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JOURNAL *e*

OF

THE PROCEEDINGS

OF

n
THE LINNEAN SOCIETY.

ZOOLOGY.



VOL. I.

LONDON:

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AND

WILLIAMS AND NORGATE.

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PROCEEDINGS

OF THE

LINNEAN SOCIETY OF LONDON.

November 6th, 1855.

Thomas Bell, Esq., President, in the Chair.

Mr. Ward, F.L.S., exhibited a fine growing specimen of *Holcus saccharatus*, Ard., raised in a closed case in January, and planted out on a bank in his garden when about 10 inches high.

Mr. Westwood, F.L.S., presented a fruit of *Luffa Ægyptiaca*, Mill., a plant cultivated in all warm countries, and commonly called the *Towel-gourd*. The specimen presented was dried, like those so frequently seen in collections, with the pulp washed out; but was remarkable as being part of a cargo imported from the West Indies for the purpose of paper-making. The beautiful network fibre is also bleached and made into picture-frames, basket-work, reticules, &c.

Mr. Westwood also presented an abnormal growth of the *Asparagus officinalis*, L., from his garden at Hammersmith, in which the flattened stem, not thicker than a card, had attained a width of an inch and a half.

Read an Extract from a Letter addressed by Thomas Shearman Ralph, Esq., A.L.S., to Mr. Kippist, "On the Kâtëpo, a supposed
LINN. PROC.

poisonous Spider of New Zealand." (See "Zoological Proceedings," p. 1.)

The reading of Mr. Ralph's letter was followed by a conversation on the habits of spiders generally, and especially on those of *Argyroneta aquatica*.

Mr. Ralph also presented specimens of several microscopic objects, including the tongue and tooth of a leathery species of *Chiton*, and the sting of a Mosquito opened out. The latter he describes as follows: "A sheath, which is open anteriorly, and has also the property of being bent at a right angle to allow of the deep insertion of the sucking-tube, which is yellow, is furnished on either side with two fine lancet-shaped instruments, having their tips serrated, and also with a third, apparently placed anterior to the sucking-tube, and constituting a true lancet, by means of which the first puncture is made; the tube and jaws enter together, the latter following up the work of the lancet."

November 20th, 1855.

Thomas Bell, Esq., President, in the Chair.

Read "Remarks on some habits of *Argyroneta aquatica*," by the President. (See "Zoological Proceedings," p. 3.)

Read also a Paper "On some new species of *Chamælaucicæ*," by Dr. C. F. Meisner. (See "Botanical Proceedings," p. 35.)

Dr. Meisner's Paper was followed by a "Notice of two apparently undescribed species of *Genetyllis*, from S.W. Australia," by Richard Kippist, Esq., Libr. L.S. (See "Botanical Proceedings," p. 48.)

December 4th, 1855.

Thomas Bell, Esq., President, in the Chair.

John Francis Champion, Esq., Daniel Hanbury, Esq., Robert Hulme, Esq., John Lee, Esq., LL.D., Lester Lester, Esq., and James Townley, Esq., were elected Fellows.

Read Extracts from two Letters addressed to the President by Henry Evans, Esq., of Darley Abbey, near Derby, giving an account of his experience in shooting Seals on the coast of Ireland, and noticing the occurrence in the neighbourhood of Roundstone, near Clifden, of the Harp-Seal, *Phoca Grælandica*, L.

Read also "Observations upon *Mystropetalum* and *Cynomorium*," being a continuation of Dr. J. D. Hooker's Memoir "On the Structure and Affinities of *Balanophoræ*," read during the last Session, and ordered for publication in the "Transactions."

December 18th, 1855.

Thomas Bell, Esq., President, in the Chair.

William Archer, Jun., Esq., and William Dickinson, Esq., were elected Fellows.

Mr. W. Pamplin, A.L.S., exhibited some living specimens of the Water-spider (*Argyroneta aquatica*).

Prof. Bentley, F.L.S., exhibited the following specimens:—1st. A fasciated branch of the *Larix europæa*, Dec. 2nd. A cluster of flowers of the *Tanacetum vulgare*, in which some of the plants had acquired an abnormal development apparently from the attack of insects. 3rd. A monstrosity of the *Papaver bracteatum*, Lindl., in which the stamens showed a gradual transition into pistils. This he considered a very interesting specimen, as no such transitions occur naturally between these organs, although such are common between stamens and petals. In this specimen the abnormal bodies in some cases exhibited partially developed anthers containing pollen on their outer surface, while their inner bore numerous ovules. Prof. Bentley stated that he had observed the flowers of the plant from which his specimen had been taken to exhibit the above peculiarity for two seasons successively; and he thought therefore that it was probable such a variety would become permanent.

Dr. J. D. Hooker, F.L.S., read a "Note on some species of West Indian Seeds washed up on the coast of South Wales."

Read a Paper "On a new genus of Ferns;" by Thomas Moore, Esq., F.L.S. &c.

The reading was commenced of a Paper "On the Natural History of the Glowworm (*Lampyrus noctiluca*, L.);" by the late George Newport, Esq., F.R.S., F.L.S. &c. Prepared from the Author's MS. by Prof. Ellis of University College. (See "Zoological Proceedings," p. 40.)

January 15th, 1856.

Thomas Bell, Esq., President, in the Chair.

Nathaniel H. Mason, Esq., John R. Mummery, Esq., and R. J. Shuttleworth, Esq., were elected Fellows.

The Rev. C. A. Johns, F.L.S., exhibited a drawing, and a specimen in spirit, of the *Sphaeria militaris*, found by him in June last, growing upon a chrysalis among dead leaves, in Buckley Vale, Devon.

Mr. William Matchwick, with the permission of the President, exhibited specimens of the fruit, and a tracing of the leaf, of *Paulownia imperialis*, gathered by him on the 18th ult. in the neighbourhood of the Champs Elysées, Paris, where the fruit had ripened in the open air, on a tree about 20 ft. high.

Mr. W. W. Saunders, F.R.S., F.L.S. &c., exhibited several specimens of a kind of insect-wax, and of several vegetable substances, collected by Mr. R. W. Plant in Natal; and read the following extract from Mr. Plant's letter relating to them, dated Natal, 15th August 1855:—

"Loose in the box you will find some berries (*Atumber*). The outer covering contains tannin of great strength, and excellent ink is made of them. The kernel yields oil, but of its quality or quantity I cannot speak. I have also sent a small parcel of insect-wax (*Gian*), which, if it does not compete with that of China, may have peculiarities of its own worth knowing. It is in extensive use among the Kaffirs for a very singular purpose. Every man taking a wife is distinguished by wearing a coronet,

formed by twisting the hair on the crown of his head into an oval ring by means of this wax, which, when finished, has much the appearance of a ring of india-rubber, and as it is never covered either from heat or moisture, and the man is never afterwards without this ornament, the wax must have some very enduring properties.

“There is also included a sample of three or four kinds of indigenous medicines. The first is a species of *Polygala*, which has been used with success by some of our doctors as a substitute for the *Radix serpentaria* of the West. No. 2 is our sarsaparilla. No. 3 I take to be colocynth. No. 4 is called by the natives Maundi, and it is from the Amatinga country, where it is held as a specific for the relief of sun-stroke. No. 5 (*Tambesi*) is the tooth-ache plant, known, I believe, on the Cape frontiers. I am assured by those who have used it, that a piece of the root rubbed upon the gums will loosen any tooth, so that the vilest may be removed.”

Read, a “Note on *Lepidosiren annectens*,” by Edward Newman, Esq., F.L.S.

Read also, a “Note on a supposed species of *Pelopæus*,” by E. Newman, Esq., F.L.S. (See “Zoological Proceedings,” p. 39.)

Read further, “A Catalogue of the Dipterous Insects collected by Mr. Wallace in the Malay Peninsula,” by Francis Walker, Esq., F.L.S.; with a Preface by W. W. Saunders, Esq., F.R.S., F.L.S. &c. (See “Zoological Proceedings,” p. 4.)

February 5th, 1856.

Thomas Bell, Esq., President, in the Chair.

Henry Christy, Esq., and Alexander Goodman More, Esq., were elected Fellows.

Read, a “Notice of the habits of *Atypus Sulzeri*, Latr.,” by Edward Newman, Esq., F.L.S. &c.; intended for publication elsewhere.

Read also, a "Note on a Fungus found imbedded in the Fens of Cambridgeshire;" by the Rev. M. J. Berkeley, F.L.S. &c. (See "Botanical Proceedings," p. 52.)

Read further, the commencement of a Paper, entitled "Notes on *Loganiaceæ*;" by George Bentham, Esq., F.L.S. &c. (See "Botanical Proceedings," p. 53.)

February 19th, 1856.

Robert Brown, Esq., V.P., in the Chair.

Albert Hambrough, Esq., and the Rev. Charles Popham Miles, were elected Fellows.

Read, a "Note on the quantity of Tannin in the Gall of *Cynips Quercus-Petioli*;" by Edward Hart Vinen, Esq., M.D., F.L.S.

Read also, a "Description of a new species of *Paussus* from Tropical Africa;" by John O. Westwood, Esq., F.L.S.

Read further, the completion of Mr. Bentham's "Notes on *Loganiaceæ*," the reading of which was commenced at the last Meeting.

ADDITIONS

TO THE

LIBRARY OF THE LINNEAN SOCIETY.

RECEIVED FROM JUNE 20, 1855, TO DECEMBER 31, 1855.

[Continued from page 345 of Vol. XXI. of the Society's Transactions.]

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ACADEMIES and SOCIETIES.	
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Verein zur Beförderung des Gartenbaues in den K. Preussischen Staaten. Verhandlungen, Neue Reihe, jahrg. 2, Juli-Dec. 1854. Berlin, 1855, 8vo.	THE SOCIETY.
Bonn :—Naturhistorischer Verein. Verhandlungen, jahrg. 1-5, 7-11, & 12, heft 1 & 2. Bonn, 1844-55, 8vo.	THE SOCIETY.

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Report of the Meeting held in the Council Hall of Glasgow, Nov. 22, 1855, for concluding the transactions connected with the recent Meeting of the British Association in that city. Glasgow, 1855, 8vo.

W. GOURLIE, Esq., F.L.S.

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| Denkschriften. Mathematisch - naturwissenschaftliche Classe, band 1-9. Wien, 1850-55, 4to. | |
| Sitzungsberichte. Mathem.-nat. Classe, band 1-15, and band 16, heft 1. <i>Ib.</i> 1848-55, 8vo. | |
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| K. K. Geologische Reichsanstalt. Jahrbuch. Jahrg. 5, nos. 3 & 4. Wien, 1854, 8vo. | THE INSTITUTE. |
| Zoologisch-botanischer Verein. Verhandlungen, band 3 & 4. Wien, 1853–54, 8vo. | THE ASSOCIATION. |
| Washington :—Smithsonian Institution. | |
| Contributions to Knowledge, vol. 7. Washington, 1855, 4to. | |
| Annual Reports (8 & 9) of the Board of Regents. <i>Ib.</i> 1854–55, 8vo. | |
| Report on the Fishes of the New Jersey Coast ; by S. F. Baird. <i>Ib.</i> 1855, 8vo. | |
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| | THE AUTHOR. |
| Bate (C. S.) On the Homologies of the Carapace, and on the Structure and Functions of the Antennæ in Crustacea. London, 1855, 8vo. | |
| | THE AUTHOR. |
| Bekker (E.) Der Stachel der Löwen an dessen Schweif-ende. Darmstadt, 1855, 8vo. | |
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| | THE AUTHOR. |

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| Burmeister (H.) Systematische Uebersicht der Thiere Brasiliens, theil 1, and theil 2, heft 1. Berlin, 1854-55, 8vo. | THE AUTHOR. |
| Cullen (W.) Lectures on the Practice of Physic; digested by W. Withering, 1768. MS. fol. | |
| | HENRY LEE, Esq., M.D., F.L.S. |
| Dana (J. D.) United States Exploring Expedition during the years 1838-42, under the command of Charles Wilkes, U.S.N., vol. 13.—Crustacea, parts 1 & 2, 4to (with folio Atlas of plates). Philadelphia, 1852. | THE AUTHOR. |
| Darwin (C.) Monograph of the sub-class Cirripedia; with figures of all the species.—Balanidæ, &c. London, 1854, 8vo. | |
| | RICHARD KIPPIST, Libr. L.S. |
| DeCandolle (A.) Géographie Botanique raisonnée. 2 tomes. Paris, 1855, 8vo. | THE AUTHOR. |
| Dowden (R.) Walks after Wild Flowers; or the Botany of the Bohereens. London, 1852, 12mo. | THE AUTHOR. |
| Ellesmere (Earl of) Address at the Anniversary Meeting of the Geographical Society, May 28, 1855. London, 1855, 8vo. | |
| | Dr. NORTON SHAW. |
| Harvey (W. H.) Manual of the British Algæ. London, 1841, 8vo. | |
| Henslow (J. S.) List of British Plants growing wild in the parish of Hitcham, Suffolk. 1 sheet. | THE AUTHOR. |
| Hooker (J. D.) and Fitch (W. H.) Illustrations of Himalayan Plants, chiefly selected from drawings made for the late J. F. Cathcart, Esq. London, 1855, fol. | Dr. HOOKER. |
| Hooker (J. D.) and Thomson (T.) Flora Indica, vol. 1. London, 1855, 8vo. | THE AUTHORS. |
| Horsfield (T.) Brief Notices of several new or little-known species of Mammalia, lately discovered in Nepal by B. H. Hodgson, Esq. London, 1855, 8vo. | THE AUTHOR. |
| Jekel (H.) Insecta Saundersiana: or Characters of undescribed Insects in the Collection of W. W. Saunders, Esq.—Coleoptera, part 1. London, 1855, 8vo. | |
| | W. W. SAUNDERS, Esq., F.L.S. |
| Jessen (C. F. G.) Prasiolæ, generis Algarum, monographia. Kilia, 1848, 4to. | THE AUTHOR. |
| Johnson (C.) and Sowerby (J. E.) Ferns of Great Britain, part 5. London, 1854, 8vo. | J. E. SOWERBY, Esq. |
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| Jones (J. P.) and Kingston (J. F.) Flora Devoniensis. London, 1829, 8vo. | WILLIAM PAMPLIN, Esq., A.L.S. |
| Journals:— | |
| Annales des Sciences Naturelles. Parties Zoologique et Botanique. 4ème série, tome 3. Paris, 1855, 8vo. | |
| Annals and Magazine of Natural History, 2nd series, nos. 91-96. London, 1855, 8vo. | RICHARD TAYLOR, Esq., Under-Sec. L.S. |
| Botanical Magazine; edited by Sir W. J. Hooker, K.H., F.R.S. and L.S.: 3rd series, nos. 127-132. London, 1855, 8vo. | |
| Journal of Botany and Kew Garden Miscellany; edited by Sir W. J. Hooker, K.H. &c. Nos. 78-83. London, 1855, 8vo. | THE PUBLISHER, LOVELL REEVE, Esq., F.L.S. |
| Linnaea; herausgegeben von D.F.L. von Schlechtendal. Band 25, heft 3-6, and band 26, heft 1 & 6. Halle, 1852-54, 8vo. | THE EDITOR. |
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| Naturalist; edited by B. R. Morris, Esq., M.D. Nos. 54 & 55. London, 1855, 8vo. | R. HOBSON, Esq., M.D. |
| Pharmaceutical Journal and Transactions; edited by Jacob Bell, Esq., F.L.S. Nos. 169-174. London, 1855, 8vo. | THE EDITOR. |
| Philosophical Magazine and Journal of Science. 4th series, nos. 62-68. London, 1855, 8vo. | RICHARD TAYLOR, Esq., Under-Sec. L.S. |
| Phytologist: new series, nos. 3-8. London, 1855, 8vo. | THE PUBLISHER, W. PAMPLIN, Esq., A.L.S. |
| Quarterly Journal of Microscopical Science; by Edwin Lankester, M.D., and George Busk, Esq. Nos. 12 & 13. London, 1855, 8vo. | THE MICROSCOPICAL SOCIETY. |
| Zoologist; edited by Edward Newman, Esq., F.L.S. Nos. 153-158. London, 1855, 8vo. | THE EDITOR. |
| Kölliker (A.) Ueber den Bau der Cutispapillen und die sogenannten Tastkörperchen R. Wagners. 8vo. | THE AUTHOR. |
| — Beiträge zur Anatomie und Physiologie der menschlichen Retina. Leipzig, 1854, 8vo. | THE AUTHOR. |
| — Ueber die letzten Endigungen des Nervus Cochleare, und die Functionen der Schnecke. Würzburg, 1854, 4to. | THE AUTHOR. |

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| Lubbock (J.) On the Freshwater Entomostraca of South America. (From Trans. Ent. Soc., N.S., vol. 3.) 1855, 8vo. | THE AUTHOR. |
| Moore (T.) The Ferns of Great Britain and Ireland ("Nature-printed"), parts 4-9. London, 1855, fol. | HENRY BRADBURY, Esq. |
| — Illustrations of Orchidaceous Plants, part 12. <i>Ib.</i> 1855, 8vo. | THE AUTHOR. |
| Müller (F.) Definitions of rare, or hitherto undescribed Australian Plants. Melbourne, 1855, 8vo. | THE AUTHOR. |
| Newman (E.) History of British Ferns (3rd edition). London, 8vo. | THE AUTHOR. |
| Quetelet (A.) Sur la Relation entre les Températures et la Durée de la Végétation des Plantes. (Extr. du Bull. Acad. R. Belg., tome 22.) 8vo. | THE AUTHOR. |
| Reeve (L.) Conchologia Iconica. Monographs of the genera Donax, Lutraria, Mesodesma, Natica, and Patella. London, 4to. | THE AUTHOR. |
| Sowerby (G. B.) Thesaurus Conchyliorum, part 16. London, 1855, 8vo. | |
| Spengler (L.) On the Effects of the Thermal Waters of Ems. London, 1854, 12mo. | THE AUTHOR. |
| Stainton (H. T.) <i>Ed.</i> —The Entomologist's Annual for 1856. London, 1855, 8vo. | THE EDITOR. |
| Stainton (H. T.), Zeller (Prof.), and Douglas (J. W.) Natural History of the Tineina, vol. 1. London, 1855, 8vo. | H. T. STAINTON, Esq. |
| Ville (G.) Recherches expérimentales sur la Végétation. Paris, 1855, 8vo. | THE AUTHOR. |
| Weddell (H. A.) Sur les Cystolithes; ou Concrétions calcaires des Urticées, &c. 8vo. | THE AUTHOR. |

DONATIONS

TO THE

MUSEUM OF THE LINNEAN SOCIETY,

Exclusive of Presents of single Specimens of Animals, Plants, &c.

[Continued from page 352 of Vol. XXI. of the Society's Transactions.]

DONATIONS.

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J. O. WESTWOOD, Esq., F.L.S.
- Dried Specimens of *Anemone Coronaria*, *Anemone ranunculoides*, *Ceratocephalus falcatus*, *Rhododendron ferrugineum*, and *Cypripedium Calceolus*, from Switzerland, &c.
T. C. JANSON, Esq., F.L.S.

March 4th, 1856.

Thomas Bell, Esq., President, in the Chair.

Read, a "Note on some Larvæ voided by Children," by Edward Newman, Esq., F.L.S.

Read also, a "Notice on the occurrence of *Sepia biserialis* in Cornwall," by Jonathan Couch, Esq., F.L.S. (See "Zoological Proceedings," p. 99.)

Read further, a Memoir "On the Development of the Ovule of *Santalum album*, with some remarks on the phenomena of impregnation in Plants generally;" by Arthur Henfrey, Esq., F.R.S., F.L.S. &c. (See "Transactions," vol. xxii. p. 69.)

March 18th, 1856.

W. Yarrell, Esq., V.P., in the Chair.

Henry Adams, Esq., was elected a Fellow.

Mr. Longmuir, jun., exhibited a photograph of *Numenius borealis*, shot in Kincardineshire in September last.

Read, "Remarks on the Influence of the Sexual Organ in modifying external characters in Animals," by William Yarrell, Esq., V.P.L.S. &c. (See "Zoological Proceedings," p. 76.)

Read also, a Paper entitled "Remarks on the covering of the Seed in *Clusiaceæ*, *Magnoliaceæ*, &c., and on the development of the raphe in general;" by John Miers, Esq., F.R.S., F.L.S. &c. (See "Transactions," vol. xxii. p. 81.)

April 1st, 1856.

Thomas Bell, Esq., President, in the Chair.

James Alexander Brewer, Esq., and Thomas Hawkes Tanner, Esq., M.D., were elected Fellows.

Read, a "Note on the recent Discoveries in regard to the Microgonidia of Freshwater Algæ;" by the Rev. M. J. Berkeley, M.A., F.L.S. &c. (See "Botanical Proceedings," p. 145.)

Read also, a "Note on some collections of Arctic Plants, chiefly made by Dr. Lyall, Dr. Anderson, Herr Miertsching, and Mr. Rae, during the Expeditions in search of Sir John Franklin;" by J. D.

Hooker, Esq., M.D., F.R.S., F.L.S. &c. (See "Botanical Proceedings," p. 114.)

Read further, a Paper "On the Botany of Raoul Island, one of the Kermadec Group, in the South Pacific Ocean;" by J. D. Hooker, Esq., M.D., F.R.S., F.L.S. &c. (See "Botanical Proceedings," p. 125.)

April 15th, 1856.

Thomas Bell, Esq., President, in the Chair.

Frederick Currey, Esq., M.A., was elected a Fellow.

Read, an Extract of a Letter from R. Spruce, Esq., addressed to G. Bentham, Esq., F.L.S., giving an account of Tarapota in Peru, from whence the Letter is dated, and of its vegetation.

Read also, a "Note on *Obolaria Virginica*, L.; by Asa Gray, M.D., F.M.L.S. &c. (See "Botanical Proceedings," p. 129.)

Read also, a "Note on the Chinese Insect-wax," by Daniel Hanbury, Esq., F.L.S. (See "Zoological Proceedings," p. 103.)

Read also, a "Note on Wax-producing Insects from Port Natal and China," by J. O. Westwood, Esq., F.L.S. &c. (See "Zoological Proceedings," p. 103.)

Read further, the Commencement of a Memoir "On several instances of the anomalous development of the Raphe in Seeds, and the probable causes of such deviations from the usual course of structure, especially in reference to *Stemonurus* (*Urandra* of Thwaites);" by John Miers, Esq., F.R.S., F.L.S. &c. (See "Transactions," vol. xxii. p. 97.)

May 6th, 1856.

Thomas Bell, Esq., President, in the Chair.

John Samuel Gaskoin, Esq., F.L.S., exhibited some of the so-called "Jumping-seeds," described by Sir W. J. Hooker and J. O. Westwood, Esq., in the "Kew Journal of Botany;" the motion of which is due to the larva of a small insect enclosed in the seed.

Read, a Paper "On the Action of Sea-water on the Germination of Seeds;" by Charles Darwin, Esq., F.R.S., F.L.S. &c. (See "Botanical Proceedings," p. 130.)

Read also, a Note "On the Vitality of Seeds after prolonged submersion in the Sea;" by S. James A. Salter, Esq., M.B. Lond., F.L.S. &c. (See "Botanical Proceedings," p. 140.)

Read further, a Paper "On the Homopterous Insects of Singapore and Malacca;" by Francis Walker, Esq., F.L.S. &c. (See "Zoological Proceedings," p. 82.)

May 24th, 1856.

Anniversary Meeting.

Thomas Bell, Esq., President, in the Chair.

This day, the Anniversary of the birth of Linnæus, and that appointed by the Charter for the Election of Council and Officers, the President opened the business of the Meeting with the following Address:—

GENTLEMEN,

IN reviewing the events of the past year, in connexion with the objects of the Linnean Society, there are, perhaps, few striking facts to record of particular interest to the Society itself, or bearing, in any marked degree, upon the advance of Natural History in general. There has been no very important discovery enunciated, of a character to impugn former theories or systems, or to establish new ones; no new foundation or institution inaugurated, by which Natural Science will be materially extended or diffused. But, on the other hand, the general progress of this branch of knowledge has been steadily going on; and, if the year which has elapsed since I last addressed you may not hereafter constitute one of those bright, red-letter periods which will live in history as the turning-point of some important department of discovery, yet the accumulation of new facts, tending to the elucidation of various doubtful questions, and the settlement of previously debated theories, will be found sufficient at least to preclude any feeling of dissatisfaction or disappointment. Within our own sphere, I may appeal to the numerous valuable papers which have been read at our meetings, and have already been, or are about to be, published in our Transactions and Proceedings, and to the continued, perhaps I may say the increased interest of our meetings—to show that our energies are at least undiminished; and our efficacy, as the principal medium of the advancement of natural science in this country, unimpaired. The general appreciation of the character of the Society in this point of view, is evidenced by

the almost unprecedented number of naturalists who have been enrolled in our list of Fellows during the present session,—amounting to no fewer than 20,—besides those whose certificates are still suspended.

It is with much regret and sorrow that I turn to the painful side of the account, and find it my duty to refer to the annual diminution of our numbers by death, besides several who have, from various causes, withdrawn from us ; but although there were many, amongst those who have been removed from us by the inevitable fate of man, whose loss as good men and most valuable members of society, and some of them ardent cultivators of natural science, we must deeply deplore,—and I have myself to mourn the loss of one who was the constant and faithful friend of nearly fifty years,—yet few of those of whom we have been thus deprived had occupied a conspicuous place in the scientific world, or contributed in particular to our own Transactions, or taken any active part in the affairs of the Society.

At the last anniversary I had the pleasure of announcing to you, that the Council had unanimously resolved upon a modification of your publications, which should afford the opportunity of a more extensive and more speedy issue of such papers, read at your meetings, as might not require to appear in the quarto form of your Transactions. This resolution has now been carried into effect, as far as the brief period which has since elapsed has permitted. It would be premature as yet to declare, that all the anticipations of advantage from this design have been realized. It will require at least another year to ascertain its full results, and whether the present plan shall be exactly followed, or whether any modification of it may prove desirable. I may, however, be permitted even now to state, that I have not heard one word of dissatisfaction expressed by any one ; but, on the contrary, I have received from many quarters the assurance of the cordial welcome with which the new publication has been received, and of the general approval of the form in which it has been issued. The only condition with which I have heard this approval connected is, that the quarto Transactions should never be infringed upon by its humbler and less pretentious handmaid. I need not say, that in this view I most heartily concur ; nor could I feel the satisfaction which I now do at the present working and future prospects of the Journal of our Proceedings, did I not confidently expect that it will not interfere with the regular appearance, or diminish the value and importance of those Transactions, which have been so long identified with the

Society, and to which its past and present prestige has been so mainly due. There will, I sincerely believe, be material enough for both forms. Papers of great value will, I doubt not, continue to be communicated, of a nature which requires speedy publication, without the necessity of quarto illustrations. Exclusive of these two considerations, however, it must be confessed that there is some difficulty in laying down any very definite rule as to the nature of those papers requiring each particular form of publication respectively, and it must be left to the consideration of the Council to determine the question in the case of each individual paper. With all these difficulties, the circumstance of bringing home to every Fellow of the Society, within reach of the post, an important portion of our Transactions, at stated and not distant periods, without trouble or expense to the recipients, has hitherto been most satisfactory, and will, I am confident, tend, when the system is rendered fully effective by experience and habit, to increase the numbers and importance of the Society, by bringing into our ranks many zealous cultivators of natural history, who, from their remote residence, would not otherwise have been induced to join us. With regard to one element of the plan, the sale of the Journal out of the Society, I have to state, that comparatively few of the separate parts of Zoology and Botany have been disposed of; the sale of the entire work has been somewhat greater.

I cannot take leave of this subject without adverting to the effective manner in which the new scheme has been commenced. For this, and for innumerable other good offices,—I may say, for the general conduct of the affairs of the Society,—we are deeply indebted to the talent, the devoted zeal, and the disinterested labours of our excellent and esteemed Secretary. I cannot, in his presence, enlarge on the obligations which we are constantly and unceasingly under to Mr. Bennett. It would, I know, be painful to him, and you are all too well acquainted with his great services,—requited only by his own sense of usefulness, and by our gratitude, which I know he values,—to require that they should be dwelt upon by me.

It is with much pleasure also, and with sincere acknowledgement, that I feel called on to advert to the able and cheerful manner in which he has been seconded in this work by Mr. Kippist. Without such zeal and ability it would have been impossible to have commenced and carried out a new and untried plan such as this.

The only drawback to the satisfaction which we must feel at the utility and advantages on which I have been dwelling, is the considerable expense which, in its outset, must necessarily be incurred; and on this subject I cannot but observe, that without some such relief from our present expenditure as we have been hopefully anticipating, from a prospect of house-accommodation to which I shall presently more particularly ask your attention, I cannot see how the expenses of the Journal are to be met, unless the advantages which its free distribution involves should prove a sufficient stimulus to many naturalists to enter the Society. I have, however, one circumstance to state, which is, so far as it goes, encouraging, and that is, that when the whole expenses of the Journal, as far as it is now published, are paid, the balance of our annual receipts and expenditure, small though it be, is in favour of the Society.

This result was not, I believe, anticipated; on the contrary, it was fully expected that we should have had to call for extensive assistance for the issue of even the first part. I should not, perhaps, have thought it necessary to advert at all to the state of the finances but for this circumstance, as the statement of the income and expenditure is now before you; but as I have referred to the subject, I cannot but congratulate the Society upon the favourable results of the audit, and especially on the large sum which appears in the item of admission-fees, and the small comparative number of new compositions. The latter source of income has a good temporary appearance on our books; but when it is recollected that the average term of membership is thirty-six years, the annual subscription is obviously the more advantageous to the Society.

I have sometimes thought, that, constituted as we are, and with aims and objects so noble, we have perhaps too much restricted our labours to the conventional routine of our meetings and the publication of our Transactions. I hope I shall not be misunderstood here. I should be the last to ask for, or to sanction any, even the slightest encroachment upon those long and wisely established means of carrying out our objects. But there may be other methods of usefulness, by which our sphere of operation may be enlarged, by more extensive association with the outer world, if I may so speak, and by becoming the centre of the interests of Natural History throughout the country. And on reflecting upon the various directions in which the Linnean Society

may thus legitimately exercise its influence, there is one which appears to me at the present moment deserving of some consideration.

When the Society was first instituted, its objects, as you will find them expressly stated in our Charter, were “for the cultivation of the science of Natural History in all its branches, and *more especially* of the Natural History of Great Britain and Ireland.” Now, although it is very certain that the publication of numerous periodical works, having this particular design in view, has rendered it less necessary for the Society to expend its resources upon the mere local Flora and Fauna of various districts of our own country, whilst the rapid advance of zoological and botanical science has rendered the prosecution of the higher branches our primary aim,—and I need only appeal to our publications to show the extent to which this purpose has been, and still continues to be, carried out,—it has occurred to me that in one particular, hitherto unattempted, we may, without entrenching upon our higher duties, assist materially in increasing and extending the knowledge of the natural products of the country.

It was the observation of the most accomplished and fascinating writer on local natural history that England has ever seen, that if the natural productions of each district had their local historian, our knowledge of the natural history of the country would become more perfect than by any other means; and every one knows how beautifully and how perfectly the author of that sentiment carried it into practice. It is indeed the only means by which this end can be obtained; and it is therefore with much pleasure that I advert to the numerous local institutions, now springing up in various directions, in some instances in connexion with mechanics’ institutes, with schools, or other establishments for the education or instruction of the middle classes, the principal design of which is to allocate in a provincial museum the natural products of the county or of a more circumscribed district, and frequently associated with a collection of local antiquities. I have thought it might be useful to point out some circumstances which would conduce to the proper design of such institutions, and at the same time render them the means of greatly extending our acquaintance with indigenous zoology and botany. The primary object then of these institutions should be the collection and preservation of the animals, plants, and palæontological specimens which are found in the district; and to this should be added a full and accurate record of their habitats and of any other inter-

esting circumstances connected with them, whether of soil, of geological position, of meteorological phenomena, the period of the year when obtained, peculiarities in their habits, and in short any facts which may bear upon their history. If in addition to this first consideration it happens that instruction is to be given, by lectures or other means, in the study of Natural History generally, a typical collection may be added, which should be considered as entirely distinct from the local one, and as having a totally different object. Upon this, however, it is not my purpose to dwell at present, further than to call attention to the plan which has been so energetically and intelligently carried out by my friend Professor Henslow, whose exertions in this behalf are already well known and appreciated. I would refer particularly to the Ipswich Museum as a practical example of what may be done in this respect, and to the lists which Mr. Henslow has furnished to the British Association, and which are probably now before you.—To recur to the local collections. My friend Professor Phillips, in a recent address to the Malvern Field-Naturalists' Club, alluding to the formation of such a museum, has very strongly, and with great propriety urged the rejection, by an absolute rule, of all offers of specimens excepting such as are connected with the locality. The consequence of the neglect of this salutary caution is the accumulation of masses of specimens from all parts of the world, many of which might be available if suitably placed, but are a mere useless incumbrance in a local museum. They not only occupy space which might be more beneficially employed, but they take off the attention and waste the time of those who resort to the museum for information, and of those whose duty it is to take care of the contents and keep the records.

Now, it has appeared to me that in many instances the utility of such collections might be extended beyond the bounds of the locality in which they are placed, by the communication to the Linnean Society (by reports either periodical or at indefinite times) of their new acquisitions, or of the observations recorded by the curators or naturalists respectively attached to them in the manner which I have before recommended. These, or selections from them, might be printed, when considered of sufficient value, in our Journal; and thus many an interesting fact would be permanently recorded and made universally known, which would otherwise be lost; and great encouragement would be held out to many a young naturalist in the country, by being placed in such a relation to this Society.

A circumstance has recently occurred in reference to the most important and interesting portion of our property, the Linnean Collections, of which I think it may be agreeable to you to be informed. It was proposed in the Council that a Committee should be appointed to examine into the present condition of those collections,—as to what they respectively consist of,—where they are now respectively deposited,—in what state they now are, and whether any suggestions may occur to the Committee with reference to their preservation and exhibition to the Fellows of the Society and the visitors. The Committee consisted of the President, the Secretary, Mr. Bentham, and Mr. Wilson Saunders, and they afterwards obtained the assistance of Mr. Hanley with reference to the Shells, and of Mr. Yarrell to the Fishes.

It has appeared to me that this subject was a perfectly legitimate one to form an element in my address, as it cannot but be very interesting to all who have the character of the Society at heart, and are anxious for the preservation and proper use of the invaluable collections in question. Instead, therefore, of merely embodying in my address a brief abstract of the acts of the Committee, as I at first intended, I will, with your permission, read the Report which they delivered to the Council, *in extenso*.

“ *Report presented to the Council, May 6, 1856.*

“ The Committee of Council, consisting of the President, Mr. Bentham, Mr. Wilson Saunders, and the Secretary, appointed on the 1st of April, 1856, ‘to examine the Books, Manuscripts and Collections, forming the Library and Museum of Linnæus, and to report to the Council

“ ‘ What they respectively consist of,

“ ‘ Where they are now respectively deposited,

“ ‘ In what state they are respectively, and

“ ‘ Whether any suggestions may occur to the Committee with reference to their preservation and exhibition to the Fellows of the Society and Visitors,’ report as follows:—

“ The Committee have held several meetings, viz. on the 7th, 10th and 15th of April, and on the 1st of May, and carefully examined into the several matters referred to them. The result of their investigations may best be stated under the general heads of Books, Manuscripts, Plants, Insects, Shells, Fishes, and Miscellaneous Zoological Specimens.

“ 1. *Books.*

“ The Books are for the most part placed on the shelves of the

General Library of the Society. They are all marked in the hand of the late Sir James Edward Smith as derived 'E Bibliothecâ Linnæi propriâ.' There is no separate catalogue of them; but they are entered in the General Catalogue of the Library, with the exception of a few miscellaneous volumes not relating to natural history, chiefly medical theses.

"The remaining portion of the Books, which must be regarded as the most important, as containing MS. notes by Linnæus himself, and as connected with his Herbarium and other collections, are contained in a case placed in the meeting-room near the Linnean Herbarium.

"The Committee consider it to be highly desirable that the Natural-History Library of Linnæus should be separated from the rest of the Society's books :

"That a list should be made of the volumes so separated :

"That for the future these volumes be not lent out to the Fellows without the special permission of the Council.

" 2. *Manuscripts.*

"The Manuscripts are contained in a large chest in the south-western room of the second floor of the Society's house, and are in an excellent state of preservation. They are at present tied up in bundles; but the Committee consider it desirable that, when the Society is able to afford it, the correspondence should be mounted on guards and bound in volumes.

" 3. *Plants.*

"The Herbarium is contained in three upright narrow cabinets formerly belonging to Linnæus, and in which it has remained up to the present time: these cabinets are placed in the meeting-room of the Society. The plants are in excellent condition, and well protected in conformity with directions given by the Council on the recommendation of a committee in 1836. The Committee recommend that these cabinets should be conspicuously distinguished by means of a framework or in some other way.

" 4. *Insects.*

"The Insects are in a good and secure cabinet placed in the south-western room of the second floor, and are in an excellent state of preservation. While in the possession of the first President of the Society, the late Sir J. E. Smith, a number of additional insects were incorporated with those of Linnæus; and the

Committee recommend that, as soon as the opportunity offers, these insects be separated from the Linnean, and the two collections be arranged in distinct parts of the cabinet.

“ 5. *Shells.*

“ In the examination of the collection of Shells the Committee requested and obtained the valuable assistance of Mr. Hanley.

“ The Shells are contained in a distinct cabinet placed in the same room with the manuscripts and insects. The Committee regret to state that serious injury has resulted to the Linnean collection of shells from the careless mode in which they have been occasionally referred to by visitors, and from the attempt of a former sub-curator to arrange them according to a modern method. Many of the specimens have thus been displaced from their original receptacles, and other difficulties have been created to the complete identification of the Linnean species, and their discrimination from the specimens added by Sir J. E. Smith.

“ On Mr. Hanley’s recommendation, the Committee resolved that it is highly desirable

“ That the Linnean collection should, as far as possible, be separated from the specimens subsequently added :

“ That all the specimens which can be undoubtedly identified as Linnean should be attached to boards with the Linnean name added, and any useful memoranda relating to them.

“ Mr. Hanley kindly offered his assistance in carrying out these recommendations, and stated it as his opinion that the present cabinet would be sufficient for the purpose, and that very little expense would be incurred.

“ 6. *Fishes.*

“ With the valuable assistance of Mr. Yarrell, who consented to join the Committee for the purpose, the Committee proceeded to examine the collection of Fishes, which are at present contained in the drawers of a cabinet in the large south attic, and consist of half-skins pasted upon paper, and generally in fair condition. Many of these undoubtedly belonged to Linnæus; some appear to have formed part of the collections of his son; and others were probably added by Sir J. E. Smith.

“ Mr. Yarrell recommended that they should be pasted on cardboard in such a manner as to retain all the original papers and the writing upon them; and the Committee resolved

“ That it be recommended to the Council to accept the kind offer of Mr. Yarrell to superintend the operation :

“That the specimens when so laid down be systematically arranged, and placed in drawers in a more easily accessible situation.

“7. *Miscellaneous Zoological Specimens.*

“These chiefly consist of a few Reptiles and Crustacea, contained in some of the drawers of the shell-cabinet, or in those of the cabinet of the large attic, which the President undertook to examine, and to separate whatever can be identified as Linnean.

“While examining the miscellaneous specimens in the south attic, the Committee observed several bundles of Swedish academic announcements, and anatomical and other dissertations not immediately connected with natural history. They recommend that these parcels be securely placed in brown-paper covers, labelled with a general statement of their contents. Twelve copies of Broussonnet’s ‘*Descriptiones et Icones Piscium*,’ which are duplicates to the Library, are recommended to be sold.

“In the Linnean shell-cabinet the Committee find a large number of bad or injured specimens of Lichens on Stones, chiefly British, and forming no part of the Linnean Collection. These appear to be utterly worthless, and the Committee recommend that they be thrown away.”

It cannot but be most gratifying to learn that these collections, to which so peculiar a value attaches, should have been found by the Committee in so perfect a state. It was indeed far beyond the expectations of those who were deputed to examine them.

I have now, Gentlemen, to call your attention to a matter to which I have already alluded, and which, if our present anticipations are fulfilled, must be productive of the most advantageous results to this Society, and I may add, ultimately to the advance of natural knowledge in this country. You are all too well aware that, while other Societies formed for the cultivation of various branches of science, the Royal, the Geological, the Astronomical, and the Geographical Societies, had received, one after another, the substantial support of the Government, in having commodious apartments assigned to them,—three of them being located in that great central official building, Somerset House,—the Linnean Society, the representative of the natural-history sciences in this country, the oldest offspring of the great parent of British science, and certainly not the least useful and important of such bodies, remained unaided and unsanctioned by the authorities of the Government, dependent wholly upon its own resources, shackled

and crippled by the expenses of rent and other requirements, from which others were exempt. It is not necessary for me now to inquire into the causes of this neglect. It were vain now to search for the occasion of the remarkable fact, that while we had for our Presidents in succession, a noble Duke of great Parliamentary influence—another noble Lord, whose connexions have been closely associated with the Government at various times—a venerable Prelate, the brother of a cabinet minister,—no favourable reply could be obtained to our applications for house-accommodation. Such, however, was the case; and we were obliged to toil on, encumbered with a debt, incurred, not by foolish or unnecessary extravagance, but by the acquisition of a priceless library and collection of natural objects, by which circumstance we became the depository of a sacred and most interesting trust, and while others were, so to speak, basking in the sunshine of official favour, we were thrown upon our own curtailed and inadequate resources. But, Gentlemen, we have no reason to despond. What we have done, we have done for ourselves; and we may well look with complacency upon our acquisitions, upon our publications, upon our acknowledged usefulness, and upon the character we hold in this and in every other country where natural knowledge is cultivated, and feel an honest pride in the reflection that we have done all this unpatronized and unassisted.

Affairs were in this anomalous position when, some years since, a scheme, emanating from several Fellows of the Royal Society, and Members of the Philosophical Club of that Society, was proposed and repeatedly discussed at the meetings of the Club, the object of which was to bring about the juxtaposition of scientific Societies, in some commodious and suitable building, worthy of British science, to be provided by the country for that purpose. The only principle upon which such a design could either with justice or with any probability of success be carried out is, *juxtaposition, but with separate property and independent action*—and this was the principle which I have always advocated, and the only one to which my humble sanction could ever have been given.

Such was the object of a movement which, after many alternations of energy and repose, has at length obtained a partial recognition of the great principle which it was its object to promote. It would be taking up your time unnecessarily were I to retrace all the intermediate steps which have been taken, and the varying phases which the question has assumed. I would however state, that the deputation which waited upon Lord Aberdeen, when his

lordship was Prime Minister, received from him the assurance of his entire concurrence in the object ; and on the particular claims of the Linnean Society being strongly brought before him, he at once acknowledged the justice of those claims, and the anomalous nature of our position. From this time the object of the movement assumed a more definite form ; and as it would be impossible to obtain separate accommodation in any one building for all the Societies which profess to cultivate every minor branch of science, the claims were limited to those chartered Societies which might be considered as representing the larger departments of scientific research. Within this category would be included the Royal, the Linnean, the Geological, the Astronomical, and the Chemical Societies. This definite object was very strongly urged upon the late Sir William Molesworth, at an interview with which we were favoured by him, and his parting words were, " Well ! it appears quite clear that those five Societies ought to be accommodated "—and yet, a few days afterwards, in the House of Commons, that gentleman stated, in answer to a question put to him, that it was only those Societies which were located in Somerset House which were to be provided for. And this has, up to nearly the present moment, been the difficulty. Science has not been generally recognized for its own sake, but only as its accommodation could be provided for at the least possible expense or trouble to the Government, and for the sake of obtaining possession of the apartments occupied by the Societies in Somerset House. Here then the Linneans were again ignored !

At length it was announced that Burlington House was purchased by the Government for the express purpose of affording ample accommodation to science and literature, within the walls of one great building. A deputation then waited upon Lord Palmerston, who readily recognized the claims of the five Societies ; and without pledging himself to any final adjustment of the question, expressed with his usual urbanity his general concurrence with the principle urged by the deputation.

From some cause or other which I have never fully understood, the Royal Society, upon whose agency the rest of the Societies depended, failed to press their advantage, and the UNIVERSITY OF LONDON not only applied successfully for the accommodation which had been promised to the scientific Societies, but actually took and still holds possession of a portion of the house. But more recently a strong representation was made by Lord Wrottesley to the Government on the part of the five Societies, and a meeting

was held at the rooms of the Royal Society of the representatives of those bodies. A letter was there read from Mr. Wilson, the Secretary to the Treasury, in reply to that of Lord Wrottesley, but again recognizing only the Societies which are located in Somerset House, and appointing a meeting of their representatives at the Treasury. I must here inform you, that since the eastern detached wing of Burlington House has been occupied by the University, there is only room for three Societies, at the most, in the main building and the western wing. To the surprise of the gentlemen present, Mr. Wilson assured them that the Government did not wish to turn them out of Somerset House, where they might still remain if they preferred it. Accordingly the Society of Antiquaries, the Geological, and the Astronomical Societies expressed their desire to remain as they were, and the Royal only expressed their readiness to move into the new quarters. I considered it my duty to inform your Council of these circumstances, and as the events were now following each other too rapidly for me to communicate every successive step to them, and receive their sanction, they came to a resolution,—“That it is the opinion of the Council that it is highly desirable to obtain rooms in Burlington House, and that the President be requested to take such steps as may appear to him best calculated to secure that object.” I accordingly acted upon this resolution. On receiving immediately afterwards an intimation that the officers of the Royal Society had a fresh appointment to meet Mr. Wilson, and wished to know whether the Linnean Society and the Chemical Society would be ready to accept apartments in Burlington House with the Royal, I immediately sought an interview with the President of the Chemical Society, who I found had received a similar *carte blanche* from his Council to that with which I had been favoured, and we sent in our cordial acquiescence in the proposed union.

I have now, Gentlemen, merely to record so much of the result of the interview between Lord Wrottesley the President, Col. Sabine the Treasurer, and Dr. Sharpey the Senior Secretary of the Royal Society, with Mr. Wilson, as bears upon our prospects. I am not at liberty, as I conceive, to say more than was communicated to me in the presence of others; and this simply amounts to the statement on the part of the officers of the Royal Society that the Linnean and Chemical Societies were most willing to accompany the Royal to Burlington House, and the distinct expression of Mr. Wilson's readiness to accede to this arrangement. I have waited, as you will readily believe, with intense anxiety for a com-

munication from Lord Wrottesley, to the effect that the Treasury minute has been passed, recognizing and confirming Mr. Wilson's expressed accordance with our desire.

I had last evening completed writing this address, when Dr. Sharpey, the Secretary of the Royal Society, called upon me from Lord Wrottesley, bringing with him the official Treasury minute, which I shall have the extreme satisfaction of reading to you, confirming the appropriation of Burlington House to the Royal Society, on condition of their providing suitable accommodation for the Linnean and Chemical Societies. You will find one or two points mentioned which will require some explanation, and this I shall be enabled to give you.

“Treasury Chambers, May 22, 1856.

“MY LORD,—I am directed by the Lords Commissioners of Her Majesty's Treasury to acquaint your Lordship, with reference to the views set forth in your letter to the Duke of Argyle on the 30th ult., which has been laid before the Board, that Her Majesty's Government are not at present in a position to enable them to state any definite views with respect to the project for the juxtaposition of the principal scientific Societies in a building to be erected in a convenient and central locality. I have to state that their Lordships are, however, prepared so far to concede to the views advanced by your Lordship on behalf of a large number of persons connected with Science, as to allow the temporary location of the Linnean and Chemical Societies in conjunction with the Royal Society in the present building of Burlington House, on the following conditions, viz. :—

“1st. That the removal of the Royal Society from Somerset House shall not prejudice the position of the other Societies located in that building, in regard to the terms on which they are permitted to occupy their present apartments.

“2ndly. That the Royal Society shall be put in possession of the main building of Burlington House, on the understanding that they will, in communication with the Linnean and Chemical Societies, assign suitable accommodation therein for those bodies.

“3rdly. A common library to be formed for the use of the three Societies, on the understanding that suitable arrangements shall be made for the admission thereto, for the purposes of reference and study, of men of letters and science, on orders given by Fellows of the three Societies.

“4thly. The Societies to be allowed the use of the Hall, which it is proposed to construct in the west wing of Burlington House, at such times as it may not be required by the Senate of the Uni-

versity of London, it being distinctly understood that this permission is to be so exercised as not in any way to interfere with the convenience of the University.

“5thly. The collection of portraits belonging to the Royal Society to be hung on the walls of the proposed Hall, and to be open to the inspection of the public under such regulations as may be convenient, and subject especially to the provisions in the previous clause.

“6thly. That the adoption of this temporary arrangement shall not in any respect be held to weaken the claims of the Royal Society to permanent accommodation.

“ I have the honour to be, &c. &c.,

(Signed) “ JAMES WILSON.”

“ *To the President of the Royal Society.*”

The points in this letter to which I have alluded as requiring explanation, are the temporary character of the occupation, and the union of the libraries. With respect to the first, nothing more is intended than that, upon the completion of the larger building, which is as yet only contemplated, our Society, in common with others engaged in the pursuits of science, will have ample accommodation in that building. The intention of the passage which refers to the union of the libraries is understood to be the admission to each library, for the purposes of consultation and perusal, of all the Members of the three Societies; the privilege of borrowing the books being restricted, as at present, to the Members of the Society to which the books respectively belong.

I cannot take leave of this subject and close my address without expressing my sense of the sincerity and earnestness with which the authorities of the Royal Society have advocated our cause, and the anxious desire they have expressed to commence with us the practical development of the great principle of juxtaposition. To us the success of the present effort is all-important. The immunity from rent, the close association with our brethren in scientific pursuits, the approximation of our libraries, and, let me add, the prestige attached to such a locality, must act as a powerful aid to our already growing prosperity, and enable us to carry out, unencumbered, our great mission,—the advancement of natural science, with all its advantages, the amelioration of the condition of man, the elevation of his character, intellectual and moral, and especially the promotion of the glory of the Creator, by extending the knowledge of his works.

OBITUARY NOTICES.

