowers bright yellow, with chocolate markings. Hong Kong, 1845 (*i*). And *S. Veillardii*.—Spikes large; flowers 2 inches



Fig. 85. *SOPHRONITIS GRANDIFLORA.* (ON BLOCK.)

across, sepals and petals rosy-white; lip deep-brown and orange behind, bright lilac in front. It is a singular and beautiful kind, also known as *S. Augustorum*. Sunda Isles, 1886 (*h*). For culture see "Bletia." *S. aureo-Veillardii*, of which the name tells the parentage, was raised by Messrs. Veitch & Sons. The colour is creamy-yellow with rose spots. (Fig. 86.)

STANHOPEA.—Interesting orchids, thriving best in wire baskets suspended from the



Fig. 87. *STANHOPEA AMESIANA.*

roof, as the flower spikes in every case take a downward direction. The best compost for the plants is sphagnum moss and charcoal, but a little loam fibre may be added for the strongest growers. The flowers are beautiful, but last a very short time. The under-mentioned are the most popular species: *S. Amesiana*.—Pure porcelain-white, delight-

fully fragrant. (Fig. 87.) *S. Bucephalus*.—Spikes 8 inches long; flowers 4 inches across; yellow, marked with bright crimson. Peru, 1852 (*h*). *S. devoniana*.—A fine, large-flowering species, bright orange, with reddish-brown spots. Peru, 1837 (*h*). *S. grandiflora* (syn. *S. eburnea*).—Lovely sweet-scented pure white blossoms, very freely produced. British Guiana, 1824 (*h*). *S. insignis*.—Flowers large, yellow, spotted with purple. Ecuador, 1829 (*h*). *S. oculata*.—Variable but attractive; yellow, thickly spotted with violet; the lip white, with a crimson blotch. Mexico, 1829 (*h*). *S. platyceras*.—Flowers 7 inches across; orange yellow, rosy blotches. New Grenada, 1868 (*h*). *S. tigrina*.—Variable, with brownish-yellow and purple spotted flowers. Mexico, 1839 (*h*). And *S. Wardi*.—Bright orange, plentifully spotted with crimson. Guatemala, 1836 (*h*).

STENOGLOTTIS FIMBRIATA.—A pretty orchid, with tall spikes of rosy purple flowers, thriving in rather large well-drained pots, containing a mixture of equal parts of loam, peat, and leaf-mould, with a liberal addition of finely broken charcoal. South Africa, 1871 (*i*).

THUNIA.—Beautiful orchids of very easy culture. The growth consists of long deciduous stems, the flower racemes occurring at the apex. The stems should be potted in early spring in equal parts of peat, loam, and chopped sphagnum. After potting give very little water until the young shoots at the base begin to root, then moisten freely. Keep the plants in an unshaded part of the house, and after flowering gradually decrease the water supply as the leaves fall. Keep the roots perfectly dry in winter, and if space is limited they may be turned out of their pots and the soil shaken out, the stems labelled and tied up in bundles. Avoid a low temperature in winter, and while the flowers are open keep the plants in a moderately dry house or they will be spotted. Take every care to ripen the stems thoroughly in autumn or few flowers will be produced. Four kinds are named for cultivation: *T. alba*.—Stems 3 feet high; flowers in clusters of 8 or 10; sepals and petals white; lip white, tinted with purple. Nepal, 1841 (*h*). *T. Bensoniæ*.—Similar in habit; flowers bright rosy-purple, the tints varying in different plants; lip deeper purple than the rest of the flower. Rangoon, 1867 (*h*). *T. Marshalliana*.—Rather tall in growth; flowers pure glistening white, with downy-yellow hairs on the lip. Moulmein (*h*). And *T. Veitchiana*.—Hybrid raised from *T. Bensoniæ* and *T. Marshalliana*.

TRICHOCENTRUM.—A small genus of beautiful little orchids, not sufficiently popular to need detailed notice here. They thrive in the warm house, in small pans, suspended

from the roof of the intermediate house, and must be very moderately watered summer and winter. *T. Albo-purpureum* is a charming orchid. (Fig. 88.)

TRICHOPILLA.—Attractive plants with the habit of the intermediate *Oncidiums*, and thriving under similar conditions of culture. Plenty of light all the year round, a small amount of compost and a moist atmosphere are essential to their well-being. In water-



Fig. 88. *TRICHOCENTRUM ALBO-PURPUREUM*.

ing these plants the state of growth must be considered and moderation practised in winter, though at no time must the supply be entirely withheld. Peat fibre and sphagnum moss in equal parts form the best compost, and this must overlie thorough drainage. Repot just as new growths appear, and disturb the plants no more than is absolutely necessary. Among the best kinds will be found: *T. crispa*.—A variable species, the type having sepals and petals a bright rose; lip crimson, spreading and prettily frilled. Costa Rica, 1849 (*i*). *T. fragrans* (*Pilumna*).—A lovely plant, the blossoms produced freely; pure white, with a golden-yellow eye-like blotch on the lip. New Grenada, 1856 (*c*). *T. Galeottiana*.—Sepals and petals greenish yellow; lip white, spotted with crimson and a yellow throat. Mexico, 1859 (*i*). *T. suavis*.—One of the best and most popular. Sepals and petals whitish; lip yellow, heavily spotted with red; very fragrant. Costa Rica, 1848 (*i*). And *T. tortilis*.—Sepals and petals much twisted, brown, tinged with yellow; lip white, spotted with crimson. A free-flowering, popular kind. Mexico, 1835 (*i*).

TRICHOSMA SUAVIS.—A pretty and easily-grown orchid, producing slender stems about 8 inches high, from the top of which a short flower spike issues. The blossoms

are small, with white sepals and petals; the lip marked with crimson and reddish-brown. It requires medium-sized pots and a very rough compost. Abundance of atmospheric and root moisture is also essential. Khasia Hills, 1840 (c).

VANDA.

This old-world genus contains some of the most noble orchids in cultivation, and among the smaller kinds are to be found most exquisite shades of colouring. The tall-growing section, such as *V. suavis* and others, like plenty of head-room in a light house; the smaller growers thrive near the glass, but also in a good light. Their culture, as to growing and resting seasons, compost and other details, is similar to that given under *Aërides*.

REPRESENTATIVE SPECIES.

VANDA AGNES JOACHIM.—A hybrid from *V. teres* and *V. Hookeriana*; the petals and upper sepal delicate rose, lower sepals pure white; lip purplish-rose. (Fig. 89.)

V. AMESIANA.—A lovely species, with stiff, almost cylindrical foliage; flowers on large, erect racemes; sepals and petals rosy-white; lip deep rose, with a pale margin. India, 1847 (i).

V. BATEMANNI.—A very large grower, with stout leaves 2 feet long, and large spikes of yellow flowers spotted with crimson. Moluccas, 1846 (h).

V. BENSONI.—A pretty species; growth a foot high; sepals and petals greenish, marked with brown; lip white and rosy-violet. Burmah, 1866 (h).

V. COERULEA.—One of the grandest of orchids, producing fine racemes of deep blue flowers in the autumn. There is much difference in the varieties as to colour and width of segment, but all are beautiful. Khasia Hills, 1849 (i).

V. COERULESCENS.—Flower spikes sub-erect and many-flowered; sepals and petals pale blue; lip deeper, almost violet. Burmah, 1869 (i).



Fig. 89. VANDA AGNES JOACHIM.

V. CATHICARTI.—Handsome, large-flowering kind; sepals and petals yellowish, heavily barred, and spotted with reddish-brown; lip yellow and red. Northern India, 1864 (h).

V. DENISONIANA.—A lovely species, bearing pure white flowers. Arracan Mountains, 1869 (i).

V. GIGANTEA.—Large-growing, and produces long drooping spikes of flowers, yellow, spotted with red. Moulmein, 1830 (h).

V. HOOKERIANA.—Stems and foliage terete. Flowers about 2 inches across; sepals rosy white; petals spotted with carmine; lip white with magenta-purple markings. Borneo, 1873 (h).

V. INSIGNIS.—Sepals and petals yellow, spotted with crimson lip; rosy white. Moluccas, 1867 (i).

- V. **KIMBALLIANA**.—Cylindrical leaves and stems. Sepals and petals pure white; lip rosy-purple. A popular and fine species. Shan States, 1889 (*t*).
- V. **LAMELLATA**.—Flowers light yellow, blotched with chestnut brown. Philippines, 1838 (*h*).
- V. **PARISHI**.—A fine species, though not so showy as some others. The flowers are yellowish, spotted with brown. Moulmein, 1870 (*h*).
- V. **ROXBURGHII**.—Sepals and petals pale green, tessellated with brown; lip violet-purple. Bengal, 1819 (*h*).
- V. **SANDERIANA**.—A most beautiful species, producing large handsome flowers, quite distinct from any

other Vanda. The upper sepal and petals are rather small, pale rosy lilac; the lower sepals broad and handsome, yellow, closely covered with red markings; lip small, yellow, streaked with red. Mindanao, 1882 (*h*). (Fig. 90.)

- V. **SUAVIS**.—A noble species, producing large panicles of white flowers, spotted with crimson and purple. Very sweetly scented. Java, 1847 (*t*).
- V. **TERES**.—A fine species, with cylindrical stems and foliage, and handsome flowers. Sepals and petals rose; lip rose and yellow. Sylhet, 1828 (*h*).
- V. **TRICOLOR**.—Closely related to *V. suavis*, differing only in colour. This is yellow, blotched with brownish crimson and purple. Java, 1847 (*t*).

VANILLA.—A genus of orchids much grown in tropical countries for the sake of the

commercial vanilla so much used as a flavouring condiment and perfume. Under cultivation *V. planifolia* is grown in moist, warm positions such as on the roof of an orchid house, or plant stove, or trained on the back wall. To obtain vanilla pods the flowers must be fertilized with their own pollen and the pods ripened; but they seldom have the same fine flavour and aroma as imported vanilla.

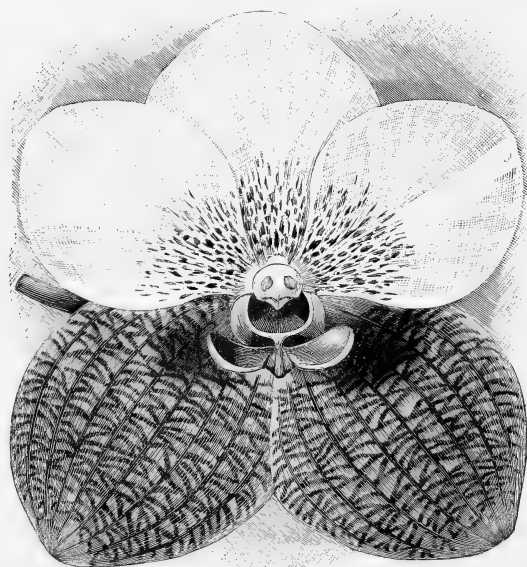


Fig. 90. VANDA SANDERIANA.

WARSCIEWICZELLA.

Charming orchids allied to, and by some authorities made synonymous with, *Zygopetalum*. The plants thrive in shallow pans or baskets, in peat and moss, over good drainage. They must be kept moist all the year round, as they have no pseudo-bulbs to sustain them over a resting season. They are rather difficult of

cultivation, and beginners should leave them alone until they have had a little experience with more easily-grown^s kinds. They greatly dislike being disturbed, and cannot well be too heavily shaded in summer. The roots are large and somewhat fleshy, so rough crocks and charcoal must be freely used with the material mentioned above. Four species are recommended, namely: *W. discolor*.—Scapes one-flowered, the flower $2\frac{1}{2}$ inches across; sepals white; petals tinged with purple; lip white in front and on the disc, the rest purple.

