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REPORT ON THE BOTANICAL COLLECTIONS FROM CHRISTMAS ISLAND, Indian Ocean, made by Captain J. P. Maclear, Mr. J. J. Lister, and the Officers of H.M.S. 'Egeria.' By W. BOTTING HEMSLEY, A.L.S.

[Read 21st March, 1889.]

THE principal facts in the present Report have already appeared elsewhere—some in one place, some in another*; but it has nevertheless been thought desirable to bring them together and give a complete list of the plants collected, with their general distribution, similar in form to the reports on the floras of various islands prepared by me for the Botany of the 'Challenger' Expedition, and to that I contributed to the Society's Journal on the Vegetation of Diego Garcia†.

The island now under consideration should not be confounded with another of the same name situated near the equator in mid-Pacific. It lies about 200 miles south of the western end of Java, from which it is separated by a depth of 2450 fathoms; and the Keeling group, 500 miles to the westward, are the nearest islands. The formation appears to be chiefly of coral-limestone, rising in a succession of almost perpendicular cliffs and terraces to an altitude of nearly 1200 feet, and covered almost everywhere with a dense entangled vegetation, including gigantic buttressed trees from 100 to 170 feet high. In shape the island is irregularly four-sided, and some twelve miles in its greatest diameter. Neither running nor stagnant water was found; yet, from the luxuriant vegetation, the rainfall must be considerable and rain frequent.

Captain Wharton quotes largely from an account furnished him by Captain Aldrich, the Commander of the 'Egeria'; and both he and Mr. Lister specially mention large trees. Among the largest are *Inocarpus edulis* and a species of *Eugenia*, which we have not been able to match with any species in the Kew Herbarium, and have not ventured to describe as new, because so

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many of the described Malayan species of this exceedingly large genus are not represented in the herbaria of this country. The trunk of the *Inocarpus* especially is highly curious, and is described in detail by Ellis ('Polynesian Researches') and Seemann ('Flora Vitiensis'); and Mr. Lister brought home sections of a young one in which the three buttress-projections are deeper than the central portion. Captain Aldrich measured one of the largest buttressed trees met with, which was about 800 feet above the sea-level. Outside the buttresses on the ground it was 75 feet in circumference; at 2 feet above the ground 56 feet; from the outer edge of the biggest buttress to the trunk nearly 14 feet, and 15 feet 6 inches to the top of the buttress. This may have been the *Eugenia* in question, as the *Inocarpus* does not appear to attain such large dimensions; or it may have been a fig-tree, though no specimens of any species were collected. That fig-trees exist in the island may almost be taken for granted; because they are among the earliest arboreous colonists in coral islands. There are also very large trees in the island without buttresses; and Captain Aldrich mentions that Lieutenant Baker measured one in the neighbourhood of Flying-fish Cove, which was perfectly straight, and at 4 feet from the ground was 34 feet in circumference. This is probably the tree we have not been able to determine at Kew, and is here doubtfully referred to the *Burseraceæ*.

As Mr. Lister states, a large proportion of the trees bear edible fruits; and there is every reason to suppose that the island has been stocked with plants by winds, carrying the spores of cryptogamous plants, and by birds, carrying the seeds of phanerogamous plants, and to a much smaller extent by ocean-currents. With the exception of two or three spots, the coast consists of overhanging cliffs rising out of deep water, and there is no port or extensive beach; hence there are comparatively few littoral plants. With regard to those plants described as new, it should not be assumed that they are endemic, because so much remains to be done in the investigation of the flora of Java and other islands.

In conclusion, I should add that I have acted as editor rather than author of this Report, though I am responsible for the new species described by myself. The plants were first compared under Professor Oliver's supervision, and a provisional report was furnished by him, the gist of which was that most of the plants could not be exactly matched with their congeners from

Java, but yet do not differ sufficiently to be specifically distinguished—an indication of considerable age of the flora of [the island.

The total number of species enumerated, or mentioned, is 80, namely:—55 flowering plants, 17 vascular cryptogams, and 8 cellular cryptogams. But probably a thorough botanical exploration of the whole island would yield at least double this number.

Enumeration of the Plants.

ANONACEÆ?

A branch bearing two or three leaves may belong to this Order; but it is important to determine it; and it is only mentioned because a specimen of the wood—that of quite a small tree—was sent.

MENISPERMACEÆ.

A branch of a plant of this Order bearing leaves only.

MALVACEÆ.

ABUTILON sp., an var. *A. indicum*? gracillimum, foliis subintegris longe acuminatis.

A. indicum is widely spread in the tropics.

There are imperfect specimens of a second species of this genus.

HIBISCUS TILIACEUS, *Linn.*—One of the commonest sea-coast trees in the tropics, and extending to some subtropical regions, and particularly abundant in Polynesia, reaching the most remote islands.

AMPELIDEÆ.