The Secretary then proceeded to read the following obituary notices of deceased *Fellows* :—

John Adamson, Esq., F.S.A., F.R.G.S. &c., was descended from a family of respectability in the county of Durham. His father, Cuthbert Adamson, in 1773, accompanied the Hon. Capt. Phipps as second Lieutenant of the *Racehorse*, in his celebrated Voyage of Discovery towards the North Pole; and was afterwards stationed at Newcastle in charge of the impress service of that port. Mr. Adamson was born in Gateshead on the 13th of September 1787, and after receiving his education at the Grammar School of Newcastle, was sent to Lisbon, where his elder brother had been for some time established in business as a merchant. The unsettled aspect of public affairs, however, induced him to return to England, and completely altered his views in life. He was soon after articulated to Mr. Thomas Davidson, an eminent legal practitioner, and Clerk of the Peace for the county of Northumberland. In 1811, at the age of 24, he was so fortunate as to obtain the appointment of Under-Sheriff of Newcastle, which office he retained for five-and-twenty years; and the advantageous position which he had thus early attained laid the foundation for his subsequent success in his profession. From his youth he cultivated a taste for literature, antiquities, and natural history. He became a Member of the Literary and Philosophical Society of Newcastle in 1811, and was one of its Secretaries from 1825 to the time of his death. His taste for Portuguese literature, acquired during his brief visit to that country in 1803, was evinced by the publication in 1808 of a translation of Nicola Luiz's tragedy of Donna Ignez de Castro; and still more strongly by his 'Memoirs of the Life and Writings of Camoens,' published in 1820; which obtained for him the title of a Corresponding Member of the Academy of Sciences at Lisbon, and induced the Queen of Portugal, at a subsequent period, to confer upon him the Orders of Knighthood of Christ, and of the Tower and Sword. In 1842 he commenced a work entitled 'Lusitania Illustrata; or Notices on the History, Antiquities, Literature, &c. of Portugal,' of which two parts only were published. He had, in 1831, printed for private circulation, under the title of 'Bibliotheca Lusitana,' a catalogue of the books in his library relating to Portugal; but this ample and probably unrivalled collection was, with few exceptions, together with nearly the whole remainder of his choice and valuable library, destroyed by fire in 1849. A very remarkable collection, however, of the works of

Camoens, together with other rare and curious selections from his library, have been sold by auction in London within the last two days.

During the earlier part of his life, Mr. Adamson was an enthusiastic collector of coins. He was one of the founders of the local Antiquarian Society, and, as its Treasurer and Secretary, contributed greatly to promote its objects. He also became a Fellow of the Society of Antiquaries, and contributed papers to the 'Archæologia,' as well as to the 'Archæologia Æliana,' of which the most important related to the discovery, at Hexham in 1832, of a number of the Anglo-Saxon coins called Stycas. In Natural History he chiefly attached himself to Conchology, and formed a valuable cabinet of shells amounting to upwards of 3000 species; but despairing of being able to keep pace with the great influx of new species of modern introduction, he determined a few years since to part with this collection. He had previously, in 1823, issued from the Newcastle press for private distribution, a little work entitled 'Conchological Tables,' the principal object of which was to show at a glance, on the authority of the best writers, the number of species in each genus which a collector might hope to procure. He was a Member of the Natural History Society of Newcastle, and, besides other donations to various institutions, he gave a collection of fossils to the Museum at Newcastle, and a collection of minerals to the University of Durham. He became a Fellow of the Linnean Society in 1823, and was elected Corresponding Member of numerous Antiquarian and Literary Societies on the continent of Europe, and Honorary Member of the Antiquarian Societies of Edinburgh, Perth and Cambridge, and of the Literary and Philosophical Society of Halifax. In the month of July last he lost his wife, by whom he had seven children, five of whom survive him. His friends had long noticed his failing health, but he continued attentive to his business until a few days before his death, which took place on the 27th of last September, when he had just completed his 68th year.

John Allcard, Esq., of Burton-Closes, near Bakewell, in the county of Derby, a member of the well-known firm of Overend, Gurney and Co., became a Fellow of the Linnean Society in 1844, and died at his house in Connaught Place West, Hyde Park, London, on the 9th of April of the present year, in the 78th year of his age. He was a very zealous and successful cultivator of ferns, and especially of tree-ferns, of which his collection at Stratford, near London, might some years ago be considered as unrivalled.

The Right Hon. William Bagot, Baron Bagot, D.C.L. &c., was the third but eldest surviving son of William, first Lord Bagot, and was born in Bruton Street, London, on the 11th September 1773. He was educated at Westminster School, and afterwards at Magdalen College, Oxford, from which University he received the degree of D.C.L. in 1834. In 1798 he succeeded his father in the peerage, and in the same year he was elected a Fellow of the Linnean Society. He took no active part in politics, but attached himself to literary and scientific pursuits, especially to agriculture and natural history, and became a Fellow of the Society of Antiquaries, and also of the Horticultural and Zoological Societies. In the year 1824 his Lordship printed 'Memoirs of the Bagot Family, compiled in 1823.' He was twice married, and died at his seat, Blithfield, near Stafford, on the 12th of February in the present year, leaving a numerous family by his second wife. His connexion with the Linnean Society extended over the long period of fifty-eight years.

Lewis Weston Dillwyn, Esq., was descended from an old Breconshire family, and was born at Ipswich in the year 1778. His father, William Dillwyn, was a member of the Society of Friends, whose immediate ancestors had emigrated to America in the company of William Penn, and who was himself early and intimately associated with Clarkson and Wilberforce in the agitation for the Abolition of Negro Slavery.

Mr. Dillwyn received his early education at a Friends' school at Tottenham, where he had for the associate of his boyish days our old and valued Fellow, Mr. Joseph Woods, together with whom he was sent for a time to Folkestone on account of the then weak state of his health. In the year 1798 he went to Dover, where he succeeded his school-companion Mr. Woods as the inmate of a friend of the name of Beck. "During his residence at Dover," says Mr. Woods, in a communication on the subject, "I paid him a visit, and well recollect the pleasure we had in rambling over the country, and finding many plants which were then unknown to us. I apprehend that it was during this residence at Dover that he first applied himself to botany, but what fixed his attention to that science I do not know. Probably his intimacy with the three brothers Forster had something to do with it." The fruit of his researches at Dover appeared in a list of plants, read at the Linnean Society in March 1801, and in October of the same year he contributed a notice of the discovery of the *Sisymbrium murale*, L., in the neighbourhood of Ramsgate,

which was published in the sixth volume of our 'Transactions.' At the beginning of 1801 he resided with his father at Walthamstow, but in the following year his father purchased the Cambrian Pottery at Swansea, at the head of which extensive establishment he was thenceforward placed, although he did not absolutely settle there until the year 1803. His principal botanical work, 'The Natural History of British Confervæ,' was commenced in 1802, when he was only 24 years of age; and 'The Botanist's Guide through England and Wales,' in two vols. 8vo, the joint production of himself and Mr. Dawson Turner, was published in 1805. In the establishment which he conducted he found means of turning to good account his studies as a naturalist, and the porcelain of the Cambrian Pottery speedily acquired great celebrity for the faithful and exquisite paintings of birds, butterflies, shells and flowers with which it was ornamented, and which, together with the beauty of the material itself, render the "Swansea China" an article of great value in the eyes of connoisseurs. It was brought to its highest state of perfection about the year 1814, but was soon after laid aside, and earthenware again became, as it now is, the sole product of the Cambrian Pottery.

In 1809 Mr. Dillwyn completed his work on 'British Confervæ,' which formed, at the period of its publication, a most valuable contribution to a very neglected branch of the natural history of the British Islands. Shortly afterwards he married the daughter of John Llewelyn, Esq., of Penllergare, in the county of Glamorgan, on whose death, his eldest son, John Dillwyn Llewelyn, became heir to the extensive estates of his maternal grandfather, and for some years afterwards, as his son's guardian, Mr. Dillwyn resided at Penllergare. Previous, however, to this removal, he published, in 1817, 'A descriptive Catalogue of Recent Shells, arranged according to the Linnean Method,' in two vols. 8vo, a work of great labour and research, which he dedicated to Sir Joseph Banks, with whom he had long been on terms of friendly intimacy, and to the free use of whose extensive library he declares himself in the preface indebted for the means of producing it in so complete a form. This work was followed, in 1823, by 'An Index to the Historia Conchyliorum of Lister, with occasional Remarks,' printed in folio, at the Clarendon Press, at the expense of the University of Oxford, which, on this occasion, offered to Mr. Dillwyn the honorary degree of D.C.L., an honour which he, however, declined. In 1823 also he com-

municated to the Royal Society a paper "On Fossil Shells," which was printed in the 'Philosophical Transactions,' and was succeeded by a second paper on the same subject in the following year. In 1827 he communicated to the Linnean Society a notice of the occurrence of *Ianthina fragilis*, Lam., in the neighbourhood of Swansea, which is published in the 16th volume of our 'Transactions.' Two short papers, one in the third volume of the 'Zoological Journal,' on the Cyprææ described by Mr. Gray, and the other in the 'Proceedings' of the Zoological Society, "On the Capture of a specimen of *Labrus maculatus* in Swansea Bay," were published in 1828 and 1829. His 'Rarer Plants of Swansea,' and his 'Memoranda relating to Coleopterous Insects found in the neighbourhood of Swansea,' both privately printed, were also widely distributed by him in the same years.

In 1832, on the election which followed the passing of the Reform Bill, Mr. Dillwyn was returned to the House of Commons for the county of Glamorgan, of which he had for many years been an active Magistrate, occasionally presiding as Chairman of the Quarter Sessions, and for which he had also served the office of High Sheriff in 1818. The freedom of the borough of Swansea was unanimously presented to him in 1834, "as a mark of great personal respect," and from 1835 to 1840 he served as Mayor and Alderman of the borough. In his capacity of a Member of Parliament, from which he retired at the election of 1841, his votes were given with more than usual independence of party trammels. His portrait appears, in company with those of his friends, Mr. Talbot and Mr. Vivian, in Sir George Hayter's celebrated picture, and has since been separately lithographed by Eddis.

During the period of his parliamentary career his visits to London were necessarily more frequent and of longer duration; but his time was not wholly swallowed up by his attention to public affairs. He was busily engaged in the libraries of the Athenæum, of the British Museum, and of the Royal and Linnean Societies, in preparing 'A Review of the references to the Hortus Malabaricus of Henry Van Rheedè Draakenstein,' which he printed in 1839. In the country too he occupied himself on a volume entitled 'Contributions towards a History of Swansea,' 300 copies of which work, printed in 1840, he presented to the managers of a bazaar for the benefit of the Swansea Infirmary, for which valuable institution the sale of these copies is believed to have produced the sum of £150. In 1843 he printed 'Hortus Collinsonianus: an Account of the Plants cultivated by Peter Col-

linson, arranged alphabetically according to their modern names, from the Catalogue of his Garden and other Manuscripts,' which forms a useful commentary on the state of English gardens in the middle of the last century. It was of course with no small delight that Mr. Dillwyn welcomed the meeting of the British Association at Swansea in 1848. As one of the Vice-Presidents of the Meeting, and President of the Section of Zoology and Natural History, he took a warm interest and an active part in all the discussions that arose; and at his residence of Sketty Hall, to which he had some years previously removed, he received with hospitable welcome several of the most distinguished members of the Association. To celebrate the occasion, he dedicated to Lord Northampton and the Council a work 'On the Flora and Fauna of Swansea,' which issued from the local press on the first day of the Meeting, and was received by the members as a pleasing contribution to their local information.

This was the last of his publications: his health gradually gave way, and for several years before his death he had ceased to mingle in the busy world, or to take any active interest in its affairs. He died on the 31st of August last, at Sketty Hall, at the age of 77, leaving two sons (both Fellows of our Society, and both distinguished cultivators of natural history) and two daughters. Mr. Dillwyn was thoroughly honourable and upright in all his dealings, a steady man of business, a liberal and active country gentleman, a warm friend, and a zealous and enlightened contributor to natural science. With his contemporary naturalists, and especially with Sir James Smith, Mr. Dawson Turner, Mr. Edward Forster, Mr. Borrer, Mr. Woods and Mr. Brown, he was on terms of affectionate intimacy; and those of a later generation looked up to him with feelings of grateful respect. He became a Fellow of the Linnean Society in 1800, and of the Royal Society in 1804; and this Society may fairly regard it as a subject of cordial congratulation to have retained for five-and-fifty years the fellowship of so valuable a member and so estimable a man.

George Don, Esq., was born at Forfar, on the 17th of May 1798. He was the eldest son of the zealous British botanist of the same name, well known as the discoverer of many of the most interesting plants of the Scottish Highlands, and a constant correspondent of the late Sir James Edward Smith, who in his 'English Flora' (under *Rosa Doniana*) speaks of him as "one of the most indefatigable, as well as accurate of botanists; who loved the science for its own sake, and braved every difficulty in its ser-

vice." On the death of his father, in 1814, Mr. Don, in conjunction with his younger brother, David, made an attempt to carry on the nursery which their father had established at Forfar; but the business was shortly after given up, the elder brother removing in 1815 to Edinburgh, where he was for a time employed in the establishment of Messrs. Dickson and Co. In the following year he came to London, and after a short engagement at the Portman Nursery, succeeded in obtaining employment at the Chelsea Botanic Garden, then under the charge of Mr. Anderson, with whom he remained as foreman till 1821, when he entered the service of the Horticultural Society, and was shortly after despatched as their collector to Tropical Africa, South America, &c. During this voyage, which occupied something more than a year (from December 1821 till February 1823), he visited Madeira, Sierra Leone, St. Thomas's, Bahia, St. Salvador, Maranham, Trinidad, Jamaica, Havana, &c., and his activity in collecting and sending home living plants, seeds, and dried specimens, obtained for him the highest encomiums of the then Secretary of the Horticultural Society, Mr. Sabine. Many of these plants afterwards flowered at Chiswick, and were described by Professor Lindley in the Horticultural Transactions, &c. Mr. Don's attention having been particularly directed to the introduction of tropical fruits and the procuring of accurate information respecting them, and his visit to Sierra Leone occurring at a time when many of its fruits (then chiefly known from Dr. Afzelius's Report to the African Society) were in perfection, he was enabled to collect materials for a very interesting account of them, which appeared in the 5th volume of the Horticultural Society's 'Transactions,' under the title "Some Accounts of the Edible Fruits of Sierra Leone, drawn up by Joseph Sabine, Esq., Secretary, from the Journal and personal communication of Mr. George Don, A.L.S." At the recent sale of the Herbarium of the Horticultural Society, specimens of the plants obtained by Mr. Don during this expedition, and which are valuable, not merely in connexion with his own botanical labours, but likewise as being, in part, typical of the species described by Messrs. Bentham, Hooker, &c., in the 'Flora Nigritiana,' were purchased for the Herbarium of the British Museum. His brother David having succeeded Mr. Brown, on his resignation in 1822, as Librarian to the Linnean Society, George was for some years domiciled with him. During the earlier part of that period, he appears to have been occupied upon a revision of the genus *Combretum*, which was read before the Linnean Society in

Went out as Nathaniel
 1821. Sabine to Africa

March 1826, and published in the 15th volume of its 'Transactions.' About the same time Mr. Don also communicated to the Wernerian Society a Monograph of the genus *Allium*, which is published in the 6th volume of the Memoirs of that Society. From 1828 to 1837 his time was principally occupied upon the 'General System of Gardening and Botany,' or as it was afterwards called, the 'History of Dichlamydeous Plants,' consisting of four 4to volumes, averaging about 880 pages each. The original intention was, that the work should include all the known species of plants, and that the whole should be comprised in four volumes; but this being found impracticable, and the publishers receiving little encouragement to proceed, it was abruptly closed at the 4th volume without its having extended beyond the *Dichlamydeæ*. He shortly afterwards entered into an engagement to supply the botanical articles of the 'Encyclopædia Metropolitana,' which he continued to do till the close of the work, great part of the introductory treatise having been furnished by him, as well as the articles in the alphabetical series, from the middle of the 11th volume to the end of the 12th. In 1842-3 he was employed by the Board of Woods and Forests in naming the trees and shrubs in Kensington Gardens and the Parks, by means of which the names of a very considerable number of species and varieties of woody plants have become familiar to the visitors. He likewise rendered much assistance to the late Mr. Loudon in the preparation of the various botanical works in which that gentleman was engaged during the last ten or twelve years of his life; and the last of his botanical labours was the preparation of a supplement to Loudon's 'Encyclopædia of Plants,' which made its appearance only a few months before his death. He had been suffering at intervals during the last two years from disease of the heart, which had latterly prevented him from being present at any of our meetings, at which he had for many years previously been a constant attendant, having been elected an Associate in 1822, and a Fellow in 1831. He died at Campden Hill, Kensington, on the 25th of February last, in the 58th year of his age.

Alexander Erskine, Esq., of Balhall, in the county of Forfar, and Longhaven, Aberdeenshire, became a Fellow of the Linnean Society in 1804, and was also a Fellow of the Horticultural Society. He died, at his residence in Bryanstone Square, on the 17th of November last, in the 81st year of his age, having been for more than fifty years a Fellow of our Society.

John Harris, Esq., of Exeter, Surgeon, was admitted a Fellow

of the Linnean Society in 1813, and died at Exeter on the 30th of June last year, at the age of 73.

Samuel Holker Haslam, Esq., became a Fellow of the Linnean Society in 1836. He was warmly attached to literary and scientific pursuits, spoke fluently both French and German, was conversant with Italian, and made considerable collections of plants and insects, both of which he presented, about two years ago, to the Natural History Society of Kendal. He died at his residence, Woodhouse, Milnthorpe, Westmoreland, on the 13th of April in the present year.

Henry Jenner, Esq., M.D., was the son of the Rev. Henry Jenner, M.A., Rector of Rockhampton in Gloucestershire, and Domestic Chaplain to the Earl of Aylesbury. In 1783 he was apprenticed to his uncle, the celebrated Dr. Edward Jenner, and being of an inquiring disposition and greatly attached to natural history, assisted him, not only in his professional avocations, but also in his natural-history studies. In this way he took a share in the investigation in relation to the Habits of the Cuckoo, published by his uncle in the 'Philosophical Transactions' for 1788. He became a Fellow of the Linnean Society in 1799, and had consequently been a Member for the long period of 57 years. His death took place in March of the present year at Berkeley, in Gloucestershire, where he had continued to reside.

Joseph Neeld, Esq., F.S.A., of Grittleton, in the county of Wilts, a Deputy-Lieutenant of Wiltshire, M.P. for the borough of Chippenham, and High-Steward of Malmesbury, was a grand-nephew of the late Philip Rundell, of Ludgate Hill, at whose death in 1827 he became possessed, as residuary legatee, of property little short of a million sterling. In the subsequent year he purchased the estate of Grittleton, to which he has since made large additions, of which Mr. Britton has lately given a particular account. A new mansion, on a scale and of a character fitted to rank with the most magnificent seats in the country, is in progress of erection; the farm-houses, cottages, and churches have been rebuilt, and the whole domain has been placed under a general system of amelioration and improved cultivation. In Parliament, Mr. Neeld was a steady supporter of the Conservative party: he married, in 1831, a sister of the present Earl of Shaftesbury, but having no issue, his great estates devolve upon his brother John. He became a Fellow of the Linnean Society in 1829, and died on the 24th of March in the present year, at the age of 67.

Rear-Admiral the Hon. William Henry Percy, sixth son of Alger-

non, first Earl of Beverley, was born on the 24th of March 1788. He entered the Navy in 1801 as first-class volunteer on board the *Lion*, 64, and became in the next year Midshipman of the *Medusa*, 32. In that ship, after sharing in the capture of several Spanish frigates and merchantmen of great value, he sailed with the *Marquis Cornwallis* for the East Indies, and returned from the Ganges to the *Lizard*, a distance of 13,831 miles, in the surprisingly short period of 84 days. He next served on board of several vessels on the Home Station, and became in 1807 Lieutenant of the *Decade* frigate, and afterwards of the *Hibernia*. In 1810 he obtained the rank of Commander, and was appointed to the *Mermaid*, 28, which was engaged in the conveyance of troops to Portugal and Spain. He was posted in 1812, and in 1814 commanded the *Hermes*, 20, which vessel, after twenty-five of her crew had been killed, and twenty-four wounded, in an unsuccessful attack on Fort Bowyer, Mobile, was set on fire and destroyed to prevent her falling into the hands of the Americans. On the court-martial which ensued, Captain Percy, who had also on this occasion under his command the *Canon*, 20, and *Sophia* and *Childers*, of 18 guns each, was honourably acquitted of all blame.

He sat in two Parliaments, from 1818 to 1826, for the borough of Stamford, and was appointed a Commissioner of Excise in 1828, from which office he retired in 1849, having previously, in 1846, accepted the rank of Rear-Admiral. His fellowship of the Linnean Society dates from 1823, and he died, unmarried, at the house of his brother, the present Earl of Beverley, in Portman Square, on the 5th of last October, in the 68th year of his age.

Henry Perkins, Esq., of Hanworth Park, in the county of Middlesex, one of the celebrated firm of Barclay, Perkins and Co., became a Fellow of the Linnean Society in the year 1825, and was also a Fellow of the Geological and Horticultural Societies. He died at Dover, on the 15th of April of the present year, at the age of 78.

John Reeves, Esq., F.R.S. &c., was the youngest son of the Rev. Jonathan Reeves of Westham, near London, and was born on the 1st of May 1774. Left an orphan at an early age, he was educated at Christ's Hospital, and afterwards entered the counting-house of a tea-broker, where he acquired so thorough a knowledge of teas, as to recommend him in 1808 to the office of Inspector of Tea in England in the service of the Honourable East India Company. In 1812 he proceeded to China as Assistant, and subsequently became Chief Inspector of Tea in the East

India Company's establishment at Canton. From the time of his arrival in China, he devoted his leisure to investigating the resources of the country, and to the pursuit of various branches of science, making it his principal object to procure specimens of the natural productions of the country, and especially those which promised to be either useful or ornamental, and to transmit them to England to such individuals or societies as appeared most likely to turn them to account. His principal correspondent for some years after his first arrival in China was Sir Joseph Banks. He formed no collections of his own, neither did he keep any record of his proceedings in this respect; so that were it not for the knowledge possessed by many among us of the extent of his contributions to our gardens and museums, there would be some risk of our obligations to his memory remaining unacknowledged and forgotten. During the whole period of his residence in China, from 1812 to 1831, he contributed largely to English horticulture, and to the Horticultural Society in particular, not only by his own direct shipments of plants, but also by collecting plants during the spring and summer, establishing them well in pots previous to the shipping season, and then commending them to the care of the captains of the Company's ships, to whom he was also always ready to recommend the most desirable plants for transportation to England. It was in this way, to instance one case among many, that the *Wistaria Sinensis* first found its way to England. It was in the latter part of his stay in China that he made the fine collection of fishes, which, together with his drawings, furnished the groundwork of Sir John Richardson's valuable Report "On the Ichthyology of the Seas of China and Japan," published in the 'Reports of the British Association' for 1845. As the history of these drawings and collections strikingly illustrates his activity in collecting, and disinterestedness in distributing his materials, I cannot do better than quote the observations of Sir John Richardson in regard to them. "For upwards of fifteen years," says that gentleman, "materials for an ample account of the fishes of China have existed in England. John Reeves, Esq., who was long resident at Macao, with an enlightened munificence, caused beautiful coloured drawings, mostly of the natural size, to be made of no fewer than 340 species of fish, which are brought to the markets of Canton. These drawings are executed with a correctness and finish which will be sought for in vain in the older works on ichthyology, and which are not surpassed in the plates of any large European work of the present day. The brilliancy

and effect of the colouring, and correctness of profile, render them excellent portraits of the fish they are intended to represent. Mr. Reeves had four copies of these drawings made. One set, which he presented to General Hardwicke, is bound up with that officer's large collection of sketches of Indian Fish, in four folio volumes, in the British Museum. Another copy, left by Mr. Reeves at Macao with Mr. Beale, formed the groundwork of the enumeration of Chinese fishes in Bridgeman's 'Chrestomathy.' A third copy, which he liberally lent to me, is the foundation of this Report. Mr. Reeves has also deposited in the British Museum specimens of Chinese fish, both dried and preserved in spirits, part of them the very examples which are figured in his drawings. His son, John Russell Reeves, Esq., [also, let me add, a valuable Fellow of our Society,] has likewise presented various fish procured at Macao to the British Museum; among which are several species not figured in his father's drawings." Mr. Reeves's contributions to the British Museum were not limited to the Natural-History departments, but included also the Library and the department of Antiquities, to the latter of which in particular he gave, from his large collection of Chinese coins, all such as were thought desirable for the national cabinet. At an early period of his residence in China, he collected, at the request of Dr. Morison, the Chinese names of the stars and constellations, which were published at that time, and are usually bound up with Dr. Morison's Chinese Dictionary.

Mr. Reeves became a Fellow of the Linnean Society in 1817, and of the Royal Society in the same year; he was also a Fellow of the Horticultural Society, the Royal Astronomical, the Asiatic, and the Zoological Societies, and of the Society of Arts; and most of these institutions are indebted to him for valuable contributions to their collections. From the time of his return to England, in 1831, he resided at Clapham, where he died on the 22nd of March in the present year, having nearly completed his 82nd year.

Samuel Rootsey, Esq., for many years Lecturer on Chemistry and Botany in the Medical School of Bristol, was born on the 12th of February 1788, at Colchester, where his father was the proprietor of extensive oil-mills. At an early age he was placed under the charge of his grandmother at Halstead in the county of Essex, and attended the grammar-school of that place for some years; after which he was removed to a boarding-school at Harlow in the same county. In 1803 he was apprenticed to a chemist at Southampton, and eagerly attached himself to the study of che-

mistry and botany, and to the acquisition of different languages, which occupied a large share of his attention during the remainder of his life. Soon after the expiration of his apprenticeship he wrote to Dr. Maton, to whom he was then personally unknown, stating his anxious desire to become a Fellow of the Linnean Society, and so strongly was Dr. Maton impressed in his favour by the terms of his letter, that he readily undertook to propose him. In the following year he was elected, and passing some time in London, was introduced by Dr. Maton to Sir Joseph Banks, Sir James E. Smith, and other eminent men of science, and derived great advantage from the permission readily granted him by Sir J. Banks to make use of his library and herbarium. In the year 1812, Mr. Rootsey established himself at Bristol as a chemist and druggist, and soon after commenced his Lectures on Chemistry and Botany, the latter of which he continued until within a short period of his death. In 1815 he published "A General Dispensatory, or Arrangement of the Pharmacopœias of London, Edinburgh and Dublin," which he dedicated to Dr. Maton; and in 1818, a "Syllabus of a Course of Botanical Lectures," delivered to his pupils at Bristol. He also published a new system of Notation in Music, and various other works. A tour in Sweden in 1824 made him acquainted with Westring, from whom he obtained the copper-plates of his Essays on Lichens and the Dyes afforded by them, of which he proposed publishing an English translation; but unfortunately this intention was never carried out. He also made the acquaintance of Broling and Afzelius; and his MS. Journal of his tour is stated to contain some highly interesting facts and observations relating to natural history. In it he mentions, among other subjects on which he was engaged, a new projection of the World, his theory of vocal intervals in Music, his mode of studying the Chinese Characters, his system of Pharmacy, his Mineralogical Sliding-Rule, &c. &c. In 1826 he published a revised and corrected edition of Donne's 'Mechanical Geometry;' and besides the separate publications already mentioned, he communicated to the Philosophical and Literary Institution of Bristol, of which he was an Honorary Member, numerous Papers on a variety of subjects, and to the Medico-Botanical Society a Paper "On the Medical Botany of Shakespeare," which was published in their 'Transactions' for 1832. From the year 1834 he was chiefly occupied in lecturing on various subjects, but more particularly on Botany, in Bristol, Bath, Swansea, Neath, and other towns in the Western district; but of late years his health

had been gradually failing, and he died on the 4th of September last, after a short illness, in the 68th year of his age.

Thomas Salter, Esq., was the descendant of a highly respectable Quaker-family in Somersetshire, and became at an early age the pupil of the late Thomas Bell, Esq. of Poole, the father of our excellent President. In 1809 he entered at St. Thomas's Hospital, and in 1810 he was admitted a Member of the Royal College of Surgeons, the Council of which, on the grant of their new Charter in 1844, conferred on him the title of Fellow. On his return to Poole, after the completion of his medical studies in London, he was admitted into partnership by Mr. Bell, whose only daughter he married. From that time, until the day of his death, he continued to practise his profession in Poole, where he acquired a high degree of influence, not only by the success of his medical practice, but also by his social qualities, the cheerfulness of his disposition, and the atmosphere of pleasant comfort which his presence diffused even in the chamber of sickness and of suffering. Through the whole of this lengthened period he prosecuted his profession in all its scientific bearings, and constantly kept pace with advancing discovery, reading all the most important medical works as they appeared, and preparing with his own hands anatomical and pathological specimens. The medical library which he has left behind him is one of the largest, and his medical museum by far the most important in the county of Dorset. He also contributed many valuable Papers to medical literature, most of which were published in the Transactions of the different medical societies; and educated more than twenty pupils, many of whom, including his three surviving sons, hold a distinguished position in the ranks of the profession: two of his sons are Fellows of our Society. His youngest son, Mr. Morgan Salter, unhappily volunteered to take the medical charge of H.M.S. Prince, and perished from the wreck of that ill-fated ship in the great storm at Balaklava. Mr. Salter's death, which was no doubt hastened by this sad event, from the shock of which he never recovered, took place suddenly. On his way to visit some sick poor, on the night of the 20th of February, the extreme coldness of the air appears partially to have arrested his circulation, which his heart was apparently too feeble to restore. He sought refuge in the house of a friend, where he died before any assistance could arrive, from no actual disease, but from sudden and complete prostration of the system. In early life he devoted his few leisure hours to the study of geology, botany and chemistry, and he has

left a choice and numerous collection of fossils accumulated at that period. In 1824 he became a Fellow of the Linnean Society, and in 1827 of the Medico-Chirurgical: he held also the Commission of a Justice of Peace for the town of Poole. Although it was his express desire that his funeral should be quiet and unostentatious, some hundreds of the most respectable inhabitants of the town attended to do honour to his memory, and the closing of shops and private houses in the route through which the funeral was to pass, evinced the deep respect in which he was held. He died at the age of 70.

The Most Noble Edward Adolphus, Duke of Somerset, K.G., Vice-Admiral of the Coast of Somersetshire, D.C.L., F.R.S., F.S.A., and a Trustee of the Hunterian Museum, was born at Monkton-Farley in Wiltshire, on the 24th of February 1775. While in his nineteenth year he succeeded to the title and estates. He was a Member of Christ Church College, Oxford, where the degree of M.A. was conferred upon him in 1794, and that of D.C.L. in 1810. From an early age he evinced an attachment to science: he was elected F.R.S. in 1797; in 1816 he became F.S.A., and in 1820 F.L.S. For some years he was President of the Royal Institution; and from 1801 to 1838 he was likewise President of the Literary Fund, to which he contributed largely during forty-six years. From 1826 to 1831 he was a Vice-President of the Zoological Society. At the anniversary of 1834, on the resignation of Lord Stanley, he was elected President of the Linnean Society, and continued to hold that office till the end of 1837, when he resigned and was succeeded in it by the late Lord Bishop of Norwich. His uniform courtesy of manners and amiability of temper, combined with the hospitable and friendly reception which he gave to men of literature and science, and the extent of his information on a wide range of subjects, will cause his memory to be cherished and respected by all who were admitted to the privilege of meeting him in social intercourse. In science he chiefly attached himself to mathematical studies, and published, in 1842, "A Treatise in which the Elementary Properties of the Ellipse are deduced from the Properties of the Circle, and geometrically demonstrated," of which a second edition was printed in the following year; and the investigation was still further pursued in another treatise, entitled "Alternate Circles and their Connexion with the Ellipse," published in 1850. His Grace was twice married, first to a daughter of the Duke of Hamilton, and secondly to the eldest daughter of Sir Michael Shaw Stewart, Bart., who,

together with seven of his children by his first wife, survives him. He died on the 15th of August last, at his residence in Park Lane, and was buried in the cemetery at Kensal Green. His eldest son, the present Duke, has filled several important offices in the State, and is a Trustee of the British Museum.

William Swainson, Esq., F.R.S., Hon. M.C.P.S. &c., was born on the 8th of October 1789. His father was then Secretary of the Board of Customs in London, and subsequently filled the important office of Collector of the Port of Liverpool. At the early age of 14, he was appointed a Junior Clerk in the same branch of the service; but a love of natural history had been so strongly implanted in him, when a mere child, by the inspection of his father's collections of British insects and shells, that it became impossible to reconcile his ardent disposition to the formal routine of official life at home. To gratify his inclination for studying the natural history of other countries, his father therefore obtained for him an appointment in the Commissariat, and in this new capacity, after a short stay at Malta, he arrived in Sicily in the spring of 1807. During the eight succeeding years he was chiefly stationed in that island, and no serious operations being undertaken by the corps to which he was attached, he had abundant opportunities of adding to his collections of plants, insects, shells and fishes, and leisure to make a multitude of drawings and sketches of natural objects. During this period he made an excursion to Greece, and also visited Naples, Genoa and Tuscany. In 1815 he returned to England, bringing with him large collections in natural history; and resolving henceforward to devote himself to no other pursuit, he relinquished the certain prospect of rapid advancement in his profession, and retired upon half-pay. His great object was to visit some distant part of the world which had been little investigated by naturalists, and he first fixed upon Southern Africa; but on hearing of the successful journey of Dr. Burchell in that region, which he supposed to have nearly exhausted its natural productions, he determined on penetrating into the interior of Northern Brazil. With this view, in company with Mr. Koster, the narrative of whose first journey in Brazil had just been published, he left England late in the autumn of 1816. But his attempts to traverse the Continent, or even to penetrate far into the interior, were frustrated by the revolution of 1817, and he was compelled to content himself with collecting in the neighbourhood of Olinda, in the district of the Rio San Francisco, and afterwards in that of Rio de Janeiro. On his

return to Liverpool he proposed to publish a Narrative of his Travels, but a short abstract of them given in the 'Edinburgh Philosophical Journal' having attracted little attention, he abandoned the idea, and determined to confine himself to the publication of his zoological materials. Accordingly having familiarized himself with the then novel art of lithography, he commenced a series of plates, drawn by himself, and issued periodically, under the title of 'Zoological Illustrations,' the first series of which, consisting of three vols., were published between the years 1820 and 1823. In order more efficiently to superintend this publication, and also another in which he soon afterwards engaged, under the title of 'Exotic Conchology,' he removed to London; but, in 1825, in pursuance of an engagement long previously formed, he married the daughter of John Parkes, Esq. of Warwick, and took up his residence in that town. In 1826 he lost his father, and soon after entered into engagements with Messrs. Longman for the publication of an 'Encyclopædia of Zoology,' which was intended to form a companion volume to Loudon's 'Encyclopædia of Agriculture and Gardening.' On reconsidering the subject, however, the publishers determined to combine this intended work with their projected 'Cabinet Cyclopædia,' and eleven volumes of the 'Cabinet Cyclopædia of Natural History,' from the pen of Mr. Swainson, successively made their appearance between 1834 and 1840, embracing 'A Preliminary Discourse on the Study of Natural History,' 'A Treatise on the Geography and Classification of Animals,' 'A Treatise on the Natural History and Classification of Quadrupeds,' of 'Birds,' 2 vols.; of 'Fishes, Amphibia, and Reptiles,' 2 vols.; of 'Shells and Shell-fish,' 2 vols.; and volumes on 'The Habits and Instincts of Animals,' on 'Animals in Menageries,' on 'Taxidermy, Bibliography, and Biography,' and, in conjunction with Mr. Shuckard, 'On the History and Natural Arrangement of Insects.' Previous to commencing this laborious undertaking, Mr. Swainson had again changed his residence from Warwick to Tittenhanger Green, in the neighbourhood of St. Albans, where he found himself sufficiently removed from the distractions of a residence in London, and at the same time sufficiently near the metropolis, to avail himself frequently of its libraries and collections. Here also he prepared and published a second series of his 'Zoological Illustrations,' consisting, like the first, of three vols. 8vo; two volumes on 'The Birds of Western Africa,' and one on 'The Flycatchers,' forming part of Lizars's 'Naturalist's Cabinet'; extensive contributions to the volume of

Sir John Richardson's 'Fauna Boreali-Americana,' illustrating the Birds; the zoological portion of Murray's 'Encyclopædia of Geography;' 'Elements of Conchology, for the use of Students and Travellers;' and five parts of a work entitled 'Ornithological Drawings: Series 1, Birds of Brazil.' In 1828 Mr. Swainson passed several weeks in Paris, busied in studying the collections of the French Museum, and adding to his large collection of natural-history drawings. In 1835 he was left a widower with five children; and marrying again some years afterwards, he determined on emigrating, with his family, to New Zealand, on the climate of which, principally with reference to its sanative character, he published a little work in 1840. In that year he embarked on board a vessel, from the unseaworthiness of which he unfortunately lost a large portion of his collections; while, on his arrival in New Zealand, he soon found that he had been misled by exaggerated representations. He did not, however, suffer himself to be dejected by these losses and disappointments. From Rio de Janeiro, at which the vessel had touched to refit, he had brought with him numerous vegetable productions, which he thought would be suitable to the climate of New Zealand, and he set himself energetically to work to establish himself in his new abode. Of his pursuits as regards natural history during this period few traces have reached England, although it cannot be doubted that here, as elsewhere, a large portion of his attention must have been devoted to his favourite pursuit. We only know that he had his full share of those losses and privations which usually fall to the lot of the earlier settlers in a new colony, aggravated by the storms and earthquakes to which New Zealand appears to be peculiarly subject. In 1851 he visited Sydney; and in 1853, he was engaged, under the authority of the governments of Van Diemen's Land and Victoria, in an examination of the timber-trees of those colonies. Soon afterwards he returned to his residence at Fern Grove, River Hutt, New Zealand, where he died, it is supposed of an apoplectic seizure, after a week or ten days' illness, on the 7th of December last, in the 67th year of his age. His entry into the Linnean Society dates from 1816, and into the Royal Society from 1820; and he was also an Honorary or Corresponding Member of numerous scientific societies both in Europe and America. Of his five children by his first wife, four sons survive him; and of these, two are settled in New Zealand. By his second wife he had three children, all daughters, who, with their mother, also survive him. In addition to the extensive series

of separate works above mentioned, he was author of 'Instructions for Collecting and Preserving Subjects of Natural History and Botany,' Liverpool, 1808 and 1820, subsequently enlarged into 'The Naturalist's Guide for Collecting,' &c., London, 1822 and 1824; and of numerous Papers in Scientific Transactions and Journals, among the most important of which are the following:—

1. On the genus *Picus* of Linnæus, &c.—*Mem. Wern. Soc.* iii. p. 288.

2. On two new Birds of the genus *Pteroglossus* of Illiger.—*Journ. Roy. Inst.* ix. p. 266.

3. On two new and remarkable Freshwater Shells, *Melania setosa* and *Unio gigas*.—*Ibid.* xvii. p. 13.

4. On several new Shells belonging to the Linnean genus *Voluta*.—*Ibid.* xvii. p. 28

5. Monograph of the genus *Ancillaria*.—*Ibid.* xviii. p. 272.

6. On *Psittacus Fieldii*, a new species of Parrot from Australia.—*Ibid.* xix. p. 198.

7. Monograph of the genus *Tachyphonus*.—*Ibid.* xx. p. 60.

8. On the Tyrant Shrikes of America.—*Ibid.* xx. p. 267.

9. On the Importance of preserving Facts connected with the Natural History of Animals.—*Ibid.* xxiii. p. 83.

10. The Characters of *Achatinella*, a new group of Terrestrial Shells.—*Ibid.* xxv. p. 81.

11. On those Birds which exhibit the typical perfection of *Anatidæ*.—*Ibid.* ser. 2. ii. p. 11.

12. An Inquiry into the Natural Affinities of the *Laniidæ*.—*Zool. Journ.* i. p. 289.

13. On the Characters and Natural Affinities of several new Birds from Australia.—*Ibid.* i. p. 443.

14. Characters and Descriptions of several Birds belonging to the genus *Thamnophilus*, Vig.—*Ibid.* ii. p. 84.

15. On two new genera of Birds, *Formicivora* and *Drymophila*, with Descriptions of several Species.—*Ibid.* ii. p. 145.

16. On the genus *Psaris* of Cuvier.—*Ibid.* ii. p. 354.

17. On several Groups and Forms in Ornithology not hitherto defined.—*Ibid.* iii. p. 158, & p. 343.

18. On the Analogies of the *Mitranæ*.—*Proc. Zool. Soc.* iii. p. 197.

19. On *Hemipodius nivosus*, a new Bird from Africa.—*Phil. Mag.* lx. p. 353.

20. On *Iridina*, a genus of Freshwater Bivalve Shells.—*Ibid.* lxi. p. 112.

21. The Characters of several rare and undescribed Shells.—*Phil. Mag.* lxi. p. 375, & lxii. p. 401.
22. On the Natural Affinities of the *Lepidoptera Diurna* of Latreille.—*Ibid.* ser. 2. i. p. 180.
23. Synopsis of the Birds discovered in Mexico by W. Bullock, F.L.S., and W. Bullock, Jun.—*Ibid.* ser. 2. i. p. 364, & p. 433.
24. On the Nut-hatch (*Sitta Europæa*).—*Mag. Nat. Hist.* i. p. 328.
25. On the Natural History and Relations of the Family of *Cuculidæ*.—*Mag. Zool. & Bot.* i. p. 213, & p. 430.

The titles of this long list of publications sufficiently indicate the wide scope of his zoological acquirements. He became deeply imbued, at an early period, with Mr. W. S. MacLeay's views on the circular succession of affinities, and the strict numerical relations of the several groups; and carried out these principles, with some peculiar modifications of his own, through nearly all the classes of the animal kingdom. As a zoological draughtsman he also attained high distinction, combining the skill of a practised artist with the accuracy of a well-instructed naturalist, and thus giving to his representations of animals a double interest as accurate copies of nature embellished by a refined taste in art.

The Rev. William Webb, D.D., Master of Clare Hall in the University of Cambridge, was the son of William Webb, M.A., Master of Bishop Vesey's Grammar-school at Sutton-Coldfield, near Birmingham, and a magistrate of the county of Warwick. He was born at Sutton-Coldfield in February 1775, and educated at home until sent to Clare Hall in 1793, where he took his degrees of B.A. 1797, M.A. 1800, B.D. 1808, and D.D. 1816. He became Fellow and Tutor of his College, and in 1815 was unanimously elected Master, which office he filled for the long period of forty-one years, during which he was twice Vice-Chancellor of the University. Previous to his election as Master, he held for a short time the living of Fornham near Bury St. Edmunds, and subsequently that of Litlington near Cambridge. At this place, during his incumbency, in the year 1821, a Roman cemetery was opened, which yielded an extraordinary store of sepulchral vessels. These are now preserved in the library at Clare Hall, and are described in two papers in the 'Archæologia,' vols. 25 and 26, accompanied by plates from drawings made by Mrs. Webb. By this lady, to whom he was married in 1815, during his short connexion with the rectory of Fornham, he had several children, one of whom, a son, alone survives. Dr. Webb

is stated to have rendered great services both to his College and to the University. He collected a very valuable library of topographical, antiquarian and botanical works, as well as a considerable number of articles of *virtù*, which have been sold by auction since his death. He was elected a Fellow of the Linnean Society in 1815, and died at Litlington, on the 4th of January in the present year, in the 81st year of his age.

The only death which it is my duty to record as having occurred among our *Foreign Members* during the past year, is that of

Johann Christoph Friedrich Klug, Doctor of Medicine and Philosophy, for the last thirty-eight years Extraordinary Professor in the University of Berlin, and one of the Directors of the Royal Zoological Museum of that capital. Information of the death of this distinguished entomologist has been so recently communicated to me, that I have not yet had the opportunity of making myself sufficiently acquainted with the particulars of his life to give even an imperfect sketch of his career. He was born at Berlin on the 5th of May 1775, and educated at the University of Halle, where he printed, in 1797; his inaugural dissertation, entitled 'Historia Instrumentorum ad Polyporum extirpationem.' His entomological publications commenced with a valuable 'Monographia Siricum Germaniæ,' published at Berlin in 4to, 1803; and this has been followed by a long succession of monographs (chiefly on the stinging *Hymenoptera*) and other works, extending nearly to the present time. Of these thirty-five are enumerated in the 'Bibliographia Zoologiæ et Geologiæ' of the Ray Society. As Keeper of one of the most extensive and best-arranged collections of insects in Europe, he had ample opportunities of contributing to entomological science, not only by his own labours, but also by the assistance which he was ever ready to afford in facilitating the labours of others.

The Secretary also announced that nineteen Fellows had been elected since the last Anniversary.

At the Election which subsequently took place, Thomas Bell, Esq. was re-elected President; William Yarrell, Esq., Treasurer; John Joseph Bennett, Esq., Secretary; and Richard Taylor, Esq., Under-Secretary. The following Five Fellows were elected into the Council in the room of others going out:—Robert Bentley, Esq.; L. L. Dillwyn, Esq.; Richard Owen, Esq.; Joseph Woods, Esq.; and James Yates, Esq.

The President nominated Francis Boott, Esq., M.D.; Robert Brown, Esq.; Richard Owen, Esq.; and William Yarrell, Esq., Vice-Presidents for the ensuing year.

The President proposed the Election of His Majesty Don Pedro, King of Portugal, as one of the Honorary Members; which, having been put to the Society by open vote, was carried unanimously.

June 3rd, 1856.

Thomas Bell, Esq., President, in the Chair.

Mr. William Penny was elected an Associate.

J. O. Westwood, Esq., F.L.S., made some observations on a Lepidopterous Insect infesting the Sugar-canes of the Island of Mauritius, and greatly diminishing the saccharine products (see "Zoological Proceedings," p. 101); and a Conversation followed among the Members present on the best means of destroying the insect and thereby preventing its ravages.

Read, a "Note on the development of *Fungi* upon Patna Opium;" by the Rev. M. J. Berkeley, M.A., F.L.S. &c. (See "Botanical Proceedings," p. 143.)

June 17th, 1856.

Special General Meeting.

Thomas Bell, Esq., President, in the Chair.

The Meeting having been specially summoned "to consider a proposal from Her Majesty's Government to give Apartments to the Linnean Society in Burlington House," contained in a Letter addressed by the Secretary of the Treasury to the President of the Royal Society, and printed at p. xxxii, it was moved by Joseph Dalton Hooker, Esq., M.D., seconded by John Forster, Esq., and resolved unanimously:—

That the Council be authorized to place itself in communication with the Councils of the Royal and Chemical Societies, with the view of carrying out the proposal of the Government, as to the occupation of Burlington House.

June 17th, 1856.

Ordinary Meeting.

Thomas Bell, Esq., President, in the Chair.

Joseph Wainwright, Esq. was elected a Fellow.

Read, a Paper "On a New Organ in Insects;" by J. B. Hicks, Esq., M.D., F.L.S. (See "Zoological Proceedings," p. 136.)

Read also, a Paper "On a New Species of *Peziza*;" by Frederick Currey, Esq., F.L.S.

Read further, "Notes on some rare or undescribed *Fungi* lately found in the vicinity of Malvern, Worcestershire;" by Edwin Lees, Esq., F.L.S.

ADDITIONS

TO THE

LIBRARY OF THE LINNEAN SOCIETY.

RECEIVED FROM JANUARY 1, 1856, TO JUNE 30, 1856.

 [Continued from page xv.]

TITLES.

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Basel, 1855, 8vo. THE SOCIETY.
- Batavia :—Natuurkundige Vereeniging voor Nederlandsch
Indië. Natuurkundig Tijdschrift. Nieuwe Serie, deel 5, afl.
5 & 6, & deel 6, afl. 3–6. Batavia, 1855, 8vo. THE SOCIETY.
- Berlin :—Verein zur Beförderung des Gartenbaues in den K.
preussischen Staaten. Verhandlungen. band 16–19, bd.
20, heft 1, & band 21. Berlin, 1842–53, 4to.
- : — Neue Reihe, jahrg. 3. *Ib.* 1855, 8vo. THE SOCIETY.
- Bombay :—Hon. East India Company's Observatory. Mag-
netical and Meteorological Observations made at, in the
years 1852 & 1853. Bombay, 1855, 4to. THE COMPANY.
- Breslau :—Imperial Academy "Naturæ Curiosorum." Nova
Acta, tom. 24, suppl. & tom. 25, pars 1. Vratislaviæ et
Bonnæ, 1854–55, 4to. THE ACADEMY.
- Calcutta :—Asiatic Society. Asiatic Researches, vol. 18. Cal-
cutta, 1833, 4to. THE SOCIETY.
- Charleston, S. C. :—Elliott Society of Natural History. Pro-
ceedings, No. 1. 1853, 8vo. THE SOCIETY.
- Cherbourg :—Société Imp. des Sciences Naturelles. Mémoires,
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- Dublin :—Geological Society. Journal, vol. 7, parts 1 & 2.
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- Frankfort :—Senckenbergische Naturforschende Gesellschaft.
Abhandlungen. band 1, lief. 2. Frankfort-a-M., 1855, 4to.
Schädel abnormen Forms, in geometrischen Abbildungen,
&c., von Dr. J. C. G. Lucaë. *Ib.* 1855, fol. THE SOCIETY.