Costa Rica, 1853 (*i*). *W. marginata*.—Single-flowered spikes; flowers 3 inches across, creamy white; lip purple. New Grenada, 1853 (*i*). *W. Lindeni*.—Allied to the last-named, colour pure white with raised purple lines (Fig. 91). And *W. Wendlandi*.—Very large and handsome flowers, 4 inches across, white, with the exception of the lip, which has a purple centre. Costa Rica, 1858 (*i*).



Fig. 91. WARSCIEWICZELLA LINDENI.

ZYGOPETALUM.

An interesting genus, and most of the species are easily grown in pots of peat fibre and sphagnum moss. They must be well watered, especially the strong-growers, such *Z. Mackayi*, and no actual dry rest is needed by any. *Z. rostratum* and *Z. maxillare* are the most difficult to contend with. They are most likely to be satisfactory on blocks of Tree-Fern stem, wired down firmly with a thin layer of moss about the base of the pseudo-bulbs. Especial care is necessary to keep down insects.



Fig. 92. ZYGOPETALUM MACKAYI.

REPRESENTATIVE SPECIES.

ZYGOPETALUM CLAYI.—Hybrid between *Z. maxillare* and *Z. crinitum*.

Z. CRINITUM.—Sepals and petals green, with pale brownish bars; lip white, lined with purple. Brazil, 1834 (v).

Z. GAUTIERI.—Very pretty plant, of medium growth. Sepals and petals brown and green; lip deep blue, with blackish-purple centre. Brazil, 1868 (v).

Z. INTERMEDIUM.—Sepals and petals yellowish green with large blotches of brown; lip whitish with purple lines. Brazil, 1844 (v).

Z. MACKAYI.—Very like the last-named, but with blue lines on the lip. Brazil, 1827 (v). (Fig. 92.)

Z. MAXILLARE.—Pseudo-bulbs small, from

creeping rhizomes. Flowers $1\frac{1}{2}$ inches across; sepals and petals greenish with brown spots; lip of differing shades of purple. Brazil, 1844 (h).

Z. ROSTRATUM.—Sepals and petals white; lip with a rosy purple centre and radiating lines of the same tint. Demerara, 1830 (v).

Z. SEDENI.—Hybrid between *Z. maxillare* and *Z. Mackayi*, and pleasingly combining the characters of both.

ZYGOCOLAX.—A genus founded for the reception of hybrids between *Zygotopetalum* and *Colax*, of which *Veitchei* is a most beautiful example (Fig. 93).

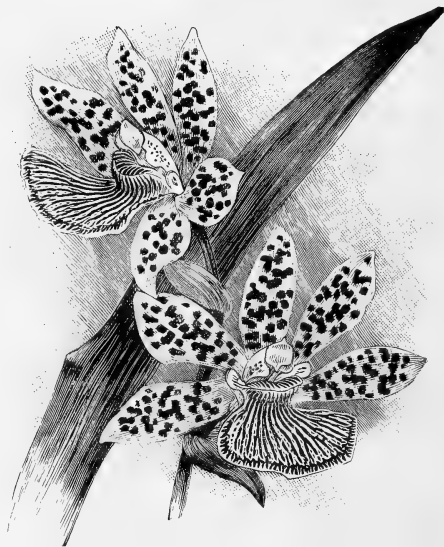


Fig. 93. ZYGOCOLAX VEITCHEI.

FERNS AND SELAGINELLAS.

WONDERFUL is the diversity of the vegetable kingdom as represented by the various kinds of plants. In orchids we find the most peculiar, as well as the most gorgeous, of flowers; in ferns no flowers are to be seen, yet these two widely

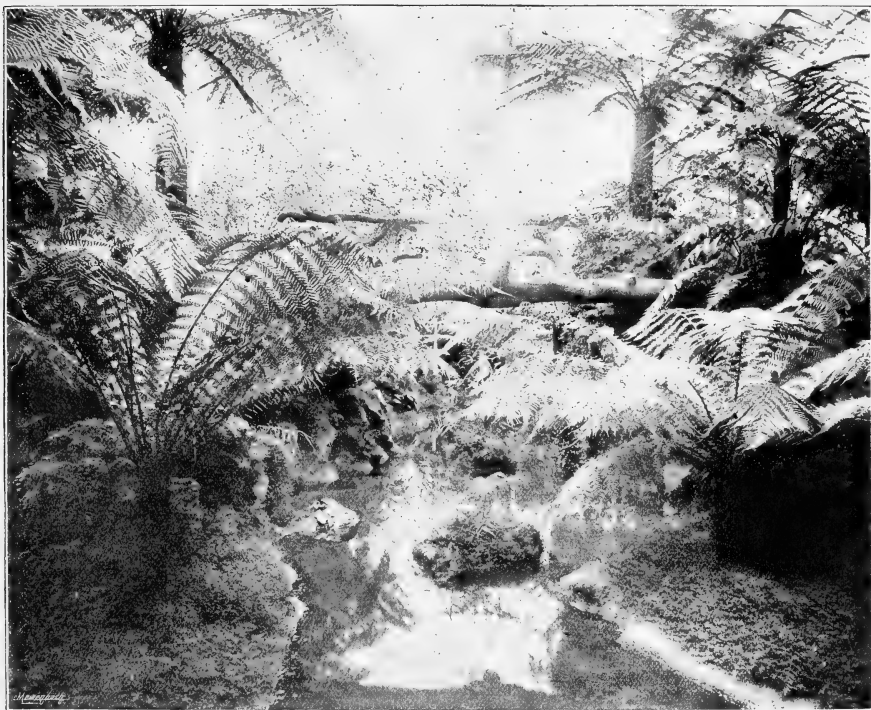


Fig. 94. THE FERNERY AT IMPNEY.

distinct families are often found in pleasing association, each enhancing the beauty of the other, as in groups of "Orchids and Ferns" at exhibitions, as well as in numerous home decorations. Orchids having had a generous share of attention in the foregoing chapter, we now turn to their elegant associates.

Ferns, though non-flowering in the ordinary acceptance of the term, rank amongst the most interesting and admired of plants. They are interesting because of the wonderful method of fertilisation, without which new plants of the nature of seedlings could not be raised; and admired because of their graceful habit, whether the plants are of large or small stature, and for the refreshing character of their elegant fronds.

Ferns in great variety succeed with various stove and greenhouse plants, adding, if well-grown, not a little to the general attractiveness of the combination. They are, however, to be seen at their best in houses constructed for their special benefit. In any case they ought to be divided into sections, a portion thriving in an ordinary stove temperature, and the remainder in cooler quarters. Much sunshine is not good for ferns, as it is apt to check their growth, and cause the fronds to present a starved, sickly yellow appearance. The other extreme, a permanent heavy shading, especially if accompanied by a moisture-laden atmosphere, has the effect of inducing longer, yet less robust, fronds—dark green in colour, it is true, but not nearly so beautiful, or so serviceable in a cut state as they might be had under more rational treatment. The difficulty is met, in many cases, by arranging ferneries in positions where only a little sun reaches them, as is the case on the north side of high walls. Ferns succeed in conservatories and other structures where the plants have the benefit of abundance of light without much direct sunshine. A little sun, other conditions being favourable, promotes the growth of good, hard fronds, not of the deepest green colour, but on that account the more admired.

Ferneries which form part of conservatories, that are desired to be constantly attractive, without partaking of formality, may be so arranged as to admit of planting out most of the ferns available. The Fernery of John Corbett, Esq., at Impney, near Droitwich, is a beautiful example, with rocks, water, lofty tree ferns and *Selaginella* clad banks, as represented in Fig. 94. A well-appointed rockwork can soon be covered with a variety of these elegant plants, which may be kept in perfect health for several years together with very little trouble. Hints on forming rockwork for hardy plants and ferns were given in Vol. I. (pp. 90-93), and the instructions also apply to the construction of rockwork under glass, leaving it to the ingenuity and taste of persons interested to form cascades, grottoes, and charming nooks to suit their particular ferneries. If ordinary plant stages are provided, these should be of a durable character, and covered with fine spar, ashes, clean gravel, or other moisture-holding material. Immediately under the fronts of the stages, rockwork or mounds ought to be formed and planted with the commoner ferns,

notably adiantums and pterises, these having a pleasing effect, and providing a large supply of fronds for cutting.

FERN-CLAD WALLS.

Bare walls ought not to be seen in any kind of fernery. These, instead of being an eyesore, can easily be transformed into objects of beauty and utility. Sometimes they are merely covered by the close evergreen, *Ficus repens*, with a few "pockets" filled with ferns dotted about the dark-green surface. An improvement on this is to enclose peaty soil, by means of galvanised wire-netting and staples, in this planting *Selaginella Kraussiana*, with ferns, also begonias of the *Rex* type, *tradescantias*, and a few other appropriate plants with ornamental foliage. But these require to be renewed every second or third season, whereas, when ferns only, and *Adiantum cuneatum* in particular, are employed—a really more beautiful arrangement—these retain their freshness, if properly attended to, for several years, while the supply of fronds for cutting is practically inexhaustible.

Walls may be clothed with ferns in this way. Secure widths of stout 2-inch wire netting to the bottom of the walls with the aid of strong iron hooks, these standing out about 4 inches from the surface. Place sphagnum, or the best moss procurable, against the netting, packing between this and the wall a mixture of two parts fibrous peat to one part of fibrous loam, from which the finer particles have been shaken. Plant thinly with small sporeling ferns, or well-rooted divisions, as the soil is added, driving in more hooks as required. When one width is completed add another, and so forth, till the top of the wall is reached. This plan is preferable to fixing the whole of the netting first, and planting afterwards, for the work cannot be well done under such circumstances. Walls and pillars can also be charmingly covered by the method advised. It has to be remembered, however, that unless the necessarily limited amount of soil employed in these arrangements is kept constantly moist, the plants rooting in it are liable to fail. Frequent syringings with tepid water, with an occasional watering from the top, are usually depended upon to supply all the moisture required; but where possible a small, freely perforated lead pipe, connected with a raised cistern or reservoir, should be fixed along the top of the walls; a thorough soaking can then be given as often as may be needed, by merely turning on the water, this trickling down gently, and evenly, and doing its work effectively.

RAISING AND PROPAGATING FERNS.

By far the greater portion of ferns grown in this country are raised from spores, but where these cannot be obtained recourse is had either to dividing the plants, or separating the rhizomes as these are formed, while some species of aspleniums, and other kinds, form plantlets along the upper portion, or at the ends of the fronds. (See page 150.)

SPORES.—Referring to these, it may be said that there are many persons, and among them not a few who either cultivate ferns or employ them for decorative purposes, who regard the more less prominent scar-like specks, or lines, on the under-sides of the fronds, as the “flowers” of ferns. They are not flowers, but more analogous to seed capsules, though ferns do not produce seeds of the same nature as those of flowering plants.

The small familiar objects referred to are sori, or sporangia, cases containing spores, and these have been appropriately described as the “representatives of seeds.” All fronds do not produce them, and those which do not are called sterile, while those on which they are clustered are known as fertile. In a few instances, as in the Royal Fern (*Osmunda regalis*), for example, the spore cases are clustered in the form of brown spikelets, which are cylindrical, fertile fronds, changed from the green, flattened, sterile fronds; and, therefore, such kinds are not uncommonly called “flowering ferns.”

FRUCTIFICATION.—It is true that ferns produce organs analogous to flowers, and with corresponding sexual distinctions; but these organs are never formed on the developed fronds, and are only discoverable by the microscope on the underside of the first visible growth of the fern from the spore, which spreads on the surface of the soil like a liverwort (*marchantia*). There lurk the essential organs of ferns—one kind, as if embossed on the flattened growth for yielding the equivalent of pollen, the other depressed for receiving it. By this process alone can spores be formed, which, when treated as minute seeds, give rise to sporelings, or young ferns, as they are produced in millions for sale.