VITIS PEDATA, *Vahl*?—Widely spread in India and Malaya.

LEEA HORRIDA, *Teysm. & Binnend*?—Java.

BURSERACEÆ?

Arbor grandis, trunco 13 ped. diametro, foliis bipinnatis, foliolis alternis obliquis integris, fructu breviter stipitato lignoso

v. corneo trilobulare, loculis unispermis, seminibus (immaturi tantum visis) exalbuminosis.

In foliage this is very near *Ganophyllum*, Blume; but the fruit is different from that attributed to it in Hooker's 'Icones Plantarum' (t. 1308), and in the absence of flowers its exact position cannot be determined. It does not seem probable that it is a new genus, though we have failed to match it.

LEGUMINOSÆ.

ERYTHRINA, sp. n.?—The material is insufficient for description.

INOCARPUS EDULIS, *Forst.*—A large buttressed tree reaching the summit. Malay Archipelago, New Guinea, and Polynesia eastward to the Marquesas.

The collection contained ripe fruit which has enabled Professor Oliver to correct Gaertner's misconception of the nature of the seed. See Hooker's 'Icones Plantarum,' xix. t. 1837.

COMBRETACEÆ.

TERMINALIA CATAPPA, *Linn.*—A native of tropical Asia, often cultivated for its fruit.

MYRTACEÆ.

EUGENIA, sp.—A large buttressed tree, upwards of 100 feet high.

We have not been able to identify this with any described species; but the material is hardly sufficient for description in so difficult a genus.

BARRINGTONIA RACEMOSA, *Blume.*—A tree about 100 feet high. Southern India, Malaya, and Polynesia.

LYTHRARIÆ.

PEMPHIS ACIDULA, *Forst.*—Tall shrub on the shore. Eastern Africa to Polynesia, and Australia.

CUCURBITACEÆ.

ZEHNERIA MUCRONATA, *Miq.*—India to South China and Malay archipelago.

ARALIACEÆ.

HEPTAPLEURUM ELLIPTICUM, *Seem.*—Creeper from the summit. India, Malaya, and North Australia.

RUBIACEÆ.

RANDIA DENSIFLORA, *Benth.*—Small tree at 600 feet. India, South China, Malaya, and North Australia.

COMPOSITÆ.

BLUMEA SPECTABILIS, *DC.*—North side at an elevation of about 700 feet. Western peninsula of India and Ceylon.

GOODENIACEÆ.

SCÆVOLA KOENIGII, *Vahl.*—Cliffs on the shore. India, Malaya, Australia, and Polynesia.

MYRSINEÆ.

ARDISIA COMPLANATA, *Wall.*—Dwarf tree from the summit. Chittagong, Malay peninsula and archipelago.

SAPOTACEÆ.

SIDEROXYLON SUNDAICUM, *Miq.*—Malay archipelago.

APOCYNACEÆ.

OCHROSIA ACKERINGÆ, *Miq. in Ann. Mus. Bot. Lugd.-Bat.* iv. p. 138 (syn. *Lactaria calocarpa*, *Miq. in Fl. Ind. Bat. Suppl.* i. p. 553, nec *Hassk.*), var. *foliis angustioribus minus obtusis*. Tall tree, from 900 feet to summit.

Sumatra.

The Christmas-Island specimens are quite young flowering branches and detached nearly ripe fruit. The latter is exactly like that on authentically named specimens; but the leaves are thinner as well as narrower, though this is probably due to their very young condition.

ASCLEPIADEÆ.

HOYA ALDRICHII, *Hemsl.*, n. sp.—Affinis *H. cinnamomifolia*, differt foliis quinquenerviis floribus minoribus albidis vel rubris petalis supra pubescentibus.

This species belongs to a small group characterized by the leaves being 3- to 5-nerved longitudinally, all of them natives of the Malayan region. Captain Maclear collected the same plant, but without flowers.

BORAGINEÆ.

CORDIA SUBCORDATA, Lam.—A sea-side and insular tree from Eastern Africa and Malaya to North Australia and throughout Polynesia.

EHRETIA BUXIFOLIA, Roxb.; syn. *E. heterophylla*, Spreng.—Deccan peninsula and Malaya to the Philippines and Formosa.

All the leaves of the Christmas-Island specimens are smooth; in others some of the leaves are smooth and some scabrid on the same shoots.

TOURNEFORTIA ARGENTEA, Linn. f.—A sea-coast plant of tropical Asia, Polynesia, North Australia, and the Mauritius.

SOLANACEÆ.

SOLANUM BIFLORUM, Lour.; syn. *S. decemdentatum*, Roxb., *S. Zollingeri*, Dun., &c.—Malay peninsula and archipelago.

PHYSALIS MINIMA, Linn.—Generally dispersed in tropical countries.

DATURA ALBA, Nees.—Widely spread in tropical countries, though often only as a colonist.

ACANTHACEÆ.