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| Geneva:—Société de Physique et d'Histoire Naturelle. Mémoires, tom.14, part. 1. Genève, 1855, 4to. | THE SOCIETY. |
| Göttingen:—Königl. Gesellschaft der Wissenschaften. Abhandlungen, band 6. Göttingen, 1856, 4to. | |
| Nachrichten, &c., vom Jahre 1855 (Nos. 1-18.). | <i>Ib.</i> 8vo.
THE SOCIETY. |
| Hobart Town:—Royal Society of Van Diemen's Land. Papers and Proceedings, vol. 2, part 3. Hobart Town, 1854, 8vo. | |
| Tasmanian Contributions to the Exhibition of Industry at Paris, 1855, fol. | |
| | THE SOCIETY, through JOSEPH MILLIGAN, Esq. F.L.S. |
| Liège:—Société des Sciences. Mémoires, tome 10. Liège, 1855, 8vo. | THE SOCIETY. |
| London:— | |
| British Museum, Catalogues of the Collections in. | |
| List of the Specimens of Birds, part 4. London, 1856, 12mo. | |
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| Entomological Society. Transactions. New Series, vol. 3, parts 7 & 8. London, 1856, 8vo. | THE SOCIETY. |
| Exhibition of the Works of Industry of All Nations, 1851. First Report of the Commissioners. London, 1852. | WILLIAM MATCHWICK, Esq. |
| — — — Third ditto. <i>Ib.</i> 1856, 8vo. | THE COMMISSIONERS. |
| Geological Society. Quarterly Journal, nos. 45 & 46. London, 1856, 8vo. | THE SOCIETY. |
| Royal Society. | |
| Philosophical Transactions, part 2 for 1855. London, 1855, 4to. | |
| Proceedings, vol. 7, nos. 16-20. <i>Ib.</i> 1856, 8vo. | |
| List of the Members, Nov. 30, 1855, 4to. | THE SOCIETY. |
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Madrid:—Real Academia de Ciencias.	
Memorias. 3 ^{ra} serie. <i>Ciencias Naturales</i> , tomo 1, pte. 3. Madrid, 1853, 4to.	
— — — 1 ^{ra} serie. <i>Ciencias Exactas</i> , tomo 1, pte. 1. <i>Ib.</i> 1853, 4to.	
Resumen de las Actas, &c. <i>Ib.</i> 1851-53, 4to.	THE ACADEMY.
Munich:—Königl. Bayerische Akademie der Wissenschaften.	
Abhandlungen der mathem.-physikal. Classe, bd. 7, abth. 3. München, 1855, 4to.	
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Newcastle-upon-Tyne:—Tyneside Naturalists' Field Club.	
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| Société Botanique. Bulletin, tome 1, nos. 2-7, tome 2, nos. 1-11, and tome 3, no. 1. Paris, 1854-56, 8vo. | THE SOCIETY. |
| Académie des Sciences de l'Institut de France. Comptes rendus, tomes 40 & 41. Paris, 1855, 4to. | THE ACADEMY. |
| Philadelphia :—Academy of Natural Sciences. | |
| Journal, new series, vol. 2, part 4. Philadelphia, 1854, fol. | |
| Proceedings, vol. 2, no. 2, vol. 6, nos. 7-12, and vol. 7, no. 1. <i>Ib.</i> 1853-54, 8vo. | THE ACADEMY. |
| Stettin :—Entomologischer Verein. | |
| Entomologische Zeitung, jahrgang 16. Stettin, 1855, 8vo. | |
| Linnaea Entomologica, band 10. Berlin, 1855, 8vo. | THE ASSOCIATION. |
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| K. K. Geologische Reichsanstalt. | |
| Abhandlungen, band 2. Wien, 1855, 4to. | |
| Jahrbuch, jahrg. 6, nos. 1 & 2. <i>Ib.</i> 1855, 8vo. | THE INSTITUTE. |
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| Alder (J.) and Hancock (A.) Monograph of the British Nudi-branchiate Mollusca, pts. 1-4. London, 1845-48, fol. | |
| | R. KIPPST, Esq., Libr. L.S. |
| Backhouse (J. jun.) Monograph of the British Hieracia. York, 1856, 8vo. | |
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| | MISS BAILY. |
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| | THE PUBLISHER, L. REEVE, Esq., F.L.S. |

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| Johnson (C.) and Sowerby (J. E.) Fern-Allies of Great Britain, parts 3-6. London, 1856, 8vo. | J. E. SOWERBY, Esq. |
| Johnston (G.) History of British Zoophytes. London, 1838, 8vo. | WILLIAM YARRELL, Esq., V.P.L.S. |
| — History of British Sponges and Lithophytes. Edinburgh, 1842, 8vo. | T. C. JANSON, Esq., F.L.S. |
| Jones (T. R.) Notes on the Palæozoic Bivalved Entomostraca. no. 3. 1856, 8vo. | THE AUTHOR. |
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| | RICHARD TAYLOR, Esq., Under-Sec. L.S. |
| Botanical Magazine; edited by Sir W. J. Hooker, K.H., F.R.S. and L.S. 3rd series, nos. 133-138. London, 1856, 8vo. | |

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| Linnaea; herausgegeben von D.F.L. von Schlechtendal. Band 26, heft 3, and band 27, heft. 2-4. Halle, 1853-55, 8vo. | THE EDITOR. |
| Literary Gazette, nos. 2033-2040, and New Series, nos. 1-18. London, 1856, 4to. | THE PUBLISHER, L. REEVE, Esq., F.L.S. |
| Medical Independent, and Monthly Review of Medicine and Surgery; by Drs. Goadby, Kane, and Robinson, nos. 1-3. Detroit, U.S., 1856, 8vo. | HENRY GOADBY, M.D., F.L.S. |
| Nya Botaniska Notiser, nos. 9-12 för 1854, and nos. 1-12 for 1855. Utgifne af K. F. Thedenius. Stockholm, 1854-56, 8vo. | THE EDITOR. |
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| Quarterly Journal of Microscopical Science; by Edwin Lankester, M.D., and George Busk, Esq. Nos. 14 & 15. London, 1856, 8vo. | THE MICROSCOPICAL SOCIETY. |
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- Macgillivray (W.) Natural History of the Dee-side and Braemar; edited by Edwin Lankester, M.D., F.R.S. London, 1855, 8vo.
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Wrottesley (Lord) Address read at the Anniversary Meeting of the Royal Society, Nov. 30, 1855. London, 1855, 8vo.	THE ROYAL SOCIETY.
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[Continued from page xvi.]

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Photographic Portraits of Thomas Bell, Esq., Pres.L.S.; Robert Brown, Esq., V.P.; Francis Boott, Esq., M.D., V.P.; William Yarrell, Esq., V.P.; J. S. Bowerbank, Esq., F.L.S.; and N. B. Ward, Esq., F.L.S.	MESSRS. MAULL and POLYBLANK.
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Dried Specimens of about 130 species of East Australian Plants, collected by Dr. Ferdinand Müller.	Dr. MÜLLER.
Cluster of the fruit of <i>Alpinia Renealmia</i> ? from Jamaica.	G. ROBERTS, Esq., through D. HANBURY, Esq., F.L.S.
Specimens of the fruit of <i>Paulownia imperialis</i> , Sieb. & Zucc., ripened during the last summer in the open air at Paris.	WILLIAM MATCHWICK, Esq.
Specimen (in spirit) of <i>Sphaeria militaris</i> , growing from the chrysalis of an insect; found by the Rev. C. A. Johns in June, 1855, among dead leaves, in Buckleigh Vale, Devon.	Rev. C. A. JOHNS, B.A., F.L.S.

JOURNAL OF THE PROCEEDINGS

OF THE

LINNEAN SOCIETY OF LONDON.

On the Kātēpo, a supposed poisonous Spider of New Zealand ;
extracted from a letter addressed by THOMAS SHEARMAN
RALPH, Esq., A.L.S., to R. Kippist, Esq., Libr. L.S., dated
Wellington, New Zealand, 18th April, 1855.

[Read November 6th, 1855.]

THIS spider is chiefly, if not only, met with under the low scrubby bushes which exist on the sand-hills along the shore ; and is frequent in the neighbourhood of Otaki. They build their retreat under the branches of the shrubs close to the ground, and make no regular net, but irregular galleries of webbing, entangled with bits of leaves and minute fragments of wood ; and judging from the remains of beetles' wings, I suppose that their principal food consists of insects of that class. Their nests are round, and contain from fifty to sixty eggs : when first hatched, the young present a very different appearance from the full-grown spiders. I have several times kept them in a bottle ; but although fed with sand flies, and occasionally with fine fragments of raw beef, on which I have seen them occupied, they entangle each other and so get destroyed : otherwise I have not been able to obtain casts of their skins. At this period they are white, dotted with black spots, there being about six pairs of black dots along the body ; and the legs are banded with black marks. The next stage, or

at least one larger in size, has the body white or grey, with a beautiful orange-coloured band along the whole length of the back. This band is angulated, consisting of a series of squares, placed obliquely and connected at their angles with an edging of white; and on each side of it are two smaller black ones similarly constituted; the limbs are banded with brownish marks. The full-grown spider is of a beautiful black; the golden band is exchanged for an orange-red one of the same shape; but as the successive coats are thrown off, it ceases to be marked at the thoracic end, being visible only towards the tail. The body of the female is larger and rounder. This spider is reputed to be venomous by the natives, who will not touch them on any account; but how far this is really the case I am scarcely able to determine, having only met with one European, who affirmed that he had been bitten by one, and had had an inflamed leg in consequence; but his belief in the cause of this inflammation was founded on native authority. I have hitherto only been able myself to make with them the following experiment:—I placed a lively unhurt mouse in a glass bottle with a fine *Katapo*, and by dint of shaking the bottle, at length induced the spider to bite the mouse in two places, first on the tail, and secondly on the paw, which latter injury the mouse resented by biting the spider and killing it. The mouse was kept supplied with air, and was found dead within eighteen hours, its body being wet, as though a quantity of urine had been discharged over it. The bottle was quite dry and clear before the spider and mouse were placed in it.

Remarks on some Habits of *Argyroneta aquatica*. By THOMAS BELL, Esq., Pres. L.S.

[Read November 20th, 1855.]

IN consequence of some observations which were made by Mr. Gosse at the last Meeting of the Society, in which he stated his opinion that the *Argyroneta* never fills its bell with air brought from the surface, but that it becomes gradually filled with oxygen evolved from the vegetation casually going on beneath the web, I immediately obtained several specimens of the animal for the purpose of setting the question at rest, and the following are the results of my observations:—

No. 1. Placed in an upright cylindrical vessel of water, in which was a rootless plant of *Stratiotes*, on the afternoon of Nov. 14. By the morning it had constructed a very perfect oval cell filled

with air, about the size of an acorn. In this it has remained stationary up to the present time.

No. 2.—Nov. 15. In another similar vessel, also furnished with a plant of *Stratiotes*, I placed six *Argyronetæ*. The one now referred to began to weave its beautiful web about five o'clock in the afternoon. After much preliminary preparation, it ascended to the surface, and obtained a bubble of air, with which it immediately and quickly descended, and the bubble was disengaged from the body, and left in connexion with the web. As the nest was, on one side, in contact with the glass, enclosed in an angle formed by two leaves of the *Stratiotes*, I could easily observe all its movements. Presently it ascended again and brought down another bubble which was similarly deposited. In this way no less than fourteen journeys were performed, sometimes two or three very quickly one after another, at other times with a considerable interval between them, during which the little animal was employed in extending and giving shape to the beautiful transparent bell, getting into it, pushing it out at one place, and rounding it at another, and strengthening its attachment to the supports. At length it seemed to be satisfied with its dimensions, when it crept into it and settled itself to rest with the head downwards. The cell was now the size and nearly the form of half an acorn cut transversely, the smaller and rounded part being uppermost.

No. 3. The only difference between the movements of this and the former was, that it was rather quicker in forming its cell. In neither vessel was there a single bubble of oxygen evolved by the plant.

The manner in which the animal possesses itself of the bubble of air is very curious, and, as far as I know, has never been exactly described. It ascends to the surface slowly, assisted by a thread attached to the leaf or other support below, and to the surface of the water. As soon as it comes near the surface, it turns with the extremity of the abdomen upwards, and exposes a portion of the body to the air for an instant; then with a jerk it snatches as it were a bubble of air, which is not only attached to the hairs which cover the abdomen, but is held on by the two hinder legs, which are crossed at an acute angle near their extremity; this crossing of the legs taking place at the instant the bubble is seized. The little creature then descends more rapidly, and regains its cell, always by the same route, turns the abdomen within it, and disengages the bubble.

No. 4. Several of them, when I received them, had the hair on

the abdomen wetted, and I placed them on some blotting-paper until they were dry. On returning them to the water, two remained underneath a floating piece of cork, and the hair being now dry retained the pellicle of air which is ordinarily observed. One of the two came out of the water, attached the cork to the glass, and wove a web against the latter, against which it rested about a quarter of an inch above the surface of the water. After remaining there about two days, it resumed its aquatic habits, and like all the others formed its winter habitation. I have now no fewer than ten which have formed their cells, in which they are perfectly at rest, and evidently hibernating.

The general habits of this interesting animal are well described by De Lignac, De Geer, Walckenaer, and others, and an excellent *résumé* of the whole observations is given by the latter author, in his 'Histoire Naturelle des Insectes Aptères.'

Catalogue of the Dipterous Insects collected at Singapore and Malacca by Mr. A. R. WALLACE, with Descriptions of New Species. By FRANCIS WALKER, Esq., F.L.S.

[Read January 15th, 1856.]

MR. A. R. WALLACE, so well known for his natural-history researches in the valley of the Amazons, and for the extensive and valuable collections sent home by him from that portion of South America, has now turned his attention to the eastern world, and is actively investigating the natural history of the East Indian Islands, after having spent some months on the Malay Peninsula. A large portion of Mr. Wallace's entomological collections pass into my hands, and being desirous of making his labours scientifically useful, I have requested Mr. F. Walker, who has such an intimate knowledge of the insects belonging to the order *Diptera*, to draw up the following catalogue of the dipterous insects discovered by Mr. Wallace at Singapore and Malacca. My object in so doing is to establish a kind of starting-point for tracing hereafter, when all Mr. Wallace's collections shall have come to hand, the geographical distribution of the *Diptera* in the very interesting portion of the globe which Mr. Wallace is now investigating with such indefatigable zeal. Singapore and Malacca, at the extremity of the Malay Peninsula, are well placed for carrying out the purpose I have in view, being in connexion northwards through the

Burman Empire with the expanded continent of Asia, and southwards in close approximation with that archipelago of splendid islands which run in a chain to the north coast of Australia, and send off a branch northwards through the Philippine Islands to the coast of China, touching there again the mainland of Asia. The present catalogue will be followed very shortly by one detailing the species of *Diptera* discovered in Borneo, the materials for which are now nearly all in this country, and other catalogues will follow until Mr. Wallace's discoveries in the *Diptera* are exhausted. That Mr. Wallace will be able to visit all the islands of the Indian Archipelago is not to be expected; but still, his plan of exploring those which have been but little examined in a natural-history point of view, will open up a large amount of information, which, when combined with the labours of other naturalists who have been working in the same districts, will give sufficient facts for laying down some laws on the geographical distribution of the insects belonging to the Order which forms the subject of the following catalogue. The specimens collected at Singapore and Malacca were taken during the six months commencing with May and terminating with October. Where the altitude of the locality above the level of the sea of any species is known, this will be found noted in the proper place. Figures will be given to illustrate new genera or any very remarkable species.

WILLIAM WILSON SAUNDERS.

14th January, 1856.

Fam. BIBIONIDÆ, *Haliday*.

Gen. PLECIA, *Hoffmansegg*.

1. PLECIA DORSALIS, n. s., mas et fœm. Atræ, thorace rufo, alis nigricantibus.

Male and female. Deep black. Thorax bright pale red. Wings blackish.

Length of the body $2\frac{1}{2}$ – $3\frac{1}{2}$ lines; of the wings 7–8 lines.

The totally red thorax of this species distinguishes it from *P. fulvicollis*, Wied., and from *P. ignicollis*, Walk.

Singapore and Mount Ophir.

Fam. CULICIDÆ, *Haliday*.

Gen. CULEX, *Linn.*

2. *Culex splendens*, *Wied. Auss. Zweifl.* i. 3: 3.

Singapore. Inhabits also Java.

3. *Culex fuscus*, *Wied. Auss. Zweifl.* i. 6. 9.

Malacca. Inhabits also Hindostan.

4. *CULEX ANNULIPES*, n. s., fœm. Obscurè fuscus, thoracis abdominisque lateribus albo-punctatis, pedibus albo-cinctis, alis sublimpidis venis fusco-ciliatis.

Female. Dark brown. Sides of the thorax and of the abdomen with minute white dots. Legs with numerous white bands. Wings nearly limpid; veins brown, ciliated. Length of the body $2\frac{1}{2}$ lines; of the wings 4 lines. Singapore. (Jungle.)

Fam. TIPULIDÆ.

Gen. LIMNOBIA, *Meigen*.

Div. I. *Meig. Zweifl.* i. 131. pl. 5. f. 5.

5. *LIMNOBIA LEUCOTELUS*, n. s., mas. Atra, alis nigricantibus, maculâ discali limpidâ, margine postico subcinereo, apice albo.

Male. Deep black. Wings blackish, with a discal limpid spot; posterior border slightly greyish for rather more than half the length from the base; tips white. Length of the body 6 lines; of the wings 12 lines.

Singapore.

6. *LIMNOBIA PLECIOIDES*, n. s., fœm. Atra, thorace pallidè rufo, alis nigricantibus.

Female. Deep black. Thorax pale red. Wings blackish. Length of the body 7 lines; of the wings 12 lines.

Singapore.

Div. L. *Meig. Zweifl.* i. 132. pl. 5. f. 4.

The structure of the wing-veins in the above division is almost, but not quite, identical with that of the following species.

7. *LIMNOBIA DICHROA*, n. s., fœm. Atra, antennis ferrugineis basi apiceque nigris, abdomine luteo, basi fasciâque latissimâ posticâ nigris, pedibus testaceis, femoribus tibiisque apice tarsisque nigris, alis fuscescentibus costâ testaceâ.

Female. Deep black. Antennæ ferruginous, black at the base and at the tips. Abdomen luteous, black at the base and with a very broad black band beyond the middle. Legs testaceous; tarsi and tips of the femora and of the tibiæ black. Wings brownish, testaceous at the base and along the costa. Length of the body 9 lines; of the wings 16 lines.

Mount Ophir.

Gen. CTENOPHORA, *Fabr.*

8. *CTENOPHORA CHRYSOPHILA*, n. s., fœm. Lutea, abdominis apice nigro, pedibus pallidè luteis, femoribus apice tibiis tarsisque nigris, alis flavescensibus apice nigris margine postico interruptè nigricante.

Female. Bright luteous. Abdomen black towards the tip. Legs pale luteous; tibiæ, tarsi, and tips of the femora black. Wings yellowish, black towards the tips, irregularly and interruptedly blackish along the posterior border. Length of the body 8 lines; of the wings 16 lines.

Singapore.

Fam. STRATIOMIDÆ, *Holiday*.Gen. PTILOCERA, *Wied.*

9. *Ptilocera quadridentata*, *Fabr. Syst. Antl.* 86. 33. (Stratiomys.)
Malacca and Singapore. Inhabits also Java, Sumatra, and the Philippine Islands.

Gen. STRATIOMYS, *Geoffroy*.

10. *Stratiomys Lutatius*, *Walk. Cat. Dipt.* pt. 3. 532.
Malacca.

Gen. CLITELLARIA, *Meigen*.

11. *Clitellaria bivittata*, *Fabr. Syst. Antl.* 79. 5. (Stratiomys.)
Singapore. Inhabits also Java and Sumatra.
12. *Clitellaria varia*, *Walk. Cat. Dipt.* 2nd Ser. pt. 1. 63.
Malacca. Inhabits also Java.
13. *CLITELLARIA FLAVICEPS*, n. s., fœm. Nigra, capite flavo, thorace cinereo trivittato, scutello bispinoso, abdomine purpureo-cyaneo, alis cinereis apud costam nigricantibus.
Female. Black. Head pale yellow. Antennæ a little shorter than the thorax. Thorax a little narrower in front, with three grey stripes. Scutellum with two stout spines. Abdomen purplish blue; disk beneath hoary. Wings dark grey, blackish along the costa; veins black. Halteres whitish.
Var. β. Smaller. Spines of the scutellum and tarsi whitish, with black tips. Length of the body $2\frac{1}{2}$ - $3\frac{1}{2}$ lines; of the wings 5-7 lines.
Singapore.

Gen. CYCLOGASTER, *Macquart*.

14. *CYCLOGASTER RADIANS*, n. s., fœm. Nigra, capite nitido, antennis fulvis aristâ albidâ, thorace cinereo radiis quinque nigris, abdomine subrotundo, tarsis albidis, alis cinereis.
Female. Black, rather broad. Head shining. Antennæ tawny, with a pubescent white arista which is as long as the preceding part. Thorax cinereous, with five black rays, three in front and one on each side. Scutellum obconical, prominent. Abdomen nearly round, cinereous, with three rows of black spots. Knees and the adjoining part tawny; tarsi whitish. Wings limpid; veins testaceous. Halteres whitish. Length of the body 3 lines; of the wings 5 lines.
Singapore.

Gen. PHYLLOPHORA, *Macquart*.

15. *PHYLLOPHORA ANGUSTA*, n. s., mas. Nigra, angusta, sublinearis, antennis setaceis basi fulvis, thorace producto cinereo-bivittato, pedibus testaceis, femoribus posterioribus suprâ piceis, alis cinereis, venis halteribusque fuscis.
Male. Black, narrow, nearly linear. Antennæ setaceous, tawny towards the base, a little longer than the head. Thorax elongated, with two cinereous stripes. Scutellum with four very minute spines. Abdomen hardly broader

and not longer than the thorax. Legs testaceous; posterior femora piceous above. Wings cinereous; veins and halteres brown. Length of the body $2\frac{1}{2}$ lines; of the wings $4\frac{1}{2}$ lines.

Singapore.

Gen. EUDMETA, *Wied.*

16. *Eudmeta marginata*, *Fabr. Syst. Antl.* 63. 3. (Hermetia.)
Singapore. Inhabits also Java, Sumatra, and Hindostan.

Gen. MASSICYTA, n. g. (*Plate I. fig. 1.*)

Corpus longiusculum, sat angustum. *Caput* transversum, breve, thorace vix latius. *Antennæ* graciles, thorace paulò breviores; articulus 1^{us} linearis; 2^{us} longi-fusiformis, 1^o vix longior; 3^{us} acuminatus, minimus. *Thorax* longi-ellipticus. *Abdomen* obclavatum, subpetiolatum, thorace plus duplò longius. *Pedes* graciles. *Alæ* elongatæ, sat angustæ.

Body rather long and narrow. Head transverse, short, very little broader than the thorax. *Antennæ* slender, a little shorter than the thorax; 1st joint linear; 2nd elongate fusiform, very little longer than the 1st; 3rd acuminated, very minute. Thorax elongate elliptical. Abdomen obclavate, subpetiolated, a little more than twice the length of the thorax. Legs slender. Wings rather long and narrow; mediastinal, subcostal, radial and cubital veins, and median veinlet of the usual structure; 1st, 2nd and 4th externo-medial veins complete; 3rd abbreviated; subanal joining the anal at some distance from the border; discal areolet irregularly hexagonal, elongated, narrower towards the tip of the wing.

17. *MASSICYTA BICOLOR*, n. s., fœm. Nigra, antennis basi testaceis apice albis, pectore scutelloque flavis, illo nigro bimaculato, abdomine testaceo fasciato, pedibus flavis, femoribus anterioribus tibiisque posticis fusco fasciatis, femoribus posticis nigris, alis cinereis, apud costam subluridis.

Female. Black, shining, with testaceous pubescence. Mouth testaceous. *Antennæ* testaceous towards the base, white at the tips. Pectus and scutellum yellow, the former with a large black spot on each side. Abdomen with testaceous bands. Legs yellow; hind femora black; anterior femora and hind tibiæ with brown bands. Wings grey, with a slight lurid tinge along the costa; veins black. Halteres pale yellow. Length of the body 6-7 lines; of the wings 10-12 lines.

Singapore.

Gen. SARGUS, *Fabr.*

18. *Sargus longipennis*, *Wied. Auss. Zweifl.* ii. 34. 11.
Malacca. Inhabits also Java.

19. *SARGUS LURIDUS*, n. s., mas. Ferrugineus, capite pectoreque testaceis, antennis fulvis, abdominis segmentis testaceo-fasciatis, apice nigro, pedibus testaceis, tibiis posticis apice nigris, tarsis posticis nigris apice albidis, alis luridis apice fuscis.

Male. Ferruginous. Head and pectus testaceous. *Antennæ* tawny. Abdomen black towards the tip; a testaceous band on the hind border of each

segment. Legs testaceous; hind tibiæ black towards the tips; hind tarsi black, with whitish tips. Wings lurid, brown towards the tips; veins brown. Halteres testaceous. Length of the body 7 lines; of the wings 14 lines.

Singapore.

Fam. TABANIDÆ, *Leach.*

Gen. TABANUS, *Linn.*

20. *Tabanus univentris*, *Walk. Cat. Dipt.* pt. 1. 151.

The description in the above reference will not well apply to the two following varieties of this species.

Var. 1. Female. Brown. Head testaceous in front and beneath. Thorax with two testaceous stripes. Abdomen ferruginous, tawny beneath and with a dorsal stripe of tawny triangular spots. Legs blackish; femora and tibiæ partly testaceous. Wings dark grey.—*Var. 2.* Like *Var. 1.* Abdomen blackish above, with a dorsal stripe of testaceous spots.

Mount Ophir. Inhabits also Borneo.

21. *TABANUS PARTITUS*, n. s., fœm. Nigricans, subtus albidus, antennis fulvis apice nigris, thorace cinerascente cano-quadrivittato, abdomine piceo albidotrivittato, pedibus testaceis, femoribus tibiisque apice tarsisque nigricantibus, alis subcinereis.

Female. Blackish; underside and head behind with whitish tomentum. Antennæ dull tawny, black towards the tips; angle of the 3rd joint minute and obtuse. Thorax greyish, with four hoary stripes. Abdomen piceous, with three whitish stripes. Legs testaceous; tarsi and tips of the femora and of the tibiæ blackish. Wings greyish, stigma and veins black; fore branch of the cubital vein simple, nearly straight. Length of the body 6 lines; of the wings 10 lines.

Singapore.

Note.—*T. rubidus*, *Wied.*, is very closely allied to the above species, but may be distinguished from it by the following characters.

T. rubidus. Front with the callus quite entire. Antennæ blackish. Middle stripe of the abdomen composed of triangular spots. Wings greyish.

T. partitus. Smaller. Front with the callus almost interrupted. Antennæ pale tawny, with darker tips. Middle stripe of the abdomen entire, parallel. Wings quite limpid.

Gen. CHRYSOPS, *Meigen.*

22. *Chrysops dispar*, *Fabr. Syst. Antl.* 112. 5.

Mount Ophir and Malacca. Inhabits also Hindostan and Java.

Fam. ASILIDÆ, *Leach.*

Subfam. DASYPOGONITES, *Walk.*

Gen. DISCOCEPHALA, *Macquart.*

23. *DISCOCEPHALA DORSALIS*, n. s., fœm. Nigricans, thorace subgibboso,

lateribus pectoreque testaceis, pedibus posticis longiusculis sat validis, tibiis posticis subarcuatis, alis subcinereis apice obscurioribus.

Female. Blackish. Thorax somewhat gibbous; sides and pectus testaceous. Hind legs rather long and stout; hind tibiæ somewhat curved. Wings greyish, rather darker at the tips; veins black. Length of the body 5 lines; of the wings 12 lines.

Malacca.

Subfam. LAPHRITES; *Walk.*

Gen. LAPHRIA, *Fabr.*

24. *Laphria Reinwardtii*, *Wied. Auss. Zweifl.* i. 503. 7.

Malacca. Inhabits also Java and Sumatra.

25. *LAPHRIA NOTABILIS*, n. s., mas et fœm. Nigra, capite thoracisque maculis quatuor transversis lateralibus auratis aut albis, abdominis lateribus albo-maculatis, pedibus pallidè flavis aut albis, femoribus tibiisque apice tarsisque nigris, alis fuscis basim versus sublimpidis.

Male and Female. Black. Head with pale gilded or white tomentum. Face convex towards the epistoma. Mystax with a few black bristles. Proboscis straight, porrect, linear. Third joint of the antennæ slender, linear, about twice the length of the 1st and 2nd together. Thorax with two transverse marks on each side of gilded or white tomentum; scutellum, sides of the hind part of the thorax, and spots on the pectus of the same hue. Segments of the abdomen with a white spot and a few black setæ on each side. Legs pale yellow or white, with hairs of the same hue and with a few black setæ; coxæ, tarsi, and tips of the femora and of the tibiæ black. Wings dark brown, almost limpid towards the base which is brown. Halteres pale yellow or whitish. Length of the body 7-9 lines; of the wings 14-18 lines.

Malacca and Mount Ophir.

26. *Laphria Vulcanus*, *Wied. Auss. Zweifl.* i. 514. 25.

Malacca. Inhabits also Java.

27. *Laphria alternans*, *Wied. Auss. Zweifl.* i. 511. 20.

Singapore. Inhabits also Java.

28. *LAPHRIA ORCUS*, n. s., fœm. Nigra, nigro-hirsuta, scutello nigro-cyaneo, abdomine pedibusque nigro-purpureis, alis nigrificantibus areolarum discis pallidioribus, halteribus albidis.

Female. Black, with black hairs and bristles. Face slightly convex. Mystax with numerous black bristles, extending over the whole surface. Scutellum dark blue. Abdomen and legs dark purple, the latter with whitish hairs on the coxæ. Wings blackish; disks of several of the areolets much paler; veins black. Halteres whitish. Length of the body 8 lines; of the wings 14 lines.

Malacca.

29. *Laphria aurifacies*, *Macq. Dipt. Exot. Suppl.* iii. 22. 33. pl. 2. f. 5.

Singapore and Malacca. Inhabits also the Moluccas.

30. *Laphria elegans*, *Walk. Cat. Dipt.* 2nd Ser. 551. 126.

Mount Ophir. Inhabits also Hindostan.

31. *LAPHRIA BASIFERA*, n. s., fœm. Obscurè nigra, capite albedo tomentosò, mystace nigro, antènnarum articulo 3° fusiformi, thoracè cano-sexvittato, abdominis lateribus albedo-maculatis, apice compresso, alis subcinereis basi sublimpidis costæ dimidio apicali fuscèscente.

Female. Dull black. Head with whitish tomentum and hairs. Face slightly convex towards the epistoma. Mystax with several black bristles. Proboscis lanceolate, stout, straight. Third joint of the antennæ fusiform, as long as the 1st and the 2nd. Thorax with six hoary stripes; the middle pair parallel, linear, very slender and almost contiguous. Abdomen with whitish spots along each side, compressed at the tip. Legs with whitish hairs and with black bristles. Wings greyish, almost limpid towards the base, brownish along the apical part of the costa; veins black. Length of the body 6 lines; of the wings 12 lines.

Singapore.

This may be the female of the following species.

32. *LAPHRIA RADICALIS*, n. s., mas. Nigra, capite argenteo, mystace nigro, antennarum articulo 3° lineari, thorace strigis quatuor lateralibus transversis vittisque duabus intermediis albidis, abdominis lateribus albedo-maculatis, ventre testaceo, alis nigro-fuscis dimidio basali limpido.

Male. Black. Head beneath with whitish hairs. Face flat, with silvery-white tomentum. Mystax with a few black bristles. Proboscis linear, rather slender. Third joint of the antennæ linear, a little longer than the 1st and the 2nd. Thorax with two transverse whitish marks on each side, and with two whitish middle stripes which are broader and further apart than those of *L. basifera*. Pectus with testaceous whitish tomentum. Abdomen with a row of whitish spots along each side; underside testaceous except at the tip. Legs with blackish hairs; femora with testaceous hairs. Wings blackish brown, limpid for almost half the length from the base; veins black. Halteres whitish. Length of the body 5 lines; of the wings 10 lines.

Mount Ophir, at the height of 4000 feet.

33. *LAPHRIA INAUREA*, n. s., fœm. Obscurè nigra, capite, thoracis lateribus, pectore abdominisque marginibus fulvo-tomentosis, mystace nigro, antennarum articulo 3° longi-fusiformi, thorace cinereo-bivittato, abdomine ferrugineo, apice nigro, alis obscurè fuscis basi pallidioribus.

Female. Dull black. Head, sides of the thorax, pectus, and hind borders of the abdominal segments with tawny tomentum. Face slightly convex towards the epistoma. Mystax with a few black bristles. Third joint of the antennæ very elongate-fusiform, longer than the 1st and the 2nd. Thorax with two parallel cinereous stripes. Abdomen ferruginous, black and shining towards the tip; underside somewhat cinereous. Legs with tawny hairs. Wings dark brown, somewhat paler towards the base; veins black. Halteres testaceous. Length of the body 8 lines; of the wings 14 lines.

Singapore.

34. *LAPHRIA BASIGUTTA*, n. s., mas. Nigra, capite aureo, mystace nigro, antennarum articulo 3° lineari, thorace abdomineque fulvo-tomentosis, alis nigricantibus basi sublimpidis.

Male. Black. Face almost flat, with pale gilded tomentum. Mystax with

very few black bristles. Proboscis linear, more slender than that of *L. radicalis*. Third joint of the antennæ linear, a little longer than the 1st and the 2nd, more slender than that of *L. radicalis*. Thorax with dull tawny tomentum; pectus more cinereous. Abdomen more slightly tawny. Legs with cinereous hairs and black bristles. Wings blackish, almost limpid towards the base; veins black. Halteres tawny. Length of the body 5 lines; of the wings 9 lines.

Singapore.

35. *LAPHRIA FUSIFERA*, n. s., fœm. Nigra, cinereo-tomentosa, capite albido, mystace nigro, antennarum articulo 3^o fusiformi, thoracis vittis duabus pectoreque canis, abdomine apicem versus rufo, alis subcinereis apud costæ dimidium apicale fusciscentibus.

Allied to *L. crassipes*, Fabr. *Female*. Black, with greyish tomentum. Head whitish in front, with white hairs beneath; face very convex towards the epistoma. Mystax with a few black bristles. Proboscis oblique, ascending, stout, straight, lanceolate. Third joint of the antennæ fusiform. Thorax with two hoary stripes; sutures and pectus hoary. Abdomen pale red towards the tip which is compressed. Legs with whitish hairs and black bristles. Wings greyish, brownish for half the breadth along the apical half of the costa; veins black. Length of the body 6 lines; of the wings 12 lines.

Singapore.

36. *LAPHRIA SOBRIA*, n. s., fœm. Nigra, fulvo-tomentosa, capite albo, mystace nigro, abdominis apice glabro, tibiis ferrugineis, alis cinereis basi sublimpidis.

Female. Black. Face flat, with shining white tomentum. Mystax with a few black bristles. Proboscis straight, slender, linear. Thorax and abdomen with tawny tomentum, the latter bare and shining towards the tip. Pectus more cinereous. Tibiæ somewhat ferruginous. Wings dark cinereous, almost limpid towards the base; veins black. Halteres testaceous. Length of the body 5 lines; of the wings 10 lines.

Singapore.

37. *LAPHRIA PLANA*, n. s., mas. Nigra, cinereo-tomentosa, capite albido, mystace nigro, antennarum articulo 3^o elliptico, pedibus fulvis, alis cinereis, halteribus albidis.

Male. Black, with cinereous tomentum. Face whitish, flat. Mystax with very few black bristles. Proboscis straight, porrect, slightly lanceolate, somewhat short. Third joint of the antennæ elliptical, a little shorter than the 1st. Pectus hoary. Legs tawny. Wings grey; veins black. Halteres whitish. Length of the body 4 lines; of the wings 10 lines.

Singapore.

38. *LAPHRIA IMBELLIS*, n. s., fœm. Nigra, cinereo-tomentosa, capite albido, mystace albo, antennis fulvis, thoracis strigis transversis quatuor lateralibus vittisque tribus intermediis canis, abdominis segmentis maculis lateralibus albidis, pedibus fusco-fulvis, alis limpidis apice fuscis, halteribus albidis.

Female. Black, with cinereous tomentum. Head with white hairs beneath. Face whitish, slightly convex towards the epistoma. Mystax with a few

white bristles. Proboscis lanceolate, short, straight, porrect. Antennæ tawny. Thorax with two transverse hoary marks on each side, and with three indistinct hoary stripes. Pectus whitish. Abdominal segments with a transverse whitish spot on each side of the hind border. Legs tawny, with paler hairs; coxæ black; anterior tarsi towards the tips, hind tarsi at the base, and hind tibiæ brown. Wings limpid, brown at the tips; veins black. Halteres whitish. Length of the body 5 lines; of the wings 10 lines.

Singapore.

Subfam. ASILITES, *Walk.*

Gen. ASILUS, *Linn.*

39. *ASILUS FUSIFORMIS*, n. s., fœm. Niger, cinereo-tomentosus, capite albido, mystace testaceo, thoracis vittis tribus pectoreque canis, abdominis apice compresso glabro, pedibus rufis, tarsis nigris, femoribus anterioribus nigromaculatis, alis subcinereis.

Female. Black, with cinereous tomentum. Head whitish in front, rather thickly clothed with whitish hairs; a few black bristles behind; face slightly convex towards the epistoma. Mystax with several testaceous bristles. Proboscis stout, straight, lanceolate. Palpi with thick black bristles. Antennæ black. Thorax with three indistinct hoary stripes. Pectus hoary. Abdomen oblanceolate, with whitish and black hairs, compressed, shining, and bare towards the tip. Legs red, very stout, beset with black spines; tarsi except at the base and knees black; a black spot on each of the anterior femora. Wings slightly cinereous; veins black, tawny at the base and along the costa. Halteres testaceous. Length of the body 13 lines; of the wings 24 lines.

Malacca.

40. *ASILUS LINEOSUS*, n. s., fœm. Fuscus, capite subaurato, mystace testaceo nigroque, antennis pedibusque nigris, thorace aureo-quadrivittato, abdomine fulvo-fasciato, apice nigro compresso transversè ruguloso, tibiis luteis apice nigris, alis cinereis.

Female. Dark brown. Head with pale gilded tomentum, clothed beneath with whitish hairs; face convex towards the epistoma. Mystax with several testaceous bristles and with a few more slender black bristles. Proboscis stout, straight, lanceolate. Palpi thickly beset with black bristles. Antennæ black; arista almost thrice the length of the 3rd joint which is fusiform. Thorax with four dull pale gilded stripes; sides and pectus cinereous. Abdomen oblanceolate, with broad fawn-coloured bands, black, shining, compressed and transversely rugulose towards the tip. Legs black, armed with black spines; tibiæ pale luteous, with black tips; onychia pale luteous. Wings cinereous; veins black. Halteres ferruginous. Length of the body 12 lines; of the wings 20 lines.

Singapore.

41. *ASILUS DEBILIS*, n. s., mas. Cinereus, capite flavido-albo, mystace testaceo nigroque, antennis fulvis, thorace fusco-bivittato, abdominis segmentis cano-

fasciatis, pedibus testaceis, femoribus tibiisque apice tarsisque nigricantibus, alis sublimpidis apice nigricantibus.

Male. Cinereous. Head with yellowish-white tomentum, clothed beneath with white hairs; face very slightly convex towards the epistoma. Mystax with a few testaceous, and with still fewer black bristles. Proboscis black, slightly lanceolate, rather slender. Antennæ tawny; 3rd joint and arista black, the latter four times the length of the former which is fusiform. Thorax with two brown stripes. Pectus hoary. Abdomen with a hoary band on the hind border of each segment. Legs testaceous, with very few black bristles; tarsi, except at the base and tips of the femora and of the tibiæ, black; hind femora and hind tibiæ mostly black. Wings nearly limpid, blackish towards the tips; veins black. Halteres testaceous. Length of the body 7 lines; of the wings 14 lines.

Malacca.

42. *ASILUS LATIFASCIA*, n. s., mas. Cinereo-niger, capite albido, mystace testaceo, thoracis vittis quatuor pectoreque canis, abdomine ferrugineo, basi apiceque nigris, pedibus fulvis nigro-variis, alis nigricantibus margine postico fusco.

Male. Black, with a slight cinereous tinge. Head with some whitish hairs beneath. Face whitish, flat. Mystax with many pale testaceous bristles. Proboscis straight, slightly lanceolate. Antennæ black. Thorax with four slight hoary stripes. Pectus hoary. Abdomen ferruginous, black at the base and towards the tip. Legs tawny; tarsi, hind femora, and tips of the posterior tibiæ black; anterior femora black above. Wings blackish, brown along the hind border; veins black. Halteres testaceous. Length of the body 9 lines; of the wings 16 lines.

Singapore.

43. *Asilus Barium*, *Walk. Cat. Dipt.* pt. 2. 426.

Mount Ophir. Inhabits also Ceylon and Sumatra.

Gen. OMMATIUS, *Illiger*.

44. *Ommatius Pennus*, *Walk. Cat. Dipt.* pt. 2. 469.

Malacca. Inhabits also Sumatra, Borneo, and Corea.

45. *Ommatius Hecale*, *Walk. Cat. Dipt.* pt. 2. 476.

Singapore.

46. *OMMATIUS GRACILIS*, n. s., mas. Nigro-fuscus, facie atrâ, thoracis lateribus pectoreque canis, pedibus fulvis, femoribus tibiisque apice tarsisque nigris, alis sublimpidis apice cinereis.

Male. Blackish-brown. Face flat, deep black. Proboscis black, rather slender, slightly lanceolate. Antennæ black. Pectus and sides of the thorax hoary. Abdomen dull black. Legs tawny; tarsi and tips of the femora and of the tibiæ black. Wings nearly limpid, dark grey towards the tips; veins black. Halteres testaceous. Length of the body 6 lines; of the wings 10 lines.

Mount Ophir.

Fam. LEPTIDÆ, *Westw.*Gen. LEPTIS, *Fabr.*

47. LEPTIS DECISA, n. s., mas. Nigra, capite albo, antennis testaceis basi nigris, thoracis callis testaceis, vittis duabus pectoreque canis, abdomine testaceo, vittâ dorsali fasciisque nigris, femoribus testaceis apice nigris, alis sublimpidis fasciâ apiceque fuscis.

Male. Black. Head white in front. Antennæ testaceous, black towards the base. Humeral calli testaceous. Thorax with two hoary stripes; sides and pectus hoary. Abdomen testaceous, with a black dorsal stripe and a black band on the hind border of each segment. Femora testaceous, with black tips; hind femora black for more than half the length from the tips. Wings nearly limpid, pale brown towards the tips, and with a darker brown band which tapers irregularly from the costa to the hind border and crosses the base of the discal areolet; veins black. Halteres testaceous. Length of the body $4\frac{1}{2}$ lines; of the wings 9 lines.

Malacca.

Fam. BOMBYLIDÆ, *Leach.*Gen. ANTHRAX, *Fabr.*

48. ANTHRAX DEGENERA, n. s., mas et foem. Nigra, pectore albido, abdominis lateribus ferrugineis, ventre testaceo, alis subcinereis, pedibus basi testaceis. Mas. Alis basi et apud costam nigro-fuscis. Foem. Alis plus dimidio basali nigro-fuscis.

Male and Female. Dull black. Head not broader than long. Antennæ small; 3rd joint short-conical; arista somewhat longer than the 3rd joint. Pectus whitish. Abdomen blackish-brown, ferruginous on each side, testaceous beneath. Legs long, slender. Wings greyish; veins black; radial vein curved towards its tip; fore fork of the cubital undulating, parallel to the radial, forming near its base an obtuse angle which emits the stump of a vein; hind fork straight; three nearly straight externo-medial veins; 2nd connected with the 3rd by an undulating and very oblique veinlet; subanal vein near the anal on the border. Halteres testaceous.—*Male.* Hind femora testaceous towards the base; anterior femora dark testaceous. Wings blackish-brown at the base and along the costa.—*Female.* Hind femora testaceous with black tips; anterior femora paler testaceous. Wings blackish-brown for much more than half the length from the base. Length of the body $3\frac{1}{2}$ lines; of the wings 10 lines.

Singapore.

Fam. DOLICHOPIDÆ, *Leach.*Gen. PSILOPUS, *Meigen.*

49. PSILOPUS CLARUS, n. s., mas. Viridis, capite cyaneo, facie pectoreque albis, antennis nigris, abdominis segmentis nigro-fasciatis, pedibus testaceis, tibiis posticis apice tarsisque nigris, alis limpidis.

Male. Green. Head bright blue, white in front. Proboscis, legs and halteres

testaceous. Antennæ black; arista as long as the thorax. Pectus white. Abdominal segments with black bands. Legs long; tarsi and tips of the hind tibiæ black. Wings limpid; veins black; fore branch of the præbrachial vein slightly curved; hind branch extending to the border; discal transverse vein rather deeply undulating. Length of the body $4\frac{1}{2}$ lines; of the wings 8 lines.

Mount Ophir.

50. *PSILOPUS ROBUSTUS*, n. s., fœm. Purpureo-cyaneus, capite purpureo, facie pectoreque albis, antennis pedibus halteribusque testaceis, thorace viridi-vario, abdominis fasciis nigris, tarsis apice nigricantibus, alis subcinereis.

Female. Purplish-blue. Head bright purple, white in front. Proboscis and antennæ testaceous; arista black, full as long as the thorax. Thorax green on each side and in front. Pectus white. Abdomen with black bands. Legs long, pale testaceous; tarsi blackish towards the tips. Wings slightly greyish; veins black; fore branch of the præbrachial vein moderately curved; discal transverse vein moderately undulating. Halteres pale testaceous. Length of the body $2\frac{1}{2}$ lines; of the wings 6 lines.

This may be the female of *P. clarus*.

Singapore.

51. *PSILOPUS SUBNOTATUS*, n. s., mas. Cyaneus, capite purpureo, facie pectoreque albis, proboscide antennis pedibusque testaceis, thoracis lateribus anticis viridibus, abdomine viridi-cyaneo basi apiceque purpurascente, tarsis apice nigricantibus, alis subcinereis albido-bifasciatis.

Male. Blue. Head purple above, white in front. Proboscis and antennæ testaceous; arista black, nearly as long as the thorax. Thorax green on each side in front. Pectus white. Abdomen greenish-blue, purplish at the base and at the tip. Legs testaceous, rather long; tarsi blackish towards the tips. Wings slightly greyish, with two imperfect whitish bands; hind border white towards the tip; costa interruptedly blackish; veins black; fore branch of the præbrachial vein almost straight; hind branch extending to the border; discal transverse vein almost straight, hardly undulating. Halteres pale testaceous. Length of the body $2\frac{1}{2}$ lines; of the wings 6 lines.

Mount Ophir.

52. *PSILOPUS POSTICUS*, n. s., mas. Viridis, proboscide antennis abdominis fasciis pedibusque nigris, tibiis luridis, alis nigris apud marginem posticum sublimpidis.

Male. Dark green. Head above bluish-green. Proboscis and antennæ black; arista nearly as long as the body. Abdomen with black bands. Legs black; posterior tibiæ lurid; fore tibiæ testaceous. Wings black, rather narrow, nearly limpid along the hind border; veins black; fore branch of the præbrachial vein slightly curved; discal transverse vein slightly undulating. Halteres black. Length of the body 2 lines; of the wings 5 lines.

Malacca.

53. *PSILOPUS TENEBROSUS*, n. s., fœm. Purpureo-niger, facie pectoreque albis, abdomine purpureo, pedibus fulvis, femoribus apice tarsisque nigricantibus, alis nigricantibus margine postico fasciâque sublimpidis.

Female. Purplish-black. Head dull black, white in front. Proboscis piceous. Antennæ black; arista rather shorter than the thorax. Pectus white. Abdomen dark purple. Legs tawny; tarsi and tips of the femora blackish. Wings blackish, nearly limpid along the hind border, and at two-thirds of the length with a nearly limpid band which extends from the hind border to the cubital vein; veins and halteres black; fore branch of the præbrachial vein very deeply curved; discal transverse vein almost straight. Length of the body 3 lines; of the wings 6 lines.

Singapore.

Fam. SYRPHIDÆ, *Leach.*

Gen. CERIA, *Fabr.*

54. *Ceria Javana*, *Wied. Auss. Zweifl.* ii. 81. 1.

Malacca. Inhabits also Java.

Gen. ERISTALIS, *Latr.*

55. *Eristalis Amphicrates*, *Walk. Cat. Dipt.* pt. 3. 623.

Malacca. Inhabits also Hindostan, Java, and China.

56. *Eristalis niger?* *Wied. Auss. Zweifl.* ii. 183. 45.

Singapore. Inhabits also Java?

57. *ERISTALIS SINGULARIS*, n. s., fœm. Ater, aristâ nudâ, pedibus posticis subincrassatis, tibiis anterioribus basi testaceis, alis subcinereis apud costæ medium nigricantibus.

Female. Deep black. Head shining in front. Arista bare. Legs shining; hind femora rather thick; hind tibiæ slightly dilated; anterior tibiæ pale testaceous towards the base. Wings greyish, with a blackish tinge along the middle of the costa; veins black. Length of the body 4 lines; of the wings 8 lines.

Singapore.

Gen. HELOPHILUS, *Meigen.*

58. *HELOPHILUS INSIGNIS*, n. s., fœm. Nigricans, capitis lateribus anticis pectorisque fasciis duabus testaceis, antennis ferrugineis, thoracis vittis quatuor, scutello abdominisque fasciis tribus luteis, hujus marginibus subchalybeis, tibiis fulvis apice nigricantibus, alis subcinereis basi subluridis apud costæ dimidium apicale fuscescentibus.

Female. Blackish. Head pale testaceous on each side in front. Antennæ ferruginous. Thorax with four luteous stripes. Pectus with a testaceous band on each side. Scutellum luteous. Abdomen with three luteous bands; 1st broad, interrupted; 2nd narrower than the 1st, broader than the 3rd; hind borders of the segments slightly chalybeous and shining. Tibiæ tawny, with blackish tips. Wings slightly greyish, with a lurid tinge at the base, and a slight brownish tinge along the costa beyond the middle; veins black, tawny towards the costa. Halteres testaceous. Length of the body 8 lines; of the wings 14 lines.

Singapore.

Gen. XYLOTA, *Meigen*.

59. XYLOTA CONFORMIS, n. s., fœm. *Ænea*, capite femoribusque chalybeis, antennis fulvis, thorace testaceo-bivittato, abdominis fasciis duabus latis interruptis pedibusque testaceis, alis subcinereis.

Female. *Æneous*. Head chalybeous, with whitish tomentum in front, with short white hairs beneath. Proboscis black. Antennæ tawny; arista bare. Thorax with two testaceous tomentose stripes. Pectus with a testaceous band on each side. Abdomen with two broad interrupted testaceous bands. Legs testaceous; femora chalybeous; tarsi with brownish tips. Wings slightly greyish; veins black; stigma brown. Halteres testaceous. Length of the body 5 lines; of the wings 10 lines.

Singapore.

Gen. MILESIA, *Latr.*

60. *Milesia macularis*, *Wied. Auss. Zweifl.* ii. 107. 5.

Singapore. Inhabits also Java.

61. *Milesia Reinwardtii*, *Wied. Auss. Zweifl.* ii. 104. 1.

Singapore. Inhabits also Java.