It is to be noted that spores do not form on the flattened growth (*prothallium*) which bears the organs of fructification, but only on the fronds that follow, on which they develop, it may be two or three years after fertilisation has been effected. That is a very interesting, not to say a mysterious, fact, as the connection between cause and effect does not seem to be easily traceable. Another fact is also worthy of mention—namely, that when a fern plant has once been made fertile in the manner indicated, it may, under favourable conditions, continue to yield spores throughout its career, as may

other plants raised from it by division of the crowns; or in other words the effects of the one original process of fecundation may be seen through generations.

CROSS-FERTILISATION.—For the better comprehension of this subject by the inexperienced,

the illustrations of Mr. F. W. Burbidge, and his remarks, are repeated on page 11, Vol. I., of this work, and are worthy of attention. The matter would not have been dwelt on so fully, and as plainly as possible here, if it had not a very practical bearing on the raising of new varieties of ferns. For this purpose the information imparted is essential, and, by acting in accordance with it, several valuable new ferns have been raised from spores, as the result of cross-fertilisation. In all kinds of flowering plants (phanerogams) this has to be effected before the seeds are formed, and therefore long before they can be sown; but in the case of

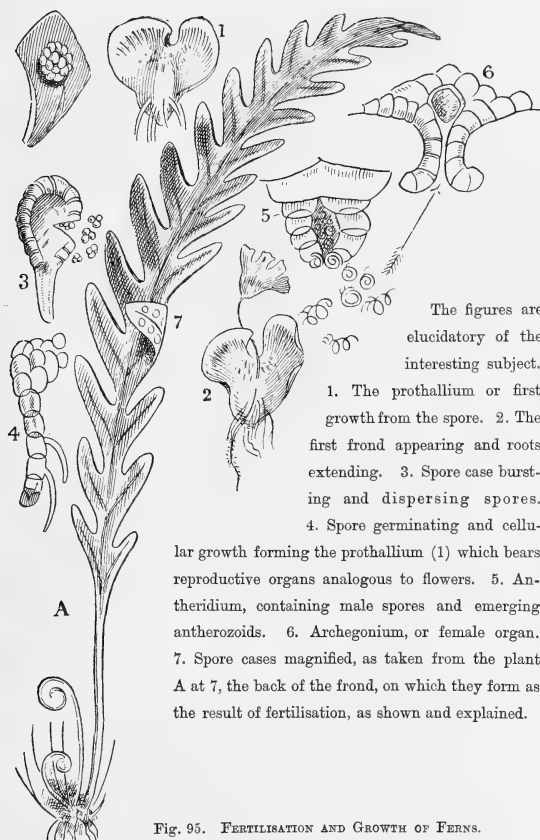


Fig. 95. FERTILISATION AND GROWTH OF FERNS.

The figures are elucidatory of the interesting subject.

1. The prothallium or first growth from the spore.
2. The first frond appearing and roots extending.
3. Spore case bursting and dispersing spores.
4. Spore germinating and cellular growth forming the prothallium (1) which bears reproductive organs analogous to flowers.

5. Antheridium, containing male spores and emerging antherozoids.

6. Archegonium, or female organ.

7. Spore cases magnified, as taken from the plant A at 7, the back of the frond, on which they form as the result of fertilisation, as shown and explained.

non-flowering plants (cryptogams), such as ferns, the spores have to be sown first, fertilisation following on their vegetation.

PROCEDURE AND RESULTS.—Knowing the facts of the case, the raising of new ferns, the result of cross-fertilisation, becomes a very simple matter, for it only amounts to the

mixing of ripe spores gathered from the fronds of different kinds of ferns, sowing these thickly, and treating in the manner that will be described. But why sow thickly? Because by so doing the first growths (prothallia) from the spores, instead of resting flat on the soil, as they would if ample room were afforded, are forced upwards at the edges by crowding, thus exposing, so to say, the "flowers of ferns" to the fructifying influence by the transmission of the quickening antherozoids, from one germ frond to the receptive organ (archegonia) of another of a different species or variety.

As the result of such process, and the practice of mixing the spores, many beautiful new ferns have been raised perfectly distinct from all others, and more will certainly follow in due course. When it is desired to raise large numbers of any particular kind of ferns that shall be true in character to the plants that produced the spores, these must not be mixed, but sown separately, or the object in view will not be attained.

RAISING SPORELINGS.—So-called "seedling" ferns are usually more perfect in form and of freer growth than are plants obtained by division or rhizomes. Fully matured fronds bearing spores, on the underside, should be examined frequently, and when the sori, or cases, begin to turn brown, the time has arrived for collecting. Gather the fronds, and place them, spore side downwards, on a sheet of paper, in a dry position, or the fronds may be placed in paper bags. Keep the species or varieties separated, except for the purpose of cross-fertilisation. The spores may be sown at any time of the year, and long delay after gathering them is inadvisable.

Extra pains must be taken with the preparation of the pans, or pots of soil for the reception of fern spores. Half fill 6-inch pots or pans with crocks, and fill up firmly with a mixture of fine sifted peat and small pieces of crushed bricks. For very choice ferns, the peat should be first baked, with a view to destroying fungi germs, and also the spores of common kinds of ferns which are liable to overpower the more delicate growers. Give the soil, after it has been made firm and level in the pots, a good watering, through a fine rose, then wait till the next day before sowing the spores. Distribute these as evenly as possible, covering with squares of glass only. Set the pots or pans in saucers of water, in a temperature of 60° to 65° and shade heavily. The spores must not be disturbed by watering, but the soil should be kept constantly moist from below, filling the saucers with water, as often as it is drawn, by capillary attraction, up into the soil. Vegetation may take place in a fortnight, but, in the case of some species, it is frequently delayed for months. The prothallus, or small green cellular expansion, first appears, and tiny fronds spring from it in due course.

When the young plants are about an inch in height, or still earlier, if very closely packed together and showing signs of damping off, take out small patches with a little soil attached, and insert them in seed pans filled with fine sandy peat. Arrange the pans where they will not be exposed to much fire heat, in the same temperature as before, shading carefully on bright days, and keeping the soil steadily moist. After the plants have made good progress and before they crowd and weaken each other, place them singly in thumb pots, or sizes just large enough to hold the small ball of soil and roots comfortably, using a mixture of fine loam, peat, leaf soil, and sand. Arrange them on an ash-covered stage not far from the glass, and maintain a moist atmosphere and genial temperature. Shift them into larger

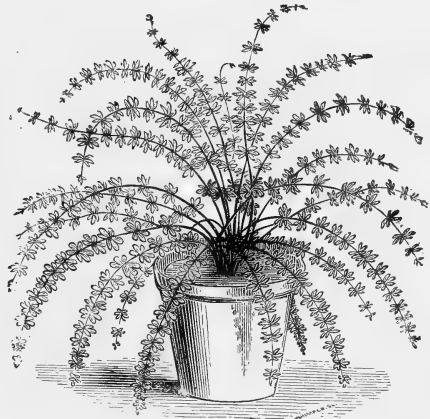


Fig. 96. PELLÆA TERNIFOLIA.

sizes before they become root-bound; the strong-growing species naturally make the better progress and require the most pot room. A properly potted fern is shown in Fig. 96, *Pellæa ternifolia*, a distinct and elegant species.

DIVIDING FERNS.—It is not possible to obtain spores in all cases, and the slower method of propagating by division of the crowns has to be resorted to. *Adiantums*, as an instance, are largely increased by division, and this can best be done just when growth is commencing in February, or early in March. Large plants may be split up freely at that time, and in many instances would be benefited by the operation, as they are apt to become very weak in the centres. Severe sub-division of either choice *adiantums* or other kinds of ferns similarly propagated, and upon which advice will be offered in due course, ought not to be attempted. This delicate work should be done with a small plunging fork rather than a cutting tool, and the balls of soil and roots ought to be combed out and rounded with a pointed stick, so that they will not need comparatively large pots at first. *Davallias*, *gleichenias*, or other genera with creeping rhizomes, can be divided, or neat little plants may be obtained by pegging down the points of the rhizomes in

lumps of peat, or by layering them into small pots. The latter is the safest and best method of increasing gleichenias, and the layers ought not to be detached from the parent plant before they are strongly rooted. Treat the smaller divisions and layered plants similarly to established sporelings.

PROLIFEROUS OR VIVIPEROUS FERNS.—Many species of ferns are remarkable in producing a number of plantlets on the growing fronds. These are particularly observable in some of the aspleniums, polystichums, adiantum lunulatum, and its variety, dolabrilforme; platyceriums, Woodwardia radicans, and many others. When the tiny ferns,



Fig. 97. A PROLIFEROUS FERN.

beautifully produced on the parent fronds, are large enough, they may be carefully taken off and dibbed an inch or so asunder in pans of peaty soil; or the larger, such as the one separated in Fig. 97, may be at once placed singly in thumb pots, taking the same care of them as advised in the case of ferns raised from spores. For facilitating the rooting of the small plantlets, it is not uncommon to

lay portions of fronds containing them on peaty soil in pans under hand lights, keeping them close and moist till the baby ferns take possession of the soil.

SOIL, POTTING AND INSECTS.

SOIL.—Some few species may require special treatment or different soil to the rest, but the great majority succeed well in a mixture of two parts sound loam, one part each of peat and leaf soil, with sharp sand, lumps of sandstone and charcoal to keep it porous and sweet, packing this moderately firm about the roots. Those ferns with slender rhizomes generally thrive best in pans of soil, with the rhizomes pegged down on lumps of peat, *acrostichum*, *davallias*, and *gleichenias* coming under this head.

POTTING.—Ferns of an evergreen nature may be shifted into larger pots or pans at almost any time of the year, but as a rule this important work is best performed early in the spring, before fresh fronds have formed. At this period in their career many of the

large plants of robust species may have their balls of soil and roots considerably reduced, or combed out with the aid of a stout pointed stick, afterwards trimming them with a knife, and they can then be returned to pots of nearly or quite the same size they were in before. All do not need re-potting every season, but can be kept growing strongly with the aid of abundance of water and weak liquid manure. Nor do any of them require very large pots. They are most effective in pots small in proportion to the size of the plants, while, if over-potted, the new soil is liable to become sour and injurious to the

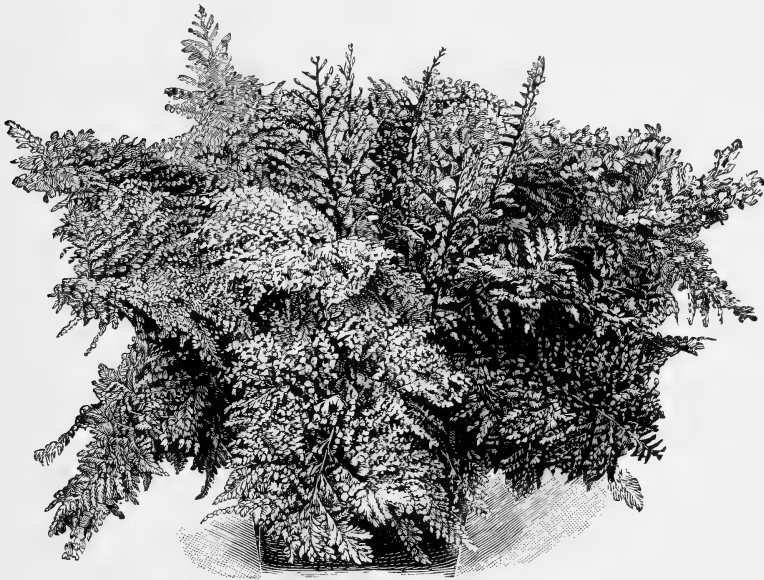


Fig. 98. *POLYPODIUM SCHNEIDERI*.

roots, the plants quickly assuming a sickly appearance. In every case clean, well-drained pots or pans should be used by way of safeguards against souring of the soil. Fine specimens are then soon established, after the manner of the beautiful *Polypodium Schneideri* (Fig. 98).