DICLIPTERA MACLEARI, Hemsl., n. sp.—Herba annua, erecta, 1½–2-pedalis, caule tereti viridi minutissime puberulo ramoso ad nodos incrassato, ramulis gracilibus. Folia longe petiolata, membranacea, lanceolata, ovato-lanceolata vel ovato-rhomboida, maxima cum petiolo 6 poll. longa, utrinque valde attenuata, acutissima, glabrescentia, subtus pallidiora; petiolus gracillimus. Cymæ axillares, paucifloræ, brevissime pedunculatæ; bracteæ exteriores aculeiformes, interiores (florales) obovatæ vel obovato-rotundatæ, longe aculeato-cuspidatæ, per paria approximata, bifloræ; bracteolæ angustissimæ calycem superantes. Flores sessiles; calyx 5-partitus, segmentis angustissimis puberulis;

corolla parcissime puberula, fere æqualiter bilabiata, labio superiore integro; stamina 2, exserta, antheris bilocularibus. *Capsula* discoidea, vix sesquilineam diametro, straminea, parce puberula, disperma; semina discoidea, muriculata.

VERBENACEÆ.

CALLICARPA LONGIFOLIA, *Lam.*—From the summit. Malay peninsula and archipelago and North Australia.

TECTONA GRANDIS, *Linn. f.*—The teak is widely spread in India and Malaya.

LABIATÆ.

ANISOMELES OVATA, *R. Br.*—Generally spread in tropical Asia.

NYCTAGINEÆ.

BOERHAAVIA REPANDA, *Willd.*—From the summit. Widely spread in tropical Asia.

PISONIA EXCELSA, *Blume.*—All over the Malay archipelago.

AMARANTACEÆ.

ACHYRANTHES ASPERA, *Linn.*—Warm parts of Asia, Africa, America, E. Australia, and almost throughout Polynesia.

DEERINGIA CELOSIOIDES, *R. Br.*—India, Malaya, Australia, and New Caledonia.

PIPERACEÆ.

PEPEROMIA, sp., an var. *P. LEVIFOLIÆ*, *Miq. ?*—Too young for exact determination. From the summit.

LAURINEÆ.

HERNANDIA OVIGERA, *Linn.*—From the summit. Malaya.

EUPHORBIACEÆ.

EUPHORBIA HYPERICIFOLIA, *Linn.*, var. ?

This has more the habit and glands of *E. Atoto*, *Forst.*, though

in other respects it is nearer *E. hypericifolia*, as defined in Hooker's 'Flora of British India;' and, as there limited, it is dispersed nearly all over the tropics.

CLEIDION JAVANICUM, *Blume*.—India, including the Deccan, Ceylon, and Malaya.

MACARANGA TANARIUS, *Muell. Arg.*—Malay peninsula and archipelago.

URTICACEÆ.

CUDRANIA JAVANICA, *Tréc.*—Eastern Africa, India, Malaya, and Eastern Australia.

LAPORTEA CRENULATA, *Gaud.*—India and Malaya.

FLEURYA RUDERALIS, *Gaud.*—Malay archipelago and Polynesia.

ORCHIDEÆ.

(By R. A. ROLFE, A.L.S.)

PHREATIA LISTERI, *Rolfe*, n. sp.—*Planta* dense cæspitosa, 2½–4 poll. alta. *Folia* anguste linearia, obtusa, basi attenuata, 2–3½ poll. longa, 1½–2 lin. lata, subdisticha. *Scapi* erecti, graciles, 2½–3 poll. longi, bracteis subulato-lanceolatis, 1–1½ lin. longis, floribusque subsessilibus minutissimis. *Sepala* ovata, subacuta, ½ lin. longa. *Petala* sepalis subsimiles, minora. *Labellum* cochleato-ellipticum, concavum, integrum, basi contractum, sepalis paulo longius. *Columna* brevissima. *Capsula* elliptico-oblonga, 1½ lin. longa.—On tree-trunks.

In habit this plant resembles *P. limenophylax*, Benth., from Norfolk Island, and *P. minutiflora*, Lindl., from Borneo, though its leaves are longer than in either. To the latter it is very closely allied, both in the size and structure of its flowers; but in that species the lip is gradually narrowed towards the base. Lindley's drawing represents three linear basal keels, while in the present one the lip narrows very abruptly, and the crest appears to be rather of the nature of a spherical somewhat swollen callus; but this point was difficult to make out in the excessively minute dried flowers. The present species is twice the size of the Bornean one.