62. MILESIA VESPOÏDES, n. s., mas. *Atra*, verticis maculâ trigonâ testacâ, abdominis fasciâ latissimâ luteâ, femoribus posticis extus apices versus ferrugineis, alis fuscis apice luridis margine postico cinereis.

Male. Deep black. Head with a minute elongate-triangular testaceous spot on the vertex; fore part and humeral calli shining. Abdomen partly clothed with black hairs, with a very broad luteous band which occupies rather more than half the hind part of the 2nd segment and the fore half of the 3rd. Hind femora ferruginous on the outer sides towards the tips. Wings dark brown, lurid towards the tips, grey along the hind border. Halteres pale testaceous. Length of the body 11 lines; of the wings 22 lines. Singapore.

Gen. SYRPHUS, *Fabr.*

63. SYRPHUS CONSEQUENS, n. s., mas et fœm. Luteus, vertice nigro, antennis nigro-vittatis, thoracis disco chalybeo, abdominis fasciis quatuor atris, femoribus posticis apice neonon tibiisque posticis nigris, alis subcinereis apud costam subfuscis.

Closely allied to *S. ericetorum*.—*Male and Female*. Pale luteous. Head black and shining on the vertex by the antennæ, pale testaceous in front. Proboscis tawny. Antennæ tawny, with a black dorsal stripe; arista black. Disk of the thorax chalybeous. Abdomen with four deep black bands on the hind borders of the segments. Hind tibiæ, hind tarsi, and tips of hind femora black. Wings slightly greyish, with a brown tinge along the costa; veins black. Halteres pale testaceous.—*Female*. Vertical callus capitate. Length of the body $4\frac{1}{2}$ – $5\frac{1}{2}$ lines; of the wings 10–12 lines.

Singapore and Mount Ophir.

64. SYRPHUS DUPLEX, n. s., mas et fœm. Chalybeo-niger, gracilis, antennis maris piceis fœminæ fulvis, abdominis fasciis tribus interruptis testaceis,

femoribus anterioribus testaceis apice nigris, posticis basi testaceis, alis subcinereis.

Male and Female. Chalybeous black, slender. Antennæ of the male piceous, of the female tawny. Abdomen with three dull interrupted testaceous bands, slightly compressed for three-quarters of the length in the male. Legs black; anterior femora testaceous with black tips; hind femora testaceous at the base. Wings greyish; veins and stigma black. Halteres testaceous. Length of the body 6 lines; of the wings 12 lines.

Singapore.

65. *SYRPHUS TRILIGATUS*, n. s., mas. Flavus gracilis, antennis fulvis, thoracis disco chalybeo-nigro, pectore et metathorace nigris, abdominis fasciis quatuor latis quatuorque angustis nigris, femoribus posticis nigro latè fasciatis, tibiis tarsisque posticis nigris, alis subcinereis.

Male. Pale yellow, rather slender. Antennæ tawny. Disk of the thorax chalybeous black. Pectus and metathorax mostly black. Abdomen with eight black bands which are alternately broad and narrow. Hind femora with a broad black band; hind tibiæ and hind tarsi black. Wings greyish; stigma brown; veins black. Halteres pale testaceous. Length of the body $4\frac{1}{2}$ lines; of the wings 9 lines.

Mount Ophir.

Fam. MUSCIDÆ, Latr.

Subfam. TACHINIDES, Walk.

Gen. ECHINOMYIA, Duméril.

66. *ECHINOMYIA BREVIPENNIS*, n. s., mas. Nigra, capite anticè albo, frontilibus ferrugineis, scutello abdominisque fasciis testaceis, alis subcinereis parvis basi limpidis.

Male. Black, stout. Head white, with white hairs beneath; front and vertex black, shining; frontalia ferruginous, slightly widening from the vertex to the antennæ; epistoma slightly prominent. Antennæ extending to two-thirds of the length of the face; 3rd joint truncated, not much longer than broad, much broader and shorter than the 2nd; arista stout, tapering from its two indistinct basal joints, full twice the length of the 3rd joint. Scutellum testaceous. Abdomen elongate-oval, longer than the thorax. Wings greyish, rather short, limp towards the base; veins black, testaceous towards the base; præbrachial vein forming a very slightly acute angle at its flexure, near which it is very deeply curved inward, and is thence straight to its tip which joins the tip of the costal; discal transverse vein straight, parted by much less than its length from the border, and by little more than half its length from the flexure of the præbrachial. Alulæ greyish, with testaceous borders. Length of the body 6 lines; of the wings 9 lines.

Mount Ophir, at the height of 4000 feet.

Gen. TACHINA, Fabr.

67. *TACHINA OPHIRICA*, n. s., fœm. Cinerea, latiuscula, capite argenteo, fron-

talibus atris, thoracis vittis quatuor interruptis nigris, scutelli margine abdominisque fasciis canis, alis subcinereis.

Female. Cinereous, rather short and broad. Head hoary, silvery-white above and in front; frontalia deep black, slightly widening from the vertex to the antennæ; facialia without bristles; epistoma hardly prominent. Antennæ extending to about three-quarters of the length of the face; 3rd joint linear, slender, rounded at the tip, about twice the length of the 2nd; arista stout for about half its length, very much longer than the 3rd joint. Thorax with four slender interrupted black stripes; scutellum with a hoary border. Abdomen black, obconical, hardly longer than the thorax; a broad hoary band on the fore border of each segment. Wings slightly greyish; veins black; præbrachial vein forming an almost right and rather well-defined angle from whence it is slightly curved inward to its tip; discal transverse vein hardly curved inward, parted by rather less than its length from the border and from the flexure of the præbrachial. Alulæ white. Length of the body 4 lines; of the wings 8 lines.

Mount Ophir, at the height of 4000 feet.

Gen. MASICERA, *Macquart.*

68. *Masicera tomentosa*, *Macq. Dipt. Exot. Suppl.* 2.

Mount Ophir, at the height of 4000 feet.

69. *MASICERA VICARIA*, n. s., fœm. Nigra, longiusecula, capite albo, frontilibus atris, thoracis vittis quatuor, lateribus scutello abdominisque fasciis duabus latis interruptis canis, alis cinereis.

Female. Black, rather long. Head white, with short white hairs beneath and behind; frontalia linear, deep black; facialia without bristles; epistoma not prominent. Eyes pubescent. Antennæ extending nearly to the epistoma; 3rd joint linear, slender, slightly rounded at the tip, about four times the length of the 2nd; arista rather stout for full one-third of the length from the base, very much longer than the 3rd joint. Thorax with four hoary stripes; sides and scutellum hoary. Abdomen elongate-obconical, much longer than the thorax, with two broad interrupted hoary bands. Legs stout. Wings grey; veins black; præbrachial vein forming a rather obtuse angle at its flexure, from whence it is slightly curved inward to its tip; discal transverse vein undulating, parted by very little less than its length from the border and from the flexure of the præbrachial. Alulæ whitish. Length of the body 5 lines; of the wings 9 lines.

Singapore.

Gen. EURIGASTER, *Macquart.*

70. *EURIGASTER MUSCOIDES*, n. s., fœm. Nigra lata, capite albido, frontilibus nigris, palpis testaceis, thorace cano nigro-quadrivittato, scutelli apice fulvo, abdomine cano-fasciato, alis cinereis apud costam fusciscentibus.

Female. Black, broad, with long bristles. Head whitish; frontalia black, linear; facialia without bristles; epistoma not prominent. Eyes pubescent. Palpi testaceous. Antennæ extending to the epistoma; 3rd joint linear, rounded at the tip, full four times the length of the 2nd; arista

slender, very much longer than the 3rd joint. Thorax hoary, with four black stripes. Scutellum tawny towards the tip. Abdomen obconical, hardly longer than the thorax, with a broad hoary band on each segment. Legs slender, hardly setose. Wings grey, brownish in front; veins black; præbrachial vein forming a slightly obtuse angle at its flexure, from whence it is slightly curved inward to its tip; discal transverse vein straight except a slight curve by its hind end, parted by much less than its length from the border, and by rather more than its length from the flexure of the præbrachial. Alulæ white. Length of the body 3 lines; of the wings 6 lines. Singapore.

Gen. ZAMBESA, n. g. (Plate I. fig. 2.)

Mas. *Corpus* longum, angustum, subcylindricum. *Facies* verticalis, subretracta. *Facialia* nuda. *Epistoma* planum. *Palpi* longiusculi, sat graciles. *Antennarum* articulus 3^{us} gracilis, linearis, 2^o sexties longior; aristâ gracillimâ. *Oculi* nudi. *Abdomen* lineare, thorace multò longius. *Pedes* longiusculi. *Alæ* sat angustæ.

Male. Body long, narrow, almost cylindrical. Face vertical, slightly retracted towards the base. Facialia without bristles. Eyes remote, bare. Palpi rather long and slender. Antennæ extending to the epistoma; 3rd joint slender, linear, rounded at the tip, six times the length of the 2nd; arista very slender, rather longer than the 3rd joint. Abdomen linear, much longer than the thorax. Legs rather long. Wings rather narrow; costal vein ending at hardly in front of the tip of the wing; brachial vein joining the cubital.

71. ZAMBESA OCYPTEROÏDES, n. s., mas. Nigra, capite albo, frontalibus atris, antennarum articulo 3^o fulvo, thorace cano nigro-quadrivittato, abdominis fasciis duabus latis interruptis semihyalinis albido-testaceis, femoribus testaceis apice nigris, tibiis piceis, alis limpidis, apice margineque postico cinereis.

Male. Black. Head white, with short white hairs beneath; frontalia deep black, linear. Proboscis testaceous. Palpi black. Third joint of the antennæ tawny. Thorax hoary, with four black stripes, of which the outer pair are very much broader than the inner pair. Abdomen a little narrower than the thorax, with two broad whitish testaceous semihyaline bands which are interrupted above. Femora testaceous, with black tips; tibiæ piceous. Wings limpid, grey towards the tips and along the hind borders; veins black; præbrachial vein forming an obtuse angle at its flexure from whence it is slightly curved inward to its tip, which joins the cubital very near the border; discal transverse vein very slightly curved inward, parted by less than its length from the border, and by more than its length from the flexure of the præbrachial. Alulæ white. Length of the body 5 lines; of the wings 10 lines.

Singapore.

Subfam. DEXIDES, *Walk.*

Gen. DEXIA, *Meigen.*

72. DEXIA DIVERGENS, n. s. (gen. *Thelaira*, *Desv.*), mas. Cava longa an-

gusta, capite albo, frontalibus atris, proboscide palpis antennisque testaceis, aristâ plumosâ, thorace nigro-quadrivittato, abdomine testaceo semihyalino, vittâ fasciisque nigris, pedibus longis testaceis, tarsis nigris, alis subcinereis.

Male. Body hoary, long, narrow, with long black bristles. Head white; frontalia deep black, widening from the vertex to the antennæ; facialia without bristles; epistoma not prominent. Eyes bare. Proboscis and palpi testaceous. Antennæ testaceous, not nearly extending to the epistoma; 3rd joint slender; arista black, plumose. Thorax with four black stripes, of which the outer pair are broader than the inner pair. Abdomen testaceous, semihyaline, with a black dorsal stripe, and with a black band on the hind border of each segment. Legs long, testaceous; tarsi black. Wings greyish; veins black; præbrachial vein forming a hardly obtuse angle at its flexure, from whence it is indistinctly undulating to its tip which joins the costal at a little in front of the tip of the wing; discal transverse vein slightly curved inward near its hind end, parted by hardly more than half its length from the border, and by hardly less than its length from the flexure of the præbrachial. Alulæ whitish. Length of the body 6 lines; of the wings 11 lines.

Mount Ophir.

Subfam. SARCOPHAGIDES.

Gen. SARCOPHAGA, *Meigen.*

73. *Sarcophaga ruficornis*, *Fabr. Syst. Antl.* 287. 12. (Musca.)

Malacca. Inhabits also Hindostan.

74. *SARCOPHAGA RECIPROCA*, n. s., fœm. Cana, capite albo, frontalibus palpis antennis thoracis vittis pedibusque nigris, abdomine subtessellato, alis subcinereis.

Female. Hoary. Head white; frontalia black, linear. Proboscis, palpi and antennæ black. Thorax with three black stripes, and with black lines intersecting the two intermediate hoary stripes. Abdomen slightly tessellated. Legs black. Wings greyish; veins black; præbrachial forming a right angle at its flexure, near which it is much curved inward, and is thence straight to its tip; discal transverse vein slightly undulating, parted by less than its length from the border, and by little more than half its length from the flexure of the præbrachial. Alulæ white. Length of the body 6 lines; of the wings 11 lines.

Singapore. A smaller specimen from Malacca apparently belongs to this species.

75. *SARCOPHAGA ALIENA*, n. s., fœm. Cana, capite albo, frontalibus palpis antennis thoracis vittis pedibusque nigris, abdomine tessellato, alis subcinereis.

Female. Hoary. Head white; frontalia black, slightly widening in front. Proboscis, palpi and antennæ black. Thorax with three black stripes, and with black lines intersecting the two intermediate hoary stripes. Abdomen tessellated. Legs black. Wings slightly greyish; veins black; præbrachial forming a very slightly acute angle at its flexure, near which it is much curved inward, and is thence straight to its tip; discal transverse vein

hardly undulating, parted by a little less than its length from the border, and by much more than half its length from the flexure of the præbrachial vein. Alulæ white. Length of the body 4 lines; of the wings 8 lines.

Mount Ophir.

Subfam. MUSCIDES.

Gen. IDIA, *Meigen*.

76. IDIA TENEBROSA, n. s., fœm. Obscurè viridis punctata, capite pedibus halteribusque nigris, antennis piceis, alis fusco-cinereis apud costam nigris.

Female. Dull green. Head slightly tuberculated above, black and shining in front. Frontalia dull black, hardly decreasing in breadth to the base of the antennæ which are piceous. Thorax very minutely punctured, with a slight hoary tinge which is interrupted by three slender indistinct black stripes. Abdomen shining, thickly punctured. Legs black. Wings brownish grey, black along the costa. Alulæ grey, with black borders. Halteres black. Length of the body $4\frac{1}{2}$ lines; of the wings 7 lines.

Mount Ophir. Inhabits also South Africa.

77. IDIA BICOLOR, n. s., fœm. Viridis, capite albido, facie nigrâ, frontalibus obscurè nigris, antennis fulvis, thorace nigro-quadrivittato, abdomine æneo-marginato, vittâ dorsali nigrâ, pedibus nigris, alis cinereis costâ apiceque nigricantibus, halteribus albidis.

Female. Green. Head whitish and shining above, black and shining in front. Frontalia dull black, linear, furcate hindward. Antennæ tawny. Thorax with a slight hoary bloom and with four slender black stripes. Abdomen æneous at the tip and along each side, and with a slight black dorsal stripe. Legs black; coxæ and femora green. Wings grey, blackish along the costa and at the tips. Alulæ dingy whitish. Halteres whitish. Length of the body 3 lines; of the wings 5 lines.

Malacca.

Gen. MUSCA, *Linn*.

78. Musca flaviceps, *Macq. Dipt. Exot.* ii. 2. 145. 23. pl. 18. f. 1. (Lucilia.) (Genus Chrysomyia, *Desv.*)

Singapore. Inhabits also Hindostan.

79. MUSCA CHRYSOÏDES, n. s. (genus Chrysomyia, *Desv.*), mas. Sericeo-viridis, capite testaceo, palpis antennisque fulvis, abdominis vittâ dorsali fascisque nigris, alis subcinereis apice obscurioribus.

Male. Sericeous green, hardly shining. Head testaceous. Proboscis black. Palpi and antennæ tawny. Abdomen with a black dorsal stripe, and with a black band on the hind border of each segment. Legs black; coxæ and femora green. Wings greyish, much darker towards the tips; veins black, tawny along the costa; præbrachial vein forming a very obtuse and somewhat rounded angle at its flexure, from whence it is slightly curved inward to its tip; discal transverse vein deeply undulating, parted by much less than its length from the border, and by a little less than its length from the flexure of the præbrachial vein. Alulæ dingy testaceous. Length of the body 5 lines; of the wings 10 lines.

Malacca and Mount Ophir.

80. *MUSCA PORPHYRINA*, n. s. (genus *Lucilia*, *Desv.*), fœm. Purpurea, capite albedo, antennis pedibusque nigris, palpis fulvis, abdomine æneo-purpureo, alis cinereis.

Female. Purple. Head whitish. Proboscis and antennæ black. Palpi tawny. Thorax with a slight hoary tinge which is very indistinctly striped. Abdomen bronze-purple. Legs black. Wings grey; veins black; præbrachial vein forming a very slightly obtuse angle at its flexure, from whence it is very slightly curved inward to its tip; discal transverse vein nearly straight, parted by little more than half its length from the border and from the flexure of the præbrachial. Alulæ dark grey. Length of the body $4\frac{1}{2}$ lines; of the wings 9 lines.

Mount Ophir, at the height of 4000 feet.

81. *MUSCA TRITA*, n. s. (genus *Lucilia*, *Desv.*), fœm. Cyaneo-viridis, capite pedibusque nigris, facie albâ, thoracis lateribus subpurpurascensibus, abdominis lateribus apiceque albedo-tomentosis, alis sublimpidis.

Female. Bright bluish-green. Head and appendages and legs black; face white. Sides of the thorax slightly purplish. Abdomen green, with slight whitish tomentum along each side and at the tip. Wings almost limpid; veins black; præbrachial vein forming a very obtuse and slightly rounded angle at its flexure, from whence to its tip it is hardly curved inward; discal transverse vein hardly curved inward, parted by much less than its length from the border and by a little less than its length from the flexure of the præbrachial vein. Alulæ greyish. Length of the body 3 lines; of the wings 6 lines.

Malacca.

82. *MUSCA DEFIXA*, n. s. (genus *Lucilia*, *Desv.*), mas. Cyaneo-viridis, capite albedo, epistomate testaceo, palpis pedibusque nigris, antennis fulvis, alis subcinereis.

Male. Bluish-green. Head whitish; epistoma testaceous. Proboscis, palpi and legs black. Antennæ tawny. Wings greyish; veins black; præbrachial vein forming a slightly obtuse and slightly rounded angle at its flexure, from whence to its tip it is moderately curved inward; discal transverse vein slightly undulating, parted by one-third of its length from the border, and by less than half its length from the flexure of the præbrachial. Alulæ grey. Length of the body 3 lines; of the wings 6 lines.

Singapore.

83. *MUSCA REFLECTENS*, n. s. (genus *Pollenia*, *Desv.*), fœm. Purpureo-cyanea, viridi-varia, capite fulvo, frontalibus cinereis, palpis antennisque testaceis, pectore testaceo, maculis duabus purpureo-cyaneis, abdomine cano-subtessellato, apice æneo, pedibus validis nigris, tibiis fulvis, alis subcinerascensibus.

Female. Purplish-blue tinged with green, hardly shining. Head fawn-colour, testaceous in front; frontalia cinereous. Proboscis black. Palpi, antennæ and pectus testaceous, the latter with a purplish-blue mark on each side. Abdomen slightly tessellated with hoary tomentum, æneous at the tip. Legs black, stout; tibiæ tawny. Wings very slightly greyish; veins black, testaceous towards the base and along the costa; præbrachial

vein forming a very obtuse angle at its flexure, from whence it is slightly undulating to its tip; discal transverse vein very deeply undulating, parted by full half its length from the border, and by much less than its length from the flexure of the præbrachial vein. Alulæ white. Length of the body 5 lines; of the wings 10 lines.

Malacca.

84. *MUSCA INFIXA*, n. s. (genus *Silbomyia*, *Macq.*), fœm. Viridi-cyanea, capite albido, frontalibus antennisque nigris, palpis fulvis, thoracis vittis quatuor abdomineque purpureis, pedibus piceis, femoribus cyanascentibus, alis cinereis costâ venisque fusco-marginatis.

Female. Greenish-blue. Head whitish. Frontalia, proboscis and antennæ black. Palpi tawny. Thorax with four purple stripes. Abdomen purple. Legs piceous; femora bluish. Wings grey, brownish along the costa and along the borders of the veins, which are black; præbrachial vein forming an almost right and somewhat rounded angle at its flexure, from whence it is very slightly curved inward to its tip; discal transverse vein very slightly undulating, parted by full half its length from the border, and by much more than its length from the flexure of the præbrachial vein. Alulæ dark grey. Length of the body 5 lines; of the wings 10 lines.

Singapore.

85. *MUSCA FUMIPENNIS*, n. s. (genus *Silbomyia*, *Macq.*), fœm. Cyaneo-viridis, capite testaceo, frontalibus piceis, palpis antennisque testaceis, thoracis vittis quatuor subobsoletis purpurascentibus, scutello abdomineque purpureo-cyaneis, pedibus nigris robustis densè pilosis, alis fuscis, apud costæ dimidium basale sublimpidis.

Female. Bluish-green. Head pale testaceous; frontalia piceous. Proboscis black. Palpi and antennæ testaceous. Thorax with four very indistinct purplish stripes. Scutellum and abdomen purplish-blue. Legs black, stout, thickly pilose; fore coxæ tawny. Wings brown, paler at the tips and along the hind border, nearly limpid along the costa for half the breadth, and rather less than half the length from the base; veins black; præbrachial vein forming a very slightly oblique and much-rounded angle at its flexure, from whence it is moderately curved inward to its tip; discal transverse vein nearly straight, parted by rather more than half its length from the border, and by much less than its length from the flexure of the præbrachial vein. Alulæ grey. Length of the body 5 lines; of the wings 10 lines.

Singapore.

86. *MUSCA DOTATA*, n. s. (genus *Phormia*? *Desv.*), mas. Viridis, capite antico albo, palpis antennisque fulvis, abdominis vittâ dorsali nigrâ fasciisque nigro-æneis, pedibus nigris, alis cinereis, dimidio apicali antico nigro-fusco.

Male. Green. Head white in front. Proboscis black. Palpi and antennæ tawny. Abdomen with a black dorsal stripe, and with blackish bronze bands. Legs black. Wings grey; apical half blackish-brown, excepting the hind border; veins black; præbrachial vein forming a very obtuse and somewhat rounded angle at its flexure, from whence it is very slightly

curved inward to its tip; discal transverse vein moderately undulating, parted by little more than half its length from the border and by rather less than its length from the flexure of the præbrachial. Alulæ grey. Length of the body $3\frac{1}{2}$ lines; of the wings 7 lines.

Singapore.

87. *MUSCA DIFFIDENS*, n. s. (genus *Pyrellia*, *Desc.*), fœm. Cyaneo-viridis, capite albido, palpis antennis pedibusque nigris, alis vix cinerascensibus.

Female. Bright bluish-green. Head whitish. Proboscis, palpi, antennæ and legs black. Wings hardly greyish; veins black; præbrachial vein gently curved at its flexure, from whence it is almost straight to its tip; discal transverse vein almost straight, parted by much less than its length from the border, and by much more than its length from the curve of the præbrachial vein. Alulæ whitish. Length of the body 3 lines; of the wings 6 lines.

Singapore.

88. *MUSCA CONFIXA*, n. s. (genus *Pyrellia*, *Desc.*), fœm. Lætè viridis cyaneo purpureoque varia, capite nigro, antice albido, palpis testaceis, antennis nigris basi rufescentibus, abdominis apice subæneo, pedibus nigris, alis cinereis.

Female. Bright green, tinged with blue and purple along each side. Head black above, whitish in front. Proboscis black. Palpi testaceous. Antennæ black; first and second joints reddish. Abdomen slightly æneous at the tip. Legs black; femora green. Wings grey; veins black; præbrachial vein gently curved at its flexure, between which and its tip it is slightly curved inward; discal transverse vein moderately undulating, parted by much less than its length from the border, and by a little less than its length from the flexure of the præbrachial vein. Alulæ dark grey. Length of the body $3\frac{1}{2}$ lines; of the wings 7 lines.

Mount Ophir, at the height of 4000 feet.

89. *MUSCA REFIXA*, n. s. (genus *Pyrellia*, *Desc.*), fœm. Purpurea, lateribus subtùsque cyanea aut cyaneo-viridis, capite antico, palpis pedibusque nigris, antennarum articulo tertio piceo, alis subcinereis.

Female. Purple shining, blue on each side and beneath. Head in front, proboscis, palpi and legs black. Third joint of the antennæ piceous. Wings slightly greyish; veins black; præbrachial vein forming a gentle curve at its flexure, which is very near the border, indistinctly curved outward from thence to its tip; discal transverse vein almost straight, parted by little more than half its length from the border, and by about its length from the flexure of the præbrachial vein. Alulæ grey. Length of the body $2\frac{1}{2}$ – $2\frac{3}{4}$ lines; of the wings 5 – $5\frac{1}{2}$ lines.

Var. β. Bluish-green. Scutellum purplish-blue. Discal transverse vein very indistinctly curved inward.

Singapore.

90. *MUSCA PERFIXA*, n. s. (genus *Pyrellia*, *Desc.*), fœm. Purpurea, capite palpis antennis pedibusque nigris, alis limpidis.

Female. Very nearly allied to *M. reftxa*. Purple, shining. Head and appendages and legs black. Wings limpid; veins black; præbrachial vein

forming a gentle curve at its flexure which is very near the border, straight from thence to its tip; discal transverse vein almost straight, parted by about half its length from the border, and by a little more than its length from the flexure of the præbrachial vein. Alulæ whitish. Length of the body 3 lines; of the wings 6 lines.

Mount Ophir.

91. *MUSCA AFFIXA*, n. s. (genus *Morellia*, *Desv.*), mas. Obscurè nigra, capite antico albo, thoracis vittis tribus latis albidis, abdomine subtessellato, alis subcinereis.

Male. Dull black. Head white in front. Thorax with three broad whitish stripes. Abdomen slightly tessellated. Wings greyish; veins black; præbrachial vein forming a gentle curve at its flexure which is very near the border, nearly straight from its flexure to its tip; discal transverse vein hardly undulating, parted by less than half its length from the border, and by little less than its length from the flexure of the præbrachial vein. Alulæ grey. Length of the body 4 lines; of the wings 7 lines.

Mount Ophir.

Subfam. ANTHOMYIDES, *Walk.*

Gen. *ARICIA*, *Macq.*

92. *ARICIA ARGENTATA*, n. s., mas. Cana, capite argenteo, palpis antennis pedibusque nigris, thoracis vittis duabus nigricantibus, scutelli apice testaceo, abdominis maculis quatuor nigris dorsalibus basi testaceo, femoribus testaceis, alis subcinereis.

Male. Hoary. Head silvery-white. Proboscis, palpi, antennæ and legs black. Thorax with two blackish stripes. Scutellum towards the tip and femora testaceous. Abdomen with four black dorsal spots, testaceous towards the base. Wings and alulæ slightly greyish; veins black, testaceous towards the base; cubital and præbrachial veins slightly diverging for about two-thirds of their length from the præbrachial transverse vein, very slightly converging from thence to the border; discal transverse vein oblique, slightly curved inward along its hind half, parted by a little more than its length from the præbrachial transverse, and by much less than its length from the border. Length of the body $3\frac{1}{2}$ lines; of the wings 6 lines.

Malacca.

Gen. *HYDROTEA*, *Macq.*

93. *HYDROTEA SOLENNIS*, n. s., mas. Nigra, capite cano, thorace subcinereo nigro-trivittato, abdomine longi-obconico, tibiis ferrugineis, alis subcinereis.

Male. Black. Head hoary in front. Thorax slightly cinereous, with three black stripes. Abdomen elongate-obconical. Tibiæ ferruginous. Wings slightly greyish; veins black, testaceous at the base; cubital and præbrachial veins slightly diverging for nearly two-thirds of their length from the præbrachial transverse vein, very slightly converging from thence to the border; discal transverse vein oblique, curved inward in the middle, parted by about its length from the præbrachial transverse and by little more than

half its length from the border. Alulæ greyish. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

Mount Ophir, at the height of 4000 feet.

94. *ARICIA PATULA*, n. s., mas. Nigra sat lata, antennis, thoracis lateribus, abdomine pedibusque fulvis, abdominis apice tarsisque nigris, alis cinereis.

Male. Black, rather broad. Eyes bright red. Antennæ, sides of the thorax, scutellum, abdomen and legs tawny. Abdomen hardly longer than broad, black towards the tip. Tarsi black. Wings and alulæ grey; veins black, tawny towards the base; cubital and præbrachial veins diverging for more than two-thirds of their length from the præbrachial transverse, parallel from thence to their tips; discal transverse vein very oblique, curved inward near its hind end, parted by more than half its length from the border, and by very little more than its length from the præbrachial transverse vein. Length of the body $3\frac{1}{2}$ lines; of the wings 7 lines.

Singapore.

Subfam. HELOMYZIDES, *Fallen*.

Gen. *XARNUTA*, n. g. (*Plate I. fig. 4.*) (*Trypetidae*)

Helomyza affinis; mas et fœm. Corpus sat latum. Antennarum articulus 3^{us} linearis; arista ~~nuda~~ *Femora* antica subtùs tenuiter spinosa. Alæ latiusculæ.

Allied to *Helomyza*. *Male and Female*. Body rather broad. Third joint of the antennæ linear, rounded at the tip; arista ~~bare~~. Fore femora with slender spines. Wings somewhat broad; discal transverse vein slightly oblique, parted by much less than half its length from the border, and by about its length from the præbrachial transverse vein.

95. *XARNUTA LEUCOTELUS*, n. s., mas et fœm. Ferrugineo-fulva, antennis testaceis, pedibus fulvis, alis nigro-fuscis apice albis, margine postico subcinereo.—Fœm. Abdominis apice nigro.

Male and Female. Ferruginous tawny, with black bristles. Head rather paler. Antennæ testaceous; arista black. Legs tawny; fore femora with black spines beneath. Wings blackish-brown, greyish along the hind border for more than half the breadth and less than half the length from the base; extreme tips white; veins black. Alulæ whitish testaceous.

Female. Tip of the abdomen black. Length of the body $3\frac{1}{2}$ lines; of the wings 7 lines.

Singapore.

Gen. *HELOMYZA*, *Fallen*.

96. *HELOMYZA INTEREUNS*, n. s., mas. Fulva, capite metathorace pectore pedibusque testaceis, abdominis maculis transversis nigricantibus, tarsis ferrugineis, alis subcinereis apices versus et apud venam transversam discalem fuscis.

Male. Tawny with black bristles. Head, metathorax, pectus, legs and halteres testaceous. Abdomen with a transverse blackish mark on the disk of each segment towards the tip. Tarsi somewhat ferruginous. Wings slightly greyish; tips brown, which hue is darkest in front; veins tawny,

black towards the tips; transverse veins black. Discal transverse vein clouded with brown, parted by much less than its length from the border, and by much more than twice its length from the præbrachial transverse vein. Alulæ whitish. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines. Malacca.

97. *HELOMYZA EXEUNS*, n. s., mas. Fulva, capite antico, metathorace pectore pedibusque testaceis, abdominis maculis transversis nigricantibus, tarsis ferrugineis apice fuscis, alis subcinereis maculâ apicibusque fuscis.

Very nearly allied to *H. intereuns*. *Male*. Tawny. Head in front, metathorax, pectus, legs and halteres testaceous. Abdomen with a transverse blackish mark on the disk of each segment. Tarsi ferruginous, with black tips. Wings slightly greyish; tips brown; veins black, tawny at the base; a brown spot on the discal transverse vein, which is straight, slightly oblique, parted by less than its length from the border, and by about thrice its length from the discal transverse vein. Alulæ whitish. Length of the body $2\frac{1}{4}$ lines; of the wings $4\frac{1}{2}$ lines.

Mount Ophir.

Subfam. LAUXANIDES, *Walk.*

Gen. LAUXANIA, *Latr.*

98. *LAUXANIA EUCERA*, n. s., mas. Nigra cinereo-tomentosa, capite atrobiguttato, antennis piceis longissimis, aristâ albâ, abdomine pedibusque fulvis, femoribus tibiisque nigro-fasciatis, alis subcinereis apud costam subluridis.

Male. Black, with greyish tomentum. Head with a deep black spot on each side between the eyes. Proboscis dull tawny. Palpi black. Antennæ piceous; 1st joint long; 3rd slender, cylindrical, longer than the 1st and the 2nd together; arista white, pubescent, longer than the 3rd joint. Abdomen and legs tawny; femora and tibiæ with black bands; tarsi with black tips. Wings greyish, slightly lurid along the costa; veins black; discal transverse vein straight, slightly oblique, parted by less than its length from the border, and by more than twice its length from the præbrachial transverse vein. Halteres tawny. Length of the body 2 lines; of the wings $4\frac{1}{2}$ lines.

Singapore.

99. *LAUXANIA DETEREUNS*, n. s., fœm. Nigra, nitens, antennis piceis, aristâ nigrâ, tarsis anticis basi tibiisque tarsisque posterioribus testaceis, alis subcinereis.

Female. Black, shining, with black bristles. Antennæ piceous; 3rd joint elongate-conical, much shorter than that of *L. eucera*; arista black, pubescent, full thrice the length of the 3rd joint. Fore tarsi at the base and posterior tibiæ and tarsi testaceous. Wings slightly greyish; veins and halteres testaceous; discal transverse vein straight, almost upright, parted by almost its length from the border and by nearly twice its length from the præbrachial transverse vein. Length of the body $1\frac{1}{4}$ line; of the wings 3 lines.

Mount Ophir, at the height of 4000 feet.

Gen. CELYPHUS, *Dalman*.

100. *Celyphus obtectus*, *Dalman*, *Analecta Entomologica*, 32. 1. pl. 2. B. f. 1-5.

Malacca. Inhabits also Hindostan and the Philippine Islands.

Subfam. ORTALIDES, *Haliday*.Gen. LAMPROGASTER, *Macq.*

101. LAMPROGASTER ZONATA, n. s., fœm. Nigra, capite flavo nigro-vario, antennis piceis, thorace flavo-quadrivittato, abdomine flavo-bifasciato, tarsis albis, alis subcinereis maculis costalibus fasciâque fuscis.

Female. Black, shining. Head pale yellow, with four black shining stripes in front; vertex, with a broad dull black stripe which occupies the whole breadth behind, is notched on each side between the eyes, and is narrower in front. Antennæ piceous; 3rd joint nearly linear, rounded at the tip; arista minutely plumose, more than twice the length of the 3rd joint. Thorax with four yellow stripes, one on each side in front of the wings, and one on each side of the scutum. Abdomen with two yellow bands; 1st slender; 2nd apical, dilated in the middle of the fore border; knees tawny; tarsi white, with blackish tips. Wings greyish, slightly lurid and with brown marks at the base and along the costa, and with a brown band which extends along the præbrachial vein to half the space between the latter and the border; discal transverse vein straight, upright, parted by about one-third of its length from the border, and by much more than its length from the præbrachial transverse, which is oblique. Halteres tawny. Length of the body 5 lines; of the wings 10 lines.

Singapore.

102. LAMPROGASTER GLABRA, n. s., mas. Nigra, antennis piceis, abdominis fasciâ subapicali flavâ, tarsis albis, alis sublimpidis maculis basalibus fasciisque quatuor fuscis.

Male. Black, shining. Antennæ piceous, in structure like those of *L. zonata*. Abdomen with a slender yellow band near the tip. Tarsi white, with black tips. Wings nearly limpid, with four brown bands, slightly testaceous and with some indistinct brown marks at the base; 1st and 3rd bands entire; 1st broader and darker than the others; 2nd and 4th interrupted; veins black, testaceous towards the base; discal transverse vein straight, upright, parted by one-fourth of its length from the border, and by more than its length from the præbrachial transverse vein, which is also upright. Halteres tawny. Length of the body 3 lines; of the wings 6 lines.

Singapore.

103. LAMPROGASTER TRANSVERSA, n. s., fœm. Nigra, capite fulvo fasciis duabus nigris unâque albidâ, antennis fulvis, thoracis vittis quatuor dorsalibus fulvis duabusque lateralibus albidis, abdomine nigro-purpureo basi fulvo maculisque duabus subapicalibus flavis, pedibus fulvis, tarsis albidis, alis subcinereis fusco sexfasciatis.

Female. Black. Head tawny, with two black bands above and a whitish band in front. Antennæ tawny. Thorax with four dorsal tawny stripes which

are confluent in front and with two lateral whitish stripes. Abdomen blackish-purple, tawny at the base, and with a yellow spot on each side near the tip which is lanceolate. Legs tawny; tarsi whitish, with black tips; hind tibiæ with brownish tips. Wings slightly greyish, with about six irregular macular brown bands; veins brown, tawny at the base; discal transverse vein nearly straight and upright, parted by much less than its length from the border, and by more than its length from the præbrachial transverse vein, which is oblique. Halteres testaceous. Length of the body 4 lines; of the wings 8 lines.

Malacca.

104. *LAMPROGASTER VITTATA*, n. s., mas. Nigra, capite ex parte flavo, antennis fulvis, thorace flavo-bivittato, scutello flavo-marginato, abdominis vittâ dorsali flavâ, tarsis albis, alis nigricantibus basi fasciisque quatuor albidis.

Male. Black, shining. Head pale yellow in front, beneath and about the eyes. Antennæ tawny. Thorax with two yellow stripes; scutellum with a yellow border. Pectus with an oblique yellow band on each side. Abdomen with a yellow dorsal stripe. Tarsi white, with black tips. Wings blackish, whitish at the base, and with four whitish bands; 1st band irregular; 2nd and 3rd entire; 4th interrupted; veins black; discal transverse vein straight, upright, parted by about one-fourth of its length from the border, and by much more than its length from the præbrachial transverse vein, which is slightly oblique. Halteres testaceous. Length of the body 3 lines; of the wings 6 lines.

Singapore.

105. *LAMPROGASTER GUTTATA*, n. s., fœm. Cinerea, capite nigro trimaculato anticè testaceo, antennis fulvis, thorace cano-quinquevittato, lateribus testaceis, abdominis fasciâ anticâ fulvâ, tarsis albidis, alis subcinereis fasciis octo subinterruptis fuscis.

Female. Black, with cinereous tomentum. Head partly dull testaceous in front; vertex with three black spots, two in front and one behind. Antennæ tawny; arista pubescent. Thorax with five hoary stripes which are connected in front by a transverse band; sides testaceous. Pectus with an oblique dull testaceous stripe on each side. Abdomen with a tawny band on the hind border of the first segment; oviduct slender, lanceolate. Tarsi whitish, with black tips. Wings greyish, with about eight irregular and partly interrupted brown bands; veins and halteres testaceous; discal transverse vein nearly straight and upright, parted by about one-fourth of its length from the border, and by more than its length from the præbrachial transverse vein. Length of the body 3 lines; of the wings 6 lines.

Singapore.

106. *LAMPROGASTER TRUNCATULA*, n. s., fœm. Nigra robusta, abdominis apice compresso lanceolato, tarsis albis, alis subcinereis lituris transversis fusciscentibus fasciisque duabus nigro-fuscis.

Female. Black, stout, slightly shining. Arista pubescent. Abdomen compressed and lanceolate at the tip. Tarsi white, with black tips. Wings slightly greyish, with several slight transverse brownish marks, and with

two blackish-brown bands; the 1st broad, basal, not extending beyond half the breadth from the costa; the 2nd narrow, entire, near the 1st; veins black; discal transverse vein straight and upright, parted by one-third of its length from the border, and by very much more than its length from the præbrachial transverse vein. Halteres- testaceous. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

Singapore.

Gen. XANGELINA, n. g. (*Plate I. fig. 3.*)

Fœm. Corpus latiusculum, parce setosum. Caput antice subdilatum; facies magna. Antennæ breves; articulus 3^{us} longi-conicus; arista longa, gracilis, plumata. Abdomen brevi-ovatum, thorace non longius. Pedes breviusculi. Alæ medioeriter latæ; venæ rectæ.

Female. Body rather broad, with a few bristles. Head somewhat dilated in front; face large. Antennæ short; 3rd joint elongate-conical; arista long, slender, plumose. Abdomen short-oval, not longer than the thorax. Legs rather short. Wings moderately broad; subcostal vein extending to about one-fourth of the length of the wing; mediastinal extending a little beyond the subcostal; radial ending at about seven-eighths of the length; cubital ending at the tip; cubital and præbrachial almost parallel beyond the discal transverse vein, which is straight and upright, and parted by very much more than its length from the præbrachial transverse, and by much less than its length from the border.

107. XANGELINA BASIGUTTA, n. s., fœm. Testacea, scutello fusco, abdomine fulvo, alis subcinereis guttâ costali nigrâ venis transversis nigro-sublimbatis.

Female. Testaceous. Proboscis partly brownish. Scutellum brown. Abdomen tawny. Wings slightly greyish; veins black; a black dot at the tip of the subcostal vein; transverse veins slightly clouded with black. Length of the body 2 lines; of the wings 4 lines.

Malacca.

Gen. PLATYSTOMA.

108. PLATYSTOMA RIGIDA, n. s., mas. Ferrugineo-fusca, capite subtus albo, antennis piceis, pectore albido, pedibus nigris, alis nigricantibus albo confertim at interruptè guttatis.

Male. Ferruginous-brown, tomentose. Head white behind and beneath, ferruginous and shining in front. Antennæ piceous; arista slightly plumose. Pectus whitish. Legs black. Wings blackish, thickly studded with white dots, which disappear at the base and on an undulating band beyond the middle; veins black. Length of the body 3 lines; of the wings 6 lines.

Singapore.

109. PLATYSTOMA STELLATA, n. s., mas. Cinereo-nigra, capite subtus albido, antennis fulvis, facie abdominis apice pedibusque nigris nitentibus, alis obscurè cinereis guttis confertis at interruptis limpidis.

Male. Cinereous-black, tomentose. Head shining black in front, whitish behind and beneath. Antennæ tawny. Abdomen shining black at the

tip. Legs black and shining. Wings dark grey, with numerous limpid dots which are comparatively wanting on a blackish-brown stripe along two-thirds of the length of the costa, and on an exterior upright band which is connected with the above stripe. Length of the body 3 lines; of the wings 6 lines.

Malacca.

Gen. THEMARA, n. g. (Plate I. fig. 5.)

Mas. *Corpus* latiusculum, subsetosum. *Caput* thorace paulò angustius. *Antennæ* epistoma non attingentes; articulus 3^{us} lanceolatus, longiusculus; arista latè plumosa. *Abdomen* ellipticum, thorace non longius. *Alæ* latiusculæ, obscuræ, maculis pallidis, venis radiali et cubitali undulatis.

Male. Body rather broad. Head and thorax slightly setose. Head a little less broad than the thorax; epistoma not prominent. Proboscis short. Palpi short, porrect. *Antennæ* not reaching the epistoma; 3rd joint lanceolate, rather long; arista deeply plumose, about twice the length of the 3rd joint. Abdomen elliptical, as long as the thorax. Wings rather broad, dark, with pale marks; subcostal vein ending at much beyond one-third of the length; mediastinal ending at much beyond half the length; radial undulating, ending at about five-sixths of the length; cubital undulating, ending at the tip of the wing; præbrachial and subanal hardly undulating; discal transverse vein straight, nearly upright, parted by one-tenth of its length from the border, and by more than half its length from the præbrachial transverse.

110. THEMARA AMPLA, n. s., mas. Ferruginea, subtùs testacea, scutello, abdominis fusci fasciis tribus pedibusque testaceis, alis obscurè fuscis, maculis tribus anticis luridis tribusque posticis albis.

Male. Ferruginous, slightly shining, testaceous beneath. Head in front and appendages testaceous. Scutellum and legs testaceous. Abdomen brown above, testaceous at the base and with two testaceous bands. Wings dark brown, with three hyaline triangular spots in front and three on the hind border; the costal spots lurid, the hind spots white. Length of the body 4 lines; of the wings 8 lines.

Singapore.

Gen. STRUMETA, n. g. (Plate II. fig. 4.)

Fæm. *Corpus* latiusculum, pubescens, vix setosum. *Abdomen* brevi-ovatum, thorace latius et paulò longius. *Alæ* mediocriter latæ, limpida, fasciis fuscis, venâ transversâ præbrachiali undulatâ, perobliquâ.

Female. Body rather broad, dull, pubescent, hardly setose. Head rather less broad than the thorax; epistoma not prominent. Proboscis and palpi short. *Antennæ* mutilated in the insect here described. Abdomen short oval, broader and a little longer than the thorax. Wings moderately broad, limpid with brown bands; longitudinal veins almost straight; subcostal and mediastinal veins almost contiguous; mediastinal vein ending at much beyond half the length of the wing; radial ending at a little beyond four-fifths of the length; cubital ending at somewhat in front of the tip; discal

transverse vein nearly straight and upright, parted by full one-fourth of its length from the border, and by about its length from the præbrachial transverse which is undulating and very oblique.

111. *STRUMETA CONFORMIS*, n. s., fœm. Cervina, thoracis vittis duabus, metathorace et pectoris disco nigricantibus, pedibus testaceis, alis limpidis fusco-quadrifasciatis.

Female. Fawn-colour. Thorax with two blackish stripes. Metathorax and disk of the pectus blackish. Legs and halteres testaceous. Wings limpid, pale brown along the costa, and with four pale brown bands; 1st and 2nd bands connected hindward; veins black, testaceous towards the base. Length of the body 4 lines; of the wings 7 lines.

Singapore.

Gen. *VALONIA*, n. g. (*Plate I. fig. 6.*)

Fœm. Corpus sat angustum, pubescens. *Caput* anticè subdilatatum. *Antennæ* breviusculæ; articulus 3^{us} longi-conicus; arista pubescens. *Abdomen* fusiforme, thorace paullò longius. *Pedes* sat robusti. *Alæ* angustæ, obscuræ, maculis limpidis.

Allied to *Platystoma*.—*Female*. Body rather narrow, dull, pubescent. Head as broad as the thorax, slightly dilated in front; epistoma not prominent. Proboscis and palpi short. *Antennæ* rather short, not reaching the epistoma; 3rd joint elongate-conical; arista pubescent. *Abdomen* fusiform, a little longer than the thorax. Legs rather stout, especially the hind pair. Wings narrow, dark with limpid spots; subcostal vein ending at before one-third of the length of the wing; mediastinal ending at much beyond half the length; radial ending at a little before three-quarters of the length; cubital and subanal hardly undulating, the former ending at a little in front of the tip of the wing; discal transverse vein straight and upright, parted by less than half its length from the border, and by a little less than its length from the præbrachial transverse.

112. *VALONIA COMPLICATA*, n. s., fœm. Obscurè cinerea, capite testaceo, thorace nigro-punctato, abdomine guttis quatuor lateralibus albis tomentosus subtùs testaceo, pedibus fulvis, femoribus posterioribus tibiisque posticis nigris, alis subcinereis guttis plurimis limpidis.

Female. Dark grey. Head and appendages testaceous. Thorax punctured with black; humeral calli black, shining. *Abdomen* with two white tomentous dots on each side; underside testaceous. Legs tawny; posterior femora black, with tawny tips; hind tibiæ blackish except at the base. Wings greyish, with very numerous limpid dots, blackish and without dots along more than half the length of the costa; veins black. Halteres testaceous. Length of the body 3 lines; of the wings 5 lines.

Malacca.

Gen. *SOPHIRA*, n. g. (*Plate II. fig. 1.*)

Fœm. Corpus sat angustum, pubescens. *Caput* thorace paullò angustius. *Antennarum* articulus 3^{us} longiusculus, sublanceolatus; arista plumosa.

Abdomen subfusiforme, apice attenuatum, thorace paulò longius. *Pedes* graciles. *Alæ* longiusculæ, sat angustæ, venis limbatis.

Female. Body rather narrow, dull, pubescent. Head a little less broad than the thorax; epistoma not prominent. Proboscis and palpi short. Antennæ not reaching the epistoma; 3rd joint rather long, sublanceolate; arista plumose. Abdomen subfusiform, somewhat attenuated at the tip, a little longer than the thorax. Legs slender. Wings rather long and narrow; subcostal vein ending at before one-third of the length of the wing; mediastinal ending at much beyond half the length; radial ending at about seven-eighths of the length; cubital ending at very little in front of the tip; discal transverse vein straight, hardly oblique, parted by one-fourth of its length from the border, and by very much more than its length from the præbrachial transverse.

This genus seems to be somewhat allied to the *Helomyzides*.

113. *SOPHIRA VENUSTA*, n. s., fœm. Testacea, thoracis fasciâ metathorace abdominisque fasciis tribus maculisque duabus subapicalibus nigris, tibiis fuscescentibus, alis limpidis venis fusco-limbatis.

Female. Testaceous. Thorax with a black band between the wings. Metathorax black. Abdomen with three black bands, and with a black subapical spot on each side. Tibiæ brownish; tarsi tawny. Wings limpid, lurid in front, striped with brown along most of the veins; veins black, tawny towards the base; cubital vein minutely setose towards the base. Length of the body 4 lines; of the wings 8 lines.

Singapore.

Gen. *RIOXA*, n. g. (Plate II. fig. 3.)

Fœm. *Corpus* angustum, pubescens. *Caput* sat parvum, thorace multò angustius. *Antennarum* articulus 3^{us} sublinearis; arista rarè plumosa. *Thorax* longi-ovatus. *Abdomen* fusiforme, thorace multò angustius, vix longius. *Pedes* graciles, antici breves. *Alæ* longæ, mediocriter latæ, obscuræ, guttis albis.

Female. Body narrow, dull, pubescent. Head rather small, much less broad than the thorax; epistoma not prominent. Proboscis and palpi short. Antennæ not reaching the epistoma; 3rd joint almost linear, moderately long; arista thinly plumose. Thorax elongate-oval. Abdomen fusiform, much narrower, but hardly longer than the thorax. Legs slender; fore legs short. Wings long, moderately broad, dark with white dots; radial vein ending at rather in front of the tip of the wing; discal transverse vein almost straight, very oblique, parted by about one-fourth of its length from the border, and by somewhat less than its length from the præbrachial transverse.

114. *RIOXA LANŒOLATA*, n. s., fœm. Cervina, thorace nigro-quadrivittato, abdomine nigro vittâ dorsali cervinâ, pedibus testaceis, alis nigricantibus strigâ discali guttisque quinque albis.

Female. Fawn-colour. Proboscis, legs and halteres testaceous. Thorax with two blackish stripes on each side, the outer pair shortened hindward. Abdomen black, with a fawn-coloured dorsal stripe which is attenuated hindward, and does not extend to the tip. Wings blackish, almost limpid along the hind border for more than half the length from the base, with a white discal streak and with five white dots; 1st dot in a line with the streak; 2nd very minute,

behind the 1st; 3rd on the costa near the tip; 4th larger, apical, near the 5th, which is on the hind border. Length of the body 5 lines; of the wings 10 lines.