INSECT PESTS.—Ferns are liable to be infested and injured by all the insect pests to which stove plants generally are liable. Thrips are, or were at one time, most to be feared, but thanks to the introduction of nicotine vaporizers, they can now be destroyed

effectually without risking injury to the delicate fronds. Aphides may be kept down in the same way; mealy bug, brown and white scale, have also to be reckoned with. These can only be extirpated by frequent careful brushings and spongings with soapy water, as hot as can be borne by the hand, not waiting till the plants are badly infested before commencing operations.

THE CULTURAL GROUPING OF FERNS.

No practical purpose would be served by occupying space in a popular work of this kind by a narrative explanatory of the scientific classification of Ferns; but, as has been previously intimated, it is advisable, where possible, to group them according to their cultural requirements and adaptability for specific objects. Some Ferns require a comparatively high and others a relatively low temperature, and are known as stove and greenhouse kinds respectively. Then there are the stately Tree Ferns, which in appropriate positions are highly imposing; and the chaste elegance of the Filmies, attaining in some instances only a few inches in height; while others are displayed to great advantage when grown in baskets. Reference was made on page 143 to the custom that prevails at exhibitions of associating Ferns and Orchids in groups, and it cannot be doubted that both families gain in effectiveness thereby. But nowhere is the association more pleasing than in the structure in which the plants are grown, and which is well illustrated in the photographic reproduction (Fig. 99). This picture represents one of the plant houses of Mr. W. Thompson, at Walton Grange, Stone, Staffs., whose reputation as an Orchidist is world-wide. As may readily be seen, the majority of the orchids are miltonias, with several *odontoglossum crispum*, and the long spikes of *oncidiums* in the background. These are placed in a carpet of Maidenhair Ferns, of which the front row only can be seen. Then from the floor a rock wall, with numerous pockets for ferns, has been so formed that the underneath portion is perfectly hidden. Instead of a bare space there is the refreshing wall of greenery surmounted by the trails of *Selaginellas* with the Orchids above. Nothing more charming could be desired, and it is a method of procedure which in adaptation allows ample scope for individual taste and judgment. The following observations on the cultural grouping of Ferns, based on long practice, may afford guidance to the comparatively inexperienced.

STOVE FERNS.

Plants from the tropics naturally require more heat than those from the temperate zone, and experience has proved that some species of Ferns require more light than others. Information on these matters will be given when the different genera and species are discussed. Strong heat is not as a rule desirable for even Stove Ferns; but during the growing period, which may be said to last from February to September,



Fig. 99. THE ASSOCIATION OF FERNS AND ORCHIDS.

inclusive, genial warmth and a moist atmosphere should be maintained. Commencing at a temperature of 60° to 65° in February, with an increase to 65° to 75° in the summer, then gradually lowering to 55° to 65° in the autumn and winter, will under good management suffice for the health of stove or hothouse kinds.

In mixed plant-houses ferns are liable to be syringed more than is desirable. *Gymnogrammas* and other kinds with powdery or hairy fronds ought not to be syringed

at any time, but those with smooth fronds are not so liable to be injured by sprinkling water on them. All through the growing season, supply those which are firmly established in pots, pans, or tubs, with abundance of water, clear weak liquid manure being also of great service, while the atmosphere should be kept in a moist condition by means of syringing among the pots, and damping the walks whenever these are found somewhat dry. For affording shade, movable blinds are preferable to a permanent shading applied to the glass in the form of a pigment, and further, a judicious use of blinds obviates the necessity for opening the ventilators very wide, many kinds of ferns not liking exposure to currents of either cold or dry air.

GREENHOUSE FERNS.

Properly treated, numbers of adiantums, aspleniums, gleichenias, nephrolepis, lomarias and pterises, may be successfully grown with ordinary greenhouse plants, or in regular ferneries only sufficiently heated to exclude frost during the winter. Ferns in mixed plant-houses ought to be arranged where they are well sheltered from cold winds, and suitable kinds thrive in a genial temperature 45° to 50° in March, rising to 55° to 60° in the summer. When at rest during the winter the deciduous kinds should be kept just moist at the roots, the evergreen species being watered whenever approaching dryness. A moderate amount of shade ought to be given, much as advised in the case of stove ferns. The choicer hardy or British ferns succeed admirably under greenhouse treatment.

FILMY FERNS.

Of the many genera and species in cultivation few are more beautiful, interesting, and generally attractive than those known as Filmy Ferns. Among these, *Todeas* are the grandest and most popular, the other principal genera being *Hymenophyllum* and *Trichomanes*. They do not require a great amount of warmth, as they are found to thrive better in a warm greenhouse temperature than they do in a stronger heat. Abundance of moisture in the atmosphere is imperative. Unless the specimens are extra large, the proper place for filmy ferns is a glazed case, or small plants may be grown under bell-glasses, keeping these quite close. They are in a happy condition when the fronds sparkle with moisture condensed on them, as they must not be syringed. Filmy ferns should also have special root treatment. Those with rhizomatous or creeping stems ought to be placed on blocks of peat, or short lengths of dead-tree fern stems.

For others well-drained pots or pans with lumps of fibrous peat and loam, charcoal, sandstone, silver sand, and sphagnum are suitable. The strong growers may have a coarse mixture of the six materials last named, and be annually top-dressed with more of the same in March.

From the first they must be kept close and carefully shaded, and the soil never allowed to become dry, watering the stones and medium in which they are rooting frequently, through the spout of a can. After the plants are once well established progress will be fairly rapid.

TREE FERNS.

These noble ferns are better adapted for large ferneries and conservatories than for ordinary plant houses. The three principal genera are *Alsophila* (Fig. 100), *Cyathea*, and *Dicksonia*, and well-grown specimens are of considerable decorative value. A moderately warm temperature, accompanied by shade and abundance of atmospheric moisture, suits tree ferns admirably. They require large quantities of water, and free drainage must therefore be provided in the pots or tubs in which they are grown. Those with long stems are not easily spoiled by being crowded in among various other ferns or plants, but ample room must be afforded the younger specimens, the fronds being numerous and attaining large dimensions. Stems of imported tree ferns when received should be laid or stood in a warm position, covered with moss or canvas, and kept constantly moist by syringing. Place them in large pots or tubs directly top growth commences but still keep the stems covered and moist till they are clothed with



Fig. 100. *ALSOPHILA LEICHARDIANA*.

active roots, afterwards keeping these alive by means of moisture supplied by the syringe. Stems that do not survive importation may be utilised, either by having the top scooped out and a free-growing drooping fern planted in it, or the stem may be covered with small ferns, fastening them on with blocks of peat and wire.

BASKET FERNS.

Several species of ferns of more or less scandent habit never display their charms so effectively as when well grown in baskets suspended from the roofs of structures in



Fig. 101. ADIANTUM CILIATUM.

which the atmosphere and temperature are conducive to their health. Wire baskets are usually employed, the sides being thickly and firmly lined with moss for holding the compost securely. This may consist of a mixture of turfy peat and loam, with broken charcoal added. It should be rather lumpy than otherwise, and pressed down into a firm springy mass when the plants are introduced. Baskets are employed from 18 inches to twice that size in diameter. By the exercise of good judgment in water-

ing, guarding against giving too much at the first when the roots of the plants are few, and taking care to supply sufficient when the soil is packed with them, splendid cultural objects can be produced. The ordinary fronds of *Goniophlebium* and *Asplenium longissimum* often hang down to a length of 5 or 6 feet, while *Adiantum lunulatum* is quaint by its twirling growths, bearing numerous fernlets; and *A. ciliatum* (Fig. 101) is elegant. *Nephrolepis exaltata* is a fine basket fern, and some of the *adiantums* form elegant masses. The climbing fern *Lygodium scandens* (*japonicum*) is particularly effective in baskets, some of the growths ascending spirally up the supports, while others hang down in elegant profusion. A more complete selection will be given in a

subsequent page. Some ferns, such as Davallias, also grow well on suspended blocks of cork (Fig. 102).

SELECT FERNS.

Owing to the great and rapid increase in the number of species and varieties in some of the genera, anything like a full detailed description would tend to bewilder rather than instruct the majority of readers of this work. Brief reference will be made to many of the best species and varieties of ferns in their sections and selections for various purposes offered, before the subject is dismissed.

ACTINIOPTERIS. — A small genus of stove ferns, which are both distinct and attractive. *A. radiata*, India, forms fan-shaped fronds 3 to 6 inches high. *A. australis* is a variety of the preceding, differing principally in being larger and more vigorous. The pots for *Actiniopteris* ought to be half filled with crocks, and the plants should be potted in equal parts of crocks and charcoal broken up small, adding silver sand and a small portion of loam and peat. Propagated by spores.



Fig. 102. DAVALLIA ON CORK BLOCK.

ADIANTUM.

A large and very popular genus, comprising species requiring gentle heat, others that thrive in a cool greenhouse, and a few nearly or quite hardy.

REPRESENTATIVE SPECIES AND VARIETIES.

A. æmulum.—Brazil. Fronds slender, tri-subquadripinnate, 6 inches or more in length. Stove or warm greenhouse.
A. æthiopicum.—Spain. Fronds deltoid, quadri-pin-

nate, 12 to 18 inches long, and 6 to 9 inches broad. *A. chilense* and *A. sulphureum* are forms of this species, *A. assimile* and *emarginatum* synonymous. Greenhouse.

- A. *AFFINE*.—New Zealand. Fronds tri-pinnate, 10 to 15 inches long, glabrous; stem creeping. Greenhouse.
- A. *ANEITENSE*.—Aneitum Isles. Fronds deltoid, tri-pinnate, 18 to 24 inches long, and broad. Stove or warm greenhouse.
- A. *BAUSEI* (Fig. 103).—A distinct Hybrid, raised by

magnificum, Mariesi, O'Brieni, and undulatum are all desirable varieties of *A. capillus-veneris*.

- A. *CARDIOCHLENA*.—Columbia. Fronds simply pinnate, 2 to 3 feet long, and 12 to 18 inches broad. Stove.
- A. *CAUDATUM*.—Tropics generally. Fronds simply pinnate, 6 to 12 inches broad, often elongated



Fig. 103. *ADIANTUM BAUSEI*.

- Mr. C. F. Bause. Fronds spreading and pinnæ drooping. Has been called the "Sleeping Fern." Stove or warm greenhouse.
- A. *BELLUM*.—Bermuda. Fronds tufted, bi-pinnate, 3 to 6 inches high. Greenhouse.
- A. *CAPILLUS-VENERIS*.—Common Maidenhair. Fronds variable, 6 to 9 inches long. Greenhouse or frame. *cornubiense*, *crispulum*, *daphnites*, *fissum*, *grande*, and rooting at the extremity. Stove or warm greenhouse. *A. ciliatum* is considered to be a form of the preceding.
- A. *CONCINNUM*.—Tropical America. Fronds ovate, deltoid, tri-pinnate, 12 to 18 inches long, 6 to 9 inches broad, drooping. *A. C. latum* is of more erect growth than the species. Stove.
- A. *CRISTATUM*.—West Indies. Fronds 18 to 36 inches