PHREATIA CONGESTA, *Rolfe*, n. sp.—*Planta* repens, 4–5 poll.

alta. *Pseudo-bulbus* ovoideo-elongatus, diphyllus. *Folia* anguste linearia, obtusa, basi attenuata, 3-4½ poll. longa, 2-3 lin. lata. *Spicæ* laterales, brevissimæ, subcongestæ, ovoideæ, ¾-1 poll. longæ, bracteis ovato-lanceolatis, floribusque subsessilibus minutissimis. *Sepala* ovato-oblonga, obtusa, ½ lin. longa, trinervia. *Petala* sepalis subsimiles, minora, uninervia. *Labellum* ovatum, subconcauum, integrum, obtusum, trinervium, basi contractum, sepalis paullo brevius. *Columna* brevissima. *Capsula* fusiformi-oblonga, 2½ lin. longa.—From high tree-trunks.

A markedly distinct species, though its relationship to *P. contracta*, Miq., may be closer than can be determined from Miquel's imperfect description.

DORITIS, sp. n.? (specimina fructifera tantum adsunt).—On tree-trunks on the ridge or highest part of the hill above Flying-Fish Cove.

PALMÆ.

DIDYMOSPERMA, sp.—On sea-shore.

There are good specimens of this palm or palms, though the fruit is wanting; but there is a little uncertainty about the leaves belonging to the same species as the inflorescence. Except in size, it does not differ materially from *D. porphyrocarpa*. Mr. Lister appears to have been of the opinion that the specimens represent two species; it seems probable, however, that they are male and female of the same species.

PANDANEÆ.

PANDANUS, spp.—There are incomplete specimens of three species in the collection, one of which, having thin, almost flaccid leaves, is said to form a thicket some 10 feet high on the edge of the shore.

CYPERACEÆ.

FIMBRISTYLIS CYMOSA, R. Br.—Java to Australia and the Sandwich Islands; but, as understood by some botanists, it has a much wider range.

GRAMINEÆ.

ISCHÆMUM MURINUM, *Forst.*—Malaya and Polynesia.

ERAGROSTIS PLUMOSA, *Link.*—India, China, and Malaya.

FILICES.

(By J. G. BAKER, F.R.S.)

DAVALLIA SOLIDA, *Swartz.*—Tropics of the Old World.

DAVALLIA DISSECTA, *J. Sm.*—Malay Archipelago.

ASPENIUM NIDUS, *Linn.*—Warm regions of the Old World.

ASPENIUM FALCATUM, *Lam.*—Warm regions of the Old World.

ASPENIUM (§ EUASPENIUM) CENTRIFUGALE, *Baker*, n. sp.—*A.* caudice erecto, stipitibus brevibus brunneo-viridibus parce paleaceis, paleis basalibus lanceolatis membranaceis, frondibus glabris viridibus oblongo-lanceolatis, pinnis multijugis contiguis petiolatis inæquilateraliter oblongo-lanceolatis profunde pinna-tifidis basi anteriore cuneatis basi posteriore cuneato-truncatis, venis flabellatis, soris brevibus supra medium venarum impositis, indusio firmulo persistente.

A near ally of the Himalayan *Asplenium laciniatum*, Wall., from which it differs in the position of the sori, which are placed almost entirely in the lobes of the pinnae above the middle of the veins, leaving the central entire portion of the pinna sterile. Stipes 2-3 in. long. Lamina 4-5 in. long, 1½-2 in. broad. Central pinnae the longest, an inch long by ¼-⅓ in. broad. Sori ⅛-⅙ in. long.

NEPHRODIUM TRUNCATUM, *Presl.*—Tropics of the Old World.

NEPHRODIUM SYRMATICUM, *Baker.*—Tropical Asia.

NEPHRODIUM INTERMEDIUM, *Baker.*—Tropical Asia.

ASPIDIUM MEMBRANACEUM, *Hook.*—India and China.

NEPHROLEPIS ACUTA, *Presl.*—Cosmopolitan in the tropics.

NEPHROLEPIS RAMOSA, *Moore.*—Tropics of the Old World.

POLYPODIUM ADNASCENS, *Swartz.*—Tropical Asia.

POLYPODIUM IRIOIDES, *Lam.*—Tropics of the Old World.

VITTARIA ELONGATA, *Swartz.*—Tropics of the Old World.

ACROSTICHUM FLAGELLIFERUM, *Wall.*—Tropical Asia.

ACROSTICHUM (§ GYMNOPTERIS) LISTERI, *Baker*, n. sp.—*A.* rhizomate late repente crassitie cygni pennæ, stipitibus sterilibus elongatis subnudis haud contiguis, frondibus lanceolatis membranaceis acutis basi attenuatis, venis primariis perspicuis parallelis, intermediis in areolas copiosas hexagonas anastomosantes venulis liberis inclusis productis, frondibus fertilibus linearibus stipitibus longioribus.

A well-marked new species, allied to the Himalayan, Ceylonese, and Malayan *A. variable*, Hook. Stipes of the sterile frond 7–8 inches long. Sterile frond 9–12 in. long, 2 in. broad, narrowed gradually to the apex and more suddenly to the base. Fertile frond 4–5 in. long, under $\frac{1}{2}$ in. broad at the middle, narrowed gradually to both ends.