Singapore.

Gen. XIRIA, n. g. (Plate II. fig. 2.)

Mas. Corpus metallicolor, subsetosum. Caput latiusculum. Palpi longiusculi. Antennæ breves; articulus 3^{us} sublinearis; arista latè plumosa. Thorax robustus. Abdomen lineare, thorace paulò longius et multò angustius. Pedes longiusculi, sat validi. Alæ mediocriter longæ latæque.

Male. Body metallic, slightly setose. Head rather broad, hardly narrower than the thorax; epistoma not prominent. Proboscis short. Palpi porrect, rather long and stout. Antennæ short, not nearly reaching the epistoma; 3rd joint almost linear; arista deeply plumose, much more than twice the length of the 3rd joint. Thorax stout. Abdomen linear, a little longer than the thorax and about half its breadth. Legs rather long and stout. Wings moderately long and broad; subcostal vein ending at rather beyond one-third of the length; mediastinal ending at very much beyond half the length; radial ending at beyond five-sixths of the length; cubital ending at hardly in front of the tip; discal transverse nearly straight, slightly oblique, parted by about half its length from the border, and by rather more than its length from the præ-brachial transverse.

115. XIRIA ANTICA, n. s., mas. Purpurea, capite nigro, antennarum articulo 3^o ferrugineo, pedibus testaceis, tibiis nigris, tarsis albis anticis ferrugineis, alis sublimpidis apice nigricantibus maculis costalibus albis et nigricantibus.

Male. Purple. Head and appendages black. Third joint of the antennæ ferruginous. Legs testaceous; tibiæ black; fore tarsi ferruginous; posterior tarsi white, with brown tips. Wings nearly limpid, with two white and two blackish spots on the costa; tips blackish; veins black, testaceous along the costa. Halteres whitish. Length of the body 4 lines; of the wings 8 lines.

Mount Ophir.

Subfam. ACHIIDES, Walk.

Gen. ACHIAS, Fabr.

116. Achias maculipennis, Westw. *Oriental Entomology*, 38. pl. 18. f. 4. Singapore. Inhabits also Java.

Subfam. DIOPSIDES, Walk.

Gen. DIOPSIS.

117. DIOPSIS QUINQUEGUTTATA, n. s., fœm. Nigra, proboscide pedibusque fulvis, his ex parte fusciscentibus, alis nigricantibus basi apice guttisque quinque sublimpidis. (Plate II. fig. 7.)

Female. Black, shining. Proboscis tawny. Petioles of the eyes about half the length of the thorax. Scutellum with two spines, which are more than half the length of the thorax. Legs tawny, partly shaded with brown. Wings blackish, nearly limpid at the base and at the tips, and with two interrupted nearly

limpid bands, the first of two dots, the second of three dots; veins black. Length of the body 3 lines; of the wings $4\frac{1}{2}$ lines.

Mount Ophir.

118. *DIOPSIS QUADRIGUTTATA*, n. s., mas. Picea, capite oculorum petiolis pedibusque fulvis, his ex parte fusciscentibus, alis nigricantibus basi fasciâ subapicali guttisque quatuor sublimpidis. (Plate II. fig. 6.)

Male. Piceous, shining. Head and petioles of the eyes tawny, the latter fully half the length of the thorax. Scutellum with two spines, which are less than half the length of the thorax. Legs tawny, slightly shaded with brown. Wings blackish, nearly limpid at the base and towards the tips, except the extreme part of the latter which is slightly blackish; two interrupted nearly limpid bands, each composed of two dots; veins black. Length of the body $2\frac{1}{2}$ lines; of the wings 4 lines.

Malacca.

Subfam. SEPSIDES, *Walk.*

Gen. CALOBATA, *Fabr.*

119. *CALOBATA CONFINIS*, n. s., fœm. Nigra, capite cyaneo, antennis piceis, femoribus posterioribus albo-cinctis, tarsis anticis albis, alis subcinereis fasciis duabus connexis fuscis, 2^a apicali.

Female. Black, dull. Head blue, shining. Proboscis and antennæ piceous. Posterior femora with a white ring near the tips; hind femora with a white ring at the base; fore tarsi white. Wings greyish, with two brown bands, the first connected on the hind border with the second, which is apical; veins black. Halteres whitish, with black knobs. Length of the body 7 lines; of the wings 10 lines.

Singapore and Mount Ophir.

120. *CALOBATA IMMIXTA*, n. s., fœm. Nigra, capite cyanescente, facialibus atris, antennis piceis, pedibus testaceis anticis nigris, tarsis anticis albis, femoribus posterioribus fasciis quatuor nigris, alis subcinereis fasciis duabus subconnexis fusciscentibus, 2^a apicali.

Female. Black, dull. Head bluish, shining; facialia deep black. Proboscis and antennæ piceous. Legs testaceous; fore femora black, testaceous towards the base; fore tibiæ black; fore tarsi white; posterior femora with four black bands; posterior tibiæ dull testaceous, black towards the base; posterior tarsi brownish. Wings slightly greyish, with two brownish bands, the first slightly connected on the hind border with the second which is apical; veins black. Length of the body 5 lines; of the wings 10 lines.

Malacca.

Subfam. PSILIDES, *Walk.*

Gen. MICROPEZA, *Macq.*

121. *MICROPEZA FRAGILIS*, n. s. Fulva, femoribus tibiisque anticis fuscis, tibiis posterioribus basi apiceque fuscis, tarsis anticis posticisque albidis, alis subcinereis guttis tribus apiceque limpidis.

Tawny. Fore femora and fore tibiæ brown; posterior tibiæ brownish at the

base and at the tips; fore tarsi and hind tarsi whitish. Wings very slightly greyish, with three limpid spots forming a curved band near the tips which are also limpid; veins black. Length of the body $3\frac{1}{2}$ –4 lines; of the wings 5–6 lines.

Singapore and Mount Ophir.

Gen. NERIUS, *Wied.*

122. *Nerius fuscipennis*, *Macq. Dipt. Exot.* ii. 3. 241. 1. pl. 325. f. 5.

Singapore and Mount Ophir. Inhabits also Java and the Philippine Islands.

Gen. TEXARA, n. g. (*Plate II. fig. 5.*)

Fem. *Corpus* gracile, non setosum. *Caput* subproductum; *facies* brevis. *Antennæ* epistoma attingentes; *articulus* 3^{us} clavatus; *arista* pubescens, subapicalis. *Thorax* subfusiformis. *Abdomen* lanceolatum, thorace angustius et duplò longius. *Pedes* postici longi, femoribus incrassatis serratis, tarsis anticis subdilatatis. *Alæ* angustæ.

Female. Body slender, without bristles. Head slightly produced, as broad as the thorax; face short; epistoma not prominent. Antennæ extending to the epistoma; third joint clavate; arista minutely pubescent, seated near the tip of the third joint. Thorax subfusiform. Abdomen lanceolate, narrower than the thorax and about twice its length. Anterior legs moderately long and stout; fore tarsi slightly dilated; hind legs long; hind femora incrassated, serrated beneath; hind tibiæ slightly curved. Wings narrow; subcostal vein not extending to one-third of the length of the wing; mediastinal vein not extending to half the length; radial extending to a little beyond three-quarters of the length; cubital ending at very little in front of the tip of the wing; discal transverse vein straight, upright, parted by less than its length from the border, and by about thrice its length from the præbrachial transverse.

123. *TEXARA COMPRESSA*, n. s., *fem.* Nigra, capite nigro-cyaneo subtùs cano, antennis piceis, aristâ albidâ, alis subcinereis, halteribus albidis.

Female. Black. Head bluish-black, with hoary tomentum beneath. Antennæ piceous; arista whitish. Wings greyish; veins black. Halteres whitish. Length of the body 5 lines; of the wings 6 lines.

Singapore.

DESCRIPTION OF PLATES I. AND II.

Obs. All the figures are more or less magnified, and the outline-details comprise the side and front views of the head, antennæ, and base of the wings.

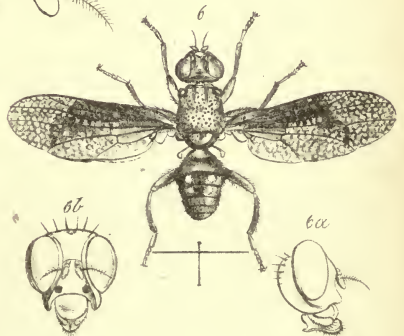
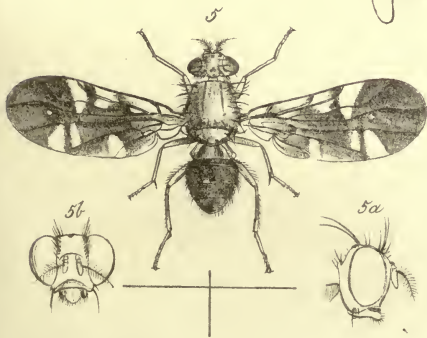
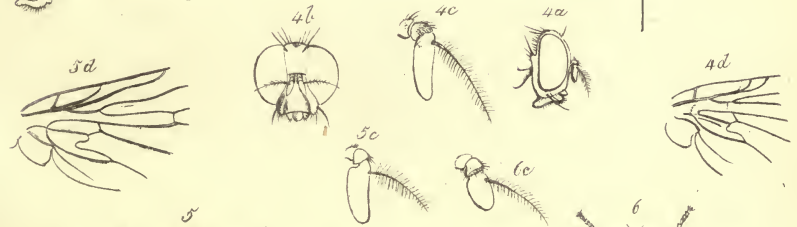
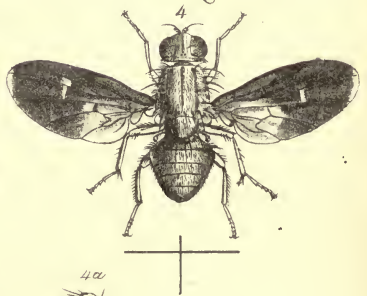
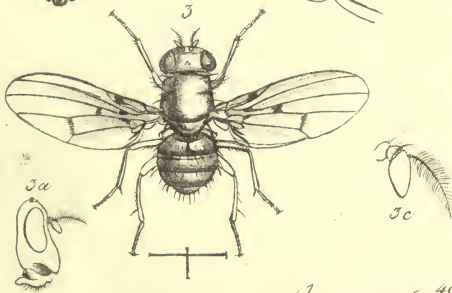
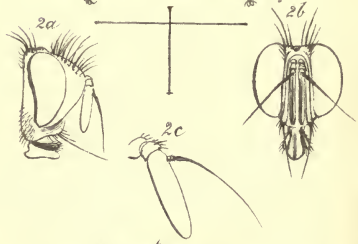
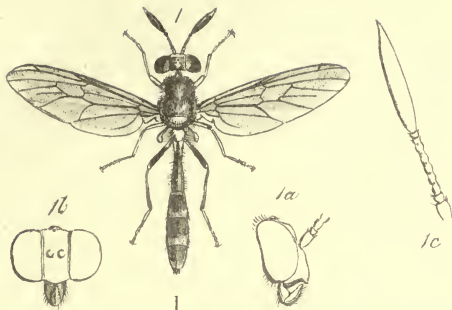
PLATE I.

Fig. 1. *Massicyta bicolor*; 1*a*, head seen sideways; 1*b*, the head seen in front; 1*c*, antenna.

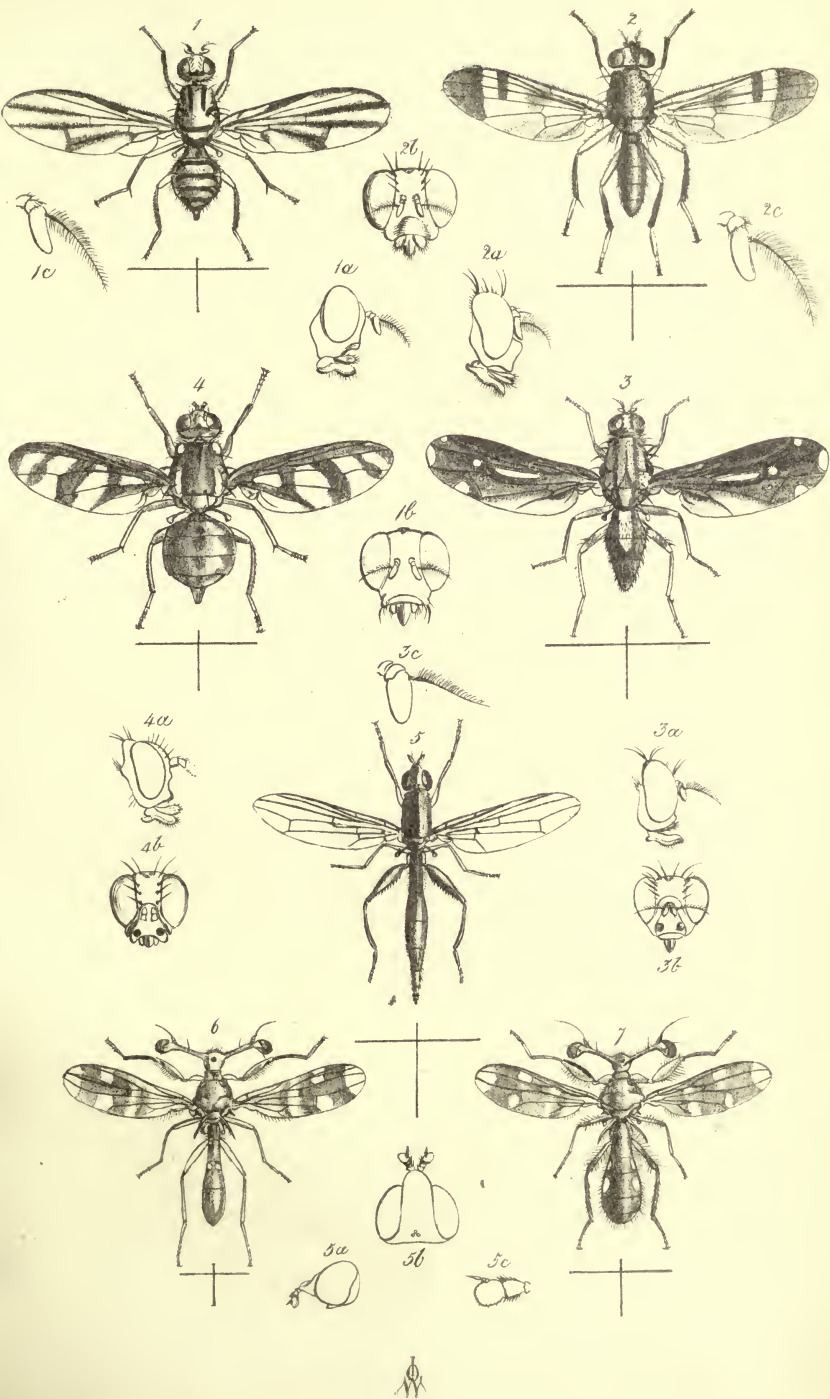
Fig. 2. *Zambesa Ocypteroïdes*; 2*a*, head sideways; 2*b*, ditto in front; 2*c*, antenna.

Fig. 3. *Xangelina basigutta*; 3*a*, head sideways; 3*b*, ditto in front; 3*c*, antenna; 3*d*, base of the wing.

Fig. 4. *Xarnuta leucotelus*; 4*a*, head sideways; 4*b*, ditto in front; 4*c*, antenna; 4*d*, base of wing.









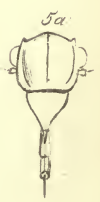
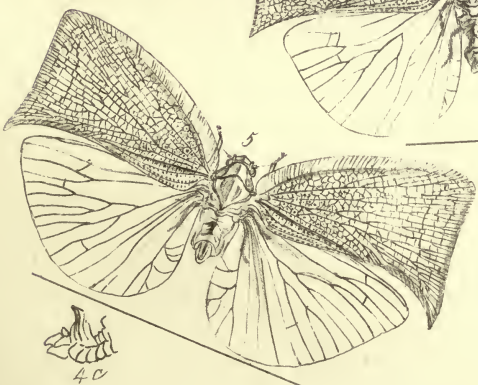
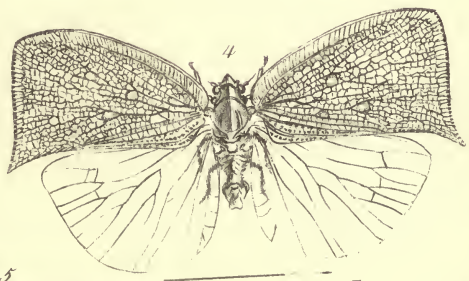
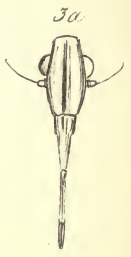






Fig. 5. *Themara ampla*; 5*a*, head sideways; 5*b*, ditto in front; 5*c*, antenna; 5*d*, base of wing.

Fig. 6. *Valonia complicata*; 6*a*, head sideways; 6*b*, ditto in front; 6*c*, antenna.

PLATE II.

Fig. 1. *Sophira venusta*; 1*a*, head sideways; 1*b*, ditto in front; 1*c*, antenna.

Fig. 2. *Xiria antica*; 2*a*, head sideways; 2*b*, ditto in front; 2*c*, antenna.

Fig. 3. *Rioxa lanceolata*; 3*a*, head sideways; 3*b*, ditto in front; 3*c*, antenna.

Fig. 4. *Strumeta conformis*; 4*a*, head sideways; 4*b*, ditto in front.

Fig. 5. *Texara compressa*; 5*a*, head sideways; 5*b*, ditto in front; 5*c*, antenna.

Fig. 6. *Diopsis 4-guttata*.

Fig. 7. *Diopsis 5-guttata*.

Note on a supposed species of *Pelopæus*. By EDWARD NEWMAN, Esq., F.L.S.

[Read January 15th, 1856.]

IN No. 59 of the "Proceedings" of our Society is a letter addressed to our Secretary on the economy of a certain Hymenopterous insect as observed by the writer when at Bombay: several of the explanations in this letter require correction, although evidently written in good faith. The description of the insect and its nest is fully sufficient to identify the tribe and even genus: it is one of the *Vespina*, and doubtless of the genus *Pelopæus*: the name of "Mason-bee" is therefore assigned to it in error, because there is a tribe of Mason-bees possessing a most wonderful and interesting economy, and with that tribe the present insect has nothing whatever to do.

In the second place, the male is represented as the builder of the nest,—a statement so opposed to all we know of the economy of *Hymenoptera*, that it may safely be pronounced erroneous; the building insect was certainly not a male, and as certainly a female or neuter.

In the third place, the shining green insect, described as the female, was unquestionably a parasite, probably of the genus *Chrysis*: its presence in the nest of the wasp was as an insidious enemy, not as the legitimate partner and participator in domestic care.

On the Natural History of the Glowworm (*Lampyrus noctiluca*).

By the late GEORGE NEWPORT, Esq., F.L.S. Prepared from the Author's MS.* by GEORGE VINER ELLIS, Esq., Professor of Anatomy in Univ. Coll., London. Communicated by the Secretary †.

[Read December 18th, 1855.]

IN the summer of the years 1840, 1841 and 1842, I devoted a great deal of time to the investigation of the natural history and anatomy of the Glowworm, in continuation of some researches commenced in the country so long ago as the year 1830. These researches had reference more especially to the internal structure of the light-producing organs, and to the origin and nature of the light. But although the structure of the parts concerned was repeatedly and carefully examined, and although the insects themselves were submitted to numerous experiments, I was unable to arrive at any entirely satisfactory conclusion, either with regard to the peculiarities of the structure of the organs, or to the nature of the light which they emit. I felt bound, therefore, to withhold from publication the observations I had then made until such time as I might be able either to enter more fully into the examination both of the natural history of the insect and of its peculiar organization, or to afford such an explanation of the mode of origin and of the nature of its luminous property as would be in accordance with the many facts already ascertained by other inquirers. Some years later, on comparing the results of a series of observations on the habits and anatomy of other insects, and especially of *Meloë*, with the discoveries of Faraday and Matteucci in physical science, I was led to the conclusion that a very close relation exists between the *vital* and *instinctive forces* of the organic world and the physical forces of the inorganic. This view, which was announced in a

* Some additional MS. on the Anatomy and Light of the Glowworm, that is less complete, I hope to be able to communicate to the Society on a future occasion.—G. V. E.

† The materials of the present paper have been extracted from the note-books of the late Mr. Newport by Professor Ellis, of University College. It was evidently Mr. Newport's intention to have continued his observations on this very interesting insect; and there can be no doubt that, had he lived to carry out this intention, the paper would have appeared in a much more complete and elaborate form. But the observations, incomplete as they are, have appeared too important to be left unpublished; and, with this explanation, which is due to Mr. Newport's memory, they are now printed in the Society's "Journal of Proceedings."—SECRETARY.

paper on *Meloë* read to the Linnean Society on the 18th of November 1845, seems to me now to afford a correct explanation of the origin and nature of the light of the Glowworm, and to elucidate facts in the natural history of this and other insects, which do not seem to be reconcilable in any other way. Added to this, I am at length enabled, through more perfect means of microscopic investigation, to supply, from recent examination, facts respecting the anatomy of the light-giving organs and the other structures, which had escaped me in my former inquiries.

I propose, therefore, in this paper to give a full account of the natural history and anatomy of the Glowworm.

NATURAL HISTORY OF THE INSECT.

The Imago.

The Glowworm is an insect which has attracted the attention of our earliest naturalists: it was well known both in this country and on the continent. Although very limited in its geographical distribution, it is usually common in those parts in which it is located.

The period at which the *Lampyrus noctiluca* common to the north of Europe usually makes its first appearance in this country is about the middle of June, after it has undergone its metamorphosis. From that time to the end of June or the middle of July it is found in abundance on grassy banks, in sheltered spots in lanes, and at the sides of hedges, especially on calm dewy evenings. It is most abundant in Kent at the end of June, but in Gloucestershire in the middle of July, and shines most vividly at those times on perfectly calm evenings. Very few are observed to shine on cold rainy nights, and scarcely one is seen to glimmer on a perfectly dry night when there is a brisk cold wind. At a temperature of the air below 58° Fahr., the perfect female is said not to shine, but with that statement my own observations do not entirely agree. It has been thought, also, that the glowworm ceases to be luminous before midnight; but, although the light is given out most intensely and by the greater number of individuals before that hour, yet this is not invariably the case with all, as I have witnessed light emitted by some as late as two o'clock in the morning, and by others until after dawn. The light given out during the first few evenings of the glowworm's appearance is of a faint yellow colour, but after several evenings, if the creature continues to shine, it becomes of a greenish-yellow, and is less intense: this faintness is very marked if the insect has been kept

several days in confinement, and especially when there has not been communion with the other sex. It is given out from the ventral surface of the last three segments of the body, which are almost transparent, and have no dark pigment in their texture; but it is most intense in the anterior half of the tenth and eleventh segments, on each of which it forms two broad bands extending across the whole surface. In the twelfth or last segment it is feeble, and appears merely as two bright spots, one on each side of the surface, and each about the size of a moderate pin's head. The light is most intense in those females which have passed through their metamorphosis only within the last two or three days, and have not yet paired: in these it is sometimes so powerful, that I have been able to read small print for an hour by my watch in the darkest night. It is given forth most intensely in faint flashes immediately the insect becomes stationary after locomotion, and usually when it has crept up a blade of grass, or crawled along a slight eminence in its native haunts; if the insect is watched at that time, it may frequently be observed to coil the extremity of its body upwards, exposing its light most to view, and turning it to the right and to the left, as if to use it as a beacon for the wandering volant male. Even when she is perfectly stationary on the ground for a few minutes, the female rests with the extremity of her body turned to one side, so as still to show the light; though if the male continues absent, she seldom remains long in one place or position, but continues alternately to wander on and to rest, scintillating her light more and more intensely at intervals.

I have witnessed these circumstances repeatedly both in the natural haunts of the insect and in confinement; and am scarcely prepared to regard them as a direct act of the will, but rather as an evolution of instinct through the direct stimulus of vital causes, precisely as I regard what is in like manner believed to be a voluntary extinction of the light (Kirby and Spence, vol. ii.) at the moment of capture or of sudden contact with a foreign body. At the instant of such contact the entire body of the insect is contracted and shortened, more especially on the ventral surface; and not only are the light-giving segments drawn one within the other, but the luminous organs within them are simply removed from immediate contact with the tegument, and are not, as supposed by Murray* and Müller, hidden behind opaque parts: possibly the

* See Murray's *Experimental Researches on the Light of the Glowworm*. Edinb. 1826.

darkness may be also due to the withdrawal of nervous influence and its employment in the action of the muscles; and thus the semblance of an act of volition may be given to what is owing to purely vital and physical causes. This explanation appears probable from the fact that the light is never completely extinguished in the anal segment, in which the organs within are not easily removed from contact with the tegument by the ventral muscles. It may be necessary to bear these circumstances in mind, as we shall find that they are of some consequence with reference to the right interpretation of the nature of the light.

It has been supposed by most naturalists (Kirby and Spence, &c.*) that the production and use of the light have immediate reference to the function of reproduction,—a view in which I entirely coincide, as it is not only in accordance with the facts now stated, but with all the circumstances of the natural history of the insect. It has been objected to this view by some, that the male also is slightly luminous, but this fact in no way affects the conclusion with regard to the female.

The male of *Lampyrus noctiluca*, as every naturalist is aware, is a winged insect with large organs of vision over the greater portion of each side of the head. It is far less numerous than the female, and is very rarely taken, except on calm evenings, while hovering about, or when in company with the females shining most vividly; it is, however, allured by the presence of artificial light (Westwood, Introduction, p. 248). The sole object of its life in the winged state is to search out its partner; and as it takes no food whatever when it has assumed the winged condition, its period of existence is necessarily very brief, for it dies generally after it has paired. The light of the female too, after the union of the sexes, becomes greatly diminished, and soon after the deposition of her ova—a proceeding which occupies a few days—she also perishes; so that in a week or two after the middle of July, when almost every individual has deposited her ova or has died unimpregnated, all traces of the light of the glowworm are extinguished.

Like the females of most insects, the glowworm has her life prolonged for a considerable period beyond that of her congeners, if she has not been impregnated. And the chances that some of the females may not be impregnated are very great, as the males are not only few in number, but their time of appearance, so far as my

* Journal of a Naturalist, 1830, 3rd edit. p. 302; Westwood's Introduction, 1838, vol. i. p. 248.

observations have gone, is very limited; they are to be found chiefly only on the first two or three evenings after the glowworms have begun to shine, and just completed their metamorphoses, and even then only on warm calm nights. While, therefore, those females which have received the male proceed with the deposition of their ova, their light waning more and more on each evening until at length it ceases with the life of the parent, the unimpregnated females continue to shine more and more vividly on each succeeding night, and their life is prolonged for many days beyond the usual period in expectation of the chance partner that may yet remain. The period during which the glowworm continues to shine is rarely more than from fifteen to twenty days. Its time of appearance and disappearance varies only a few days in different localities, usually from the end of June to the middle of July; but if in the season of their coming forth the weather is boisterous and wet, not only are fewer individuals seen, but their time of stay is more limited, because many perish early, either at the time when their metamorphosis is about to be completed, and when excess of moisture is exceedingly injurious to them, or during their exposure on the herbage awaiting their partners. Instead of finding them abundant at one spot in such seasons, they are met with but rarely, and are scattered solitarily over a wide extent.

The Impregnation of the Female, and the Deposition of the Eggs.

In the summers of 1840 and 1841 I received from the country, through the kindness of a friend, several collections of glowworms, both in the latter stage of the larva, and in the imago state. With these I was enabled to watch the transformation, to observe the pairing of the sexes, and the development of the ova. Degeer originally watched the metamorphosis, and Martle, with subsequent writers, has given some account of the habits of the larva; but they left very much to be ascertained. In the middle of June 1841, having then received a collection of both male and female glowworms, and having also by me some other females, reared from larvæ sent to me in the early part of the year, which had not paired, I had the means of watching the whole of their natural history, and the period of the development of the young.

I placed a virgin female, which I knew to be such from having raised it from the pupa only a few hours before, under a glass, and put with it two of the males which I had then just received from the country. This was at six in the evening of the 19th of June.

Within a very few seconds of the occurrence, the males became most assiduous in their attention to the female, and one of them was in contact in from ten to twelve minutes; but it had not remained longer than a minute when it was accidentally removed, and the female instantly passed a single egg. Union was again effected in an equally short length of time, but the female endeavoured to escape, and did not receive the attention of the male as might have been expected; in a few minutes, however, she became more quiet, and the male remained in contact. This second attachment commenced at exactly sixteen minutes after six P.M.; and the temperature of the atmosphere was then 66° Fahr. in the open air—the evening being moist but warm. The glowworms continued in contact for fifteen minutes, when the female began to crawl about, actively dragging after her the male, which maintained his attachment, though he lost it once for a few seconds; and while thus attached, the antennæ of the male were thrown backwards, and the head was drawn along under the thorax. The sexes now continued united for an hour and a half, and then separated naturally, the impregnation appearing to have been complete. At fourteen minutes before eight P.M. I placed them in a box, the bottom of which was covered with damp earth with a little tuft of grass, for the purpose of observing the time and mode of depositing the eggs. I now placed the vessel in the open air, covered with a thin gauze net to prevent the escape of the insects; the female continued for nearly an hour to crawl about on the grass and on the earth, still emitting her light, but with only moderated brilliancy, while the male was concealed beneath the grass and remained perfectly quiet as in repose. At five o'clock on the following morning, when the temperature of the air was about 60° Fahr., the female continued in motion with the male still flitting about her, but the two were not in contact. I now examined the vessel and the tuft of grass very carefully, but no eggs had yet been deposited. I then covered the vessel, so as to exclude light as much as possible, and placed it in a dark room. At eleven o'clock in the day, when the atmosphere was at 65° Fahr., the male was still in occasional attendance on his partner, but no eggs had yet been deposited by her. During the remainder of this day and in the evening, the attention of the male was undiminished, but on the following morning I found him dead. The female, however, did not begin to deposit her eggs until the next evening. The conclusion to be drawn from this experiment seems to be, that, though the female is impregnated at an early period after

quitting the pupa state, the eggs may not be deposited for twenty-four to forty-eight hours after impregnation.

In the following year (1842) I had an opportunity of repeating this observation. Having carefully preserved some larvæ of the glowworm through the preceding winter and spring, and succeeded in rearing pupæ and perfect insects from them, I found on the morning of the 18th of June, the temperature being at 67° Fahr., that four female glowworms had assumed the perfect state, and that two of these had begun to shine very brilliantly. There were also two male insects; these had not yet assumed the perfect form, but were still pupæ; and as the whole of these had entered the pupa state about the same time, it would seem that the males remain longer in that condition than the females. During the night between the 20th and 21st of June, the two males also threw off the pupa-covering, and their elytra remained soft and pliable, being liable to injury for several hours. On the evening of the 21st, the males began to pay attention to the females, and on examining the insects at five o'clock on the following morning (June 22nd) I found them *in coitu*; at three o'clock in the same afternoon, when the temperature of the atmosphere was 70° Fahr., the boxes which contained the glowworms having been placed in a dark closet, they were still attentive to the females, and I found that some eggs had been deposited at the roots of the grass. One of the males was very attentive to the female that appeared to have deposited the ova. This female was shining much more brilliantly than the others. The fact of eggs having been deposited by one of these females within a very few hours after copulation, while in the former case eggs were not produced until nearly two days had elapsed, seems, when the relative time of the females leaving their pupa state is considered, to confirm the conclusion above stated, namely that when the female has been abroad for a day or two before being impregnated, the ova, being already fully matured, are then deposited very soon after the communion of the sexes; while, if the female is brought into contact with the male very quickly after leaving the puparium, the ova may not be deposited for one or two days afterwards.

The deposition of eggs, which had commenced on the 22nd of June, as mentioned above, was continued: at half-past ten on the morning of the 24th, when the temperature of the atmosphere was about 65° Fahr., I found that an abundance of eggs had been deposited. A few of these were on the stems and blades of the grass, but by far the greater proportion on the small exposed root-

fibres; this, therefore, appears to be the habit of the insect. The males continued to pay attention to their partners, which were still engaged in the act of deposition, so that repeated impregnation may be necessary, perhaps, for the full impregnation of all the ova. On the 25th of June, at ten A.M., I removed some of the eggs to a glass tube, closed at each end by a cork, for the purpose of observing their development; as there is some difficulty in doing this when the eggs are repeatedly exposed in the observations.

I now observed that the males were beginning to pay less attention to their partners; so that the season of shining is followed quickly by that of pairing and the deposition of the eggs; and when the latter takes place quickly after pairing, the female has already been in communication with the male, or has been for some days abroad.

On the 26th of June, in the afternoon, when the temperature was near 70° , all my glowworms, both male and female, were still living, but the former ceased to pay any attention to the latter, and these were not depositing any ova.

On the following day, however, June 27th, a few more eggs were deposited, and one of the males was again attending to and flitting about the female; but after this day all further attention entirely ceased, and the males died. The light of the females also became exceedingly faint, and was shot forth only feebly at intervals. In a few days these also died. I am not prepared, however, to state whether these invariably die after depositing their ova, as I believe, or whether they continue to feed and live on until the following year. It is quite certain that they take some nourishment in their perfect state, but this is not the case with the male.

In connexion with the deposition of the ova, it is interesting to mark the way in which that process is conducted when the union of the sexes has not been effected. Thus, if it happens from the absence of males that the glowworm has not been impregnated within two or three days after quitting the pupa, the light is given out for one or two evenings with increased intensity, and is constantly exposed to view in the manner before described; whilst the insect appears to be greatly excited, and alternately moves from place to place, resting on the ground or climbing to the extremity of blades of grass, changing the position of her body and the light, and shining with greater brightness, but no eggs are deposited. Like many other insects, and more especially the females of some *Lepidoptera*, the glowworm retains her eggs for a

very long time when unimpregnated; and if at the end of several days impregnation has not occurred, the natural instinct of the creature becomes markedly affected, precisely as I formerly pointed out is the case with the female *Meloë* under similar circumstances (Linn. Trans. vol. xx. p. 302). Her body becomes greatly distended by the fully matured ova within her; the light loses its brilliancy and is less constantly exposed, and its colour is changed to a greenish hue. She wanders about, with evident distress, less rapidly, but more constantly, and ultimately deposits her eggs at random on the grass over which she travels, or even on the ground, one or two at a time. A very slight mechanical stimulus of touch or pressure on her body will then occasion her to extrude an egg, but nevertheless she is extremely tenacious of life, and lives on until very many of her ova have been carelessly extruded and scattered. After some time she dies. In one experiment made to ascertain the length of time the glowworm may live unimpregnated, I found the light given out with greater brilliancy on the second evening after the glowworm had been in confinement; with still greater on the third and fourth, at which time the little prisoner was evidently in great distress, alternately traversing the sides and bottom of the box in which she was confined, then remaining stationary for a few minutes and emitting her light with its utmost vividness,—it being at one moment very bright, and then slightly dimmed for a few seconds, but only to be shed again at the next instant with greater brilliancy. The insect was strongly attracted by the light, first to the one side and then to the opposite; and the sexual impulse was manifested by the frequent protrusion of the vaginal portion of the body. On the fifth evening the light had become fainter; and from this time to the tenth day, when the insect died, the light continued to diminish in brilliancy, and became of a much greener colour.

At the moment of the laying of the eggs, each is covered with a very glutinous and adhesive matter, as I have found when an egg has been extruded from the body beneath my eye under a lens. They are affixed firmly by means of this matter to the small exposed roots or the base of the stems of blades of grass, though not in the ground as some have stated, but close to the surface; so that, without being covered by the soil, they are constantly retained in a humid locality, and yet are freely submitted to the influence of heat and air,—conditions which I have constantly found absolutely necessary for their development. Some naturalists have stated that they are usually deposited on moss; but this condition,

I believe, is not usual. I have always found my specimens in confinement attached as stated to the exposed roots or stems of grass, whence the larvæ, when hatched, are most likely to find their prey near to them, and where they are constantly in a damp place, and in a situation in which all their requirements are best supplied.

Supposed Luminosity of the Eggs.

It has frequently been stated that the eggs are luminous, but of the truth of this there is considerable doubt (Rogerson, Murray, Tiedemann): they certainly are slightly effulgent soon after they are deposited, but this, I consider, is due rather to the matter with which they are covered when extruded, than to any inherent property of their own. With the view of ascertaining the truth of the statement, I have examined the ova both within and without the body. In the female which had died unimpregnated on the tenth day after capture, the ovaries were filled with ova, and when placed in water before removal from the body appeared to emit a greenish light; after three hours' immersion they still appeared, when the specimen was carried into a dark room, to give out a very faint greenish light; but when they had been standing a few hours longer in the water, no light was perceptible from them: the light appeared to have been due to what was transmitted through them from the segments. I then opened the body of a female that was still living, but which had deposited a large proportion of her eggs; and on carrying the specimen into a dark room, the remaining ova appeared to be luminous, like the preceding; the specimen was then immersed still living in water, and the ova appeared to be more luminous than before. The entire ovaries containing the ova were next removed from the body beneath water, placed in a separate vessel, and carried into a dark room, but no light was then emitted by them. They were as opake as those of other insects; so that the light which they appeared to give out before removal from the body, was due in reality to that of the light-giving segments, being transmitted through them. The segments themselves, after the eggs were removed, still emitted light very powerfully, although immersed in water, and continued to do so for nearly five hours, while the insect lived, and almost as brightly as when the insect is uninjured. In a third instance, which was examined at the same time as the preceding, I found the ovaries, when opened in the air, full of ova, but these were not luminous. On placing the insect in water, the eggs then appeared to give

out a faint light, but after immersion for an hour or two they ceased to shine. When the ova and ovaries were removed, I found that the segments gave out only a very faint light, although the insect was still living, and light continued to be given out from them for several hours, but very faintly. It was thus evident to me that the ova which are within the ovarium certainly do not emit light before deposition, but merely transmit that of the segments beneath them; but when the ova are deposited, I am inclined to admit that a very slight luminosity is sometimes apparent, though this is due rather to the fluid covering of the egg than to the egg itself.

The Development of the Embryo.

I have stated that some of the eggs deposited between the 22nd and 25th of June were removed into a glass tube, still attached to the roots of grass to which they had been affixed. This was done in order that the eggs might not be affected too much by warmth and dryness during examination, as when they are long exposed, or have not sufficient moisture, they quickly dry up and are destroyed. If, however, they are enclosed in a tube, and the interior of the tube only very slightly moistened occasionally, then the eggs become developed as in the natural haunts. I did not observe the development of the young *Lampyris* within the eggs, as opportunities were wanting for my so doing, but only watched that of the egg itself, and the time of appearance of the young. The tube with the eggs was placed in the same box and under the same circumstances precisely as some of the same brood of eggs which still remained attached to the roots of grass. In both these sets I found that at about the 25th or 28th day after the eggs had been deposited they were considerably enlarged,—a certain sign that their development was in progress; this increase was very distinctly marked at this time, viz. about the middle of the period of development of the embryo, in accordance with what I have before and since observed in the development of other species of insects and in other broods of eggs of the glowworm itself, as well as in the *Iulidæ* (Phil. Trans. 1841).

On the 7th of August I had the satisfaction to find that the eggs in the tube, which had been deposited between the 23rd and 25th of June, were producing their larvæ. I had been prevented during the interval from watching minutely the daily progress of the eggs, and I am unable to detail the steps of the formation in

this insect: I had noticed only that the egg had considerably increased in size, but had not in any way changed its colour. It, however, appeared now to be slightly effulgent on the day before the young appeared,—a phenomenon which I subsequently found to be attributable to the embryo within. I saw one specimen immediately after leaving the ovum: at first it was coiled up and inactive,—a circumstance which I attribute to its being still enclosed in the amnion after the shell has burst. It was then of a very delicate straw-white colour, and for a few minutes quite inactive: as soon, however, as its body is stretched out and the amnion removed, it begins to move very feebly, but after a short time with more strength. Its colour also begins to change, the white becoming of a darker shade, and in less than half an hour the whole body is tinged of a very light grey. In the course of two or three hours this colour becomes much darker, and after some hours longer it is of a dull black, like the body of the parent. Its body is then composed of thirteen segments, including the head, and it moves with considerable activity; its onward motion being mainly effected by means of the anal segment, which serves the purpose of the prolegs of herbivorous larvæ in assisting the progress of its body.

The length of time which these eggs had occupied in development was thus on the average about forty-five days, or a little more than six weeks. The other specimens, which had remained in the box attached to the roots of grass, were hatched in about the same time; but the period of incubation was shorter by ten or twelve days than that occupied in the development of a brood of glow-worms' eggs in the preceding year, when the temperature of the season was very much lower with rain.

During the time the specimens above referred to were in course of development, the heat was above the average, for at the latter part of the time on one day it was 86° , and on more than one it ranged from 76° to 78° Fahr. This result agrees with that derived from the observations I have before and since made, viz. that the more or less rapid development of the embryo is mainly dependent on differences in the amount of heat supplied to it from without.

The Food and Habits of the Larva.

Six days after the larvæ were hatched, I supplied them with their proper food—a portion of a living snail, which they immediately began to devour with great avidity. Before this they had sipped

the water added to the interior of the tube. The proper food of the larva was ascertained first, I believe, by Rogerson (*Philos. Mag.* vol. lviii. p. 63), who is quoted by Murray, in the year 1826; it was afterwards pointed out by M. Maille in the '*Bulletin Soc. Phil.*,' Feb. 1826, also in the '*Annales des Sciences Naturelles*,' vol. vii. p. 353, and since then by a writer in the '*Penny Cyclopædia*.' The fact has since been re-stated and established with additions, by Rennie, in 1831*. Rogerson stated that the larvæ "feed on small snails, and the carcasses of insects, &c."

At the end of eighteen days the larvæ were still very active, and had grown considerably, but had not yet shed their skins; they had been fed during the interval on portions of a snail. On the following day (August 26th), or nineteen days after hatching, one specimen underwent its first change in casting off its skin, but exhibited no change of form. When the larva first escapes from the egg, the only change it experiences is that of colour: it becomes of a deep grey-black, with the margin and posterior angles of the segments of a whitish colour, and with a distinct white line along the middle of the back in the line of the dorsal vessel. After the first change of skin, the whole of the upper surface of the body becomes of a much deeper colour; the longitudinal line almost entirely disappears, and the angles of the segments are then white, and have also a reddish or flesh-coloured spot at the apex.

On the 15th September, or nineteen days after the first change, some of the specimens cast their tegument a second time, while others had only then just entered their first period, although the whole had been living under like conditions. I have constantly noticed similar differences, and am strongly induced to refer them to original imperfect impregnation of the ovum.

I had thus traced the individuals I had watched from the egg, to the second change of tegument in the middle of September, when by accidents most of them died; and I was forced to continue my observations on other specimens which had been supplied to me from their native haunts in the beginning of October.

A full account of the habits of the Glowworm was first given in the '*Bulletin Soc. Phil.*,' Feb. 1826, and subsequently in the same year in the '*Annales des Sciences Naturelles*,' vol. vii. p. 353, and these memoirs are attributed to M. Maille. Rogerson, however, as mentioned before, had given a brief history of the insect, and had already shown that it feeds on snails. A particular account of the cleanliness of the larva is given in the '*Bulletin des Sciences*

* *Journal of the Royal Institution of Great Britain*, vol. i. pp. 16 & 19, 1831.

Naturelles,' June 1826, vol. viii. p. 296; and the same is also referred to by a writer in the 'Penny Cyclopædia,' in which are given some additional accounts of the voracity of the creature and its mode of feeding.

I am not aware, however, that any one has made observations similar to some which have been reported to me in a letter dated August 23, 1840, by my friend Professor Ellis. The writer in the 'Penny Cyclopædia' states that he kept the larvæ alive for a long time, and that they subsisted upon snails: "Attacking those of the largest sort sometimes, they would seize a snail whilst crawling, and when the snail retired within its shell they would still keep their hold, and allow themselves to be carried into the shell with the snail; and although they became enveloped with mucous secretion, it very seldom appeared to adhere to their bodies." Mr. Ellis wished to observe the proceedings here described of the larva being carried into the shell by the snail, and therefore furnished snails to some larvæ that he had in confinement. He was not able to verify the statements made by the writer referred to. On the contrary, he says: "Instead of witnessing that effect, I was astonished to find that the manner of destroying the snail was by a series of sudden bites, repeated at intervals; and I was moreover struck with the fact that the snail seemed in extreme agony after the first bite. I therefore made a number of experiments with snails, and the following are the results:—

"*Exp. 1.*—A rather large snail was bitten; it retracted after the wound of the glowworm into its shell, and had afterwards a partial paralysis (if I may so speak), inasmuch as it could not right its shell when crawling.

"*Exp. 2.*—Another, bitten in the horn, was not able, or did not protrude it fully for as much as a quarter of an hour afterwards; and put out only one (the opposite) for some time.

"*Exp. 3.*—Some smaller snails, bitten once by a large larva, never emerged from their shells afterwards, and it is now *eight* hours since, while one or two seemed to be dead.

"Perhaps you may think these effects are due to mechanical injury. I kept this also in view, and pierced some of the snails when crawling through and through with a needle, and fastened them thus to the table; but although they retracted into their shells as much as possible for the time, they came out again directly afterwards, and were to all appearance as well and active as ever—even those that had been impaled three or four times. These effects cannot be simply those arising from mechanical injury,

seeing the difference in the results. I therefore infer that there is some special poison inserted, or influence exercised, at the time of striking the prey, like that of the snake-tribe; and that the effect on the snail is proportioned to its size, for it takes repeated bites to kill a large one. I am further confirmed in this opinion by the fact that, when a dead snail is presented, the glowworm simply begins to eat slowly. The way in which the glowworms remove the snail, when killed, is interesting: they walk backwards with it, using the claws (prolegs) at the end of the tail as feet."

These interesting facts, communicated to me by my friend Professor Ellis, immediately led me to watch the proceedings of the glowworm. I had the gratification of witnessing every particular, and the opportunity of confirming what he had pointed out, as he had forwarded to me with the glowworms some of the same species of snail as those employed by himself. These snails proved to be the *Helix nemoralis*, and were mostly young individuals; but there were also some full-grown ones, and besides them was a small specimen of *Limax agrestis*. As a general result, I found that the larvæ attacked most fiercely and fed upon the former species of snail most voraciously, but would not touch the latter; their proper food therefore appears to be the *Helices*.

On repeating these observations, I at first thought that it was only the smaller snails which fell a prey to this larva, but I soon found, as stated by the writer in the 'Penny Cyclopædia,' that the very largest are also destroyed by it; for I have seen the full-grown and largest-sized *Helix* attacked by a single larva. I have not, however, seen the larva actually drawn into the shell by the snail, as mentioned by M. Maille, and I therefore suspect that was an accidental occurrence which is likely to happen, since the mode of attack, as M. Maille states, is by sudden bites, repeated, as my friend observes, at intervals, and, as I myself noticed, made by the larva with apparently great caution. So far from the larva being drawn into the shell by the snail, I have noticed that the frothy matter that is invariably given out by the snail when it returns into its shell after being bitten by its assailant, is particularly avoided by the larva. I witnessed the attack of a larva on a very large and full-grown snail while crawling. The larva raising the anterior part of its body made one sudden and very cautious bite about midway in the body of the snail on the margin of the foot, and repeated this by running backwards and forwards from the tail to the head of the snail. At each bite the snail seemed to be in great agony, and a greenish transparent fluid was

instantly exuded from each wound. In this way the larva continued its attack on the snail, running along the side of it from tail to head and back again, repeating its bite at each turn as the snail crawled along. It seemed to direct its chief attacks against the head of its victim, and in this it succeeded in two or three attempts. Once the snail was bitten at the base of one of the large feelers, and the effect was inability to protrude the organ to its full extent. I then placed this snail aside until the next day: although it had been the object of repeated attacks it was not killed, but only appeared to be a little paralysed. These experiments were made on the 27th of August, when the larvæ were in full activity. On the following afternoon I found that the specimen set aside had really been more injured than at first appeared; it moved very feebly and slowly, and was unable to protrude the feelers on the injured side of the body to their full extent. The inferior margin of the body from the head to the posterior extremity of the foot was unused, irregular and shrunken, and the entire animal had evidently suffered greatly in health; it appeared to be highly sensitive to light. I then placed near it a large larva, by which it was immediately bitten in the inferior horn on the left side, and the snail retired into its shell. Before it could withdraw itself completely, it was again struck in the margin of the foot on the right side, and the larva then passed quietly to the opposite side and wounded it there also; then, just as the snail was about to reappear, bit it again twice, first in the inferior, then in the superior horn of the right side; and when the snail made an effort to protrude the left horn, which had never recovered its original power, wounded it again in that also. After this, it was struck again on the margin of the foot on both sides, and the snail then seemed to be entirely incapable either of completely withdrawing itself within the shell, or of locomotion and attempt to escape. Its body soon appeared shrunken and corrugated, and writhed as if in great agony. It occasionally protruded a very small portion of its horns, but it seemed to have lost all power to project them to their full extent, the utmost length being then not more than one-half that of their original dimensions.

It was interesting to observe with what apparent caution the glowworm proceeded with its work of destruction. It protruded its head to the greatest extent from the thorax, extended its body backwards, and flexed and affixed it firmly by its prolegs, so as to obtain as it were a fulcrum against which it might direct its whole strength in the attack. When I removed the snail, in order

to learn whether it would ultimately recover from its injuries, the larva seemed perfectly disconsolate, turning its head about with extended mandibles in every direction, and watching like a dog at fault. A second snail was then supplied to it, which I shall designate

No. 2.—This also was a snail of the very largest size and perfect health. The instant it had left its shell and began to crawl freely along, the larva attacked it: it was bitten once in the inferior horn of the right side and immediately drew itself within the shell; but almost as quickly came forth again, though it did not protrude the horn. In a few minutes the snail had regained its full power of locomotion, and crawled slowly along, yet apparently in agony. The larva then ran quickly backwards and forwards at the side of its victim, with its head and mandibles extended, and watching for a proper opportunity to strike it again: it next passed backwards to the side of the snail as this creature crawled forwards, and suddenly struck it again in the under lip. The snail instantly retracted, and before the larva could disengage itself, drew it within the shell for a short distance; but this was evidently accidental, as the latter let go its hold, and, affixed by its prolegs, awaited the onward movement of the snail again. After this it gave its victim another severe wound, and the snail withdrew itself entirely. The larva appeared to search eagerly about for its lost victim, first in one direction and then in another. Soon after this it bit the snail within the shell, and this wound had the effect of occasioning the creature to protrude itself, and again it crawled along, the larva following in its track.