- long, 9 to 12 inches broad, with a terminal central pinna 6 to 9 inches long. Stove.
- A. *CUNEATUM*.—Brazil. Fronds deltoid, tri- or quadripinnate, 9 to 18 inches long, and 6 to 9 inches broad. Stove or greenhouse. Extremely popular. *A. c. grandiceps* is a handsome crested form; *A. c. Lawsonianum* is much more finely divided than the type; *A. c. mundulum* more compact.
- A. *CURVATUM*.—Tropical America. Fronds dichotomous, 12 to 18 inches long, and 2 to 3 inches broad. Elegant stove species.
- A. *DECORUM*.—Peru. Fronds sub-deltoid, three to four pinnate, 9 to 15 inches long. Greenhouse.
- A. *DIGITATUM*.—Peru. Fronds 1 foot to 3 feet long, 6 to 18 inches broad; spreading. Also known as *A. speciosum*. Stove or greenhouse.
- A. *ELEGANS* is in the way of *A. cuneatum*, and preferred for cutting.
- A. *EXCISUM*.—Chili. Fronds 6 to 18 inches long, and 3 to 6 inches broad. Multifidum is a variety of *A. excisum*, with fronds divided and tasselled at the points, and is very handsome. Greenhouse.
- A. *FARLEYENSE*.—Jamaica. Fronds deltoid, tri- or quadripinnate, 12 to 24 inches long, 6 to 12 inches broad. One of the noblest ferns in cultivation. Stove. (Fig. 104.)
- A. *FORMOSUM*.—Australia. Fronds quadripinnate, 18 to 24 inches long, and 12 to 18 inches broad. Greenhouse.
- A. *FULVUM*.—New Zealand. Fronds deltoid, 9 to 12 inches long, and 6 to 8 inches broad. Greenhouse.
- A. *GLAUCOPHYLLUM*.—Mexico. Fronds, quadripinnate, 12 to 24 inches long and 9 to 15 inches broad. Greenhouse. Synonymous, *A. amabile*, *A. andicolum*, and *A. mexicanum*.
- A. *GRACILLIMUM*.—Garden origin. A handsome, finely-divided form of *A. cuneatum*. Greenhouse.
- A. *HENSLOVIANUM*.—Columbia. Fronds tripinnate, 12 to 18 inches long, and 6 to 9 inches broad. Stove. Synonymous, *A. lætum*, *A. Reichenbachii*, and *A. sessifolium*.
- A. *HISPIDULUM*.—Tropics of Old World. Fronds dichotomous, 6 to 15 inches long. Greenhouse.
- A. *LATHOMI*.—Garden origin. Fronds 18 to 24 inches long, with imbricate, deeply-cut pinnules. Stove.
- A. *LINDENI*.—Amazons. Fronds tripinnate, and noble in appearance. Stove.
- A. *LUDDEMANNIANUM*.—A handsome, crested form of *A. capillus-veneris*.
- A. *LUNULATUM*.—Hong Kong. Fronds simply pinnate, 6 to 12 inches long, and 1 to 2 inches broad. Stove. Synonymous, *A. dolabriforme*.
- A. *MACROPHYLLUM*.—Tropical America. Fronds simply pinnate, 9 to 15 inches long, and 4 to 8 inches broad. One of the finest species. Stove.
- A. *OBLIQUUM*.—West Indies. Fronds costate, 6 to 12 inches long, and 2 to 4 inches broad.
- A. *PACOTTI*.—Garden origin. Fronds decompound, with imbricated segments. Belonging to the Maiden-hair section.
- A. *PEDATUM*.—North Hindostan. Fronds dichotomous, 6 to 15 inches long. Handsome, deciduous and hardy.
- A. *PERUVIANUM*.—Peru. Fronds simply pinnate, branching at the base, tall growing, and imposing in appearance. Stove.
- A. *PRINCEPS*.—New Grenada. Fronds quadripinnate 12 to 24 inches long, and 9 to 18 inches across. A noble stove species.
- A. *RENIFORME*.—Madeira. Fronds simple, reniform. Greenhouse.
- A. *RUBELLUM*.—Bolivia. Fronds deltoid, pinnate, 4 to 6 inches long. In a young state tinged crimson in colour, changing to light green tinged with pink. Greenhouse. Allied to *A. tinctum* and *A. decorum*.
- A. *SEEMANNI*.—Central America. Fronds simply pinnate, lower pinne compound, 12 to 20 inches long. A distinct and handsome stove species.
- A. *TENERUM*.—Mexico. Fronds quadripinnate, 1 to 3 feet long, and 9 to 18 inches broad. Stove.
- A. *TETRAPHYLLUM*.—Tropical America. Fronds long and broad, with large pinne. Stove. *Hendersoni* is a handsome variety of *A. tetraphyllum*.
- A. *TINCTUM*.—Tropical America. Fronds deltoid, bi-pinnate, 6 to 12 inches long. When young of a delicate rose colour. Stove or greenhouse.
- A. *TRAPEZIFORME*.—West Indies. Fronds 12 to 24 inches long, and spreading. Stove. *Cultratum*, *pentadactylon*, *Sanctæ Catherinæ* and *Funcki*, are all varieties of *A. trapeziforme*.
- A. *VEITCHIANUM*.—Peruvian Andes. Fronds deltoid, bi-pinnate, 9 to 18 inches long, and reddish when young. Elegant and distinct stove species.
- A. *VENUSTUM*.—Himalayas. Fronds tri-quadr-pinnate, 6 to 12 inches long, and 4 to 8 inches broad. Greenhouse, hardy in sheltered positions. Synonymous, *A. microphyllum*.
- A. *WILLIAMSII*.—Mountains of Peru. A noble greenhouse species of Maidenhair.
- A. *WILSONI*.—Jamaica. Fronds simply pinnate, 9 to 18 inches long, 6 to 12 inches broad. Stove.

Adiantums are propagated by spores and by division. May be grown in the soil and under the treatment recommended for ferns generally. The plants should not be heavily shaded.

ALSOPHILA.—A family of noble tree ferns of which three species are recommended: *A. australis*, Java and Malaya; form stems 10 to 30 feet high; fronds bi-pinnate and from 6 to 12 feet long. Cool stove species. *A. Leichardtiana* (Fig. 100), distinct and handsome, allied to the former, succeeds in a greenhouse. It grows in the woods near Sydney, and is there known as the "Whip-stick" Fern. *A. excelsa*, Norfolk Island, stem slender, and from 10 to 30 feet high; fronds bi-pinnate, ovate, lanceolate, and from 6 to 15 feet in length; greenhouse. Alsophilas are propagated by spores. For other information see Tree Ferns, page 155.

ANEMIA.—A small genus of stove or warm greenhouse ferns, principally from Tropical America. The species most in favour are *A. Dregeana*, *A. fraxinifolia*. Synonymous, *Anemidictyon Phyllitidis*. Well adapted for growing with other dwarf kinds in cases (Fig. 105), and succeed in moist, shady positions. Suitable soil—equal parts of fibrous loam and peat, with an admixture of sand. Propagated by spores.

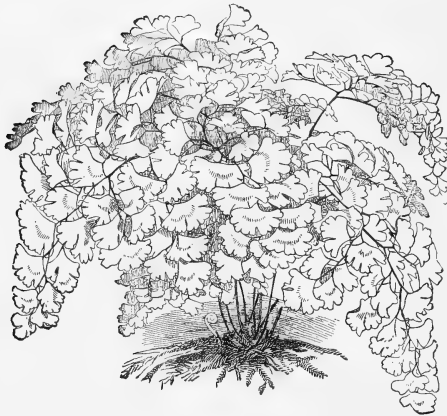


Fig. 104. ADIANTUM FARLEYENSE.

and succeeding in a shady position in a stove-warm greenhouse or conservatory. May be planted in borders or tubs, in equal parts of loam, peat, leaf-soil and sand. Increased by spores.

ASPIDIUM.—Shield Fern. This genus comprises stove, greenhouse, and hardy species. Three desirable stove species are *A. dilaceratum*, *A. macrophyllum*, and *A. viviparum*; *A. mucronatum* succeeding in a greenhouse. Shade from sun. Pot in a mixture of loam, peat, leaf-soil and sandstone, and increase by spores.

ASPLENIUM.—A large genus which includes a considerable number of popular species, all of which can be cultivated without difficulty. A collection may well comprise *A. Belangeri*, *A. formosum*, *A. longissimum*, *A. novæ-caledoniæ*, *A. nobile*, and *A.*

ANGIOPTERIS.—*A. evecta*, from the Tropics of the Old World, is the only species in cultivation, this attaining a height of 3 to 6 feet,

viviparum, stove species; and *A. bulbiferum*, *A. Colensoi*, *A. flaccidum*, *A. Hemionites* (*palmatum*) and its crested variety, thriving in an ordinary greenhouse. All succeed in a mixture of equal parts loam, peat, leaf-soil and sand. Increased by spores and frondlets.

BALANTIUM.—There is only one species—*B. culcita* (also known as *dicksonia*)—a noble Fern sometimes attaining to a height of 4 feet. It thrives in a greenhouse temperature in a compost of loam, peat, and sand. Two or three other species are occasionally included, but the most reliable authorities place these with *dicksonia*.

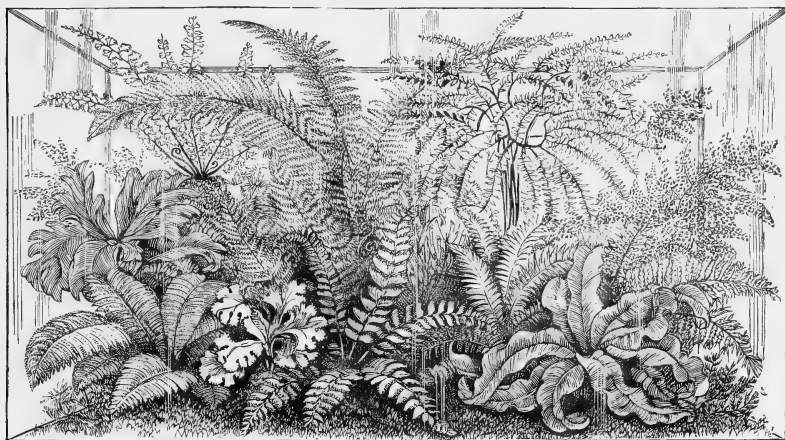


Fig. 105. CASE FOR FERNS. (Page 166.)

Some growers designate *B. culcita* as a Tree-Fern, but this is not really the case, as it does not produce a stem after the manner of *dicksonia*, *alsophila*, and *cyathea*. Propagated by spores.

BLECHNUM.—A popular genus of stove and greenhouse evergreen ferns of easy culture. Favourite species are *B. brasiliense*, *A. corcovadense*, *A. lanceolatum*, *A. latifolium*, *A. longifolium*, and *A. occidentale*. Pot in equal parts loam, peat, leaf-soil, and sand. A shady position is desirable. Propagated by spores.

CHEILANTHES.—Lace Fern. An elegant family that repays for good culture in a warm greenhouse. The best are *C. Borsigiana*, *C. chlorophylla*, *C. Clevelandi*, *C.*

elegans (Fig. 106), *C. farinosa*, *C. gracillima*, *C. hirta* Ellisiana, *C. tomentosa*, and *C. viscosa*. Grow in pots, in a shady position. Soil: peat two parts, loam one part, adding silver-sand. Propagated by spores.

CIBOTIUM.—A small genus of Tree-Ferns nearly allied to *Dicksonia*. Four noble species are *C. Barometz*, *C. princeps*, *C. regale*, and *C. Schiedeii*. Grow in large pots or tubs in a shady part of a stove or warm greenhouse, and supply abundance of water to the roots during the summer. Peaty compost. Increased by spores.

CYATHEA.—*C. dealbata* and *C. medullaris* are tree-ferns, and may be grown in either a greenhouse or conservatory. They should be arranged in a shady, moist position, and when of large size succeed best in tubs. Compost: two parts peat to one of fibrous loam, adding sharp sand freely. Propagated by spores.



Fig. 106. CHEILANTHES ELEGANS.

Mooreana, *D. tenuifolia* *stricta* and *D. Veitchiana*. Pot in a mixture of two parts loam to one each of peat and leaf-soil, with a free admixture of powdered charcoal and sand. Grow in pots or hanging baskets, in a somewhat light position. Increased by spores and division or laying the rhizomes.

DICKSONIA.—*D. artarctica*, *D. cicutaria* and *D. squarrosa* are all tree ferns of noble dimensions, succeeding well in a warm greenhouse or conservatory. They enjoy a shady position, and fine specimens may be grown in large pots or tubs. Soil: peat two parts, fibrous loam one part, with silver-sand in abundance. Increased by spores. A fine effect is produced by *Dicksonias* in pots supported over the water in the great transept of the Crystal Palace.

CYRTOMIUM.—See **ASPIDIUM**.