LYCOPODIACEÆ.

LYCOPODIUM PHLEGMARIA, *Linn.*—Tropics of the Old World.

MUSCI.

(By C. H. WRIGHT.)

NECKERA LEPINEANA, *Mont.*—Malay archipelago and Polynesia.

THYRIDIDIUM FASCICULATUM, *Mitt.*—Malay archipelago, Polynesia, Chili.

HEPATICÆ.

PTYCHANTHUS SQUARROSUS, *Mont.*—Tasmania, Fiji.

LEJEUNIA SERPYLLIFOLIA, *Libert.*—Europe, India, Socotra, tropical and South Africa, North and South America, and Australasia.

LICHENES.

USNEA TRICHODEA, *Ach.*—Very widely spread in the tropics, and extending into some temperate regions.

FUNGI.

(By Dr. M. C. COOKE.)

POLYPORUS (§ FOMES) AUSTRALIS, *Fries.*—Warm regions of both hemispheres.

POLYPORUS (§ FOMES) CONCHATUS, *Fries.*—Europe, Asia, Australasia, North and South America.

STEREUM LOBATUM, *Kunze.*—Warm regions of both hemispheres.

STUDIES IN VEGETABLE BIOLOGY.—V. *Apiocystis* a *Volvocinea*,
a Chapter in Degeneration. By SPENCER LE M. MOORE,
F.L.S.

[Read 20th December, 1888.]

(PLATES LIV.—LVI.)

INTRODUCTORY.—During the autumn of 1885 I chanced, while examining some Algæ from a pond at Lee, to come upon a type then believed to be undescribed. This organism was bottle-shaped or pyriform, the narrow end attached almost exclusively to threads of *Cladophora fracta*, Kuetz., but occasionally to those of *Mesocarpus Pleurocarpus*, De Bary, as well. In its earliest stage it consisted of a colourless sac containing a single gonidium, from the distal end of which proceeded two cilia having the remarkable property of piercing the parent wall, and extending therefrom some distance into the surrounding water. This gonidium divided, the successively formed daughter cells following suit, while the parent wall grew coincidentally, and eventually appeared as a large sac (zoosporangium) with upwards of a hundred biciliated gonidia ranged upon its wall. Being acquainted with the rare type called by Naegeli *Apiocystis Brauniana*, which I had been fortunate in finding several years previously, the resemblance between that and the ciliated organism was at once seen; but the protruding cilia prevented recognition of identity, as they seemed to point to a volvocineous affinity by arguing the intercalation of a cœnobial phase or phases. At the time above mentioned but scant opportunity offered for studying the life-history of the supposed novelty. However, in the spring of this year I again had the

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BURSERACEJE P

Arbor gaudis, trunco 13 ped. diametro, foliis bipinnatis, foliolis alternis obliquis integris, fructu breviter stipitato lignoso

v. corneo trilqulare, loculis unispermis, seminibus (immaturi tantum visis) exalbuminosis.

In foliage this is very near *Ganophyllum*, Blume; but the fruit is different from that attributed to it in Hooker's 'Icones Plantarum' (t. 1308), and in the absence of flowers its exact position cannot be determined. It does not seem probable that it is a new genus, though we have failed to match it.

LEGUMINOS1E.

ERYTHRINA, sp. n. ?-The material is insufficient for description.

INOCARPUS EDULIS, Forst.-A large buttressed tree reaching the summit. Malay Archipelago, New Guinea, and Polynesia eastward to the Marquesas.

The collection contained ripe fruit which has enabled Professor Oliver to correct Gaertner's misconception of the nature of the seed. See Hooker's 'Icones Plantarum,' xix. t. 1837.

COMBRETACEAE.

TERMINALIA CATAPPA, Linn.-A native of tropical Asia, often cultivated for its fruit.

MYRTACE1E.

EUGENIA, sp.-A large buttressed tree, upwards of 100 feet high.

We have not been able to identify this with any described species; but the material is hardly sufficient for description in so difficult a genus.

BARRINGTONIA RACEMOSA, Blume.-A tree about 100 feet high. Southern India, Malaya, and Polynesia.

LYTHRARIEE.

PEMPHIS ACIDULA, Eorst.-Tall shrub on the shore. Eastern Africa to Polynesia, and Australia.

CUCURBITACEE.

ZEHNEIRIA MUCRONATA, Miq.-India to South China and Malay archipelago.

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COLLECTTIONS FROM CIRTSTMAS ISLAND.

ARALIACEE.

UI EPTAPLEURUM• ELLIPTICTUM, Seemr.-Creeper from the summit.
India, Malaya, and North Australia.

RUBIACEE.

RANDIA DENRTRLOIA, Benth.--Small tree at 600 feet. India,
South China, Malaya, and North Australia.

COMPOSITE.