Observing how little injurious effect was produced on the snail by these repeated attacks of its assailant, I began to suspect that if the injury to the snail depended on the effect of any specific poison injected into the wound at the moment of striking it, that by the repetition of attacks on the snail No. 1, the virulence of the poison might have become exhausted, and the bites on this one therefore produce but little injury. Accordingly I removed this larva, and placed a second one in its stead to attack the snail, and certainly the result which followed the bites of this second seemed in some measure to justify the supposition. No sooner had this larva been placed near the snail than it struck it repeatedly in the head, the snail retracting at each attack, and appearing to suffer much more severely than from all the attacks of its first assailant: each wound appeared to be equally severe, until at last the snail shrunk into its shell. It did not appear, however, to be

able to remain within the shell more than a few minutes after being wounded, as it seemed to writhe in agony from the bites. These observations therefore do not seem to support the statement, that it is usual for the larva to be drawn by the snail into its shell; on the contrary, the instinct of the larva seemed to lead it to avoid this interruption to its attack, as before striking severely it invariably affixed itself firmly by its prolegs and curved the posterior part of its body in the form of an arch, as if for the purpose of affording a means of support, and allowing the entire body to be suddenly extended forwards to reach the object of its attack. On one or two occasions, when the larva made a very fierce bite, and struck its mandibles deeply into the wound as the snail was crawling at full length out of its shell, the larva was dragged along for a short distance, but I never saw the creature drawn into the shell by the snail. I now set aside this individual like No. 1, and placed a much smaller snail with the larva first employed. This I shall call No. 3. The size of this snail was not greater than that of a large pea.

No. 3.—The larva bit this snail once, and the effect was immediately evident, although this creature had so repeatedly bitten the larger snail; yet the power of locomotion was not destroyed. The specimen No. 4 was next exposed to this larva: this was rather larger than No. 3: it was bitten once in the head and retired within its shell. At the expiration of one minute it came out again, but its power of locomotion was affected, and it was unable to protrude its left horn. I now allowed this snail to be bitten by another larva which had not been employed before, and which was rather smaller than those before used: the snail was bitten once by it and withdrew itself, and seemed to exhibit effects of something more severe than the simple wound. This snail I put by like the former.

Another specimen, No. 5, was now employed: this was rather larger than the two preceding, but not so large as the first two; it was also bitten once by the larva last employed. This specimen as yet had been perfectly uninjured. The larva seemed voracious and active; it bit this specimen slightly at the extremity of the foot, and I allowed it to bite again the head and neck. The snail, when bitten on the head, instantly retired and threw out abundance of froth; it soon emerged from the shell, and attempted to crawl, but it was unable to keep the shell upright on its back; it then retired within, and again came forth from the shell with apparently a little more power. I then allowed it to be bitten

again on the mouth, and it again withdrew itself. By this time it was evident that the snail was much injured, and I allowed the larva to feed upon it.

I then placed a healthy snail, No. 6, about the size of those just noticed, and allowed this to be bitten once by a fresh and hitherto unemployed larva. The wound in this was in the head: the snail withdrew into its shell and never came forth again; and two hours afterwards I found that it was completely dead. This experiment induced me to think, with my friend Professor Ellis, that the bite of the glowworm is peculiarly poisonous to the snail, although I was uncertain in what way it produces its effect. It was evident from all the previous observations, that, even after the first bite from a larva that had already expended its force on other snails, the bitten snail writhes and seems to be in great agony; and if a young individual, it often dies from this single wound in a state of contraction or kind of convulsion, giving out at the time a sanious fluid.

The circumstances noticed in these detailed experiments with regard to the little effect produced on different snails by the same larva which had previously bitten many successive times, and the very marked result which instantly followed the bite of one which had not before been employed, seem to support the opinion that a fluid, which is poisonous to the snail, is injected into the wound by the larva at the moment of its bite, and that the effect produced is diminished in the ratio of the number of times the larva has already bitten: precisely as in poisonous snakes, in which, as also in the glowworm, we may suppose the want of power to produce death may be due to exhaustion of the supply of their secreted fluid, or to its imperfectly matured secretion and dilution with other fluids.

I may mention here, in support of the view that a poison is injected, that I have noticed, on watching some larvæ which were preparing to attack the snail, a transparent fluid oozing from its mouth and extended mandibles. Whether this fluid is secreted by distinct poison-glands, as is the case with the centipede and with serpents; or whether it is merely a profuse flow of saliva, which may act as a poison on the prey, is yet a subject for inquiry. Certainly such a fluid is produced, and the mouth of the glowworm is filled with it to overflowing at the moment of its attack. I have witnessed the same thing in the *Carabidæ* and in the *Silphidæ*, both of which generate an abundance of dark-coloured foetid fluid from the mouth at the time they are feeding, though this I am

inclined to regard as the proper saliva of these insects. At one time I thought I had detected two poison-glands, in the form of two sacculated salivary vessels, in the perfect female glowworm, but I was not able to confirm this dissection in other instances. It is not improbable that the fluid exuded by the mouth may be secreted by the stomach; as in one instance, while a larva was attacking a large snail, I observed that its mouth was flowing with a blackish fluid, which it subsequently regurgitated in considerable quantity. It was similar in appearance to the fluid ejected from the salivary glands or the stomach by the larva and imago *Carabi*; and it seems probable therefore that the fluid of the *Lampyris* is of the same kind.

That the effect of the bite on the snail was not simply that of mechanical injury, I am of the same opinion as my friend above quoted, since, like him, I struck several snails through in every part with a needle, and wounded them ostensibly far more severely than did the larva; and yet they appeared not to suffer half so much inconvenience, nor givé evidence of agony by their peculiar contortions, but moved away with as much activity as before: their movements were not in the slightest degree impeded. One snail, which I repeatedly struck through the head and neck, and impaled on the table, seemed quite unaffected when released, and appeared, if there was indeed any difference in its speed, to move a little quicker. Even although I pierced this specimen through the head twice, close to the cerebral ganglion, it did not appear to be seriously injured: it withdrew for an instant within its shell, but soon came forth again and moved away with as much ease and speed as before, and was alive and apparently quite well on the following day. Another and much larger snail, pierced twice through the stomach and head, crawled away as readily as when uninjured; but when this same specimen was afterwards bit once by a larva which was only of moderate size, the snail withdrew into its shell, and was completely dead within two hours.

Although the mechanical injury inflicted by myself on this last snail had not produced any marked result, the effect from the bite of the larva of the glowworm was instantaneous, and reminded me strongly of the action of some deadly poison injected into the body of a vertebrated animal, as that of the viper, &c., only that it was more rapid and approximative to the effect of an electric shock.

The repetition, extension, and variation of the experiments of Professor Ellis prove:—

That the single bite of a larva of the glowworm will infallibly

kill a small snail, of about the size of a large pea, in less than two hours.

That two or three bites are usually required to kill a snail about the size of a small bullet.

That the effect produced by the bite is not that of mere mechanical injury. Nor does it appear that a bite at one spot is more fatal than at another; for although the larva usually attacks the head of the snail, it wounds it in other parts also with similar results. But if the snail is very large, instinct prompts the glow-worm to bite it two or three times at the foot, before venturing to strike it on the head.

That even when the snail is twice pierced through its head with a needle near the cerebral ganglion, or through its body, but little effect is produced, though when this same snail was bitten by the larva it was dead in two hours.

That when two small snails about the size of grapes were employed, one being pierced through and through with a needle, and the other not so injured, but bitten once only by a large larva, both snails immediately retired into their shells; and that whilst the bitten one never came forth again and was nearly dead at the end of two hours, the other snail was alive and apparently well on the following day.

I noticed also that, although a snail may be bitten once by a small larva and not appear at the time to have been much injured, yet it frequently dies after some hours. This fact still further tends to support the view that some poison is injected, or some serious derangement of the vitality of the snail is occasioned at the time of inflicting the wound, and to confirm it in a negative way by the fact, that if the larva be allowed to exhaust its force, of whatever nature this may be, by repeatedly biting a snail, and then be employed to wound a very much less snail, the effect it produces is far less marked than if it had not previously bitten any.

What is the nature of this influence? Can it at all resemble that of the shock of the electric eel or of the torpedo, both of which we know become exhausted by the repeated use of their power; or can it resemble that of the ray or stinging skate, which is believed to inject a poison with its sting?

But although the effect is fatal to a small snail, even when the larva has previously exhausted its force, it is yet exceedingly slight in the latter case, when the creature is allowed to strike a large snail. On one occasion I employed a full-grown larva which had been used before, to attack a full-grown *Helix* that was as

large as a walnut: the larva struck it repeatedly without killing it. I saw the creature wound the snail at least from thirty to forty times. On the following day the snail was living and able to crawl, but was so much injured that it was unable to balance its shell, and moved along with it tilted on one side. Its progression also was impeded, for it moved very slowly, and kept its feelers depressed, and nearly close to the table over which it was crawling, as if looking out to avoid danger, moving one horn on one side and then the other on the opposite. This was twenty-four hours after it had been injured. I next put a very healthy full-sized larva to attack it. At first the snail did not appear to recognize the danger, and actually crawled over the back of its enemy; but very soon its danger seemed to become known. It appeared to recognize its foe, and continued to crawl round him in a circle, even when placed in a straight line before the larva, as if to avoid the danger. The larva soon bit it on the head, and the snail drew back, but not into its shell; a second wound was then made in the foot. On examining the wound with a lens, after each bite, I observed some dark-coloured sanious fluid upon it, such as I have seen flowing from the mouth of the larva.

From what I have above stated, it will be seen that it is by no means a common occurrence for the larva to allow itself to be drawn by the snail into the shell, since it usually attempts to retain firm hold, by means of its prolegs, of whatever it may be moving over, before striking its prey; but it is occasionally drawn into the shell when it attacks large individuals. I saw one larva bite a large snail fiercely in the head while the snail was crawling, and as the wounded animal instantly withdrew itself before the glowworm could detach itself, the latter was drawn more than half its length into the snail's shell, and had its head and body compressed by that of the snail. This position, as appeared from the struggles and rotation of the body of the larva in attempting to relieve itself, was by no means agreeable; and it came forth covered with slime, and apparently not disposed to return very soon to the attack. On another occasion, when the snail, unconscious at first of the presence of its enemy, slowly crawled over it, and covered its whole body with slime, the insect withdrew, and did not return to the attack until it had rid itself of its filthy covering.

The Voracity of the Larva.

The voracity of the larva of the glowworm is extreme. When they are only about half-grown, they will attack fiercely any new

victim that may chance to be crawling near them, even though they may have fed plentifully on their prey but a few minutes before. Having killed a snail, they seldom leave it, except for a few minutes, until the whole of the body is devoured. They will remain for many hours with their heads buried in the body of the snail, gorging to the utmost, and plunging their small heads and erected mandibles into its viscera, which they continue to pierce and exhaust until all the juices of the body are drained. I have sometimes seen four or five larvæ crouched one upon the other, in a snail-shell, feasting and gorging upon their prey. In this latter respect they somewhat resemble in habit, as they do in general appearance and colour, the voracious larva of the Lady-bird (*Coccinella*) which preys upon *Aphides*. The glowworm larvæ will pertinaciously continue to attack and devour the snails until they are so completely gorged, that they can move but with difficulty, and yet at the expiration of half, and sometimes even but a quarter of an hour, during which they are motionless, as in sleep, or as if fatigued, they will return to their feast as voraciously as before.

Cleanliness of the Larva.

Although the larva manifests such an avidity for food, and continues to gorge itself so long and so pertinaciously, with its head thrust into the snail, and its body buried in the shell amidst the decomposing corporeal elements, it is nevertheless very diligent to cleanse itself of the slime. M. Maille (*loc. cit.*) first mentioned this circumstance, and pointed out the organs which it uses for that purpose. Degeer, however, long ago referred to the structure, but did not observe its use.

After the larva has finished its repast, it leaves the snail, as I have seen, retreats a short distance beneath the roots of grass, and begins to cleanse itself from the adherent slime. This process is effected, as mentioned by Maille, by means of the anal prolegs, protruded from the thirteenth segment, which I shall more particularly describe hereafter. With this apparatus, which the author referred to says is "*une espèce de houppes nerveuse composée de 7 ou 8 rayons blancs*" (Bulletin des Sciences Nat. p. 297), but which consists in reality of a number of fleshy radiations, muscular, not nervous, and capable of being greatly elongated, the larva grasps its mandibles, and wipes them and every part of its body to which any slime adheres, using its organ in the manner of a sponge or tail to wipe away the offensive matter. When the

slime has become adherent to the body and is partially dried, the creature seems to have the power of detaching it, by curling the posterior part of the body round in every direction, and using the apparatus in the manner of a hand or claw for that purpose.

The Luminosity of the Larva.

The luminosity exists at the very moment that the embryo is escaping from the egg-shell and amnion. At that time a faint light is given out from the ventral surface of the anal segment of the being that is starting into active existence. I have repeatedly seen light emitted from those parts on each side of the twelfth segment, when the little creature has but the minute before been liberated, and is still a feeble creeping body of a pale straw colour, and not one line in length. Macaire also mentions the fact (*Journal de Physique*, July 1821, tom. xciii.) of having seen the light in larvæ that had just quitted the egg, and were of the size mentioned above. I have found the light given out most vividly when the little body has been suddenly disturbed or slightly compressed.

I have noticed the light at this early period in all my specimens reared in the closed glass tube, as well as in those produced from eggs still attached to a tuft of grass-roots in the soil. Even at this early period I have found that the little insect may be induced to give out its light more brightly than usual, when it is placed in a tin box, and agitated slightly by shaking this in a dark room. The light then emitted resembles two very minute brilliant points, the brightness of which is constantly varying and twinkling, like stars of the smallest magnitude in the heavens.

It is thus evident that the same influence that occasions the perfect glowworm to shine with increased brightness, operates equally in the very young larva. And as the light is given out by the larva from its birth, there is reason to think that the luminosity of the egg, at the later period of development of the embryo, is not due to any luminous property of the yelk-tissue, but to the special light-giving organs of the embryo.

But although light has been observed at this early period of the larva only by Macaire and myself, it has been long known that the larva, at a later period of growth, emits light. This was noticed by Swammerdam (*Bibl. Nat.* p. 124), and afterwards by Degeer (*Mém. de l'Acad. des Scien. Paris*, tom. ii. p. 261), and since by Schmidt, Macaire and Todd; and Burmeister has shown that the larva of *L. splendidula* is also luminous.

I have found the light of the larva of *Lampyris noctiluca* to proceed from two little lobes on the ventral surface of the twelfth segment, which are the only parts that transmit light in this larva. The light, when the larva is nearly full-grown and full-fed, in good health, and placed in a warm atmosphere, is at times almost as brilliant for a few seconds as that emitted by the perfect insect. But it is of short duration, and its degree of intensity is not sustained; besides which, it is of a greener colour, and is given out only when the insect is in motion: even then the light is emitted only in flashes or scintillations. This fact, however, is of some interest with reference to the nature of the light itself, its emission being hardly referable to a phosphorescent property of secreted fluid, but more probably to discharges of vital force through nervous function.

In support of this view, it may be said, that when the young larvæ are violently shaken and driven against the sides of a box, they emit their light more brilliantly; and that the full-grown larva, under such circumstances, gives out its light for a short time almost as brilliantly as the perfect insect. The larva seems, like the perfect insect, to have some control over its light, or at all events to become excited to emit it under certain circumstances. Thus, I have noticed that when the larvæ had been exposed for a short time to artificial light, they did not shine, or but very feebly; but when the light was suddenly removed, they at first gave out not a single gleam of light, though in four or five minutes afterwards one or two began to shine; and when they had remained undisturbed in darkness from a quarter to half an hour, most of them were shining.

I have found that the larvæ shine during the whole night when undisturbed. I placed a collection of larvæ which had fed voraciously during the day, in a glass phial, which was placed on a table by my bedside on a dark night; and being awake during the greater part of the night, I observed them shining at twelve, at one, at two, at three, at four, and even so late as at five o'clock, but always far less brightly than the imago. The creature thus appears to have some control over the emission of its light in a state of rest, for I have seen them shining when undisturbed during the whole of the night. On the other hand, when they have been exposed to light, either artificial or that of the sun, it was found, when the illuminating influence was suddenly removed, that they had ceased to shine; but after remaining in darkness for a few minutes, they gave out their light again, and continued to do

so steadily until disturbed or again exposed to light, when they ceased to shine, becoming luminous again after a short interval, when the light was again removed.

Another circumstance also which influences their shining is deficiency of food. It is only when well-fed that they give out light more brightly; for if deprived of food, the light is then very feeble.

All these circumstances tend to show that the light is greatly influenced by physical causes, and that those physical causes which operate generally on the body, or health, or vital force of the animal itself, as food, motion, heat, are precisely those which affect the production of light.

The Growth and Hybernation of the Larva.

It constantly happens with insects as with other animals, that when many individuals, constituting one brood, are hatched at very nearly or exactly the same time, some of them grow more rapidly and arrive at their completion much earlier than others. This is precisely the case with the larvæ of the glowworm. Owing to this circumstance, some individuals undergo their changes more rapidly, and attain to their imago state sooner than others, but having reached that stage and performed the great intent of their being, their life is rarely if ever prolonged beyond that of their fellows in a similar state of existence.

This difference in the rapidity of the growth appears to depend on physical causes, as for instance the more complete development of the constituents, and the subsequent more complete impregnation of the ova from which these precocious growths are produced; the greater amount of nourishment which the young have taken during corresponding periods of time; and generally the circumstances in which the whole brood have been placed in regard to light, heat, air, locality, and quality of food. I have usually observed that the larger beings came first from the egg, and appeared more robust and healthy than those subsequently produced; further, that a difference of but a very few hours in the earlier hatching of these individuals is followed by a much greater difference than can be accounted for merely by the length of time between the birth and the first and subsequent changes which the several individuals undergo.

Another circumstance of very great importance, since it is applicable to all beings, is, that the facts first noticed being taken

into consideration, those become the most healthy and most matured individuals to which food in full abundance is supplied during the earlier periods of existence. Improper food, or food in too restricted quantity at this period, more affects the rapidity and extent of growth during the subsequent periods of the life of this insect, and probably also of other animals, than deficiency of proper nourishment at any farther advanced stage. Not only are the changes of the animal retarded by this deficiency, but its full development is rarely if ever attained. I may mention, in support of this statement, that there was a difference in the period at which the eggs of the glowworm, placed in the glass tube as I have mentioned, were deposited, of only *ninety-one hours*, namely from three P.M. June 22nd to ten A.M. June 26th; but there was a difference in the hatching of the larvæ from these very eggs of nearly *eight days*, or more than *one hundred and ninety hours*, namely from the morning of August 7th to that of the 15th of the same month, although during the whole period of six weeks' incubation, all the circumstances under which the whole of these eggs were placed were exactly the same. I have constantly noticed like circumstances in the development of other insects, the *Forficulæ*, *Meloë*, and others, and regard the facts stated as of general application in development.

These facts may help to explain what otherwise might seem to be the result of imperfect observation, viz. that the larvæ of the same brood of glowworms do not all undergo their changes at the same time, or even attain their maturity in the same year, although developed from the egg in the same season. For instance, the most advanced individuals of those reared in the tube, underwent their *first change* on the *nineteenth day*, and the second also in the same length of time, *nineteen days*; but others had not then entered on their *first*. This was on the 15th of September. Some individuals of other broods obtained from their native haunts, I found had undergone this change as early as the 1st of that month.

The very earliest periods of development of the glowworm are thus of considerable length, and exceed that of the majority of insects. The Sphinx larva undergoes its first two changes, if at the same season of the year and at nearly the same temperature of the atmosphere, within *thirteen days*, those of the glowworm being *thirty-eight* (Phil. Trans. 1837, p. 315). But in proportion as the temperature of the season diminishes, so is the length of time which the larva continues before changing increased, the amount of food supplied, heat, and other circumstances being the same. But inde-

pendently of any diminution of temperature or supply of food to the larva, the interval of time between each successive change is progressively increased; and this occurs in the larvæ of all insects, and perhaps the young of all animals. So that at last a very long period may elapse between the young glowworm's penultimate change of skin, and that by which its larva or simple period of growth is terminated, by its assuming the quiescent state of a nymph; and if any yet earlier changes are retarded, either through late development from the ovum or insufficient supply of food, or through the influence of external physical causes, its growth is arrested, and the animal does not complete its development as a larva until the following summer. Thus the changes of the being are influenced by *physical causes*, and subject to *physical laws*.

It is only by reference to these circumstances that we are enabled to understand how the glowworm occasionally passes more than an entire year without undergoing its metamorphosis to the perfect state, seeing that this its latter stage is always attained in the month of June and July in this country. Yet the concurrent observations of naturalists have shown that this is the case. Rogerson noticed that it may be a year and nine months before it becomes a perfect larva; and I have certainly found this to be the case in some under my own observation. As my specimens were numerous, I was enabled to observe their habits during the winter and their change to the perfect state; but as I had by accident lost most of the brood I had reared, and watched to their second change, my observations were made on others supplied to me at the end of September from their natural haunts. I preserved them in an earthen vessel partly filled with mould and a turf of grass, and secured at the top with gauze. An abundance of *Helices* were supplied to them, and some of the larvæ seemed almost never to desist from feeding. I put with these the only four remaining specimens of the brood I had reared. The whole continued to gorge to repletion during the first part of October, and gave out light freely when touched, or in any way compressed. The temperature of the room in which they were kept was at this time ranging from 50° to 55° Fahr.

In the evening of the 18th of October, when the temperature of the room was 50° Fahr., the larvæ were still active and feeding; they were very healthy, and some of them were shining—one very brightly.

On the 25th of November I found them still feeding, but the largest were less active in their movements; they seemed to be in

quest of moisture, and most of the food was consumed. On adding water to the soil, they began immediately to sip the fluid. Others were at rest in a state of partial torpor in the emptied shells of some of the snails which they had devoured. They seem to use these shells as their hybernacula, taking food at intervals and then relapsing into a state of repose. One or two, however, were partly buried in the earth. The temperature of the room in which they were kept at this time usually ranged from 40° to 50° Fahr. On one occasion at the end of August and beginning of September, I found the larvæ pass under the turf among the roots of grass, and desist from feeding: this occurred with specimens which but a few days before attacked the snails most pertinaciously and voraciously. The temperature of the season was then from 65° to 70° Fahr.

On the 30th of November, the temperature of the room having been a little increased during the last few days, the larvæ were again feeding as eagerly as before, and several of them now appeared to be very fat. Still however they sought food, but moved more slowly than heretofore.

On the 13th of December, the temperature of the room being then 51° Fahr., the larvæ were still in a state of hybernation: when touched they moved their bodies slightly, but did not attempt to escape. Even in this state however they still gave out light, the brightness of which was increased at the moment they were touched.

On the 22nd of December, the temperature of the room during the preceding night having been stationary at 35° Fahr., and at the time of the observation only 36° Fahr., they were still hibernating, and lay with the body contracted and the head partially drawn beneath the thorax: when touched lightly, they still moved the body. Some of them were reposing in the empty snail-shells. I had now an opportunity of observing that, in a dry atmosphere, even at this low temperature, they still continued to give out light; for when they were touched and turned on their backs, they not only gave out light, but that with greater brightness. A low temperature of the atmosphere therefore does not necessarily arrest their luminosity; and this fact seems to favour the view that the light is the result of a vital property, of the nature perhaps of the electric discharge of fishes, rather than of phosphorescence or chemical action.

On the 25th of December, when the temperature was 48° Fahr., they still remained hibernating.

On the 30th of December, on taking them into an atmosphere

of 60° Fahr. for a short time, they became aroused, gave out light, and moved about apparently in search of food.

On the 6th of January, when the temperature of the room had remained for a day or two at only 33° Fahr., that of the external atmosphere being then 28° Fahr., my larvæ were again in a state of hibernation, and when disturbed still gave out a faint light, but when undisturbed no light was perceptible: this I think still further confirms the view I have advanced, as at this low temperature the respiration of the insect was almost completely suspended. The part from which the light was given out was the two spots on the penultimate or twelfth segment.

On the 2nd of February, at a temperature of 45° Fahr., I found the specimens aroused, and apparently disposed to feed: some food was supplied to them, and they commenced feeding, but less eagerly than in the autumn.

From this time, during the months of March and April, they were supplied with food: many of them died; several, however, still remained to undergo their changes to the perfect state.

On the 28th of May, the temperature being 70° Fahr., my specimens were still feeding, and continued to do so until the 9th of June, a few days before which they ceased to take nourishment and became more inactive.

Change of Tegument of the Larva.

I have not been able to ascertain with precision the number of times the larva changes its tegument before arriving at its full size. I believe, however, there are four changes. The mode in which this is performed differs from that of many other larvæ, as it has been correctly described by some observers.

I have several times witnessed the operation. It is effected by a lateral fissure on each side of the prothorax and mesothorax, extending forwards to the neck behind the head, so that the whole may be elevated like the lid of a box, out of which the larva first presses its thoracic segments, and then withdraws its head and the organs of sense, and the legs, slipping backwards the skin to the extremity of its body.

At the time of the larva leaving the skin it is perfectly white and colourless, delicate and easily injured, and when disturbed or touched gives out its light more vividly. Immediately the tegument has been cast, the larva coils itself up in a circle, and seems forcibly to extend all the segments of its body, protruding

its head and neck to their fullest extent, as well as its anal appendage. Although the creature is so courageous at other times, it is now very timid and takes no food for several hours: indeed it will not venture near a snail to attack it, as if conscious of its present weakness.

One specimen which changed at ten o'clock in the evening became shining and active, and acquired its dark colour at the expiration of twelve hours; but it did not venture to take food for several hours afterwards.

The Nymph.

On the morning of the 9th of June one of the larvæ cast its skin, and assumed the condition of a nymph. This specimen was a female; but a male specimen had already changed to the same state only a few hours before. At mid-day, when the temperature was 75.5° Fahr., a second female assumed the same condition; and on the evening of that day at six P.M., when the temperature was 77.5° Fahr., two others, one male and one female, also changed. At ten P.M., the heat being still so high as 72° Fahr., I found the whole of these giving out an abundance of light; the females, although undisturbed, were exceedingly luminous, and the males shone almost as brightly as the perfect insect in its state of greatest activity.

It was quite evident that in the quiescent state of a nymph, the emission of the light was not the result of any direct influence of the will or instinct of the insect; it was simply the result of the *vital forces* of the body, the manifestation of which seemed to be greatly augmented by the very high degree of temperature of the atmosphere. It was interesting also to notice that the whole of the specimens, three females and two males, underwent their change on the same day, in which the weather became much warmer than for some days previously. The light emitted by these insects was apparently in a ratio corresponding to the increase of heat; the rapid increase of the temperature operated nearly equally upon the whole in inducing their transformation to the nymph state, within a few hours of each other; and, as we shall afterwards learn, the same external force equally accelerated their development when they had assumed this condition.

The mode in which the change to the nymph state is effected is precisely that of the shifting of the skin by the larva; but the result of the change is different, in consequence of the operation of

laws of organization, which I shall attempt to explain in connexion with the anatomy of the insect.

The form which the insect assumes as a nymph is that of a semicircular body.

The Imago.

On the 16th of June, the temperature of the atmosphere being then 73° Fahr., and it having been likewise at nearly the same height during some preceding days, the three female specimens threw off their nymph covering and assumed the *Imago* state: their change was thus completed at this high temperature in *seven days*,—a very marked instance of the influence of increased heat in accelerating the metamorphosis. M. Maille found that his insects passed *fifteen days* as the interval between the larval and perfect state, namely seven days of quietude in assuming the form of nymph, and *eight* full days in the nymph state (Bull. des Sc. Nat. viii. 297). But some specimens which I reared from the larvæ in the summer preceding this, left the larva state about the 25th of May, and at a much lower temperature of the atmosphere than those now observed.

The pupa-covering is exceedingly thin and delicate; and not only during the pupa state, but immediately when they became perfect insects, my specimens shone very brightly. The tegument thrown off by the larva on becoming a pupa is solid and of a dark colour, but that of the pupa, shed on assuming the imago state, is almost colourless, and very thin and transparent.

The two male specimens, which assumed the nymph state at the same time as the females, did not reach the imago condition until the night of the 20th of June, and were thus *eleven days* in the state of nymphs, so that the females appear to become perfect much earlier than the males. This fact is of importance with regard both to the natural history and the relative anatomical development of the two sexes. The female undergoes but little change in her anatomy, and continues in a semilarval condition; consequently she is most early fitted for leaving the puparium, and is ready to receive the male, whose life is very limited.

From the individuals thus produced, I may simply state that I succeeded in again observing the deposition of eggs and the hatching of larvæ.

We are now prepared, by the consideration of the natural history, to proceed to the description of the anatomy of the glowworm, which will form the subject of a future paper.

On the Quantity of Tannin in the Galls of *Cynips Quercus-petioli*.

By EDWARD HART VINEN, Esq., M.D., F.L.S. &c.

[Read February 19th, 1856.]

MUCH interest has been excited by the frequent occurrence in this country of the galls of *Cynips Quercus-petioli*, and they appear, from a recent communication in the 'Gardeners' Chronicle,' to have increased to such an extent during the past season, as to do vast mischief to the trees infested by them, rendering them unproductive of acorns, and even threatening their entire destruction.

In a recent conversation with Mr. Westwood on this subject, he informed me that these galls had been used in Devonshire for the purpose of making ink, and at the same time suggested that it would be desirable to know whether they contained sufficient tannin to render them useful substitutes for the ordinary galls of commerce. At his request I undertook to ascertain this, and thought the result might be sufficiently interesting to communicate to the Society: the following is the result of my examination. By macerating 100 grains of Devonshire galls in æther and water, a residue was obtained weighing 26·74 grains: this contained 17 grains, or about two-thirds, of tannic and gallic acids. In order to estimate the comparative value of these galls with those of commerce, 100 grains of best Aleppo galls were submitted to the same treatment with æther and water. The residue weighed 58·50 grains, containing 56 grains of tannic and gallic acids. Of the superiority of the foreign galls there can of course be no doubt; but in comparing the results of these two analyses, it is necessary to observe, that the Aleppo galls operated on were very heavy specimens of the best kind of galls of commerce, and that they had not been perforated by the *Cynips*, while the Devonshire galls had all been perforated, and therefore contained a much smaller proportion of tannin than would have been the case if they had been examined at an earlier period.

If we compare the published analyses of nutgalls, considerable difference will be found in the quantity of tannin obtained by different chemists. The following are the principal:—

Sir Humphry Davy found ..	26 per cent. of "tannin."
Pelouze	40
Leconnel	60
Guibourt	65
Mohr	72
Buchner	77

However widely these results may vary, they are entitled to every credit; and high as are those of the two last-mentioned chemists, their well-known accuracy will ensure entire confidence in their statements. I am inclined to think that these great discrepancies are owing to accidental causes, among which the variable nature of the seasons, which influences so much the quantity and intensity of all vegetable secretions, may be a principal one. With the small amount of tannin found in the Devonshire galls I must confess myself much disappointed; but I hope in the ensuing summer to procure some of them at an earlier period, and before they have been perforated by the *Cynips*. I have no doubt that they would then be found to contain enough tannin to justify their being collected for commercial purposes; and if they were gathered at the proper season, before the *Cynips* has escaped, and when the gall is in its most vigorous and valuable state, another good result would follow. The insect would be prevented from increasing to what seems to be a mischievous extent, and a check would be put to the serious injury, if not entire destruction, with which the oak plantations in some of our southern counties appear to be threatened.

Note on *Lepidosiren annectens*, Owen. By EDWARD NEWMAN,
Esq., F.L.S.

[Read January 15th, 1856.]

[Abstract.]

REFERRING to Prof. Owen's paper on *Lepidosiren* in the 18th volume of the Society's "Transactions," the author states that the conclusion at which that gentleman has arrived, that the animal in question is a Fish, although controverted by some of our best naturalists, appears to him to receive confirmation from one or two points in its structure on which no great stress has hitherto been laid. The first of these relates to the mode in which the gill is covered, having only a single small external opening, in which respect *Lepidosiren* makes a very near approach to *Muraena*. Secondly, the two peculiar anterior teeth in the upper jaw so closely resemble those of some Fishes, that the vignette representing these teeth in *Echiodon Drummondii*, given in Mr. Yarrell's "History of British Fishes," might serve as well for the front teeth of *Lepidosiren*. Thirdly, the continuous dorsal, caudal and anal fin, and the absence of pectorals and ventrals, are common

characters among *Muraenidæ*. And fourthly, the true Fish-scales, together with the lateral line extending from the gill to the extremity of the tail, are characters peculiar to Fishes, and not to be found among Amphibian Reptiles. Assuming then that *Lepidosiren* is unquestionably a Fish, and not either a Reptile or an osculant between Fishes and Reptiles, Mr. Newman regards it as completely obliterating the boundary set up by Cuvier between the two great subclasses of Fishes, the Osseous and the Cartilaginous. In support of this opinion he quotes several passages from Prof. Owen's paper, and concludes by stating his conviction that it is "equally impossible to place it in either the Cartilaginous or Osseous series; and we are compelled either to establish an intermediate series, consisting of but three species or perhaps genera, or to break up those great divisions, which have received the almost universal approbation of naturalists. The first course seems most undesirable in an age in which we are exerting ourselves to find associates and allies for every abnormal form, however apparently isolated. The alternative, the mingling of cartilaginous and osseous fishes, seems inevitable."

Description of a New Species of *Paussus* from Central Western Africa. By J. O. WESTWOOD, Esq., F.L.S. &c.

[Read February 19th, 1856.]

DURING the twenty-six years which have elapsed since the publication of my first Monograph on the family *Paussidæ* in the 16th volume of the "Transactions of the Linnean Society," our knowledge of the species of this singular group has increased in a remarkable manner, as we are now acquainted with nearly a hundred well-defined species. Indeed, even since the appearance of the synopsis of the family which I published in the 19th volume of the "Transactions" in 1841, the number (which then amounted to 47) has been doubled. A considerable number of these new species were described and figured in the 2nd volume of my "*Arcana Entomologica*" (1845), together with coloured figures of all the previously described species. Seventeen new species were described by me in the "Proceedings" of the Linnean Society, June 19, 1849. A new species from Tangier (subsequently found also in Spain) was described by M. Léon Fairmaire in the "*Annales*" of the French Entomological Society for 1852. Six additional species with a fresh general synopsis (recording eighty-five species)

were published by me in the "Transactions of the Entomological Society" (vol. ii. p. 84), read August 2nd, 1852, and four additional species were added by me in the "Transactions" of the same Society (vol. iii.), read July 3rd, 1854. I have now the pleasure of adding another new species of the genus *Paussus*, very remarkable in several of its structural details, and which belongs to the African section of the genus with a bipartite prothorax and an excavated clava to the antennæ.

PAUSSUS MURRAII, Westw.

P. prothorace bipartito clavâque antennarum posticè excavatâ; piceo-rufus, sub lente creberrimè punctatus, capite inter oculos transversè elevato et in medio fossulis duabus minimis transversis impresso, angulis posticis parteque posticâ prothoracis extûs porrectis et ferè latitudine elytrorum, podice setis longis marginato.

Long. corp. 3 lin.

Hab. "Old Calabar," Africæ tropicæ occidentalis. In mus. nostro. Amicissimè communicavit D. Andr. Murray, Entomologus Edinensis peritissimus.

This species is distinguished at once from every species hitherto described in the peculiar form of the clava of the antennæ and prothorax. The upper side of the head is sloping and slightly concave from between the eyes to the fore margin, which is slightly emarginate and a little depressed. Between the eyes the head is raised into a transverse ridge, in the middle of which are two very minute impressions placed transversely with raised black edges: the hinder margin of the eyes is furnished with some porrected bristles: the antennæ have a thick and somewhat prismatic basal joint, and the clava is large, being about equal in size to the prothorax; it is navicular, the front margin or keel being acute, with three deep transverse impressions within the margin. The inner basal edge is very deeply incised close to the insertion of the clava upon the basal joint, the remainder of this margin forming a long and acute angle, the outer edge of which extends to the base of the deep boat-like excavation; the upper edge of this excavation is very slightly crenated; the lower edge on the contrary is more irregular, being deeply emarginate at its base, the emargination clothed with strong bristles, and oblique from the middle to the apex of the antennæ, which is rounded; within the posterior margin the excavation is marked with four deep transverse impressions; the hind part of the head is narrowed into a neck. The prothorax is strongly bipartite; the anterior portion is the shorter, having a sharp ridge running across it, with

each side produced into a strong and acute angle. In the centre of the pronotum is a deep excavation, with a tuft of luteous setæ on each side: the hinder portion has its sides gradually dilated outwards, forming a strong salient tooth or spine on each side, pointing to the outer angle of the shoulder of the elytra; the space between the point of this spine and the outer posterior angles of the prothorax being emarginate, and furnished with a strong tuft of luteous setæ. The elytra are oblong, and with the sides nearly parallel. The disk, and especially the lateral margins, clothed with luteous setæ. The podex is oblique, flat, with the outer margin slightly raised, and fringed with long strong reddish curved bristles. The legs are slender; the tibiæ compressed, but not dilated; the tarsi distinctly 5-jointed, the basal joint being as large as the following.

The species is named in honour of Andrew Murray, Esq., of Edinburgh, whose knowledge of *Coleoptera* is evinced by the excellent Catalogue of the Scottish species recently published by him, as well as by his entomological contribution to the fine volume on the "Natural History of Dee Side" by the late Dr. MacGillivray, recently published by command of Her Majesty, and so liberally distributed by the Prince Consort. Two specimens of the species before us were received by Mr. Murray from Old Calabar, and it is to his liberality that I am indebted for one of them.

On the Influence of the Sexual Organ in Modifying External Character. By WILLIAM YARRELL, Esq., V.P.L.S. &c.

[Read March 18th, 1856.]

HAVING been requested to supply some notes to the Appendix on the subject of Red Deer, published in the handsome volume of the "Natural History of Dee Side and Balmoral," of which I have had the honour to receive a presentation-copy from H.R.H. Prince Albert, I regret that my opportunities of observation on the Red Deer have been so limited; but as the same physiological laws appear to prevail in the three species of Deer which belong to this country, I beg to offer a few remarks on the influence of the sexual organ in modifying external character; the horns in Deer furnishing the most obvious external secondary sexual character in this tribe of animals.

In the volume referred to, it is stated at page 462: "That the production of the horns is dependent upon conditions connected with the sexual function, is proved by the fact, that they are not produced in castrated stags." At page 470 Mr. Robertson states that, "If the operation is imperfectly performed at the time that the stag is void of horns, small horns will grow; but these are never cast, and the velvet which always covers them when they are growing, retains its freshness to the last." Mr. Robertson has the reputation of being good authority, and I have reason to believe that he is correct. When a stag carrying horns is castrated, the operation being perfectly performed, the horns are cast, sometimes as early as the fifth day, and generally within three or four weeks. Very soon after that, the young horns begin to bud and show, whether the stag at the time of castration carried horns or not. The horns increase in size, but are frequently irregular in form, unequal on the two sides, and deficient in bulk and character for the age of the animal. Males in this state are usually called Heavers, or Heaviers, a term apparently intended to have reference to the greater size and weight of body such stags attain; but Pennant in his "British Zoology," under the article on the Goat, says, "that the meat of a castrated goat of six or seven years (which is called Hyfr) is reckoned the best; being generally very sweet and fat. This makes an excellent pasty, goes under the name of rock venison, and is little inferior to that of the deer." The Anglo-Saxon word for a he-goat is Hæfer.

The author of the "Sportsman's Cabinet," published in 1804, states in volume ii. page 61, "that Heaviers are experimentally proved to be of great strength, and afford good sport before hounds, for which reason the Royal hunting establishment of His Majesty George III. was never without a regular succession. The perfect males, after their rutting season, are out of condition for hunting.

"Among the Laplanders the males only of their rein-deer are used as beasts of burden and draught, and chiefly those which are castrated, as they are the strongest."—G. P. Blom's Essay.

To return to the castrated red deer: I remember to have seen a large red stag which had been hunted and caught in one of the outbuildings of a farmer's stack-yard in Berkshire. The horns were unequal in size, both being straight portions of the beam only; one about six inches long, the other about double that length, and both in their velvet. On the beam of greater length

was a rounded bulbous excrescence, upon which blood appeared at the slightest injury.

At the Zoological Gardens some years since, a female rein-deer died while her horns were growing and in the velvet. When the skin had been taken off, I went up to look at the state of the carcase. The shoulders and the whole of the neck were of a bright scarlet colour, from the strong determination of arterial blood to the head at that particular period.

Inequalities in the size and form of the two horns of the same deer may be accounted for, as an injury from a gun-shot wound, or other cause, may affect the horn on one side only by interfering with the natural size or course of the arteries.

When the horns of deer have completed their growth, the blood-vessels are compressed at the burr, and the velvet-like covering then begins to dry up, crack, and peel off; the deer by his fraying assisting to get rid of it.

Colonel Charles Hamilton Smith, in the article on Mammalia in Griffith's "Animal Kingdom," vol. iv. p. 93, says, "Hinds are asserted to have been found with horns, but no well-authenticated fact places this beyond a doubt."

In the Appendix to the "Dee Side Natural History," on the red deer of Scotland, p. 472, it is stated, that in no one instance does it appear that the hind of the red deer was ever observed to have horns. To this, however, there are exceptions, apparently the operation of a physiological law. John Hunter, in his "Observations on Animal Economy," states, that where the male and female among animals are distinguished by a difference in their external characters, by depriving either sex of the influence of the true sexual organ, they will seem to approach each other in outward appearance.

Some years since, a red hind, in the forest of the Duke of Gordon in Scotland, was observed to carry a single horn on one side of her head,—such a horn as the red male bears in his third year. As this appearance was unusual and interesting, a request was made to be allowed to shoot her. Leave was immediately granted, the hind was shot, and on internal examination by two competent persons, she was found to have a scirrhus ovary on the opposite side to that on which she bore the horn. The skull and horn as attached are preserved in the armoury at Gordon Castle, with a label appended detailing the particulars.

About four years ago, a red hind, in the park at Holkham, was observed to carry one horn of some length. She was closely

watched, and having cast this horn at the usual period, it was secured and preserved. I have seen it very recently. It is straight and upright, measuring thirteen inches from the burr to the end; about as thick as a man's fore-finger at its base above the burr, but tapers gradually; brown in colour at the bottom, whiter above, hard, smooth and polished towards the point, which is sharp. To add to the interest in this case, this hind dropped a calf; we may therefore suppose, the cornua and ovaries being double, that one side was healthy and perfect, the other side probably diseased.

About six years since, a red hind in the forest of the Lords of Lovatt was observed to bear a horn, and of this instance I hope to receive further particulars.

The writer in the "Sportsman's Cabinet" before referred to, mentions, at p. 61, that a deer "being deprived of only one testicle, the horn will never regenerate on that side; but continue to grow and be annually shed on the other, where the remaining testicle has not been taken away." This statement of a lateral influence, and the case of the Gordon Forest hind, induced an experiment which I will endeavour to describe. In the autumn of the year 1833, having the advantage of being on the Council of the Zoological Society with Prof. Owen, I suggested to him an experiment having reference to this sexual lateral influence. Mr. Owen very kindly immediately joined me in it. We procured two fallow-bucks, equal in size, and both in their fourth year one, a dark-coloured buck of the breed considered to have been brought originally from the North; the other a buff-coloured one from the South, and both carrying horns of equal size, and of the fourth year.

From one of these fallow-bucks, while held on the ground, Mr. Owen removed the testis of the right side, and from the other buck, the testis on the left side. Neither of these bucks cast either horn, nor was any lateral influence observable. They shed their horns as usual in the following spring, the new horns coming in due course; but in the autumn, when these horns had ceased to grow and become hard, all four horns were those of the third year, and not those of the fifth year: no lateral influence was observable, but it was plainly shown that the diminished sexual power, consequent upon the operation, had produced a corresponding diminution in the size of the horns in both cases. Towards the end of 1834, the Society's farm at Kingston, where the bucks had been kept, was given up, and further observation prevented.

The fallow-buck is at his best in his sixth, or at most in his seventh year; after which, though the carcase may increase, the horns become smaller, and irregularly going back annually through something like their former stages of increase, a very old buck has from the state of his horns been mistaken for a young one. In the osteological department of the Museum at Paris, there was, and may be now, the skeleton of a female rein-deer in which the horns were reduced to little more than a rudiment of the beam and the brow-antler; yet was this animal so old, that the molar teeth were worn down to the edges of the alveolar cavities.

Park-keepers in large establishments, where much venison is required, are in the habit of cutting 20, 30 or 40 bucks in the spring, and giving them the summer run of the park, or better still, in paddocks, while the grass remains nutritious, after which they are taken up for stall-feeding and fattened as wanted. These bucks never lose their velvet. Some park-keepers practise modifications when cutting, producing corresponding differences and effects. If a fawn is castrated at a very early age, and the earlier the better, he will never put forth horns of any sort, but remain a polled buck during life.

The roe is the smallest of our British deer, and being under the influence of the same physiological laws, requires but a brief notice.

The horns acquire but three points each at their best, and as the roe-buck increases in years, his horns, like those of our other deer, diminish in size and number of points, till they recede irregularly to their early appearance in the third or second year.

Roe-deer are preserved in some parks in England, as at Petworth in Sussex, and elsewhere, and form a pleasing addition to the scene. After having fed in the early morning, they, in fine weather, scrape out a bed for themselves in long grass, and when approached jump up in haste, and scud away like a hare from her form.

The males are said to be less friendly disposed towards their young than the males of either of the other two species; but with the very common tendency, not confined to deer, to use power where it is possessed, I suspect this tendency has its origin in the state of the horns.

Roe-bucks shed their horns in December: the new horns, while growing, are covered with their velvet, but become hard and burnished by the end of April. The kids are dropped in May, and may be occasionally exposed to a push of the then hard and pointed horn.

The horns of the red and fallow deer remain in their velvet till August, and while they are in that soft and tender state, the males never make an offensive use of them; and long before they are hard and burnished, the calves of the one, and the fawns of the other, dropped about the first week in June, are strong and nimble enough to get out of harm's way. This, however, is certain, that the old females of all the three species take especial care to conceal their young while they remain helpless.

The neutral effect produced when the animal happens to be deprived of the influence of the true sexual organ, whether from original malformation, subsequent disease, or artificial obliteration, is particularly conspicuous in our common fowls. The capon ceases to crow; the comb and gills do not attain the size of those parts in the perfect male; the spurs appear, but remain short and blunt; and the hackle feathers of the neck and saddle, instead of being long and narrow, are short and broadly webbed. The capon will take to a clutch of chickens, attend them in their search for food, and brood them under his wings when they are tired.

In the imperfect female the comb increases; a short spur or spurs appear; the plumage undergoes an alteration, getting what is usually called "foul-feathered;" she ceases to produce any eggs, and makes an imperfect attempt to imitate the crow of the cock. Being profitless in this state, she is usually made away with. The proverb says,

"A whistling woman and a crowing hen
Are neither good for gods nor men."

Our neighbours and allies the French, who seem to take a wider range in their prejudice against habits which they consider irregular, have the following proverb, which says,

"Poule qui chante, Prêtre qui danse,
Et Femme qui parle latin,
N'arrivent jamais à belle fin."

I have seen two instances in which females of the wild duck have assumed to a considerable extent the appearance of the plumage of the Mallard, even to the curled feathers of the tail. One of these birds, in my own collection, was given me when alive by my kind friend the late John Morgan, Esq. When this bird was examined after death, the sexual organs were found to be diseased, as in the cases of the hen pheasants referred to, and figured in the 2nd volume of the "History of our British Birds." In the published illustrations to his "Fauna of Scandinavia,"

M. Nilsson has given a coloured figure of a duck in this state of plumage, plate 163, which is called a barren female, and in which the curled tail-feathers are made very conspicuous.

From the general similarity in these females to the appearance assumed for a time by healthy males in July, I am disposed to refer this seasonal change in males, in this and in other species of ducks, to a temporary exhausted state of the male generative organs, and their consequent diminished constitutional influence on the plumage.

A male shut up by himself from early spring to the end of July undergoes no change in his plumage; but if he is allowed to associate with females till their season of incubation commences, he then goes through the change, and this appears to indicate the cause of the partial summer moulting.

The appearance is somewhat different, but yet very interesting, in Insects and Crustacea. In these classes the sexual organs are double, and distinct, arranged one on each side of the elongated mesial line. It sometimes happens that a species in which the sexes are of a different colour, or markings, or form, has one sexual organ of each sort, male and female, in which case each half of the same insect is developed under the exclusive influence of the sexual organ on its own side. Instances are preserved among our collections of butterflies, moths, and beetles; and I have seen it twice in the common lobster.

Nor is the human race exempt from the operation of the law which prevails in the Mammalia. In women, at an advanced age, hair appears on the chin and upper lip, and the voice alters, becoming deep in its tone. The beard in old men becomes thin and soft, and our own inimitable Shakspeare has told us,

. . . . "his big manly voice,
Turning again toward childish treble, pipes
And whistles in his sound."

Catalogue of the Homopterous Insects collected at Singapore and Malacca by Mr. A. R. WALLACE, with Descriptions of New Species. By FRANCIS WALKER, Esq., F.L.S.

[Read May 6th, 1856.]

To carry out the object I had in view, as explained in the note to Mr. Walker's paper on the *Diptera* of Singapore and Malacca,

published in the first number of the "Journal of Proceedings," I have induced the same author to undertake the following Catalogue of Homopterous Insects from the same localities. The specimens were procured during the six months commencing with May and terminating with October, and are all in my collection.

W. WILSON SAUNDERS.

3rd May, 1856.

Ord. **CICADINA**, *Burmeister*.

Fam. **STRIDULANTIA**, *Burm.*

Gen. **PLATYPLEURA**, *Amyot et Serv.*

1. *Platypleura semilucida*, *Walk. Cat. Homopt.* pt. 1. 20. 27.
Inhabits also Java.

Gen. **DUNDUBIA**, *Amyot et Serv.*

2. *Dundubia imperatoria*, *Westw. Arc. Ent.* ii. 13. pl. 51 (Cicada).
Inhabits also Borneo and Sumatra.