DAVALLIA.—Of this large genus of stove and warm greenhouse ferns, a few species are decidedly and deservedly popular. These are *D. bullata*, *D. canariensis* (Hare's-foot Fern), *D. dissecta*, *D. fijiensis*, *D. Mariesii*, *D.*

DICTYOGRAMMA.—See GYMNOGRAMMA.

DIDYMOCHLÆNA.—*D. lunulata*, a very distinct fern, is the only species in general cultivation (though others are known), and thrives in a shady part of a greenhouse. Compost: two parts of loam to one of peat, rendered porous by pounded charcoal and sand. Increased by spores.

DOODIA.—*D. aspera*, *D. aspera multifida*, *D. blechnoides*, *D. caudata* and *D. media*, are all greenhouse and evergreen species. They should have a shady position and succeed in a mixture of two parts loam, one part leaf-soil, with an admixture of pounded charcoal and sand.

DORYOPTERIS.—See PTERIS.

DRYNARIA.—See POLYPODIUM.

FADYENIA.—*F. prolifera*, the only species known, is recommended for culture in Wardian cases.

GLEICHENIA.—Greenhouse ferns, several of them very beautiful. Some of the most popular species are *G. circinata*, *G. dicarpa longipinnata*, *G. dichotoma*, *G. flabellata*, *G. Mendeli*, *G. microphylla*, *G. rupestris* and *G. Spelunçæ*. They thrive in well-drained pans and a compost of two parts fibrous peat, one part fibrous loam, charcoal and sand. A somewhat shady position is desirable, and the plants should not be syringed. Increased by spores, also by layering and division of the creeping stems.

GONIOPHLEBIUM.—A near ally of Polypodium. *G. appendiculatum*, *G. glaucum*, *G. sepultum*, and *G. subauriculatum* are worthy of inclusion in most collections of stove ferns. The last-named is a favourite basket fern. They should be grown in a moist, shady position in two parts rough peat, one part each of porous loam and leaf soil, with some sand. Propagated by spores and by division of the old plants at potting time.

GYMNOGRAMMA.—Gold and Silver Ferns. A few of the species are valuable for exhibition purposes, and all require stove-heat. Those most cultivated are *G. chrysophylla*, and its varieties—*Alstoni*, *Lauchæana*, *Mayi* and *Parsonsi*; *G. ochracea*, *G. peruviana argyrophylla*, *G. schizophylla* (Fig. 107), *G. tartarea*, *G. Veitchi* and *G. Wettenthaliana*. Pot in a mixture of equal parts loam, fibrous peat and leaf-soil, adding sharp sand and charcoal freely, also a sprinkling of coarsely-ground bones. The plants should not be heavily-shaded, or syringed. Propagated by spores, plantlets, and by division of the old plants at potting time. Though the species illustrated is shown in a basket, it is equally suitable for pot culture.

HEMIONITES.—Greenhouse Evergreen Ferns suitable for growing in Wardian cases.

The species cultivated are *H. cordata*, *H. palmata*, and *H. pinnata*. Pot in sandy peat, and grow in the shade. Increased by spores.

HYMENODIUM.—Elephant's Ear Fern. *H. crinitum*; synonym, *Acrostichum crinitum*, the only species cultivated, requires a shady position in a stove, and a compost of equal parts loam, peat, leaf-soil and sand. Increased by spores.

HYMENOPHYLLUM.—Filmy Ferns. Greenhouse. *H. caudiculatum*, *H. chiloense*, *H. demissum*, *H. Fosterianum*, *H. tunbridgense*, and *H. Wilsoni* are all beautiful and worthy of general cultivation. Pot in a mixture of equal parts peat, loam, leaf-soil,

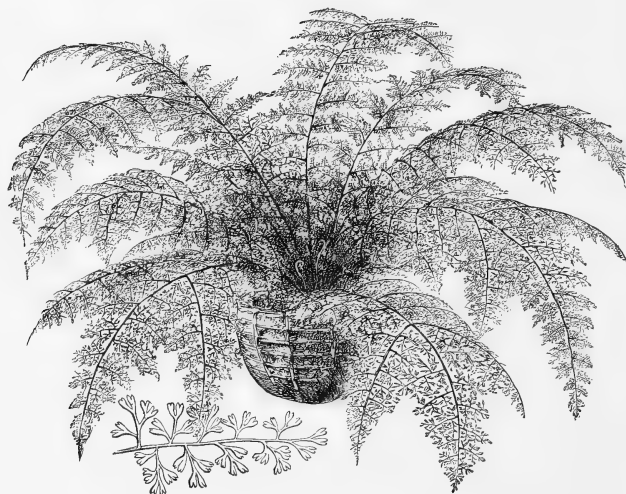


Fig. 107. *GYMNOGRAMMA SCHIZOPHYLLA*.

charcoal, sandstone, and silver-sand. Under bell-glasses or in cases (Fig. 105) are the best positions for them, and they may be grown in damp recesses of rockeries. Should not be syringed. Propagated by spores and by division at potting-time.

HYPOLEPIS.—Elegant, warm, greenhouse ferns. The most popular species are *H. distans*, *H. millefolium*, and *H. repens*. Pot in equal parts loam, leaf-soil, and sand. Propagated by spores and by division of the creeping rhizomes in March.

LASTREA.—A large genus nearly allied to *Nephrodium*. The following is a good selection: *L. atrata*, *L. aristata*, *L. decurrens*, *L. elegans*, *L. fragrans*, *L. prolifica*, and *L. Sieboldi*, all greenhouse species; and *L. Richardsi multifida*, which requires more

heat. Pot in equal parts of loam, peat, leaf-soil, and sand, and afford some shade. Spores and division.

LEUCOSTEGIA.—*L. immersa*, a greenhouse species, is suitable for a hanging basket, or may be potted in a mixture of two parts loam to one of leaf-soil and sand. A shady position is desirable. Spores and by division of the rhizomes.

LOMARIA.—A large genus which comprises numerous handsome species, some requiring heat, others succeeding well in an ordinary greenhouse, and a few are perfectly hardy. *L. discolor bipinnatifida*, *L. gibba* and *L. l'Herminieri* should be grown in a stove or warm greenhouse; while *L. attenuata*, *L. blechnoides*, *L. chilensis*, *L. ciliata* (Fig. 108), *L. falcata*, *L. lanceolata*, *L. nuda*, and *L. zamiaefolia* succeed in a greenhouse. Pot in equal parts of loam, peat, and leaf-soil, adding sand freely. A shady position is desirable. Increased by spores, and the dwarf species can also be divided at potting time. For the illustrations of *Lomaria* and *Cheilanthes* we are indebted to Messrs. B. S. Williams & Sons, Holloway.



Fig. 108. *LOMARIA CILIATA*.

LYGODIUM.—Climbing Ferns.

L. dichotomum succeeds best in a stove; *L. scandens* (*japonicum*)

may be grown in a warm greenhouse, *L. palmatum* in a cool greenhouse. Pot in equal parts of peat, loam, and leaf-soil, adding sand and charcoal. Grow in a shady position and train the fronds over trellises or stakes. Propagated by spores and by division of the old plants at the time of potting.

MARATTIA.—Strong-growing, moisture-loving ferns. *M. alata* and *M. Cooperi* should be grown in a stove; a warm greenhouse suiting *M. fraxinea*. Pot in equal parts of loam, peat, and river-sand. Grow in a moist, shady position. Increased by spores.

MENISCIUM.—A genus of stove evergreen ferns, with rhizomatous stems. The species most frequently met with is *M. reticulatum*. Pot in equal parts of loam, peat, leaf-soil,

and sand. Moist, shady position. Propagated by spores and division of the plants at potting time.

MICROLEPIA.—A genus of noble ferns, nearly allied to *Davallia*. *M. hirsuta* *augusta* should be grown in a stove, a warm greenhouse suiting *M. hirta* *cristata*, while *M. anthriscifolia*, *M. platyphylla*, and *M. strigosa* may be successfully cultivated in an ordinary greenhouse. Compost: two parts of peat to one each of loam and leaf-soil, adding sand freely. The plants are very effective when suspended in a shady position. Propagated by spores, also by division of the rhizomes early in the spring.

MOHRIA.—A single species, *M. cafferorum* and its varieties, *achill caefolia* and *thurifraga*, represent this genus. They bear a resemblance to *Cheilanthes*, are sweet-scented, and can be grown in a greenhouse. Pot in peat, with small lumps of sandstone and silver-sand. A shady position is desirable, or a Wardian or other case (Fig. 105). Increased by spores.

NEOPTOPTERIS.—Nearly allied to *Asplenium*. *N. Australasica* and *N. nidus* (Bird's-nest Fern) are noble plants, requiring a stove temperature, and the same treatment as *Aspleniums*.

NEPHRODIUM.—*N. cuspidatum* is a stove species, and *N. molle*, and its variety, *corymbiferum*, may be grown in either a stove or a greenhouse. *N. cicutarium*, *N. hirsutum*, and *N. incisum* will thrive in a greenhouse. Nephrodiums are sometimes grouped with *Lastreas*, and require similar treatment.

NEPHROLEPIS.—Comprised in this genus are several handsome species that may be quickly grown to a large size. *N. Bausei*, *N. davallioides*, and its varieties, *furcans* and *multiceps*; *N. Duffi*, *N. exaltata*, *N. pectinata*, *N. rufescens* *tripinnatifida* and *N. tuberosa* are principally grown in stoves; *N. cordata* *compacta* and *N. neglecta* thriving in a greenhouse. Pot in equal parts of loam, peat, leaf-soil, and sand. May be grown in baskets suspended from the roof, or in pots and deep pans. A shady position is necessary. Propagated by spores, by division of plants, and by pegging down the creeping stems to lumps of peat.

NIPHOBOLUS.—Climbing Polypody. Nearly allied to *Polypodium*. *N. Heteractis* and *N. lingua* *corymbifera* are the most worthy of general cultivation, these succeeding in a greenhouse. Pot in a mixture of two parts of coarse, fibrous peat, to one each of loam and leaf-soil, with a little sand. May be suspended in baskets or grown in pots in a shady position. Propagated by spores and by division of the plants.

NIPHOPSIS.—*N. angustata* of catalogues is synonymous with *Polypodium angustatum*.

NORHOCHLÆNA.—Elegant stove and greenhouse ferns. *N. chrysophylla*, *N. nivea* and *N. trichomanioides* are stove species; *N. Eckloniana*, *N. Marantæ*, *N. Newberryi* and *N. rufa* succeeding in a greenhouse. Pot in equal parts of loam, peat, leaf-soil and sand, adding charcoal and small lumps of sandstone. Shady position. Propagated by spores, and by division of the plants at potting time.

ONYCHIUM.—*O. auratum* (Fig. 109) is a handsome stove species; *O. japonicum* can be grown in a greenhouse. Pot in equal parts of loam, peat, leaf-soil, and sand. Shady position desirable. May be planted in rockeries. Increased by spores and by division of the plants.

OSMUNDA. — Royal or "Flowering" Ferns. *O. japonica corymbifera*, *O. javanica* and *O. palustris* may be grown in either a greenhouse or conservatory. Pot in equal parts of fibrous loam and peat, adding river-sand. A moist, shady position is necessary, and abundance of water during



Fig. 109. *ONYCHIUM AURATUM*.

the summer. Propagated by spores and by offsets from established plants in April.

PHLEBODIUM.—Nearly allied to *Polypodium*; requiring identical treatment. The species principally grown are *P. aureum* (Golden Polypody) and *P. sporadocarpum*.

PLATYCERIUM.—Stag's Horn Fern. Distinct from all other ferns, and some of them quaintly beautiful. *P. alcicorne* will succeed in a greenhouse or conservatory, but this and its variety, *P. alcicorne majus*, *P. grande*, *P. Hilli* (Fig. 110), and *P. Willincki* are found to make the best progress in a stove. All ought to be grown on blocks of wood suspended from the roof or sides of a house. Cover the roots with a good thickness of peat and sphagnum moss, and secure with copper-wire. Propagated by offsets.