BLUMSA SPEC ABI RLIS, DO.-North side at an elevation of about
700 feet. Western peninsula of India and Ceylon.

GOODENIACEE.

SCAEVOLA KOENIGII, Vahl.-Cliffs on the shore. India, Malaya,
Australia, and Polynesia.

MYRSINEAE.

ARDISIA COMPLANATA, Wall.-Dwarf tree from the summit.
Chittagong, Malay peninsula and archipelago.

SAPOTACEAE.

SIDEROXYLON SUNDATCUM, Miq.-Malay archipelago.

APOCYNACEE.

Ocotea ACKERTINGAE, Miq. in Ann. Mus. Bot. Lugd.-Bat. iv.
p. 138 (syn. *Lactaria calocarpa*, Miq. in Fl. Ind. Bat. Suppl. i.
p. 553, n. Hassk.), var. *foliis angustioribus minus obtusis*. Tall
tree, from 900 feet to summit.

Sumatra.

The Christmas-Island specimens are quite young flowering
branches and detached nearly ripe fruit. The latter is exactly
like that on authentically named specimens; but the leaves are
thinner as well as narrower, though this is probably due to their
very young condition.

ASCLEPIADEAE.

HOTA ALDRICHTI, Hemsl., n. sp.-Affinis *H. cinnamomifolice*,
differt foliis quinque nerviis floribus minoribus albidis vel rubris
petalis supra pubescentibus.

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This species belongs to a small group characterized by the leaves

being 3- to 5-nerved longitudinally, all of them natives of the Malayan region. Captain Maclear collected the same plant, but without flowers.

BO RAGINEAE.

Cordia subcordata, Lam.-A sea-side and insular tree from Eastern Africa and Malaya to North Australia and throughout Polynesia.

Ehretia buxifolia, Roxb.; syn. *E. heterophylla*, Spreng.-Deccan peninsula and Malaya to the Philippines and Formosa.

All the leaves of the Christmas-Island specimens are smooth ; in others some of the leaves are smooth and some scabrid on the same shoots.

Tournefortia argentea, Linn. f.-A sea-coast plant of tropical Asia, Polynesia, North Australia, and the Mauritius.

SOLANACEAE.

Solanum biflorum, Lour.; syn. *S. decemdentatum*, Roxb., *S. Zollingeri*, Dun., &c.-Malay peninsula and archipelago.

Phyalis minima, Linn.--Generally dispersed in tropical countries.

Datura alba, N.ees. -Widely spread in tropical countries, though often only as a colonist.

ACANTHACEAE.

Dicliptera maclearii, n. sp.--Herba annua, erecta, 11-2-pedalis, caule tereti viridi minutissime puberulo ramoso ad nodos incrassato, ramulis gracilibus. Folia longe petiolata, membranacea, lanceolata, ovato-lanceolata vel ovato-rhomboida, maxima cum petiolo 6 poll. longa, utrinque valde attenuata, acutissima, glabrescentia, subtus pallidiora; petiolus gracillimus. Cymae axillares, pauciflorae brevissime pedunculatae; bractea exteriores aculeiformes, interiores (florales) obovata vel obovato-rotundatae, longe aculeato-cuspidatae, per paria approximate, biflorae; bracteolae angustissime calycem superantes. Flores sessiles; calyx 5-partitus, segmentis angustissimis puberulis;

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COLLECTIONS FROM CHRISTMAS ISLAND.

corolla parvissime puberula, fere aequaliter bilabiata, labio superiore integro; stamina 2, exserta, antheris bilocularibus. Capsula discoidea, vix sesquiliueam diametro, straminea, parce puberula,

disperma; semina discoidea, muriculata.

VERBENACE..

CALLICARPA LONGIFOLTA, Lam.-From the summit. Malay peninsula and archipelago and North Australia.

TECTONA GRANDIS, Linn. f.-The teak is widely spread in India and Malaya.

LABIATIE.

ANISOMELES OVATA, R. Br.-Generally spread in tropical Asia.

NYCTAGINEZE.

BOERHAAVIA REPANDA, Willd.-From the summit. Widely spread in tropical Asia.

PISONIA EXCELSA, Blume.-All over the Malay archipelago.

AMARANTACEAE.

ACHYRANTIEES ASPERA, Linn.-Warm parts of Asia, Africa, America, E. Australia, and almost throughout Polynesia.

DEERINGIA CELOSIOIDES, R. Br.-India, Malaya, Australia, and New Caledonia.

PIPERACEE.

PEPEROMIA, sp., an var. P. LIEVIFOLIE, Miq. ?-Too young for exact determination. From the summit.

LAURINEE.

HERNANDIA OVIGERA, Linn.-From the summit. Malaya.

EUPHORBIACEE.

EUPHORBIA HYPERICIFOLIA, Linn., var. ?