3. **DUNDUBIA GUTTIGERA**, n. s. Testacea, capite suprâ vittis tribus angulosis, anticè annulo elliptico lineisque transversis lateralibus nigris, prothorace vittis duabus dorsalibus subparallelis nigris, mesothoracis scutello vittis quinque nigris, abdomine ferrugineo, alis vitreis; anticarum venis marginalibus apice venulisque transversis fusco-maculatis.

Testaceous. Head above with three angular black stripes, and in front with a black elliptical ringlet, which has black transverse lines on each side. Prothorax with two black dorsal nearly parallel stripes. Scutellum of the mesothorax with five black stripes, the inner pair abbreviated, the outer pair interrupted. Drums small, rounded. Abdomen ferruginous. Wings vitreous. Fore wings with a brown spot on each transverse veinlet and on the tip of each marginal vein. Length of the body 11 lines; of the wings 34 lines.

4. **DUNDUBIA ALBIGUTTA**, n. s. Viridis, ex parte testacea, capite suprâ lineis duabus obliquis duabusque lateralibus transversis nigris, anticè lineis nonnullis transversis lateralibus nigris, abdomine subtùs tuberculis quatuor nigris, alis vitreis; anticis apice subfuscescentibus, guttâ costali albidâ, venulis transversis 1â et 2â fusco-maculatis.

Green, partly testaceous. Head with two black lines forming an angle in front of the ocelli which are bordered with black; a black line on each side of the fore-border; front with black transverse lines along most of the ridges on each side. Drums small, rounded. Abdomen with two black tubercles on each side beneath. Wings vitreous. Fore wings slightly clouded with brown at the tips; a whitish spot on the costa at the tip of the front areolet; 1st and 2nd transverse veinlets with brown spots. Length of the body 9 lines; of the wings 32 lines.

5. *DUNDUBIA INTEMERATA*, n. s. Testacea, alis vitreis, costâ fulvâ; venis viridibus.

Testaceous. Drums small, triangular. Wings vitreous; costa tawny; veins green; 2nd marginal areolet a little shorter than the 1st; 1st transverse veinlet oblique, hardly curved, parted from the 2nd by full thrice its length; 2nd straight, more oblique and much shorter than the 1st; 3rd nearly straight, longer than the 1st; 4th a little shorter than the 3rd and as long as the 5th, from which it is parted by about thrice its length. Length of the body 10 lines; of the wings 34 lines.

Gen. *CICADA*, *Linn.*

6. *CICADA VIRGUNCULA*, n. s. Viridis, capite parvo, abdominis basi suprâ et segmentorum marginibus posticis luteis, alis vitreis, costâ venisque viridibus. Green. Head small. Drums very small. Abdomen luteous above at the base; hind borders of the segments luteous. Wings vitreous; costa and veins green; 2nd marginal areolet much shorter than the 1st; 1st transverse veinlet straight, very oblique, parted from the 2nd by about thrice its length; 2nd upright, nearly straight, much shorter than the 1st; 3rd almost straight, as long as the 1st; 4th longer than the 3rd and as long as the 5th, from which it is parted by much less than its length. Length of the body $6\frac{1}{2}$ lines; of the wings 17 lines.

Gen. *HUECHYS*, *Amyot et Serv.*

7. *Huechys sanguinea*, *Deg. Ins.* iii. 221. 18. pl. 33. f. 17 (*Cicada*). Malacca. Inhabits also Java and China.

Fam. *FULGORINA*, *Burm.*

Subfam. *FULGORELLÆ*, *Spinola.*

Trib. *FULGORITES*, *Spinola.*

Subtrib. *FULGOROIDES*, *Spinola.*

Gen. *HOTINUS*, *Amyot et Serv.*

8. *Hotinus subocellatus*, *Guérin; Delessert, Souvenirs Voy. Inde*, 66. pl. 16. f. 1; *Rev. Zool.* 1839 (*Fulgora*).

Malacca. Inhabits also Nepal.

Subtrib. *LYSTROIDES*, *Spinola.*

Gen. *APHÆNA*, *Guérin.*

9. *Aphæna rosea*, *Guérin, Voy. Belanger, Zool.* 454. pl. 3. f. 3.

Malacca. Inhabits also Sumatra.

10. *Aphæna Saundersii*, *White, Ann. Nat. Hist.* 1846, xvii. 330.

Malacca. Inhabits also Hindostan and Borneo.

Subtrib. *DICTYOPHOROIDES*, *Spinola.*

Gen. *DICTYOPHORA*, *Germer.*

11. *Dictyophora speilinea*, n. s. Viridis, capite lanceolato prasino carinis tribus suprâ unâque subtus luteis, prothorace carinis tribus prasinis dua-

busque luteis, mesothorace carinis tribus lateribusque ex parte prasinis, tibiis anticis tarsisque anterioribus fulvis, alis limpidis, venis stigmatæque viridibus.

Green. Head emerald-green, with three luteous ridges above and one beneath; protuberance lanceolate, ascending, as long as the hind part of the head. Prothorax with three emerald-green ridges, the lateral pair marginal and accompanied by two luteous ridges. Mesothorax with three emerald-green ridges; sides partly emerald-green. Fore tibiæ and anterior tarsi tawny. Wings limpida; veins and stigma green, the latter occupying three areolets. Length of the body 5 lines; of the wings 14 lines.

Singapore.

Gen. CROMNA, n. g. = *Phyllyphanta*

Dictyophora affinis. Caput suprâ conicum, subascendens; frons lanceolata, subcarinata, marginibus vix elevatis. Antennæ breves; articulus 1^{us} 2^o multò brevior. Thorax subcarinatus. Prothorax subarcuatus. Pedes breves. Alæ latæ; anticæ areolis costalibus et marginalibus ordinariis areolisque plurimis minutis discalibus abnormibus, costâ subconvexâ, margine exteriore subquadrato, angulo interiore peracuto.

Allied to *Dictyophora*. Head conical above, very slightly ascending; front lanceolate, indistinctly keeled, with the margins hardly elevated. Antennæ short; 2nd joint very much shorter than the 1st. Thorax with a slight keel. Prothorax somewhat arched. Legs short. Wings broad. Fore wings with regular areolets along the costa and along the exterior border, and with very numerous minute irregular areolets over the rest of the surface; costa slightly convex, forming a slightly obtuse angle at the tip; exterior border straight, subquadrate; interior angle very acute.

12. CROMNA ACUTIPENNIS, n. s. Viridis, subtùs pallidior, capite thoraceque testaceo-vittatis, alis anticis lineâ marginali fuscâ, posticis albis.

Green, paler beneath. Head and thorax with testaceous stripes. Fore wings with a brown line extending from near the tip of the costa to one-third of the length of the hind border from the interior angle. Hind wings white. Length of the body 3½ lines; of the wings 10 lines.

Malacca.

Gen. DARADAX, n. g.

Caput lanceolatum, ascendens, lateribus elevatis; frons lanceolata, carinata. Antennæ globosæ, minimæ. Prothorax valdè arcuatus, carinatus. Mesothorax quadricarinatus. Alæ anticæ fusiformes, areolis costalibus et marginalibus plurimis ordinariis, discalibus longis.

Head lanceolate, ascending, with a ridge along each side; front lanceolate, with a middle keel; sides also ridged. Antennæ globose, very minute; bristle moderately long, very slender. Prothorax much arched, with a slight middle keel; each side forming a fusiform compartment. Mesothorax with four keels. Fore wings fusiform, with numerous parallel equidistant veinlets along the costa; discal areolets long; marginal areolets short, like those of the costa.

13. *DARADAX FUSIPENNIS*, n. s. Viridis, ex parte lutescens, alis anticis fusco apud marginem exteriorem guttatis, posticis albis.

Green, partly lutescent. Fore wings with brown dots along the exterior border. Hind wings white. Length of the body 3 lines; of the wings 7 lines.

Malacca.

Gen. *ELICA*, n. g.

Caput conicum, subascendens, suprâ tricarinatum; frons lanceolata, tetragona, tricarinata, lateribus elevatis. *Antennæ* breves. *Prothorax* brevissimus. *Mesothorax* tricarinatus. *Alæ* anticæ latæ, venulis plurimis transversis costalibus, areolis discalibus basalibus elongatis, exterioribus abbreviatis sæpissimè hexagonis.

Head conical, slightly ascending, with three ridges above; front lanceolate, tetragonal, with three ridges, the lateral pair curved, margins also ridged. *Antennæ* conical; bristle about twice the length of the preceding part. *Prothorax* very short. *Mesothorax* with three keels. Fore wings broad, with numerous transverse veinlets along the costa; discal areolets elongate towards the base of the wing; those exterior more numerous, short, and generally hexagonal or pentagonal.

14. *ELICA LATIPENNIS*, n. s. Testacea, ex parte fulva, capite suprâ thoracisque disco fuscis, alis hyalinis subtestaceis, venis fulvis, nonnullis nigris.

Testaceous, partly tawny. Head above and disk of the thorax brown. Wings hyaline, with a slight testaceous tinge; veins tawny, some of them black, forming an irregular incomplete band. Length of the body $3\frac{1}{2}$ lines; of the wings 9 lines.

Malacca.

Gen. *ELIDIPTERA*, *Spinola*.

15. *ELIDIPTERA SMARAGDILINEA*, n. s. Ferruginea, capite ex parte prasino, cornu gracili cylindrico ascendente nigro subtùs viridi, fronte angustâ, facie pectoreque nigro alboque variis, prothorace maculis tribus prasinis, mesothorace vittâ prasinâ, abdomine vittis duabus prasinis duabusque ventralibus nigris, pedibus viridi-fulvis, femoribus basi nigris, tibiis anticis apice albis, alis hyalinis vittis duabus strigâque transversâ fuscis.

Ferruginous. Head emerald-green about the eyes and on each side of the front; protuberance slender, cylindrical, ascending, black above, green beneath, about twice the length of the head above; front long and narrow; face black and white. *Prothorax* with an emerald-green spot in the middle and one on each side. *Mesothorax* with an emerald-green stripe. *Pectus* black and white. *Abdomen* with a green stripe on each side, and with a black stripe on each side beneath. Legs tawny; femora black at the base; tibiæ and tarsi partly green; fore tibiæ white towards the tips. Wings limpid. Fore wings with a narrow brown stripe along the terminal part of the costa, and with a broad brown stripe along the corresponding part of the hind border, the two stripes connected by a brown streak along the transverse veinlets. Length of the body $4\frac{1}{2}$ lines; of the wings 11 lines.

Mount Ophir.

Subtrib. CIXIOIDES, *Spinola*.Gen. CIXIUS, *Latr.*

16. *CIXIUS PUSTULATUS*, n. s. Fulvus, subtùs testaceus, capite viridescente, guttis duabus nigris, carinis ferrugineis, alis anticis maculis pallidioribus necnon punctis plurimis guttisque paucis nigricantibus, posticis fuscis.

Tawny, testaceous beneath. Head greenish, with a black dot on each side; ridges ferruginous. Fore wings with some paler marks and with many minute blackish dots which are accompanied by two or three larger and darker dots. Hind wings brown. Length of the body 3 lines; of the wings 7 lines.

In this species the veinlets towards the tip of the costa and along the apical margin are more numerous than in the European *Cixii*.

Singapore.

17. *CIXIUS ALBISTRIGA*, n. s. Nigricans, subtùs testaceus, capite parvo, fronte angustâ fuscâ, segmentorum abdominalium marginibus posticis rufescentibus subtùs albidis, alis anticis fuscis, strigis tribus transversis costalibus subapicalibus albidis, posticis cinereis.

Blackish, testaceous beneath. Head much smaller, and with the front much narrower than in the European species; front dark brown. Hind borders of the abdominal segments reddish above, whitish beneath. Fore wings brown, with three whitish transverse streaks towards the tip of the costa. Hind wings grey. Length of the body 2 lines; of the wings 5 lines.

Singapore.

18. *CIXIUS EFFERATUS*, n. s. Testaceus, fronte subfusiformi, oculis magnis approximatis, abdomine fulvo, alis limpidis, venis fulvis, anticis stigmatè testaceo maculisque duabus marginalibus fuscis, posticis strigâ costali apicali fuscâ.

Testaceous. Front subfusiform, attenuated in front. Eyes large, nearly contiguous on the vertex. Abdomen tawny. Wings limpid; veins tawny; stigma testaceous, with a brown spot contiguous to its tip, and opposite a smaller and paler brown spot on the interior border. Hind wings with a brown streak at the tip of the costa. Length of the body $2\frac{1}{2}$ lines; of the wings 6 lines.

Singapore.

Gen. EURIA, n. g. = *Tropiduchus* *Sial*

Caput brevissimum, suprâ arcuatum; frons longa, subfusiformis, carinata.

Antennæ globosæ. *Thorax* brevissimus, carinatus, lateribus elevatis. *Alæ* anticæ mediocriter latæ, venis costalibus plurimis ordinariis, marginalibus multis sæpissimè furcatis, discalibus nonnullis, basalibus paucis.

Head very short, arched above. Front long, subfusiform, with a keel in the middle. Antennæ small, globose. Thorax very short, with a keel in the middle and a ridge on each side. Fore wings moderately broad, with the angles rounded; many oblique, parallel, equidistant veins along the costa; veins along the exterior border very numerous, mostly forked, divided by transverse veinlets from the much fewer veins in the next compartment, which is likewise divided by veinlets from the still fewer basal areolets.

19. EURIA LURIDA, n. s. Fuscescens, subtùs pallidior, capite viridi carinis fulvis, alis anticis fusco-quadrifasciatis, posticis fusco-trifasciatis.

Brownish, paler beneath. Head green, with tawny ridges. Wings lurid. Fore wings with four brown bands; 1st and 2nd dilated in front; 3rd slender, curved, joined at each end to the 2nd; 4th marginal. Hind wings with three brown bands. Length of the body $2\frac{1}{2}$ lines; of the wings 7 lines.

Singapore.

Ugyops Guér.

Gen. BIDIS, n. g.

Caput conicum, vix ascendens, vertice carinato, fronte perangustâ carinatâ lateribus elevatis. *Antennæ* filiformes; articulus 2^{us} 1^o paulò longior; setâ longissimâ. *Prothorax* arcuatus, brevissimus. *Mesothorax* tricarinatus. *Alæ* anticæ sat angustæ, areolis nonnullis apud costæ apicem et apud marginem exteriorem; areolæ basales longissimæ, discales elongatæ.

Head conical, hardly ascending, with a ridge above; front very long and narrow, with a middle keel; sides also ridged. *Antennæ* filiform; 2nd joint a little longer than the 1st; bristle about twice the length of the 2nd, and full $\frac{3}{4}$ ths of the length of the body. *Prothorax* arched, very short. *Mesothorax* with three keels. Fore wings rather narrow, with marginal areolets towards the tip of the costa and along the exterior border; discal areolets elongated, less than half the length of the basal areolets.

20. BIDIS NOTIVENA, n. s., mas et fem. Testacea, ex parte viridis, alis hyalinis, anticis substestaceis, venis testaceis ex parte nigricantibus. Mas ex parte rufescens.

Male and female. Testaceous, partly green. Wings hyaline. Fore wings with a very slight testaceous tinge; veins testaceous, here and there blackish.

Male. Partly red. Length of the body 2 lines; of the wings 6 lines.

Singapore and Malacca.

Trib. ISSITES, *Spinola*.

Gen. EURYBRACHYS, *Guérin*.

21. EURYBRACHYS MULTICOLOR, n. s. Lætè viridis, albo-tomentosa, thorace testaceo, abdominis lateribus posticis lètè rufis, membranis duabus apicalibus foliaceis fulvis, alis anticis nigro-guttatis, apud costam nigro-strigatis, marginibus latis subhyalinis, posticis albis, maculis nonnullis marginalibus nigris.

Bright green, with white tomentum. Thorax mostly testaceous. Abdomen bright red on each side towards the tip, which has two foliaceous tawny appendages. Fore wings nearly hyaline, with green disks, which are brightest beneath, and with several black discal dots; some little black streaks along the costa. Hind wings white, with some black marginal spots. Length of the body 7 lines; of the wings 22 lines.

22. EURYBRACHYS RUBRESCENS, n. s. Testacea, vertice thoraceque rufescente notatis, fronte viridi-testacèâ, pedibus roseis, alis anticis pubescentibus, basi purpureo-rufis nigro-guttatis, apices versus fulvis, fasciâ intermediâ marginibusque ex maximâ parte sordidè hyalinis, tuberculis duobus submarginalibus nigro-uniguttatis, posticis lacteo-albis fasciâ fuscâ.

Testaceous. Head, vertex and thorax with reddish marks. Front greenish testaceous. Legs rosy red. Fore wings pubescent, slightly tuberculated, and with a black shining dot near the tip of the costa and at three-quarters of the length of the hind border, purplish red and with black dots towards the base, tawny towards the tips, with a dingy hyaline middle band and with the borders chiefly of the same hue. Hind wings milky white, with a brown band. Length of the body 5 lines; of the wings 18 lines.

Mount Ophir.

Subtrib. FLATOÏDES, *Spinola*.

Gen. FLATOÏDES, *Guérin*.

23. *Flatoïdes tenebrosus*, *Walk. Cat. Homopt.* pt. 2. 406. 7.

Malacca and Singapore. Inhabits also China.

24. *Flatoïdes marginalis*, *Walk. Cat. Homopt.* pt. 2. 409. 10.

Mount Ophir. Inhabits also Africa?

25. FLATOÏDES DISCALIS, n. s. Nigra, fronte tricarinatâ marginibus subelevatis, segmentorum abdominalium marginibus posticis pedibusque testaceis, alis anticis nigricantibus disco guttisque quatuor limpidis, punctis marginalibus testaceis, posticis limpidis fusco-marginatis.

Black. Front much broader than long, with a slightly elevated margin, and with three slight keels. Hind borders of the abdominal segments and legs dull testaceous. Fore wings blackish, with a testaceous point on the tip of each vein; disk limpid; two limpid dots on the costa, and two towards the tip of the exterior border. Hind wings limpid with brown borders. Length of the body 3 lines; of the wings 8 lines.

Singapore.

✓ 26. *Flatoïdes emarginatus*, n. s. Nigricans, capite pectore pedibusque testaceis, fronte carinis tribus abbreviatis, alis nigricantibus, anticis maculâ costali albo-limpidâ, incisuris duabus costalibus exterioribus, margine exteriore anticè concavo posticè dilatato.

Blackish. Head, pectus and legs dull dark testaceous; front about twice broader than long, with an elevated border, and with three short keels on the hind part. Wings blackish. Fore-wings slightly hooked; costa with two slight excavations between the tip and a white limpid spot which is beyond the middle; exterior border concave between the tip, and a conical dilatation which is in front of the middle. Hind wings slightly excavated along the exterior half of the costa. Length of the body 3 lines; of the wings 11 lines.

Singapore.

Gen. RICANIA, *Germar*.

27. *Ricania Hemerobii*, *Walk. Cat. Homopt.* pt. 2. 425. 19.

Malacca. Inhabits also Ceylon.

Gen. CONNA, n. g.

Corpus sublineare. *Caput* thorace vix angustius, fronte depressâ, elongatâ, carinulâ mediâ, lateribus subelevatis. *Prothorax* arcuatus, carinatus, ver-

ticem posticum superans. *Mesothorax* tricarinatus. *Pedes* breviusculi, sat validi. *Alæ* latæ, apice rotundatæ; anticæ areolis costalibus ordinariis, discalibus plurimis abnormibus.

Body almost linear. Head nearly as broad as the thorax; vertex much longer than broad; front flat, much longer than broad, forming a rounded angle on the middle of each side, with the borders slightly elevated and with a slight middle keel. Antennæ short; 2nd joint much shorter than the 1st; bristle not long. Prothorax keeled, arched, extending over the hind part of the vertex. Mesothorax longer than broad, with three keels. Legs rather short and stout. Wings broad, rounded at the tips. Fore wings with a row of regular areolets along the costa; discal areolets numerous, very irregular in size and shape.

28. *CONNA GUTTIFERA*, n. s. Testacea, capite guttis sex nigris, verticis thoracisque discis fusciscentibus, abdominis vittâ dorsali fuscâ, segmentorum marginibus posticis albidis, alis hyalinis, anticis subtestaceis guttis paucis fusciscentibus, posticarum margine ex parte fusciscente.

Testaceous. Vertex and thorax with brownish disks. Head with two black dots on each side, and four in front. Abdomen with a brown dorsal stripe; hind borders of the segments whitish. Wings hyaline. Fore wings somewhat testaceous, with a few slight brownish dots. Hind wings with a brownish tinge along part of the hind border.

Length of the body $3\frac{1}{2}$ lines; of the wings 9 lines.

Malacca.

Gen. BENNA, n. g.

Corpus sat gracile. *Caput* carinatum, thorace paullò angustius, lateribus elevatis, fronte compressâ elongato-subfusiformi. *Antennæ* breviusculæ. *Thorax* tricarinatus. *Prothorax* brevissimus. *Abdomen* basi halteribus duobus capitatis, oviductu longo arcuato. *Pedes* longiusculi, sat graciles. *Alæ* latæ, apice rotundatæ; anticæ areolis discalibus brevioribus, basalibus et marginalibus longioribus.

Body rather slender. Head a little narrower than the thorax, with a keel which extends from the back of the vertex to the rostrum; sides also ridged; front compressed, elongate-subfusiform. First and 2nd joints of the antennæ a little shorter together than the breadth of the front; bristle not long. Thorax with three ridges. Prothorax very short. Abdomen at the base with two lateral capitate appendages like the halteres of *Diptera*; tip terminating in a long curved oviduct. Legs rather long and slender. Wings broad, rounded at the tips. Fore wings with about twenty areolets, formed by two irregular bands of transverse veinlets; the discal areolets generally shorter than the basal and the marginal areolets.

29. *BENNA CAPITULATA*, fœm. Testacea, abdomine lanuginoso, alis hyalinis, anticis subtestaceis, guttâ discali nigrâ guttulisque duabus fuscis, venis fuscis, basi et apud costam testaceis, venulis transversis ex parte infuscatis, strigâ apud marginem exteriorem fuscâ, stigmatè testaceo.

Female. Testaceous. Abdomen with long cottony secretions; capitate appendages with white tips. Wings hyaline. Fore wings with a very slight testaceous tinge; veins brown, testaceous towards the base and in front, with a

black basal dot, and with two smaller brown dots near the base; transverse veinlets partly clouded with brown; a brown streak along the exterior border; stigma testaceous. Length of the body 3 lines; of the wings 8 lines.

Singapore.

Gen. *POCHAZIA*, *Amyot et Serv.*

30. *Pochazia fasciata*, *Fabr. Syst. Rhyn.* 47. 8. (Flata.)

Singapore. Inhabits also Java.

31. *Pochazia fumata*, *Amyot et Serv. Hist. Nat. Hém.* 529. 2. *Flata fuscata?*
Fabr. Syst. Rhyn. 47. 9.

Malacca and Singapore. Inhabits also Java.

32. *Pochazia obscura*, *Fabr. Syst. Rhyn.* 49. 16. (Flata.)

Malacca. Inhabits also Hindostan.

✓ 33. *POCHAZIA INTERRUPTA*, n. s. ^{*Mendocera*} Testacea, fronte elongato-subquadrata, prothorace arcuato verticem ex parte superante, mesothorace tricarinato, alis fuscis, anticis apud marginem posticum ex parte luridis, fasciâ interruptâ fuscâ, apice testaceo-hyalino.

Testaceous; vertex much broader than long; front elongate-subquadrate, with a slight groove in the middle. Prothorax arched, extending over part of the vertex. Mesothorax with three slight keels. Wings brown. Fore wings partly lurid towards the hind border; an interrupted band beyond the middle; the tips hyaline, slightly testaceous. Length of the body 3 lines; of the wings 7 lines.

Singapore.

✓ 34. *POCHAZIA COSTIMACULA*, n. s. ^{*Ricania*} Nigra, capite pedibusque fulvis, vertice fusco margine fulvo, alis nigricantibus, anticis apud margines et apud venulas transversas luridis, maculâ costali albido-hyalinâ.

Black. Head and legs tawny; vertex brown, with a tawny border; front broader than long, with a middle keel and with an elevated margin. Wings blackish. Fore wings mostly lurid along the borders and about the transverse veinlets, and with a whitish hyaline spot on the costa beyond the middle. Length of the body $2\frac{1}{2}$ lines; of the wings 7 lines.

Malacca.

✓ 35. *POCHAZIA GRADIENS*, n. s. Fulva, subtus testacea, alis nigris, anticis apud costam fulvis.

Tawny, testaceous beneath. Head with a middle keel, and with the margins elevated. Front hardly broader than long; sides rounded. Wings blackish. Fore wings tawny along the costa. Length of the body $2\frac{1}{2}$ lines; of the wings 6 lines.

Singapore.

Gen. *NEPHESA*, *Amyot et Serv.*

36. *Nephesa rosea*, *Spinola, Ann. Soc. Ent. France*, viii. 400. 5. (*Ricania*.)

Flata matutina, *Walk. Cat. Homopt.* 437. 13.

Singapore. Inhabits also Java.

Gen. FLATA, *Fabr.*37. *Flata obscura*, *Fabr. Syst. Rhyn.* 49. 16.

Singapore. Inhabits also Hindostan.

Gen. COLOBESTHES, *Amyot et Serv.*

✓ 38. *COLOBESTHES ALBIPLANA*, n. s. ^{*falcata Guér. var.*} Alba, alis anticis apud costam convexis, margine exteriore quadrato, angulo interiore attenuato peracuto, posticis vix acuminatis.

White. Fore wings convex in front, rectangular at the tips, straight and quadrate from thence to the interior angle which is attenuated and very acute; hind border straight. Hind wings hardly acuminated at the tips. Length of the body 5 lines; of the wings 22 lines.

Singapore.

✓ 39. ^{*Daksha*} *COLOBESTHES MARGINATA*, n. s. Viridi-alba, mesothorace vittis duabus testaceis luteo-unilineatis, alis anticis fasciâ marginali luteâ, basi subtuberculatis, apud costam convexis, margine exteriore quadrato, angulo interiore attenuato acuto.

Greenish white. Front not broader than long, with a slightly elevated border and a slight keel; sides slightly rounded. Mesothorax on each side with a testaceous stripe which includes a luteous line. Fore wings minutely tuberculate towards the base, convex in front, rectangular at the tips, straight and quadrate from thence to the hind angle which is attenuated and acute; hind border straight; a pale luteous marginal band extending from $\frac{2}{3}$ ths of the length of the costa nearly to the middle of the hind border. Length of the body 4 lines; of the wings 18 lines.

Malacca.

Gen. PÆCILOPTERA, *Latr.*40. *Pæciloptera maculata*, *Guér. Icon. Règne Anim. Ins.* pl. 58. f. 7.

Malacca and Singapore. Inhabits also Java.

✓ 41. ^{*melicharia*} *PÆCILOPTERA LUTEIMARGO*, n. s. Subtestaceo-viridis, fronte subcarinata, lateribus subelevatis rotundatis, prothorace arcuato verticem ex parte superante, alis anticis margine exteriore subquadrato, fasciâ apicali luteâ fusco-marginatâ, posticis limpidis.

Green, with a slight testaceous tinge. Front a little longer than broad, with the border slightly elevated, and with a slight keel; sides rounded. Thorax not keeled. Prothorax nearly semicircular, extending over the vertex. Mesothorax broader than long. Fore wings subquadrate at the tips, about which there is a luteous brown-bordered band. Hind wings limp. Length of the body 3 lines; of the wings 7 lines.

Singapore.

✓ 42. ^{*melicharia*} *PÆCILOPTERA NIVEINA*, n. s. Alba, *P. luteimarginis* structurâ, alis anticis fasciâ marginali testaceâ.

White, in structure like *P. luteimargo*. Fore wings with a testaceous marginal band which extends from two-thirds of the length of the costa to the base of the hind border. Length of the body $2\frac{1}{2}$ lines; of the wings 7 lines.

Mount Ophir.

Gen. EUPILIS, n. g.

Fœm. Corpus subfusiforme. Caput breve, anticè rotundatum, thorace angustius; vertex depressus, bicarinatus; frons convexa, lævis; facies lanceolata, vix carinata. Antennæ globosæ. Oviductus longus, arcuatus, lanceolatus. Alæ sat angustæ; anticæ apice rotundatæ, venulis quatuor transversis costalibus, venulisque quatuor discalibus.

Female. Body subfusiform. Head nearly semicircular, narrower than the thorax; vertex depressed, with a ridge on each side; front convex, smooth; face lanceolate, hardly keeled. Antennæ globose. Abdomen terminating in a long curved lanceolate oviduct. Wings rather narrow. Fore wings rounded at the tips, with four transverse veinlets along the costa, and with four irregular discal transverse veinlets.

✓ 43. EUPILIS ALBILINEOLA, n. s., fœm. Testacea, ex parte viridis, fronte nigrâ, maculâ fulvâ margineque testaceo, facie fasciis duabus (antere maculari) nigris, thorace pectoreque nigro-maculatis, abdomine fasciis nigris, alis hyalinis, venis nigris, anticis subluridis fusco quinque-strigatis, venulis transversis albidis.

Female. Testaceous, partly pale green. Front black, shining, with a tawny central spot and with a testaceous border; face with two black bands, the anterior one macular. Thorax and pectus with black spots. Abdomen with black bands. Wings hyaline, with black veins. Fore wings slightly lurid, with five brown streaks; transverse veinlets white. Length of the body 4 lines; of the wings 7 lines.

Singapore.

Fam. MEMBRACINA, *Burmeister.*Gen. CENTROTUS, *Fabr.*

44. Centrotus Taurus, *Fabr. Syst. Rhyn.* 20. 19.

Mount Ophir and Singapore. Inhabits also Hindostan, Java, the Philippine Isles, and China.

— 45. ^{*Centrotus*} CENTROTUS LAMINIFER, n. s. Nigricans, scabrosus, thoracis cornubus anticis divergentibus subplanis membranaceis rufo-fuscis, postico abdomen superante, pedibus ferrugineis, alis luridis, anticis apud costam nigricantibus.

Blackish, scabrous. Thorax armed in front with two almost directly diverging nearly horizontal membranous reddish-brown horns, from each of which a keel proceeds to the tip of the hind horn, which is horizontal and extends beyond the abdomen. Legs ferruginous. Wings lurid. Fore wings blackish along the costa. Length of the body $2\frac{1}{2}$ lines; of the wings 6 lines.

Singapore.

46. ^{*Tricentrus*} CENTROTUS CALIGINOSUS, n. s. Niger, obscurus, brevis, robustus, densè et scitè scaber, thoracis cornubus lateralibus validis abbreviatis divergentibus obliquè ascendentibus, cornu postico abdominis dimidium non superante, alis anticis fuscis, basi nigris, posticis limpidis.

Black, stout, short, dull, thickly and minutely scabrous. Lateral horns of

the thorax stout, diverging, obliquely ascending, shorter than the breadth of the thorax between them; hind horn horizontal, extending to half the length of the abdomen. Tarsi ferruginous. Fore wings brown, black at the base. Hind wings limpid. Length of the body 2 lines; of the wings 4 lines.

Malacca.

Gargara
47. *CENTROTUS SEMIVITREUS*, n. s. Niger, crassus, brevis, nitens, subtilissimè punctatus, thorace anticè inermi angulato, cornu postico abdomen ferè adæquante, alis hyalinis, anticarum dimidio apicali nigro.

Black, thick, short, shining, very minutely punctured. Thorax unarmed in front, but angular on each side by the base of the fore wing; hind horn horizontal, extending nearly to the tip of the abdomen. Wings hyaline. Fore wings black for half the length from the tips. Length of the body $1\frac{1}{2}$ line; of the wings $3\frac{1}{2}$ lines.

Singapore.

Gargara
48. *CENTROTUS SEMIFASCIA*, n. s. Niger, obscurus, thorace anticè inermi, cornu postico abdominis dimidium superante; alis hyalinis, anticis guttâ costali fasciâ subapicali apiceque fuscis.

Black, dull. Thorax unarmed in front; hind horn horizontal, extending to rather beyond half the length of the abdomen. Wings hyaline. Fore wings with a brown dot in front, a subapical band, and brown tips. Length of the body 1 line; of the wings $2\frac{1}{2}$ lines.

Malacca.

Gen. MICREUNE, n. g.

Centroto affinis. Thorax anticè lanceolatus; cornu caput longè superans, apud apicem ramis duabus erectis subarcuatis armatum; cornu posticum abdominis dimidio vix brevius.

Allied to *Centroto*. Thorax prolonged into a long, slender, lanceolate horn which extends far beyond the head, and has at its tip two more slender vertical slightly recurved and diverging branches. Hind part of the thorax armed with a horizontal horn which extends to near half the length of the abdomen. Wings fusiform, much like those of *Centroto*.

49. *MICREUNE FORMIDANDA*, n. s. Nigra, thorace scabro, cornubus carinatis, segmentorum abdominalium marginibus posticis genubus tarsisque fulvis, alis anticis nigricantibus, posticis cinereis.

Black. Thorax scabrous; its horns channelled. Hind borders of the abdominal segments, knees and tarsi tawny. Fore wings blackish. Hind wings grey. Length of the body lines; of the wings lines.

Singapore.

Fam. CICADELLINA, *Burmeister*.

Trib. LÆVIPEDES, *Amyot et Serv*.

Subtrib. CERCOPIDES, *St. Farg. et Serv*.

Gen. CERCOPIIS, *Fabr*.

50. *Cercopis tricolor*, *St. Farg. et Serv. Enc. Méth. x. 604. 1.*

Var. Alis anticis nigris guttis sex basalibus rufis.

Var. Black, shining. Head, thorax, scutellum towards the tip, hind borders of the abdominal segments, and tip of the abdomen, red, as are also the legs. Femora black, the four anterior red towards the tips. Fore wings with six red dots on each at the base.

Mount Ophir. Inhabits also Java.

51. *Cercopis plana*, *Walk. Cat. Homopt.* pt. 3. 653. 10.

Var. Thorax nigro-bipunctatus.

Var. Scutum of the mesothorax with two black points.

Mount Ophir. Inhabits also Java.

52. *Cercopis dorsimacula*, *Walk. Cat. Homopt.* pt. 2. 658. 31.

Malacca. Inhabits also North Bengal.

53. *Cercopis costalis*, *Walk. Cat. Homopt.* pt. 2. 664. 45.

Var. Alæ anticæ guttis duabus subapicalibus rufis.

Var. Fore wings with two red subapical dots.

Inhabits also Malabar.

54. *CERCOPIS RUGULOSA*, n. s. Nigra, nitens, subtùs ferruginea, abdominis marginibus pedibusque rufis, femoribus vittâ nigricante, alis anticis rugulosis.

Black, shining, ferruginous beneath. Abdomen bordered with red. Legs red; a blackish band on each of the femora. Fore wings rugulose. Length of the body 5 lines; of the wings 14 lines.

Mount Ophir.

Nearly allied to *C. viridicans*, Guér., but without any tinge of green.

55. *CERCOPIS DISLOCATA*, n. s. Nigra, capite fasciâ verticis marginibusque anticis testaceis, thorace testaceo maculis duabus anticis nigris, alis anticis costâ testacâ, fasciis duabus vittâque obliquâ dislocatâ rufis.

Black. Head testaceous, black across the vertex and on each side in front. Thorax testaceous, with a black spot on each side in front. Fore wings testaceous along the costa, with two red bands, and with a red oblique stripe which extends from near the base of the wing to the hind end of the 2nd band, and is dislocated as it traverses the 1st band. Length of the body 6 lines; of the wings 14 lines.

Singapore.

56. *CERCOPIS UNIFASCIA*, n. s. Rufa, thoracis lateribus dilatatis, pectoris disco nigro, alis anticis fasciâ nigrâ, posticis hyalinis.

Red. Thorax dilated on each side. Disk of the pectus black. Fore wings with a black band across the middle. Hind wings hyaline. Length of the body 6 lines; of the wings 12 lines.

Singapore.

57. *CERCOPIS DISCREPANS*, n. s. Nigro-purpurea, subtùs nigra, alis anticis nigris maculâ elongatâ nonnunquam divisâ rufâ.

Blackish-purple, black beneath. Fore wings black, with an elongated red spot, which is contracted in the middle, and occasionally divided. Length of the body 3-3½ lines; of the wings 8-9 lines.

Singapore.

Gen. COLSA.

Corpus subfusiforme. *Caput* sat magnum, thorace paulò angustius; vertex depressus; frons convexa; facies brevi-conica, lateribus impressis. *Antennæ* brevissimæ; seta brevis. *Prothorax* brevis, anticè angustior. *Mesothorax* subpunctatus; scutellum excavatum. *Alæ* angustæ, apice rotundatæ, anticæ venulis nonnullis costalibus apicalibus venisque quatuor longitudinalibus, 1^a 2^aque furcatis.

Body subfusiform, shining. Head rather large, a little narrower than the thorax; vertex somewhat depressed; front convex; face short-conical, impressed on each side. Antennæ very short; bristle shorter than the breadth of the head. Prothorax narrower in front, about six times broader than long. Mesothorax minutely punctured; scutellum with a fusiform depression. Wings narrow, rounded at the tips. Fore wings with four longitudinal veins; 1st springing from the middle of the costa, emitting a fork towards the tip of the costa, and ending at somewhat behind the tip of the wing; 2nd forked near the base, springing from near the base of the costa; the forks connected by a veinlet at half their length; the fore fork emitting a branch to the 1st vein; 3rd slender, springing from near the base of the costa, ending on the hind border with a veinlet which connects it with the hind fork of the 2nd vein; 4th springing from very near the base of the costa, and extending obliquely to the hind border; several oblique veinlets at the tip of the costa.

58. COLSA COSTÆSTRIGA, n. s. Nigra, subtùs testacea, prothorace scutelloque testaceis, abdomine testaceo fasciâ nigrâ, coxis femoribusque testaceis, alis limpidis, venis nigris crassis, costâ nigrâ, stigmatè albido-testaceo.

Black, testaceous beneath. Prothorax and scutellum testaceous. Abdomen testaceous, with a black band. Legs black; coxæ and femora testaceous. Wings limpid; veins black, thick; costa black; stigma whitish testaceous. Length of the body $2\frac{1}{2}$ lines; of the wings $6\frac{1}{2}$ lines.

Malacca.

Subtrib. APHROPHORIDES, *Amyot et Serv.*

Gen. PTYELUS, *St. Farg. et Serv.*

✓ 59. PTYELUS BIPARS, n. s. Testaceus, capite suprâ thoraceque testaceis, pectore testaceo-bivittato, alis anticis vittâ brevi posticâ fasciâque testaceis, posticis fuscescentibus.

Black. Head above and thorax testaceous. Pectus with a testaceous stripe along each side. Fore wings with a testaceous stripe which extends along half the length of the hind border from the base, and is united to a testaceous band across the middle. Hind wings brownish. Length of the body 4 lines; of the wings 9 lines.

Singapore.

60. PTYELUS IMMUTATUS, n. s. Testaceus, capite subtùs nigricante, pectore ex parte abdomineque nigris, tibiis apice nigris, alis anticis subpubescentibus, posticis cinerascensibus.

Testaceous. Head blackish beneath and with the usual ridges. Pectus partly black. Abdomen black. Tibiæ black at the tips. Fore wings minutely

pubescent. Hind wings greyish. Length of the body $3\frac{1}{2}$ lines; of the wings 8 lines.

Singapore.

Subtrib. SERRIPEDES, *Amyot et Serv.*

Coh. TETTIGONIDES, *Amyot et Serv.*

Gen. TETTIGONIA, *Germar.*

61. *Tettigonia farinosa*, *Fabr. Syst. Rhyn.* 70. 41. *T. brevifrons*, *Walk. Cat. Homopt.* 754. 41.—*T. nigrifrons*, *Signoret, Ann. Soc. Ent. Fr. 3^{me} sér. i.* 671. 123. pl. 21. f. 14.

Malacca and Singapore. Inhabits also Java, Pulo-Pinang, and Sumatra.

M. Signoret apparently describes the male of this species as *T. farinosa*, and the female as *T. nigrifrons*.

62. *Tettigonia ferruginea*, *Fabr. Syst. Rhyn.* 69. 36. (*Cicada.*)

Singapore. Inhabits also Hindostan, Java, the Philippine Isles, and China.

63. TETTIGONIA TRIPARS, n. s. Lætè rufa subtùs ænea, capite brevi rotundato vittis duabus nigris, fronte testaceâ margine nigricante, abdomine obscurè rufo fasciis nigricantibus apice æneo, pedibus testaceis, tarsi nigris, alis anticis testaceis glaucescentibus basi rufis, posticis fuscis.

Bright red, dark æneous beneath. Head short, rounded, nearly semicircular; vertex with two black stripes; front dull testaceous, with a blackish border. Abdomen dull dark red, with blackish bands; tip æneous. Legs dark testaceous; tarsi black. Fore wings dull testaceous, with a glaucous bloom, bright red at the base. Hind wings brown. Length of the body 5 lines; of the wings 10 lines.

Malacca.

64. TETTIGONIA SUAVISSIMA, n. s. Nigra subtùs alba, capite brevi-conico vittâ guttisque duabus nigris, thoracis lateribus luteis, pectore maculis nigris, abdomine luteo maculis lateralibus fasciâ rufâ apice albo, alis anticis fuscis apices versus pallidioribus strigâ obliquâ rufâ anticè limpidis costâ luteâ, posticis fuscis apud costam limpidis basi nigricantibus.

Nearly allied to *T. semiclara*, *Signoret*, and to *T. stellata*, *Sign.*, and forming with them a distinct group in the genus. Black, white beneath. Head short-conical, rounded in front, white with a black stripe and two black dots. Thorax luteous on each side. Pectus with black spots. Abdomen luteous with black spots on each side, red towards the tip which is white. Legs white. Fore wings dark brown, paler brown with an oblique red streak towards each tip, interruptedly limpid along the costa which is luteous. Hind wings brown, limpid along the costa, blackish at the base. Length of the body 4 lines; of the wings 10 lines.

Singapore.

65. TETTIGONIA JOCOSA, n. s. Rufa subtùs alba, capite albo brevi rotundato lateribus nigris, thorace vittis quinque testaceis duabusque albis, pedibus albis, alis anticis albo-vittatis fasciâ luridâ basi testaceis apice fuscis, posticis cinereis.

Red, white beneath. Head white, short, rounded, nearly semicircular; front

black on each side. Thorax with five testaceous stripes and with two white stripes. Legs white. Fore wings with several various white stripes, testaceous at the base, lurid towards the tips which are brown. Hind wings dark grey. Length of the body 3 lines; of the wings 7 lines.

Mount Ophir.

Coh. SCARIDES, *Amyot et Serv.*

Gen. LEDRA, *Fabr.*

66. LEDRA CULTELLIFERA, n. s. Testacea punctis pallidioribus, capite conico, scutello attenuato, oviductu fulvo apice nigro, alis anticis subtuberculatis, posticis limpidis.

Testaceous. Head and thorax with minute paler dots. Head conical, broader than long. Scutum about twice broader than long. Scutellum attenuated and acuminate at the tip. Oviduct tawny, with a black tip. Fore wings very minutely tuberculate. Hind wings limpid. Length of the body $6\frac{1}{2}$ lines; of the wings 12 lines.

Singapore.

67. LEDRA CONIFERA, n. s. Fulva tuberculis pallidis, subtus testacea, capite conico, alis anticis testaceis venis ex parte rufescentibus, posticis limpidis.

Tawny, testaceous beneath. Head and thorax thickly covered with very minute pale tubercles. Head conical, hardly broader than long. Scutum not twice broader than long. Scutellum acuminate. Fore wings testaceous, very minutely tuberculate; veins partly reddish. Hind wings limpid. Length of the body 6 lines; of the wings 10 lines.

Singapore.

68. LEDRA NIGRILINEA, n. s. Testacea subpunctulata, capite scutique lateribus nigro marginatis, capite brevi-conico, alis posticis limpidis.

Testaceous, very minutely punctured. Head and sides of the scutum bordered with black. Head short-conical, twice broader than long. Scutum not twice broader than long. Scutellum acuminate. Hind wings limpid. Length of the body $3\frac{1}{2}$ lines; of the wings 7 lines.

Singapore.

Gen. PENTHIMIA, *Germar.*

69. PENTHIMIA CASTANEA, n. s. Ferruginea lævis nitens, capite anticè subtusque pectoris margine antico maculisque duabus nigris, pedibus nigris, tibiis spinosissimis, alis anticis apices versus luridis maculis nigris.

Ferruginous, smooth, shining. Head black in front and beneath. Pectus black in front and with a black spot on each side behind. Legs black; tibiæ very spinose. Fore wings lurid, and with black spots towards the tips. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

Malacca.

Coh. IASSIDES, *Amyot et Serv.*

Gen. ACOCEPHALUS, *Germar.*

70. Acocephalus olivaceus, *Walk. Cat. Homopt.* pt. 3. 846. 1.

Malacca. Inhabits also the Philippine Islands.

*hosus*Gen. CÆLIDIA, *Germar.*

71. CÆLIDIA GUTTIVENA, n. s., fœm. Nigro-ænea, capite viridi-testaceo, verticis guttis duabus frontisque vittis duabus rufis, thorace punctis testaceis, pectore abdomineque testaceis ex parte nigris, pedibus testaceis, tibiis tarsisque apice nigris, alis anticis hyalino-bifasciatis apicibus semihyalinis venis nigris luteo-guttatis, posticis cinerascentibus.

Female. Blackish-æneous. Head greenish testaceous, with two red spots on the vertex, and with two red stripes in front. Thorax thickly covered with testaceous points. Pectus and abdomen testaceous, partly black. Legs testaceous; tips of the tibiæ and of the tarsi black. Fore wings with two hyaline bands, and with semihyaline tips; veins black, with very numerous luteous dots. Hind wings greyish. Length of the body $3\frac{1}{2}$ lines; of the wings 8 lines.

Malacca.

72. CÆLIDIA PUNCTIVENA, n. s., fœm. Nigro-ænea, capite testaceo strigis tribus abbreviatis nigris, thorace punctis testaceis, pectore et abdomine nigris ex parte testaceis, pedibus nigricantibus, alis anticis testaceo-guttatis venis luteo-guttatis, posticis cinerascentibus.

Female. Blackish-æneous. Head dull testaceous, with three short black streaks between the eyes. Thorax thickly covered with testaceous points. Pectus and abdomen black, partly testaceous. Legs blackish. Fore wings with numerous minute testaceous dots between the veins which are black, with minute luteous dots. Hind wings greyish. Length of the body 4 lines; of the wings 9 lines.

Malacca.

Ord. PHYTOPHTHIREs, *Burmeister.*Fam. COCCIDÆ, *Leach.*Gen. MONOPHLEBUS, *Leach.*

73. *Monophlebus atripennis*, *Klug, Handb. ii. 80.*

Malacca and Singapore. Inhabits also Hindostan.

DESCRIPTION OF PLATES.

PLATE III.

Fig. 1. *Eupilis albilineola*, p. 93; 1*a*, head and rostrum seen in front; 1*b*, the same seen sideways; 1*c*, the extremity of the body seen sideways.

Fig. 2. *Micreune formidanda*, p. 94.

Fig. 3. *Benna capitulata*, p. 90; 3*a*, the head and rostrum seen in front; 3*b*, the same seen sideways; 3*c*, the abdomen seen beneath.

Fig. 4. *Cromna acutipennis*, p. 85; 4*a*, the head and rostrum seen in front; 4*b*, the same seen sideways; 4*c*, the abdomen seen sideways.

Fig. 5. *Colobesthes marginata*, p. 92; 5*a*, the head and rostrum seen in front; 5*b*, the same seen sideways; 5*c*, the abdomen seen sideways.

PLATE IV.

- Fig. 1.* *Colsa costastriga*, p. 96; *1a*, the head and rostrum seen in front; *1b*, the same seen sideways.
- Fig. 2.* *Bidis notivena*, p. 88; *2a*, the head and rostrum seen in front; *2b*, the same seen sideways.
- Fig. 3.* *Conna guttifera*, p. 90; *3a*, the head and rostrum seen in front; *3b*, the same seen sideways.
- Fig. 4.* *Elica latipennis*, p. 86; *4a*, the head and rostrum seen in front; *4b*, the same seen sideways.
- Fig. 5.* *Daradax fusipennis*, p. 86; *5a*, the head and rostrum seen in front; *5b*, the same seen sideways; *5c*, the extremity of the abdomen seen sideways.
- Fig. 6.* *Euria lurida*, p. 88; *6a*, the head and rostrum seen in front; *6b*, the same seen sideways; *6c*, the extremity of the abdomen seen sideways.

On the Occurrence of *Sepia biserialis* in Cornwall.

By JONATHAN COUCH, Esq., F.L.S. &c.

[Read March 4th, 1856.]

It appears from the "History of British Mollusca," by Professor E. Forbes and Mr. Hanley (vol. iv. p. 241, and Pl. P.P.P.), that the *Sepia biserialis* is regarded as of very rare occurrence in Britain; one specimen only of its shell or plate having been found in England and three in Ireland. The English specimen was obtained on the shore of the county of Northumberland. It may therefore be regarded as of some importance in the completion of our local fauna, to make the Linnean Society acquainted with the fact, that in the course of two days in the month of February of the present year I have myself found no less than ten specimens of the dorsal plate or shell of this animal, scattered among perhaps a hundred of those of the Common Bone or Burn Cuttle, *Sepia officinalis*.

My attention was attracted to these specimens by the beautiful pale pink colour of the dorsal aspect of the shell; and a very slight examination of the most perfect specimen I could find, compared with those of the common species, was sufficient to point out the decided distinction there is between them; but as the shell of this species is but little known, and those which have fallen into my hands are slightly different from what is described in the work above referred to, I beg leave to lay before the Society a more particular description than might otherwise be necessary.

The length of this shell, as described by Professor Forbes, was

$2\frac{1}{2}$ inches, and the breadth (I suppose without the membranous wing) was $\frac{1}{2}$ of an inch; but in the most perfect of my specimens, which however is defective at its blunt end, the length is 4 inches, and the breadth, including the membranous border, $1\frac{5}{8}$ inch. The form is much more slender than in the common species, and, as it approaches the mucro or spur, may be described as lancet-shaped. The spur projects much more considerably than in the *Sepia officinalis*, although in the latter I find a difference in different specimens. In the *S. biserialis* it advances $\frac{1}{8}$ th of an inch beyond the membranous border in a straightforward direction, whereas in the *S. officinalis* it is depressed and bent inward. The membranous border at this part is also turned inward, so as to enclose a cavity, and conceal the narrower portion of the shell. The structure of this spur in the *S. biserialis* is also different; for while that of the common species is for the most part hooked, round and simple, in the *S. biserialis* it is slightly lobed or keeled. I have not been able to assure myself of its shape at the point, as in my most perfect specimen it was a little injured.