PLATYLOMA.—Greenhouse evergreen ferns, allied to *Pellæa* (of which an example is figured on page 149). Those species most grown are *P. latyloura atropurpurea*, *P. falcata*, *P. flexuosa*, *P. rotundifolia*, and *P. Wrightiana*. Pot in equal parts of loam,



Fig. 110. PLATYCERIUM HILLI.

peat, leaf-soil and sand, adding a little charcoal and sandstone. Grow in a shady position. Platylomas may also be planted in rockeries under glass.

PLEOPELTIS.—Nearly allied to *Polypodium* and succeed under the same treatment. *P. fossa* is the only species generally catalogued.

POLYPODIUM.—Comprised in this large genus are several species worthy of cultivation under glass. *P. diversifolium*, *P. nigrescens* and *P. verrucosum* should be grown in a warm greenhouse or stove; *P. drepanum*, *P. pectinatum*, *P. plumosum*, and *P. Schneideri* thriving in a cool greenhouse or conservatory. Pot in equal parts loam, peat, leaf-soil and sand. Partial shade is desirable. Propagated by spores and division of the plants in March.

POLYSTICHUM.—Easily grown and effective ferns. *P. triangulum* and *P. tripterum* ought to be grown in a stove. *P. capense*, *P. flexum*, *P. setosum*, and *P. vestitum* succeeding in a greenhouse. Pot in two parts peat to one of loam, with charcoal and sand added. Shady position.

PTERIS.—Quite a large number of species and varieties belonging to this genus are in cultivation, all more or less attractive in appearance and serviceable. *P. Bausei*, *P. ludens* and *P. tricolor* are grown in stoves; the following species succeed in either greenhouses or conservatories:—*P. argyrea*, *P. cretica* and its varieties, *albo-lineata* and *nobilis*; *P. longifolia* Mariesi, *P. scaberula*, *P. serrulata* and its varieties, *eristata*, *gloriosa*, *gracilis* and *Mayi*, *P. Reginae*, *P. Reginae cristata*, *P. tremula*, *P. tremula Smithi*, *P. umbrosa*, *P. Victoriae* and *P. Wimsetti*. Pot in a mixture of equal parts loam, peat, leaf-soil and sand. Grow in partial shade. Propagated by spores; dwarf species by division of plants.

TODEA.—Crape Fern. A beautiful genus classed with Filmy Ferns. The most desirable species are *T. Fraseri* (syn. *Leptopteris Fraseri*), *T. grandipinnula*, *T. pellucida* (*T. hymenophylloides*), *T. plumosa*, *T. superba*, and *T. Wilkesiana*. Pot in equal parts of peat, loam and leaf-soil, with silver-sand, lumps of sandstone and charcoal. May be grown in a moist, shady position, or under bell-glasses and in cases. (See "Filmy Ferns.") Propagated by spores and by division of the plants at potting time.

TRICHOMANES.—Another genus of Filmy Ferns, in which are included a large number of species. Those most deserving of recognition are *T. angustatum*, *T. exsectum*, *T. parvulum*, *T. radicans* and its varieties, *alabamense*, *Andrewsi*, *cambricum*, *dilatatum* and *dissectum*; with the species *T. reniforme* and *T. tenerum*. Soil and position the same as for *Todea*. Propagated by spores and division of the plants.

WOODSIA.—The species *polystichoides* and *polystichoides Veitchi* are both desirable for the greenhouse. Pot in equal parts of loam and peat, with some sand, and grow the plants in a shady position. They are raised from spores and increased by division.

WOODWARDIA.—A small genus which comprises one noble species, *T. radicans* and its varieties, *Burgesiana* and *cristata*. *T. orientalis* also attains to an imposing size. Pot in a mixture of two parts loam to one each of peat and leaf-soil, adding a little sand. May be grown in a cool greenhouse or conservatory. Propagated by spores, division and plantlets from the fronds.

SELECTIONS FOR A WARM FERNERY.

Adiantum amabile.	Asplenium nobile.	Lomaria discolor bipinnatifida.
Bausei.	viviparum.	gibba.
cardiochlæna.	Blechnum brasiliense.	Lygodium palmatum.
concinnum.	corcovadense.	scandens (japonicum).
concinnum latum.	occidentale.	Microlepia hirta cristata.
cuneatum.	Cheilanthes farinosa.	Nephrodium molle.
cuneatum grandiceps.	hirta Ellisiana.	Nephrolepis davallioides furcans.
Farleyense.	Cibotium Barometz.	Duffi.
macrophyllum.	princeps.	pectinata.
Pacotti.	Davallia bullata.	tuberosa.
Seemanni.	dissecta.	Nothochlæna chrysophylla.
tenerum.	fijiensis.	nivea.
trapeziforme.	Mooreana.	Phlebodium aureum.
Williamsi.	tenuifolia Veitchi.	Platynerium alcornice majus
Asiophila australis.	Goniophlebium appendiculatum.	Platyloma flexuosa.
excelsa.	subauriculatum.	Polypodium diversifolium.
Aspidium macrophyllum.	Gymnogramma chrysophylla Lau-	Polystichum triangulare laxum.
viviparum.	cheana.	Pteris Bausei.
Asplenium Belangeri.	ochracea.	longifolia Mariæi.
cicutarum.	peruvianum argyrophylla.	ludens.
formosum.	Hemionitis palmata.	serulata Mayi.
longissimum.	Lastrea Richardsi multifida.	tricolor.

SELECTIONS OF FERNS FOR A COOL HOUSE.

Adiantum affine.	Blechnum gracile.	Gleichenia Speluncæ
assimile.	latifolium.	Goniophlebium sepultum.
capillus-Veneris (in variety).	Cheilanthes Bergeana.	Hymenophyllum caudiculatum.
cuneatum.	elegans.	Hypolepis millefolium.
decorum.	Cibotium regale.	Lastrea atrata.
formosum.	spectabile.	aristata variegata.
pubescens.	Cyathea dealbata.	fragrans.
venustum.	medullaris.	Leucostegia immersa.
Angiopteris evecta.	Davallia canariense.	Litobrochia robusta.
Aspidium mucronatum	tenuifolia Burkei.	Lomaria blechnoides
Asplenium bulbiferum.	Dicksonia antarctica.	ciliata.
Colensoi.	squarrosa.	Lygodium scandens (japonicum).
flaccidum.	Doodia aspera multifida.	Microlepia anthriscifolia.
palmatum.	Gleichenia dichotoma.	Moheria thurifraga.
Veitchianum	rupestris.	Nephrodium molle corymbiferum.

Nephrolepis neglecta.	Platyterium Willincki.	Pteris cretica (in variety).
Nipholobus lingua corymbifera.	Platyloma ternifolia.	longifolia Mariesi.
Nothochlona Marantæ.	Polypodium effusum.	serrulata (in variety).
Onychium japonicum.	Schneideri.	Wimsetti.
Osmunda javanica.	Polystichum flexum.	Woodsia polystichoides Veitchi.
Phlebodium sporadocarpum.	Pteris argyrea.	Woodwardia radicans cristata.

BRITISH AND OTHER FERNS FOR UNHEATED HOUSES.

The following kinds and varieties of ferns will succeed well either in pots or in rockeries, with the protection afforded by a glazed structure. For cultural details see "Hardy Fernery," Vol. I. p. 108.

Adiantum capillus Veneris. pedatum.	Cystopteris bulbifera.	Polypodium alpestre. dryopteris.
Asplenium adiantum nigrum. marinum.	Davallia Mariesi.	phlegopteris.
Trichomanes. viride.	Dictogramma japonica.	Robertianum.
Athyrium filix fœmina.	Gymnogramma leptophylla.	vulgare cambricum. v. serratum.
f. f. corymbiferum.	Lastrea æmula. cristata.	Pteris scaberula.
f. f. crispum.	Goldicæna.	Scolopendrium vulgare crispum. v. cristatum.
f. f. Fieldi.	filix-mas Bollandiæ.	v. marginatum.
f. f. grandiceps.	f. m. cristata.	v. ramosum.
f. f. mucronatum.	thelypteris.	v. multifidum.
f. f. plumosum.	Lomaria alpina. pumila.	v. Wardi.
f. f. Victoriæ.	Lygodium scandens (japonicum).	Struthiopteris germanica.
Blechnum spicant ramosum.	Onoclea sensibilis.	Woodsia itvensis obtusâ.
Botrychium virginicum.	Osmunda cinnamomea.	Woodwardia orientalis. radicans.
Ceterach officinarum.	Claytoniana.	
Cyrtomium falcatum. Fortunei.	gracilis. regale.	
	Pelteea atropurpurea.	

SELECT FILMY FERNS.

Hymenophyllum chiloense. Forsterianum. tunbridgense.	Hymenophyllum Wilsoni. Todea pellucida. superba.	Trichomanes radicans. r. dissectum. reniform.
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SELECT BASKET FERNS.

Adiantum assimile. concinnum latum. gracillimum. lanulatum.	Asplenium longissimum. Davallia canariense. dissecta. Mariesi.	Goniophlebium subauriculatum. Gymnogramma schizophylla. Microlepia hirta cristata. Nephrolepis exaltata.
Asplenium flaccidum.		

SELAGINELLAS.

Selaginellas are frequently, but erroneously, termed Lycopodiums, though both belong to the club mosses. Selaginellas are distinguished from their sturdier allies by the flat two-ranked stem and double two to three-valved fruit. The plants may be said to occupy an intermediate position between ferns and mosses, but resemble the latter rather than the former. They produce spores, but are usually propagated in a different and simpler way. Selaginellas are generally associated with ferns, and when properly grown are as pleasing and attractive as their larger, stronger-growing companions.

Selaginellas are all easily propagated, and their cultural requirements are of the simplest description. In every case comparatively young plants are the most effective, and the stock should be renewed annually, a number of young plants being prepared in well-drained pots or pans to take the place of the worn-out older ones. They are increased by cuttings of the tops and by portions of the creeping stems, many of which are already furnished with roots when taken off. These will quickly develop into small plants if kept in a close frame with a temperature of 75° to 80° for a time. When well rooted the stronger spreading species may be grown singly in small pots and given a timely shift into larger ones, and those of a spreading, free-rooting nature can be "made up" by placing several together in pots or pans, taking care not to crowd them. A light porous compost, such as may be formed with equal parts of loam, peat, leaf-soil and chopped sphagnum moss, to which sand, broken potsherds, and lumps of charcoal are added, is suitable. Most of the species succeed best in well-drained pans, and these are often used for exhibition specimens. A moderate amount of shade should be afforded the plants.

After these general remarks, brief allusions to a few of the many species available for cultivation may be given. *S. apus*, better known as *S. apoda*, is of a neat, dense, moss-like habit of growth, and of a lively soft-green colour. This should be planted rather closely in pans of raised soil and watered carefully from the sides, as a preventive of damping. Greenhouse. *S. caulescens*, of which *amœna*, *argentea* and *japonica* are desirable varieties, is a stove species, growing to a height of 9 to 12 inches and spreading. *S. grandis* (Fig. 111) is known as an elegant stove-plant, attains a height of 18 to 24 inches, branching strongly, and is very effective. *S. involvens*, of which

there is a handsome variegated form, is of a tufted habit of growth, spreading prettily from the centre. Thrives in a greenhouse.

S. Kraussiana (*Lycopodium denticulatum* of gardens), is the most extensively grown species. It is used for covering walls, carpeting rockwork and beds in plant houses, and forming neat marginal lines in conservatories and ferneries. Every small piece dibbed into light soil, kept moist and shaded, will produce roots freely, the growths spreading rapidly and forming a pleasing green carpet. Five-inch pots, well furnished with this *Selaginella*, are prepared by thousands for house and conservatory decoration; and these plants are particularly well adapted for turning out of the pots, removing much of the soil, and using for surfacing table or other plants, clothing mounds, and forming moss-like dells. *S. Kraussiana* is hardy in some districts. The golden form, *S. K. aurea*, forms attractive margin-lines and tufts under glass.