This has more the habit and glands of E. Atoto, Forst., though

2c2

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in other respects it is nearer E. hypericifolia, as defined in Hooker's 'Flora of British India;' and, as there limited, it is dispersed nearly all over the tropics.

CLEIDION JAVANICUM, Blume.-India, including the Deccan, Ceylon, and Malaya.

MACARANGA TANARINS, Miell. Arg.--Malay peninsula and archipelago.

URTICACEAE.

CUDRANIA JAVANICA, Trec.-Eastern Africa, India, Malaya, and Eastern Australia.

LAPORTEA CREMULATA, Gaud.-India and Malaya.

FLEURYA RUDERALIS, Gaud.-Malay archipelago and Polynesia.

ORCHIDACEAE.

(By B. A. ROLFE, A.L.S.)

PHREATIA LITSEI, Rolfe, n. sp.-Planta dense caespitosa, 21-4 poll. alta. Folia anguste linearia, obtusa, basi attenuata, 2-31 poll. longa, 12-2 lin. lata, subdisticha. Scapi erecti, graciles, 24-3 poll. longi, bracteis subulato-lanceolatis, 1-12 lin. longis, floribusque subsessilibus minutissimis. Sepala ovata, subacuta, 9 lin. longa. Petala sepalis subsimiles, minora. Labellum cochleato-ellipticum, concavum, integrum, basi contractum, sepalis paullo longius. Columna brevissima. Capsula elliptico-oblonga, 11 lin. longa.-On tree-trunks.

In habit this plant resembles *P. limenophylax*, Benth., from Norfolk Island, and *P. minutiflora*, Lindl., from Borneo, though its leaves are longer than in either. To the latter it is very closely allied, both in the size and structure of its flowers; but in that species the lip is gradually narrowed towards the base. Lindley's drawing represents three linear basal keels, while in the present one the lip narrows very abruptly, and the crest appears to be rather of the nature of a spherical somewhat swollen callus; but this point was difficult to make out in the excessively minute dried flowers. The present species is twice the size of the Bornean one.

PHREATIA CONGESTA, Rolfe, n. sp.-Planta repens, 4-5 poll.

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COLLECTIONS FROM CHRISTMAS ISLAND.

alta. Pseudo-bulbus ovoideo-elongatus, diphyllus. Folia anguste linearia, obtusa, basi attenuata, 3-4 poll. longa, 2-3 lin. lata. Spica laterales, brevissime, subcongestas, ovoideae, 1-1 poll. longae, bracteis ovato-lanceolatis, floribusque subsessilibus minutissimis. Sepala ovato-oblonga, obtusa, 2 lin. longa, trinervia. Petala sepalis subsimiles, minora, uninervia. Labellum ovatum, subconcavum, integrum, obtusum, trinervium, basi contractum, sepalis paullo brevius. Columna brevissima. Capsula fusiformi-oblonga, 22 lin. longa.-From high tree-trunks.

A markedly distinct species, though its relationship to *P. contracta*, Miq., may be closer than can be determined from Miquel's

imperfect description.

DORITIs, sp. n.? (specimina fructifera tantum adsunt).-On tree-trunks on the ridge or highest part of the hill above Flying-Fish Cove.

PALME.

DIDYMOSPEiMA, sp.-On sea-shore.

There are good specimens of this palm or palms, though the fruit is wanting; but there is a little uncertainty about the leaves belonging to the same species as the inflorescence. Except in size, it does not differ materially from *D. porphyrocarpa*. Mr. Lister appears to have been of the opinion that the specimens represent two species; it seems probable, however, that they are male and female of the same species.

PANDANEA~.

PAINDAVS, spp.-There are incomplete specimens of three species in the collection, one of which, having thin, almost flaccid leaves, is said to form a thicket some 10 feet high on the edge of the shore.

CYPERA CE.E.

FIMaRISTYLTs CYMOSA, R. Br.-Java to Australia and the Sandwich Islands; but, as understood by some botanists, it has a much wider range.

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GRAMINEAE.

Isch.EMx MTRuINuJ, Forst.-Malaya and Polynesia.

EIAOROSTIS PLUMOSA, link.-India, China, and Malaya.

FILICES.

(By J. G. BAKER, F.R.S.)

DAVALLIA SOLIDA, Swartz.-Tropics of the Old World.

DAVALLIA DISSECTA, J. Sm.-Malay Archipelago.

ASPENIUM NIDUs, Linn.-Warm regions of the Old World.

ASPENIUM FALCATUM, Lam.-Warm regions of the Old World.

ASPENIUM (EUASPENIUM) CENTBIFUGALE, Baker, n. sp.-

A. caudice erecto, stipitibus brevibus brunneo-viridibus parce paleaceis, paleis basalibus lanceolatis membranaceis, frondibus glabris viridibus oblongo-lanceolatis, pinnis multijugis contiguis petiolatis inaequaliter oblongo-lanceolatis profunde pinnatifidis basi anteriore cuneatis basi posteriore cuneato-truncatis, venis flabellatis, soris brevibus supra medium venarum impositis, indusio firmulo persistente.