Fig. 111. *SELAGINELLA GRANDIS*.

S. Martensi (syn., *S. stolonifera*), of which there are variegated and other handsome forms, grows to a height of 6 to 12 inches, branching and rooting freely, rendering this species suitable for mixing with ferns and *Rex Begonias* on fernery and conservatory walls. Stove and greenhouse. *S. Wildenovi*, according to authorities, is the correct name for the climbing stove-species, commonly known as *S. cæsia arborea*. It grows to a height of 12 to 20 feet, and is chastely effective when trained up walls and shaded pillars, or hanging from rockwork or plant stages. Sunny positions and a dry atmosphere are prejudicial to the plants.

PALMS AND CYCADS.

LINNÆUS, having regard to their beauty and utility, not inappropriately described Palms as "Princes of the vegetable kingdom." Few spectacles are more imposing than choice and well-managed collections of Palms. They are plants which may be looked at again and again, and always with admiration if seen in the best cultural condition. They have a history, too, and uses which cannot be ignored. How graphically Melville, in his "South-Sea Adventures," describes the uses of the Cocoa-nut Palm, *Cocos nucifera*. The passage is worth reproducing here:—

"The blessings this Palm confers are incalculable. Year after year the islander reposes beneath its shade, both eating and drinking of its fruit; he thatches his hut with its boughs, and weaves them into baskets to carry his food; he cools himself with a fan plaited from the young leaflets, and shields his head from the sun by a bonnet of its leaves. Sometimes he clothes himself with the cloth-like substance which wraps round the base of its stalks. The nuts, thinned and polished, furnish him with a beautiful goblet; the dry husks kindle his fire; the fibres are twisted into fish-lines and cords for his canoes. He heals his wounds with a balsam compounded from the juice of the nut, and with the oil extracted from it embalms the bodies of the dead. Sawn into posts, the trunks uphold his dwelling, and converted into charcoal it cooks his food. He impels his canoe through the water with a paddle made from its wood, and goes to battle with clubs and spears of the same hard material."

That is only one species out of five hundred or more. Others yield food in the form of fruit, such as dates, the produce of *Phœnix dactylifera*; sago, sugar, oil, wax, wine, and other articles of commerce are also afforded by Palms. It is interesting to note these facts, though Palms are only grown in this country as ornamental plants, and as such they will be treated in this work, with others that are commonly associated with them, though belonging to an entirely different family.

Take away Palms and Cycads from our conservatories and plant-houses and they would leave vacancies not easily filled. In a small state the plants are admirably adapted for table and house decoration, their elegance and durability being equalled by

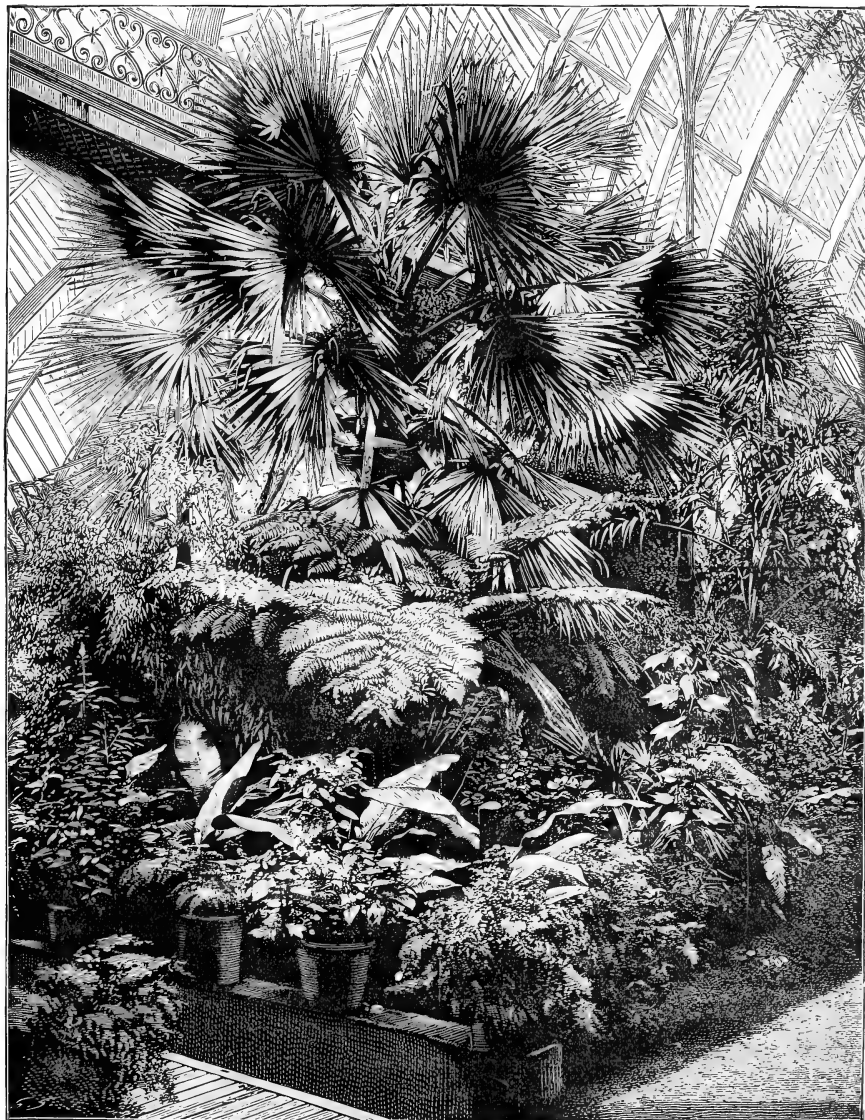


Fig. 112. SABAL BLACKBURNIANA.

very few other plants, while for grandeur and effect, in either conservatories or the show-tent, perfect specimens are unrivalled.

Palms are monocotyledonous plants and, like cereals and bulbs, produce only one seed-leaf. Cycads are dicotyledonous and produce two seed-leaves in the process of germination (see Vol. I., pp. 8—9); yet Cycads are of Palm-like growth, but the flowers and fruits (seeds) are wholly different, as produced in the form of cones; while those of Palms are in drupes—fleshy with seeds in a stone-like covering as in cherries. Hanging bunches of flowers and fruits of Palms have an attractive appearance, the cones of Cycads being more curious than beautiful. The two classes for cultivable purposes will be treated separately. The illustration (Fig. 112) will convey some idea, not only of the stately beauty of *Sabal Blackburniana*, but also of the adaptability of Palms for association with other plants.

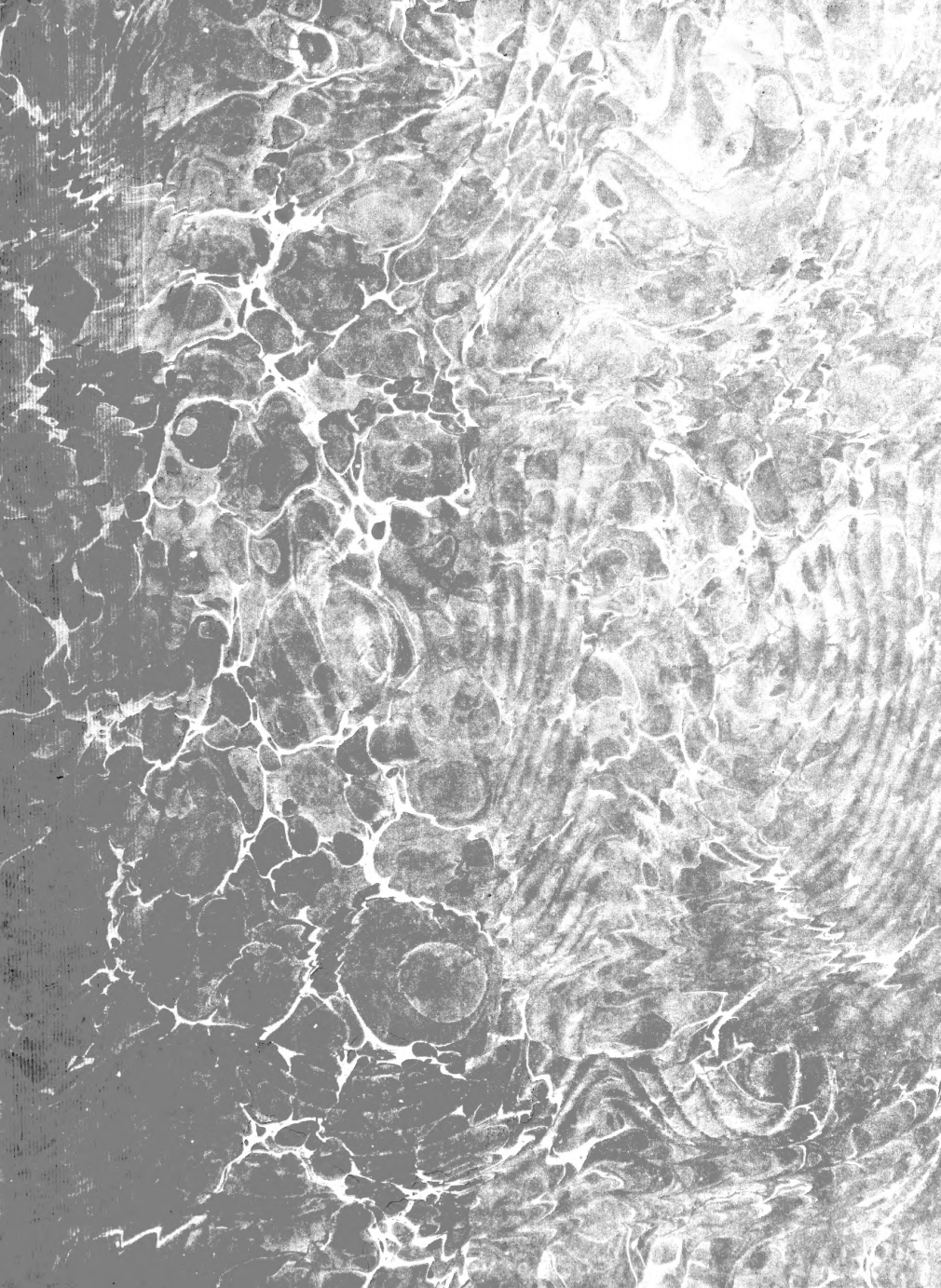
PALMS.

Noble as these plants are when of considerable dimensions, they are, as previously intimated, not less attractive when in a small state. They are raised, grown, and sold in millions for various purposes of decoration, in sizes varying from 6 inches to twice as many feet in height. As a class Palms are comparatively easy to grow, especially if the precaution is taken not to re-pot or re-tub the plants too often; also avoiding giving extra large shifts. In a seedling state progress is frequently slow; but some of them, in later years, grow faster and taller than their owners desire, and are equal to forcing off the glass roofs of the houses containing them. They love shade rather than sunshine and should be kept moist (not saturated) at the roots, allowing them to become very dry during any part of their career proving a costly mistake.

PROPAGATION.—Where suckers form, as they do in the case of a limited number of kinds, these, when large enough, may be detached, each with a few roots, from the old stems, and placed singly in pots just large enough to hold them. They should be kept growing in brisk heat and moist atmosphere, and subsequently treated similarly to seedling plants. The great majority of Palms are raised from imported seed, in several instances in such enormous quantities as to prove a source of considerable profit, notwithstanding the slow progress of some of the young plants.

RAISING SEEDLINGS.—The seed ought to be new, and may be sown at any time in the year, but preferably in February or March. Prepare pans or boxes, 3 or 4 inches deep, by providing effective drainage, and fill them with a mixture of two parts yellow





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