A near ally of the Himalayan *Asplenium laciniatum*, Wall., from which it differs in the position of the sori, which are placed almost entirely in the lobes of the pinna above the middle of the veins, leaving the central entire portion of the pinna sterile.

Stipes 2-3 in. long. Lamina 4-5 in. long, 1--2 in. broad.

Central pinnae the longest, an inch long by 4-- in. broad. Sori 1/2 - in. long.

IEPIRODIUM TRUNCATUM, Presl.-Tropics of the Old World.

RNEPIODIUM STMTICUM, Baker.-Tropical Asia.

NEPHMRODIUM INTERMEDIUM, Baker.-Tropical Asia.

ASPIDIUM MEMBRANACEUM, Hook.-India and China.

NEPHELEPIS ACUTA, Presl.-Cosmopolitan in the tropics.

FERNUM OLEIS RAMOSA, Moore.-Tropics of the Old World.

Polypodium A-nasclis, Swartz.-Tropical Asia.

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COLLECTIONS FROM CHRISTMAS ISLAND.

POLYPODIUM IRIOIDES, Lam.-Tropics of the Old World.

VITTATA ELONGATA, Swartz.-Tropics of the Old World.

ACROSTICHUM FLAGELLIFERUM, Wall.-Tropical Asia.

ACROSTICHUM (GYMNOPTERIS) LISTERI, Baker, n. sp.-A. rhizomate late repente crassitie cygni pennae, stipitibus sterilibus elongatis subnudis haud contiguis, frondibus lanceolatis membranaceis acutis basi attenuatis, venis primariis perspicuis parallelis, intermediis in areolas copiosas hexagonas anastomosantes venulis liberis inclusis productis, frondibus fertilibus linearibus stipitibus longioribus.

A well-marked new species, allied to the Himalayan, Ceylonese, and Malayan *A. variabile*, Hook. Stipes of the sterile frond 7-8 inches long. Sterile frond 9-12 in. long, 2 in. broad, narrowed gradually to the apex and more suddenly to the base. Fertile frond 4-5 in. long, under 2 in. broad at the middle, narrowed gradually to both ends.

LYCOPODIACEE.

LYCOPODIUM PHLEGMARIA, Linn.-Tropics of the Old World.

MUSCI.

(By C. H. WRIGHT.)

NECKERA LEPINEANA, Mont.-Malay archipelago and Polynesia.

TRICHODIA FASCICULATUM, Mitt.-Malay archipelago, Polynesia, Chili.

HEPATICAE.

PTYCHIA TANTILLI, Mont.-Tasmania, Fiji.

LEJEUNIA SERPYLLIFOLIA, Libert.-Europe, India, Socotra, tropical and South Africa, North and South America, and Australasia.

LICHENES.

USNEA TRICHODEA, Ach.-Very widely spread in the tropics, and extending into some temperate regions.

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MR. S. LE M. MOORE'S STUDIES

FUNGI.

(By Dr. M. C. COOKE.)

POLYPODIA (FOMES) AUSTRALIS, Fries.-Warm regions of both hemispheres.

POLYPODIA (FOMES) CONCHATUS, Fries.-Europe, Asia, Australasia, North and South America.

STEREUM LOBATUM, Kunze.-Warm regions of both hemispheres.

STUDIES IN VEGETABLE BIOLOGY.-V. Apicomycetes and Algae, a Chapter in Degeneration. By S. LE M. MOORE, F.L.S.

[Read 20th December, 1888.]

(PLATES LIV.-LVI.)

INTRODUCTORY.-During the autumn of 1885 I chanced, while examining some Algae from a pond at Lee, to come upon a type then believed to be undescribed. This organism was bottle-shaped or pyriform, the narrow end attached almost exclusively to threads of Cladophorafracta, Kuetz., but occasionally to those of MAesocarpus Pleurocarpus, De Bary, as well. In its earliest stage it consisted of

a colourless sac containing a single gonidium, from the distal end of which proceeded two cilia having the remarkable property of piercing the parent wall, and extending therefrom some distance into the surrounding water. This gonidium divided, the successively formed daughter cells following suit, while the parent wall grew coincidentally, and eventually appeared as a large sac (zoosporangium) with upwards of a hundred biciliated gonidia ranged upon its wall. Being acquainted with the rare type called by Naegeli *Apicystis Brauniana*, which I had been fortunate in finding several years previously, the resemblance between that and the ciliated organism was at once seen; but the protruding cilia prevented recognition of identity, as they seemed to point to a volvocineous affinity by arguing the intercalation of a cenobial phase or phases. At the time above mentioned but scant opportunity offered for studying the life-history of the supposed novelty. However, in the spring of this year I again had the