In addition to these well-marked distinctions, the rarer species is smooth on its dorsal aspect at that part where the more common is covered with a decided graining. The transverse striæ are also much more numerous, and of a finer structure. Their direction also at the sides is not so bent towards the slender extremity.

It is still a subject of interesting inquiry whether the animal to which this shell or plate belongs is truly a native of our own waters, since it does not appear that any observer has ascertained its existence. It is to be observed, however, that although the whole of these specimens were injured, and most of them much broken, they were scarcely more so than were those of the common species, which is, beyond question, common on our coasts. The two species were lying together on the beach, as they had been left by the tide; and although there were at no great distance from them many specimens of the stalks of the American maize, clothed with perfect leaves—and although without heads of grain, still bearing clumps of the male flowers,—yet we cannot conclude from the presence of these foreign plants that the shells can have come to us from a considerable distance, since those of the *Sepia officinalis* certainly have not done so, and the leaves and stalks of the plants bear no marks of long immersion or of a distant voyage. It is probable that they were thrown overboard from

some ship, as is often the case with foreign productions which we find cast up on our shores.

Polperro, 1856.

Notice of the "Borer," a Caterpillar very injurious to the Sugar-Cane. By J. O. WESTWOOD, Esq., F.L.S. &c.

[Read June 3rd, 1856.]

[Abstract.]

MR. WESTWOOD gave an account of the natural history of the "Borer," or caterpillar of a moth which is at the present time doing immense damage to the sugar-canes in the island of Mauritius. A committee had been formed in the island, composed of the chief planters and scientific individuals, for the purpose of investigating the subject, and from the able report which they had drawn up, it appears that the insects were in all probability imported with a cargo of new cane plants from the island of Ceylon several years ago, and that since that time the damage has been rapidly extending, and now threatens the entire destruction of the plantations. The female insect deposits her eggs in the axils of the young leaves, and the larvæ as soon as hatched bore into the stem, forming long galleries filled with the excrement of the insect, and which have the effect of bringing the stem into such a state of disease, that no crystallization will take place, and the plant becomes quite useless even for making rum. The entire transformations of the insect are effected in about six weeks, so that there are at least six successive generations in the course of a year. It appears that the chrysalis state is passed in a slight cocoon spun amongst the dead leaves of the plant; and the committee, after reviewing various proposals suggested for the destruction of the insect, had come to the conclusion that a well-organized system of burning the infested canes, as well as all loose rubbish and leaves in the plantation, was the only practicable means of getting rid of the enemy. Dr. Ulcoq, an extensive sugar-cane planter in the island, who was present at the meeting, confirmed the details contained in the report, and begged for any suggestions which could be offered by scientific men in this country for the purpose of remedying the evil. He had already been in communication with M. Guérin-Méneville and other naturalists in Paris.

Several of the members present took part in the discussion

upon the subject, and especially dwelt on the care necessary in the selection and treatment of the cuttings of the cane-tops for future plantations. The destruction of the eggs and young larvæ attached to such shoots would be effected if the latter were kept immersed in damp furrows, but the nature of the soil of the island prevented such a process; their immersion in a liquid capable of destroying the insect embryo without hurting the plant was also insisted upon; as well as the placing of the cuttings for a time in a close atmosphere saturated with the fumes of prussic acid arising from bruised laurel-leaves, which would certainly destroy the insect.

From the account given of this Mauritian borer, it appears identical with the borer of the West Indian plantations described by Fabricius under the name of *Phalæna saccharalis*, and by the Rev. L. Guilding under that of *Diatræa Sacchari* in a memoir published in the Transactions of the Society of Arts, for which he received the Gold Ceres Medal from the Society.

Notice of a Specimen of Insect-wax from China.

By DANIEL HANBURY, Esq., F.L.S. &c.

[Read April 15th, 1856.]

[Abstract.]

MR. D. HANBURY exhibited a specimen of Chinese Insect-wax in the crude state, attached to the branch on which it had been formed by the insect, *Coccus Pe-la*, Westw.* (*C. sinensis*, Westw. Pharm. Journ. xii. 478).

The specimen was obtained by Dr. M'Cartee of Ningpo, at a spot about fourteen miles N.E. of that city. The exact locality is described as "three miles from Chin-hae, southerly, behind the first range of hills across the river,—in the direction of Ling-fung," where the trees supporting the wax-insect occur on the banks of the canals.

Dr. M'Cartee procured specimens for Mr. Fortune, which that gentleman has taken to India with the view of introducing the insect into that country. He also sent specimens to William Lockhart, Esq., of Shanghai, through whose kindness that exhibited was received.

It may be remarked that, according to the Chinese accounts

* Gardener's Chronicle for Aug. 20, 1853 (p. 532).

the trees upon which the wax-insect lives are of two or three species. Of one of these, resembling an ash, a dried specimen was on the table. Mr. Lockhart has in his garden at Shanghai a small wax-tree of this species which he hopes shortly to colonize with the wax-insect. The tree has not yet flowered, and its botanical position is as yet undetermined. A living plant of the same species was brought to England by Mr. Fortune, from whose hands it passed into those of Messrs. Rollisson and Sons of Tooting.

Specimens of the manufactured insect-wax from China were also on the table.

Note on Insects producing Wax from Port Natal and China.

By J. O. WESTWOOD, Esq., F.L.S. &c.

[Read April 15th, 1856.]

THE wax-insect from Natal, exhibited by Mr. W. W. Saunders, is the female of a large species of *Coccus*, analogous to the *Coccus ceriferus*; each female being about the size of a pea, and of a dark chestnut colour, but encased in a solid layer of white waxy matter nearly a quarter of an inch thick, so as to make the entire insect as large as a boy's marble; the under side being flattened, or rather concave, so as to fit the convex surface of the branch on which they are found. The size of the insect would render it easy of observation, and the thickness of the wax would make it a more important object of commerce than the wax-insects of South America.

The Chinese wax-insect, of which so fine a specimen on the branch has been exhibited by Mr. Daniel Hanbury, differs from the latter by the waxy matter being deposited over the surface of the branch, and not confined to a coating of the insect. The specimens submitted to my examination are probably of considerable age, as they have been much deteriorated in a commercial point of view, by being attacked by other insects, namely a species of ant, of which I found the heads and other parts of several specimens; and a species of moth, of which I found portions of many chrysalides; the larvæ of which, I do not doubt, had devoured the animal matter of the *Cocci*, as well as burrowed into the wax. There were also some fragments of a *Curculio* (*Otiorhynchus*?), but these, I suppose, must have been taken accidentally on the trees in collecting the *Cocci*.

Catalogue of the Dipterous Insects collected at Sarawak, Borneo,
by MR. A. R. WALLACE, with Descriptions of New Species.
By FRANCIS WALKER, Esq., F.L.S.

[Received Sept. 15, 1856.]

Fam. MYCETOPHILIDÆ, *Haliday*.

Gen. SCIARA, *Meigen*.

Div. A. a. *Meig.* vi. 305.

1. SCIARA LATICORNIS, n. s., mas et fœm. Nigra, antennis validis, thorace nitido. Mas. Alis subnigricantibus. Fœm. Abdomine ferrugineo, alis nigricantibus.

Male and Female. Black. Antennæ stout. Thorax shining. *Male.* Wings slightly blackish. *Female.* Abdomen ferruginous. Wings blackish. Length of the body 3-4 lines; of the wings 5-6 lines.

2. SCIARA SOLITA, n. s., fœm. Nigra, antennis gracilibus, thorace abdominisque apice subnitidis, pedibus piceis, alis subnigricantibus.

Female. Black. Antennæ slender. Thorax and tip of the abdomen slightly shining. Legs piceous. Wings slightly blackish. Length of the body $1\frac{1}{4}$ line; of the wings 3 lines.

Fam. CECIDOMYZIDÆ, *Haliday*.

Gen. CECIDOMYIA, *Latreille*.

3. CECIDOMYIA DEFERENDA, n. s., fœm. Fusca, capite nigro, thorace rufescente, pedibus testaceis, alis albidis, venis halteribusque testaceis.

Female. Brown. Head black. Thorax reddish. Legs testaceous. Wings whitish, ciliated; veins and halteres pale testaceous; subcostal vein ending at a little before the middle of the costa; cubital vein ending at the tip of the wing; hind branch of the anal vein straight, and proceeding obliquely to the hind border. Length of the body $1\frac{3}{4}$ line; of the wings $3\frac{1}{2}$ lines.

Fam. BIBIONIDÆ, *Haliday*.

Gen. PLECIA, *Hoffmansegg*.

4. Plecia dorsalis, *Walk.* See page 5.

5. PLECIA SUBVARIANS, n. s., mas et fœm. Atra. Mas. Thorace rufo, alis subnigricantibus. Fœm. Thorace rufescente, alis nigricantibus.

Male and Female. Deep black. *Male.* Thorax bright red. Wings slightly blackish. *Female.* Thorax dull red. Wings blackish. Length of the body $1\frac{1}{2}$ -2 lines; of the wings 4-5 lines.

This species may be distinguished from *P. dorsalis* by its narrower wings.

Fam. CULICIDÆ, *Haliday*.

Gen. CULEX, *Linn.*

6. Culex fuscus, *Wied.* See page 5.

Fam. TIPULIDÆ, *Haliday*.Gen. LIMNOBIA, *Meigen*.

Div. n.

Veins of the wings like those of Div. S. *Meig.* (*Zweifl.* i. 147. pl. 4. f. 17), with the exception of the subcostal vein, which is not connected with the costal, but emits a veinlet at its tip to the radial.

7. LIMNOBIA IMPRESSA, n. s., fœm. Fusca, capite nigro, thoracis lateribus testaceo-marginatis, pectore cano, abdomine lutescente fasciis fuscis, pedibus pallidè fusciscentibus, genubus testaceis, alis subcinereis venis nigris.

Female. Brown. Head and antennæ black. Lateral segments of the thorax with testaceous borders. Pectus hoary. Abdomen somewhat luteous, with brown bands. Legs slender, pale brownish; knees testaceous. Wings greyish; veins black. Length of the body $4\frac{1}{2}$ lines; of the wings 8 lines.

Div. n.

Veins of the wings much like those of Div. E. *Meig.* (*Zweifl.* i. 125. pl. 6. f. 2), but the veinlet which connects the subcostal vein with the radial is far beyond the base of the fork of the latter, the cubital parts from the radial at some distance from the veinlet which connects it with the 3rd externo-medial, and the veinlet between the 3rd externo-medial and the subanal is very near the base of the discal areolet.

8. LIMNOBIA RUBRESCENS, n. s., mas. Ferrugineo-rufa, capite pedibusque nigris, pectore ventre femoribus basi coxisque rufescentibus, abdomine vittâ dorsali nigricante, alis fusco-cinereis venis stigmatæque nigricantibus.

Male. Ferruginous red, paler beneath. Head, antennæ and legs black. Abdomen with a blackish stripe. Femora at the base and coxæ reddish. Wings brownish-grey; veins and stigma blackish. Length of the body 5 lines; of the wings 12 lines.

Div. n.

Veins of the wings much like those of Div. E. *Meig.* (*Zw.* i. 125. pl. 6. f. 2), but the veinlet which connects the subcostal vein with the radial is beyond the base of the fork of the latter, and the veinlet between the 3rd externo-medial vein and the subanal is opposite the middle of the discal areolet.

9. LIMNOBIA PYRRHOCHROMA, n. s., mas. Ochraceo-rufa, capite nigro?, pedibus nigris, femoribus basi coxisque fulvis, alis cinereis venis fuscis.

Male. Ochraceous red. Head black? Legs black, slender; femora towards the base and coxæ tawny. Wings grey; veins brown. Length of the body $3\frac{1}{2}$ lines; of the wings 8 lines.

Div. n.

Differs from all the other divisions of *Limnobia* by the contorted petiole of the radial and cubital veins, and by the radial vein which near its base forms an angle emitting a branch; externo-medial veins simple; discal areolet sub-

hexagonal, about twice longer than broad; veinlet between the 3rd externo-medial vein and the subanal near the base of the discal areolet.

10. *LIMNOBIA ARGENTO-CINCTA*, n. s., fœm. Nigra, antennis verticillato-pilosis, thorace nitido, abdomine fasciis argenteis, femoribus subclavatis, alis cinereis venis nigris nebulosis.

Female. Black. Antennæ verticillate-pilose. Thorax shining. Abdomen with silvery bands. Femora subclavate. Wings grey; veins black, slightly clouded with black. Length of the body $3\frac{1}{2}$ lines; of the wings 6 lines.

Gen. PTEROCOSMUS, *Walk.*

Limnobia leucotelus and *L. plecioides*, p. 6, and other species, may be placed in this genus; the structure of their wing-veins differs somewhat from that of Meigen's Div. 1.

11. *PTEROCOSMUS LUNIGERUS*, n. s., mas. Ater, pedibus piceis, alis violaceo-nigricantibus apice testaceis maculâ discali sublunatâ albâ.

Male. Deep black. Legs piceous. Wings black, with violet reflections, testaceous at the tips, and with a white slightly curved discal white spot. Length of the body 5 lines; of the wings 8 lines.

12. *PTEROCOSMUS INFIXUS*, n. s., mas et fœm. Niger, thorace ferrugineo, abdomine antico flavescente, vittâ viridi, pedibus ferrugineis, femoribus tibiisque apice tarsisque nigris, alis violaceo-nigricantibus fasciâ brevi discali maculâque subapicali albis. Fœm. Abdominis segmentis posterioribus nigris fulvo marginatis, terebrâ ferruginâ.

Male and Female. Black. Thorax and legs ferruginous. Abdomen towards the base yellowish, and with a green stripe. Tarsi and tips of the femora and of the tibiæ black. Wings blackish, with violet reflections, adorned with a short white discal band and with a subapical white spot.

Female. Hinder segments of the abdomen black, with tawny borders; oviduct ferruginous. Length of the body 5-6 lines; of the wings 10 lines.

13. *PTEROCOSMUS OPTABILIS*, n. s., mas. Ater, abdomine luteo basi fasciâque latâ posticâ atris, pedibus piceis, alis nigricantibus apice subcinereis fasciâ brevi discali albâ.

Male. Deep black. Abdomen luteous, black at the base, and with a broad black posterior band. Legs piceous, very slender. Wings blackish, with violet reflections, greyish hyaline at the tips, with a limpid mark by the interior angle, and with a short white discal band. Length of the body 3 lines; of the wings 6 lines.

14. *PTEROCOSMUS CÔMBINATUS*, n. s., fœm. Saturatè rufo-ferrugineus, capite nigro, abdomine fasciâ anticâ testaceâ, terebrâ pedibusque pallidè fulvis, alis violaceo-nigricantibus guttis costalibus et marginalibus maculâ discali lunulâque subapicali albis costâ testaceâ.

Female. Deep reddish ferruginous. Head and antennæ black. Abdomen with an anterior testaceous band. Oviduct, legs and halteres pale tawny. Tarsi blackish towards the tips. Wings blackish, with violet reflections, with a few marginal white dots, with two white spots (one discal, the other

subapical), and with a limpid mark on the hind part of the base; costa testaceous. Length of the body 8 lines; of the wings 12 lines.

15. *PTEROCOSMUS DILUTUS*, n. s. Saturatè rufus, capite nigro, antennis pedibus halteribusque testaceis, alis cinereis costâ testaceâ venulis transversis nigricante nebulosis maculâ discali guttisque marginalibus albis.

Nearly allied to the preceding species, of which it may be an immature variety. Deep red. Head black. Antennæ, legs and halteres pale testaceous. Tarsi a little darker towards the tips. Wings greyish, pale testaceous along the costa, with a discal white spot, and with some white marginal dots of various size; transverse veinlets slightly clouded with black. Length of the body 6 lines; of the wings 10 lines.

Gen. *TIPULA*, *Linn.*

16. *Tipula pedata*, *Wied. Auss. Zweifl. i. 45. 7.*

Inhabits also Java.

17. *TIPULA VILIS*, n. s., mas. Fusca, antennis subverticillato-pilosis, thorace ferrugineo nitido, femoribus basi fulvescentibus, alis subcinereis venis stigmatæque nigris.

Male. Brown. Antennæ short, slightly verticillate-pilose. Thorax ferruginous, shining. Legs slender; femora somewhat tawny towards the base. Wings very slightly greyish; stigma and veins black. Length of the body 4 lines; of the wings 10 lines.

Fam. *STRATIOMIDÆ*, *Haliday.*

Gen. *PTILOCERA*, *Wied.*

18. *Ptilocera quadridentata*, *Fabr.* See page 7.

Gen. *CLITELLARIA*, *Meigen.*

19. *Clitellaria varia*, *Walk.* See page 7.

20. *Clitellaria flaviceps*, *Walk.* See page 7.

21. *CLITELLARIA NOTABILIS*, n. s., fœm. Nigro-cyanea, capite halteribusque pallidè testaceis, antennis pedibusque nigris, abdomine cyaneo, alis fuscis costam versus nigricantibus.

Female. Blackish-blue. Head pale testaceous. Antennæ and legs black. Thorax with a band and a stripe of grey tomentum. Abdomen blue, with grey tomentum beneath. Wings dark brown, blackish along the costa. Length of the body 5 lines; of the wings 10 lines.

Gen. *CYCLOGASTER*, *Macquart.*

22. *CYCLOGASTER DETRACTA*, n. s., fœm. Nigra, cinereo-pubescens, antennis fulvis, aristâ albidâ elongatâ tenui, pedibus albidis, coxis femoribusque nigris, alis subcinereis venis sordidè albidis.

Female. Black, with grey down. Head shining. Antennæ tawny; arista

whitish, elongated, filiform. Legs whitish; coxæ and femora black. Wings very slightly greyish; veins dingy whitish. Halteres whitish. Length of the body 2 lines; of the wings 4 lines.

23. *CYCLOGASTER INFERA*, n. s., fœm. Nigra cinereo-pubescentis, antennis nigris, articulo 1° fulvo, 3° valido; pedibus albidis, coxis femoribusque nigris, alis limpidis venis albidis.

Female. Black, with grey down. Head shining. Antennæ black; 1st joint tawny; arista stout. Legs whitish; coxæ and femora black. Wings limpid; veins whitish. Halteres white. Length of the body 2 lines; of the wings 4 lines.

Gen. *CULCUA*, n. g.

Caput parvum; frons declivis. *Antennæ* breves; articulus 3^{us} rotundus; arista apicalis, longa, tenuis, setiformis. *Thorax* productus, longiconicus. *Scutellum* quadrispinosum. *Abdomen* crassum, subrotundum, thorace brevius et latius. *Pedes* breves, simplices. *Alæ* sat angustæ. *Mas.* *Oculi* suprâ connexi.

Head small; front vertical. Antennæ short; 3rd joint round; arista long, slender, setiform, apical. Thorax elongate-conical, produced in front. Scutellum with 4 spines. Abdomen thick, nearly round, shorter and broader than the thorax. Legs short, slender, unarmed. Wings rather narrow; structure of the veins like that of *Clitellaria*.

Male. Eyes connected above.

24. *CULCUA SIMULANS*, n. s., mas. Nigra, capite albo-tomentoso, antennis fulvis, thorace et abdomine fasciis cinereo-pubescentibus, scutelli spinis fulvis, alis subcinereis fasciâ mediâ nonnunquam subinterruptâ apiceque latè nigricantibus.

Male. Black. Head with white tomentum. Antennæ tawny. Thorax and abdomen with bands of grey down. Scutellum with tawny spines. Legs pubescent. Wings slightly greyish, blackish towards the tips, and with a sometimes nearly interrupted blackish band. Length of the body 3-3½ lines; of the wings 5-6 lines.

This species also inhabits Malacca, and was accidentally omitted in the descriptions of the Malay species.

Gen. *EVAZA*, n. g.

Corpus planum, subglabrum. *Caput* thoracis latitudine. *Antennæ* breves; articulus 1^{us} longiusculus; 3^{us} rotundus; arista apicalis, longa, gracilis, setiformis. *Thorax* ellipticus. *Scutellum* quadri-spinosum. *Abdomen* subellipticum, thorace paulò longius, vix latius. *Pedes* graciles, simplices. *Alæ* sat longæ, vix latæ. *Mas.* *Oculi* magni, suprâ connexi.

Body rather flat, nearly bare. Head as broad as the thorax. Antennæ short; 1st joint rather long; 3rd round; arista long, slender, setiform, apical. Thorax elliptical. Scutellum with 4 rather long spines. Abdomen flat, elliptical, a little longer but hardly broader than the thorax. Legs slender, unarmed. Wings rather long, moderately broad; structure of the veins like that of *Clitellaria*.

Male. Eyes large, connected above.

25. *EVAZA BIPARS*, n. s., mas. Nigra nitida, oculis rufis, antennis scutelli margine postico spinisque pedibus halteribusque pallidè flavescentibus, abdominis disco flavescente, alis cinereis stigmatè venisque nigricantibus.
Male. Black, shining. Eyes red. Antennæ, hind border and spines of the scutellum, legs and halteres pale yellow. Arista black. Thorax with a testaceous line on each side. Disk of the abdomen yellowish. Wings grey; stigma and veins blackish, the latter testaceous at the base. Length of the body 3 lines; of the wings 6 lines.

Gen. *SARGUS*, *Fabr.*

26. *Sargus metallinus*, *Fabr. Syst. Antl.* 258. 11.
 Inhabits also Hindostan and Java.
27. *Sargus luridus*, *Walk.* See page 8.
28. *SARGUS LATIFASCIA*, n. s., mas. Fulvus, antennis pectore abdomine pedibusque testaceis, abdomine fasciis latis nigris, pedum posteriorum femoribus nigro vittatis, tibiis tarsisque nigris, his albedo fasciatis, alis cinereis venis nigris basi fulvis.
Male. Tawny. Antennæ, pectus, abdomen and legs testaceous. Abdomen with broad black bands. Hind femora striped with black; hind tibiæ and hind tarsi black, the latter with a whitish band. Wings grey; veins black, tawny at the base. Length of the body 5 lines; of the wings 11 lines.

Fam. *TABANIDÆ*, *Leach.*

Gen. *TABANUS*, *Linn.*

29. *Tabanus hybridus*, *Wied. Auss. Zweifl.* i. 557. 31.
 Inhabits also Macao.
30. *Tabanus univentris*, *Walk.* See page 9.
Var. Abdomen luteous-tawny, with an indistinct paler dorsal stripe.
31. *TABANUS NEXUS*, n. s., fœm. Ferrugineus subtùs canescens, callo piceo elongato, antennis nigris, thorace vittis subobsoletis rufescentibus, abdomine rufescente e maculis trigonis testaceis univittato, pedibus rufescentibus, femoribus anticis tibiis anticis apice tarsisque nigris, alis cinereis venis fusco marginatis, halteribus pallidè luteis.
Female. Very nearly allied to *T. univentris*. Ferruginous, somewhat hoary beneath. Callus piceous, long and slender. Proboscis black. Lancets ferruginous. Palpi brown. Antennæ black; angle of the 3rd joint small. Thorax with indistinct reddish stripes. Abdomen reddish, with a testaceous triangular spot on the hind border of each segment. Legs reddish; fore femora, tips of the fore tibiæ and tarsi black. Wings grey; veins black, clouded with brown. Halteres pale luteous. Length of the body 8 lines; of the wings 16 lines.
32. *TABANUS FUMIFER*, n. s., mas et fœm. Fuscus subtùs cinereus, abdomine ferrugineo-rufo apicem versus nigro segmentorum marginibus posticis testaceis, pedibus nigris, tibiis ferrugineo vittatis, alis fuscis. Mas. An-

tennis ferrugineis, alarum margine postico cinereo. Fœm. Antennis nigris, basi ferrugineis, abdomine maculis dorsalibus subtrigonis testaceis, alarum areolis cinereo vittatis.

Male and Female. Very nearly allied to *T. univentrīs*. Brown, cinereous beneath. Abdomen ferruginous-red, black towards the tip; hind borders of the segments testaceous. Legs black; tibiæ with ferruginous stripes. Wings brown; veins black. Halteres pale luteous. *Male.* Eyes æneous, and with very small facets in front. Antennæ ferruginous. Wings grey along the hind border, and with indistinct grey streaks on the areolets elsewhere. *Female.* Antennæ black, ferruginous at the base. Abdomen with a small nearly triangular spot on the hind border of each segment. Areolets of the wings with cinereous disks. Length of the body 6-7 lines; of the wings 12-14 lines.

33. *TABANUS OPTATUS*, n. s., fœm. Ferrugineus subtus canus, capite antico albido callo lanceolato, antennis nigris basi fulvis, thoracis lateribus testaceis, scutello cano, abdomine fulvo vittâ posticè dilatatâ nigrâ guttis dorsalibus albidis, pedibus nigris, tibiis anticis basi tibiisque posterioribus fulvis, alis nigro-fuscis apice lato margineque postico subcinereis maculâ mediâ sublimpidâ.

Female. Ferruginous, hoary beneath. Head whitish in front. Callus lanceolate. Proboscis black. Palpi testaceous. Antennæ black, tawny at the base; angle of the third joint acute, slightly elongated. Thorax with three darker lines; sides testaceous. Scutellum hoary. Abdomen tawny; hind borders of the segments beneath and on each side above testaceous; a black dorsal stripe which is dilated hindward; a whitish nearly triangular dot on the hind border of each segment. Legs black; fore tibiæ at the base and hinder tibiæ tawny. Wings blackish-brown; apical third part and hind border slightly cinereous; a nearly limpid discal spot before the middle; veins black. Halteres blackish. Length of the body 6 lines; of the wings 12 lines.

34. *TABANUS SIMPLICISSIMUS*, n. s., mas et fœm. Cinereus, callo trigono piceo, antennis fulvis, thoracis lateribus testaceis, abdomine testaceo apice nigricante, pedibus nigris. *Mas.* Tarsis posterioribus basi tibiisque posterioribus testaceis, tibiis anticis testaceis apice nigris, alis sublimpidis costâ venisque testaceis. *Fœm.* Femoribus apice fulvis, tibiis albidis, anticis apice nigris, tarsis posterioribus basi fulvis, alis cinereis apud costam luridis venis nigris basi ferrugineis.

Male and Female. Cinereous. Callus at the base of the antennæ broad, triangular, piceous. Palpi testaceous. Antennæ tawny; 3rd joint not dilated nor dentate. Sides of the thorax testaceous. Abdomen testaceous, blackish at the tip. Legs black.

Male. Eyes in front æneous, and with very minute facets. Tibiæ testaceous; fore tibiæ with black tips; hinder tarsi testaceous at the base. Wings nearly limpid, very slightly cinereous; costa, veins and halteres testaceous.

Female. Callus between the eyes long and slender. Femora with tawny tips; tibiæ whitish; fore tibiæ with black tips; hinder tarsi tawny towards the base. Wings cinereous, lurid along the costa; veins black, ferruginous towards the base. Length of the body $3\frac{1}{2}$ - $4\frac{1}{2}$ lines; of the wings 7-8 lines.

Gen. CHRYSOPS.

35. *Chrysops dispar*, *Fabr.* See p. 9. "Very abundant in the jungle at Sarawak."

36. *Chrysops fasciatus*, *Wied. Auss. Zweifl.* i. 198. 5.

Inhabits also Java.

37. *CHRYSOPS FIXISSIMUS*, n. s., fœm. *Picea*, capite thoracisque marginibus aureo-pubescentibus, capitis callo atro, facie ferrugineâ guttis duabus lateralibus nigris, antennis nigris basi fulvis, abdomine fulvo fasciis tribus nigricantibus, pedibus fulvis, tibiis subdilatis nigricantibus, alis subcinereis costâ apice fasciâque latâ nigro-fuscis.

Var. Abdomine bifasciato basi testaceo.

Female. Piceous. Head and borders of the thorax with gilded down. Head with a black shining callus above the antennæ; face ferruginous, shining, with a black dot on each side. Palpi tawny. Antennæ black, tawny at the base. Abdomen tawny, with three blackish bands. Legs tawny; femora and tarsi with piceous tips; tibiæ and fore tarsi black, the former slightly dilated. Wings very slightly cinereous, brown along the costa and at the tips, and with a broad brown band. Halteres testaceous.

Var. Abdomen testaceous at the base, with two bands, the fore one black, the hind one brown. Length of the body $3\frac{1}{2}$ –4 lines; of the wings 7–8 lines.

Gen. HÆMATOPOTA, *Meig.*

38. *Hæmatopota roralis*, *Fabr. Syst. Antl.* 107. 2.

"Eyes above opal white, with black specks."

39. *HÆMATOPOTA ATOMARIA*, n. s., fœm. Nigro-picea, capite antico atro nitido, antennis nigris basi nitidis, abdominis marginibus posticis canis, tibiis albido cinctis, alis nigricantibus guttis plurimis annuloque unico albis.

Female. Piceous-black. Head black and shining in front. Palpi ferruginous. Antennæ black; 1st joint shining. Abdominal segments with hoary hind borders. Tibiæ with a whitish band on each. Wings blackish, with very numerous white dots, and with one white ringlet which is by the costa at two-thirds of the length. Length of the body 3 lines; of the wings 6 lines.

Fam. ASILIDÆ, *Leach.*Subfam. DASYPOGONITES, *Walk.*Gen. DASYPOGON, *Fabr.*Subgen. MICROSTYLUM, *Macq.*

40. *Dasygogon Vica*, *Walk. Cat. Dipt.* pt. 2. 304.

Inhabits also Silhet.

41. *DASYPOGON INCOMPTUS*, n. s., mas. Nigro-cinereus subtùs canescens, facie ferrugineâ, antennis pedibusque nigris, thorace vittis quatuor canis,

abdomine maculis lateralibus canis apice rufescente, alis violaceo-nigricantibus.

Male. Blackish-cinereous, hoary beneath. Face bright ferruginous. Epistoma with six white bristles. Antennæ and legs black. Thorax with four hoary stripes. Abdomen with hoary spots along each side; tip reddish; appendages black, ciliated. Wings blackish, with violet reflections. Length of the body 9 lines; of the wings 16 lines.

Gen. DISCOCEPHALA, *Macquart.*

42. DISCOCEPHALA DORSALIS, *Walk.* (See page 9.) mas. Thorace vittis duabus testaceis, abdomine piceo fasciis latis abbreviatis testaceis apice nigro-cupreo, pedibus testaceo-fulvis, femoribus tibiisque apice nigricantibus, femoribus posticis crassis spinosis.

Male. Thorax with two testaceous stripes. Abdomen piceous, with short broad testaceous bands, blackish cupreous towards the tip. Legs testaceous-tawny; femora and tibiæ with blackish tips; hind femora thick, spinose.

Subfam. LAPHRITES, *Walk.*

Gen. LAPHRIA, *Fabr.*

43. *Laphria Reinwardtii*, *Wied.* See page 10.

44. *Laphria alternans*, *Wied.* See page 10.

45. *Laphria notabilis*, *Walk.* See page 10.

46. *Laphria triangularis*, *Walk. Cat. Dipt.* 2nd Ser. 3. 553. 138. Inhabits also Sumatra.

47. *Laphria constricta*, *Walk. Cat. Dipt.* 2nd Ser. 3. 555. 142. Inhabits also Sumatra.

48. *Laphria aurifacies*, *Macq.* See page 10.

49. *Laphria inaurea*, *Walk.* See page 11.

50. *Laphria plana*, *Walk.* See page 12.

51. LAPHRIA UNIFASCIA, n. s., mas. Nigro-cuprea aureo-hirta, mystace nigro, abdominis lateribus fasciâ ventræ rufescentibus, alis nigricantibus basi latè sublimpidis venis nigris, halteribus fulvis.

Male. Blackish cupreous, partly clothed with gilded hairs. Face with very pale gilded tomentum. Mystax with some black bristles. Antennæ black; 3rd joint linear, acuminate, a little longer than the 1st and the 2nd together. Thorax with two bands of gilded tomentum. Abdomen reddish beneath and on each side, and with a very broad reddish band. Legs black, stout, pilose; hind femora very thick. Wings blackish, nearly limpid for one-third of the length from the base. Halteres tawny. Length of the body 5 lines; of the wings 8 lines.

52. LAPHRIA COMPTISSIMA, n. s., mas et fœm. Aureo-tomentosa, facie albo-tomentosa, antennis pedibusque nigris, abdomine apicem versus nigro-purpureo, tibiis luteis, alis nigricantibus dimidio ferè basali subcinereo, halteribus fulvis apice fuscis.

Male and Female. Body covered with gilded tomentum. Mystax composed of several slender black bristles. Antennæ and legs black. Third joint of the antennæ nearly linear, slightly acuminate, hardly longer than the 1st and the 2nd together. Abdomen bare, shining and blackish-purple towards the tip. Legs rather stout; tibiæ luteous; hind tibiæ black towards the tips. Wings blackish, slightly greyish on nearly half the length from the base; veins black, tawny at the base. Halteres tawny, with brown knobs.

Male. Face with white tomentum.

Female. Face with pale gilded tomentum.

Length of the body $4\frac{1}{2}$ –5 lines; of the wings 8–9 lines.

53. *LAPHRIA RUPIS*, n. s., fœm. Nigra, capite postico pectoreque canotomentosis, facie fulvâ, thorace vittis duabus canis; abdomine cyaneo-nigro maculis lateralibus canis, alis nigricantibus basi latè subcinereis, halteribus fulvescentibus.

Male. Black. Head with hoary tomentum behind, thickly clothed beneath with testaceous hairs. Face tawny. Mystax composed of many black bristles. Thorax with two hoary stripes. Pectus hoary. Abdomen bluish-black, with hoary spots along each side. Legs stout, clothed with hoary and pale testaceous hairs, and with black bristles. Wings blackish, slightly greyish for more than one-third of the length from the base; veins black. Halteres somewhat tawny. Length of the body 6 lines; of the wings 11 lines.

54. *LAPHRIA PRODUCTA*, n. s., mas. Atra vix pilosa, facie aureo-tomentosâ, pectore cano, abdomine longiusculo punctis lateralibus canis, pedibus crassis, alis nigricantibus dimidio ferè basali subcinereo, halteribus testaceis.

Male. Deep black, hardly pilose. Face with pale gilded tomentum. Mystax with very few black bristles. Pectus with hoary tomentum. Abdomen somewhat long, with minute hoary dots along each side. Legs thick, rather short. Wings blackish, greyish for nearly half the length from the base; veins black. Halteres testaceous. Length of the body $4\frac{1}{2}$ lines; of the wings 7 lines.

55. *LAPHRIA LEPIDA*, n. s., mas. Nigra aureo-pilosa, facie aureo-tomentosâ, thorace bivittato et bifasciato, abdomine aureo-rufo, pedibus crassis pilosis, alis nigricantibus triente basali subcinereo, halteribus testaceis.

Male. Black, clothed with gilded hairs. Face with gilded tomentum. Mystax with many gilded and with a few black bristles. Third joint of the antennæ linear, conical at the tip, longer than the 1st and the 2nd together. Thorax with two stripes and two bands of gilded tomentum. Pectus gilded. Abdomen with golden-red tomentum. Legs pilose; femora incrassated. Wings blackish, slightly cinereous for full one-third of the length from the base; veins black. Halteres testaceous. Length of the body 6 lines; of the wings 11 lines.

56. *LAPHRIA COMPLETA*, n. s., fœm. Nigra fulvo-pilosa, facie pectoreque aureo-tomentosis, abdominis apice glabro nigro-purpureo, pedibus robustis, alis fuscis triente basali pallidiorè, halteribus testaceis.

Female. Black, clothed with tawny hairs. Face and pectus with gilded tomentum. Mystax with several gilded and with a few black bristles. Third joint of the antennæ elongate-fusiform, longer than the 1st and the 2nd together. Legs hairy; femora slightly thickened. Wings brown, paler towards the base; veins black. Halteres testaceous. Length of the body 6 lines; of the wings 12 lines.

57. *LAPHRIA INCIVILIS*, n. s., fœm. Nigra fulvo-tomentosa, facie subauratâ, pectore cano, abdominis lateribus cano-guttatis, tibiis basi fulvis, alis fusco-cinereis basi pallidioribus, halteribus testaceis.

Female. Black, thinly covered with tawny tomentum, not pilose. Face with slightly gilded tomentum. Mystax with very few black bristles. Pectus hoary. Hind borders of the abdominal segments with a hoary dot on each side. Legs slightly pilose; femora rather stout; tibiæ tawny, black towards the tips. Wings brownish-grey, paler at the base; veins black. Halteres testaceous. Length of the body $4\frac{1}{2}$ lines; of the wings 8 lines.

58. *LAPHRIA PARTITA*, n. s., fœm. Nigra, facie albido-tomentosâ, thorace fusco-tomentosâ, pectore cano, abdomine nigro-purpureo, pedibus fulvis, tarsis tibiis apice genubusque posticis nigris, alis subfuscis aut subcinereis, halteribus testaceis.

Female. Black. Face with whitish tomentum, which is very slightly gilded. Mystax with several bristles of the same hue. Third joint of the antennæ fusiform, as long as the 1st and 2nd together. Thorax thinly covered with brownish tomentum. Pectus hoary. Abdomen purplish-black, with a very slight cupreous tinge; sides with brownish tomentum. Legs tawny; femora moderately stout; coxæ, trochanters, tarsi, tips of the tibiæ and hind knees black. Wings slightly cinereous or with a brownish tinge; veins black. Halteres testaceous. Length of the body 4 lines; of the wings 8 lines.

59. *LAPHRIA INTERRUPTA*, n. s., fœm. Nigra, facie aureo-tomentosâ, thoracis fasciis duabus interruptis pectoreque subaurato-tomentosis, abdomine nigro-æneo maculis tribus lateralibus fulvis, tibiis tarsisque testaceis apice nigris, alis nigricantibus dimidio basali subcinereo, halteribus testaceis.

Female. Black. Face with gilded tomentum. Mystax with a few gilded and very few black bristles. Thorax with two interrupted bands of very pale gilded tomentum, which also covers the pectus. Abdomen blackish-æneous, with three tawny tomentose spots on each side. Femora moderately thick; tibiæ and tarsi testaceous, black towards the tips. Wings blackish, very slightly greyish for half the length from the base; veins black. Halteres testaceous. Length of the body 4 lines; of the wings 8 lines.

60. *LAPHRIA CINGULIFERA*, n. s., fœm. Nigra, capite pectore thoracisque fasciis duabus interruptis pallidè aureo-tomentosis, abdominis segmentis apud margines posticos aurato-tomentosis, pedibus testaceis, femoribus nigro-vittatis, tibiis posticis apice tarsisque anticis nigris, tarsis posterioribus nigro-cinetis, alis cinereis, halteribus testaceis.

Female. Black. Head and pectus with very pale gilded tomentum. Thorax with two stripes and two interrupted bands of the same hue. Mystax with many pale gilded bristles. Third joint of the antennæ linear, slightly acuminate, very much longer than the 1st and the 2nd together. Ab-

domen with a gilded band on the hind border of each segment. Legs testaceous; femora hardly stout, with black stripes; hind trochanters and fore tarsi black; hind tibiæ with black tips; posterior tarsi with black bands. Wings cinereous; veins black. Halteres testaceous. Length of the body 6 lines; of the wings 11 lines.

61. *LAPHRIA DETECTA*, n. s., mas. Atra, capite postico pectoreque albidotomentosis, thorace maculâ laterali pallidè aureo-tomentosâ, abdomine basi albo piloso maculis tribus lateralibus aurato-tomentosis, pedibus fulvis, femoribus nigro-vittatis, tarsis nigris basi fulvis, alis limpidis dimidio ferè apicali nigricante.

Male. Deep black. Head behind and pectus with whitish tomentum. Mystax with very few black bristles. Third joint of the antennæ nearly linear, elongate-conical towards the tip, very much longer than the 1st and the 2nd together. Thorax with a spot of pale gilded tomentum on each side, in front of the base of the wing. Abdomen with white hairs at the base, and with three spots of gilded tomentum on each side. Legs tawny; coxæ and trochanters black; femora rather thick, with black stripes, which are very short on the hind pair; tarsi black, tawny at the base. Wings limpid, blackish for nearly half the length from the tips; veins black, tawny in the limpid part. Halteres very pale yellow. Length of the body $6\frac{1}{2}$ lines; of the wings 11 lines.

Subfam. ASILITES, *Walk.*

Gen. TRUPANEA, *Macq.*

62. *Trupanea Amorges*, *Walk. Cat. Dipt.* pt. 2. 391 (*Asilus*); 2nd ser. pt. 3. 612. 102.

63. *TRUPANEA INSERENS*, n. s., mas et fœm. Nigra, fusco-tomentosa, facie pectoreque subauratis, mystace suprâ albidò subtùs nigro, antennis pedibusque nigris, thorace vittis quinque nigris, abdominis segmentis cano interruptè marginatis, alis fuscis.

Male and Female. Black, with brown tomentum. Face and pectus with pale, slightly gilded tomentum. Mystax with some whitish bristles above, and with very few black bristles beneath. Antennæ black; arista as long as the 3rd joint. Thorax with five black stripes. Abdomen rather slender, moderately long; hind borders of the segments with slightly interrupted hoary bands. Legs black; tibiæ ferruginous above, except towards the tips. Wings brown; veins black; 3rd externo-medial vein joining the 4th far from the base. Halteres tawny.

Male. Sexualia moderately large. *Female*. Abdomen attenuated, not stylate. Length of the body 6 lines; of the wings 9-10 lines.

Gen. ASILUS, *Linn.*

64. *Asilus Barium*, *Walk.* See p. 14.

65. *ASILUS FLAGRANS*, n. s., fœm. Piceus, capite pectoreque aureo-tomentosis, mystace aureo, antennis fulvis, thorace strigis duabus obliquis lateralibus vittisque duabus aureo-tomentosis, abdominis segmentis testaceo-

marginatis, pedibus fulvis, tibiis posticis femoribusque piceo-vittatis, tarsis posticis nigris, alis luridis triente apicali fusca.

Female. Piceous. Head and pectus with gilded tomentum. Mystax with several gilded bristles. Antennæ tawny; arista as long as the preceding joints together. Thorax with two oblique streaks on each side, and with two stripes of gilded tomentum. Abdomen moderately long, hardly stylate; hind borders of the segments testaceous. Legs tawny; femora and hind tibiæ mostly piceous above; hind tarsi black. Wings lurid; apical third part brown, which colour extends further along the hind border; veins black, tawny at the base; cubital vein forked at a little beyond half its length; hind fork very undulating; 3rd externo-medial vein joining the 4th at some distance from the border. Halteres tawny. Length of the body $5\frac{1}{2}$ lines; of the wings 12 lines.

66. *ASILUS CONTORTUS*, n. s., fœm. Niger, cinereo-tomentosus, facie albidâ, mystace suprâ nigro subtùs albido, antennis nigris, thorace vittis duabus nigricantibus, pectore cano, abdomine subaureo piloso segmentis testaceo-marginatis, pedibus ferrugineis, femoribus tibiisque apice tarsisque nigris, alis luridis areolarum apicalium fuscarum discis pallidioribus.

Female. Black, with cinereous tomentum. Face prominent, whitish. Mystax with some black bristles above, and with many whitish bristles beneath. Antennæ black; arista as long as the preceding joints together. Thorax with two indistinct blackish stripes. Pectus hoary. Abdomen with slightly gilded hairs, moderately long, hardly stylate; hind borders of the segments testaceous; tip black, shining. Legs ferruginous; tarsi and tips of the femora and of the tibiæ black. Wings lurid; apical areolets brown, with pale disks; veins black; cubital vein forked at beyond half its length; fore fork angular near its base; hind fork very undulating; 3rd externo-medial vein joining the 4th near the border. Halteres tawny. Length of the body 6 lines; of the wings 13 lines.

Gen. OMMATIUS, *Illiger.*

67. *Ommatius Hecale*, *Walk.* See p. 14.

Gen. LEPTOGASTER, *Meigen.*

68. *LEPTOGASTER TRICOLOR*, n. s., mas. Piceus, capite albido-tomentoso, thoracis vittis duabus posticè attenuatis pectorisque lateribus testaceis, abdomine nigro fasciis quinque flavis, pedibus flavis, tibiis posticis tarsisque apice nigris, tarsis posticis ferrugineis apice nigris, alis cinereis costâ luridâ, halteribus testaceis.

Male. Piceous. Head with whitish tomentum. Antennæ testaceous towards the base. Thorax with two stripes, which are attenuated hindward, and with the sides of the pectus testaceous. Abdomen black, with five yellow bands. Legs yellow; coxæ and knees black; hind femora striped with black beneath; hind tibiæ with black tips; hind tarsi ferruginous, with black tips. Wings grey, lurid along the costa; veins black. Halteres testaceous. Length of the body 7 lines; of the wings 11 lines.

69. *LEPTOGASTER INUTILIS*, n. s., mas. Niger nitens, pectore cano, pedibus testaceis, femoribus tibiis et tarsorum articulis apice nigris, femoribus

posticis apices versus nigricantibus annulo subapicali testaceo, alis limpidis venis nigris triente basali infuscatis, halteribus testaceis apice fuscis.

Male. Black, shining. Pectus with hoary tomentum. Legs testaceous; tips of the femora, of the tibiæ, and of the joints of the tarsi black; hind femora mostly blackish, with a testaceous subapical band. Wings limpid; veins black, clouded with brown towards the base. Halteres testaceous, with brown knobs. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

Fam. LEPTIDÆ, *Westw.*

Gen. LEPTIS, *Fabr.*

70. *Leptis ferruginosa*, *Wied. Auss. Zweifl.* i. 224. 6.

71. *Leptis decisa*, *Walk.* See p. 15.

Gen. CHRYSOPILA, *Macq.*

72. *CHRYSOPILA MACULIPENNIS*, n. s., mas et fœm. *Picea*, pectore testaceo cano-tomentoso, abdominis segmentis testaceo-fasciatis, pedibus testaceis, alis limpidis, fasciis tribus maculosis fuscis.

Male and Female. Piceous. Head in front and pectus with hoary tomentum. Proboscis, legs and halteres testaceous. Antennæ black. Abdomen with a testaceous band on the hind border of each segment. Wings limpid, with three irregular brown bands; 2nd and 3rd bands broad, connected, adorned with several limpid spots; veins black. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

Fam. BOMBYLIDÆ, *Leach.*

Subfam. THEREVITES, *Walk.*

Gen. THEREVA, *Latr.*

73. *THEREVA PRÆCEDENS*, n. s., fœm. *Nigra* confertim cano-tomentosa, capite antico albo barbâque albâ, pedibus subpilosis, alis subcinereis venis nigris.

Female. Black, entirely covered with hoary tomentum. Head white and shining in front, clothed beneath with white hairs. Proboscis black and shining as usual. Legs slightly hairy. Wings slightly greyish; veins black. Length of the body $3\frac{1}{2}$ lines; of the wings 5 lines.

Subfam. BOMBYLITES, *Walk.*

Gen. ANTHRAX, *Fabr.*

74. *Anthrax Tantalus*, *Fabr. Syst. Antl.* 124. 29.

Inhabits also Hindostan, Java and China.

75. *Anthrax pennipes*, *Wied. Auss. Zweifl.* i. 272. 23.

Inhabits also Java.

76. *ANTHRAX SEMISCITA*, n. s. (Group 10. *Dipt. Saund.* 167), mas. *Nigropicea* cinereo nigroque pilosa, abdomine nigro apicem versus argenteo-

micante, alis nigricantibus dimidio apicali obliquè limpido guttis duabus (unâ anteriore exteriore, alterâ posteriore interiore) nigricantibus.

Very nearly allied to *A. bimacula*, Walk. *Male*. Blackish-piceous, with a few grey and black hairs. Abdomen black, brilliant silvery towards the tip. Wings obliquely blackish for half the length from the base, the blackish part very irregular in outline, and extending to $\frac{3}{4}$ ths of the length of the costa; one blackish dot on the basal angle of the fore fork of the cubital vein, the other on the hind end of the veinlet between the 2nd and 3rd externo-medial veins; veins black. Halteres with whitish tips. Length of the body 4 lines; of the wings 11 lines.

77. ANTHRAX SATELLITIA, n. s. (Group 10. *Dipt. Saund.* 167), mas. Atravix pilosa, alis nigricantibus plus triente apicali subobliquè limpidâ guttis tribus discalibus unâque apicali nigricantibus.

Male. Deep black, hardly pilose. Wings blackish, obliquely limpid for more than one-third of the length from the tips; the outline of the blackish part slightly denticulate; the limpid part containing four blackish dots, three discal and one apical, the middle discal dot much larger than the two others. Length of the body 3 lines; of the wings 8 lines.

Fam. DOLICHOPIDÆ, Leach.

Gen. PSILOPUS, Meigen.

78. *Psilopus apicalis*, *Wied. Auss. Zweifl.* ii. 227. 32.

Inhabits also Sumatra.

79. *Psilopus robustus*, *Walk.* See page 16.

80. *Psilopus tenebrosus*, *Walk.* See page 16.

81. *PSILOPUS ALLECTANS*, n. s., mas. Lætè cyaneo-viridis, antennarum articulo 3° fulvo, aristâ longissimâ apice albidâ, abdominis segmentis atro-fasciatis, pedibus testaceis, tarsis nigricantibus, alis obscurè fuscis posticè pallidioribus, venis halteribusque nigris.

Male. Bright bluish-green. Proboscis testaceous. Third joint of the antennæ tawny; arista longer than the body, whitish at the tip. Abdomen with deep black bands. Legs testaceous; tarsi blackish, paler towards the base. Wings dark brown, paler along the hind border; veins and halteres black; fore branch of the præbrachial vein nearly straight; discal transverse vein curved outward. Length of the body 3 lines; of the wings 5 lines.

82. *PSILOPUS ALLICIENS*, n. s., mas. Lætè cyaneo-viridis, facie pectoreque argenteo-tomentosis, antennis testaceis, articulo 3° lanceolato, aristâ vix longâ, abdominis segmentis atro-fasciatis, pedibus testaceis, alis sublimpidis, venis halteribusque testaceis.

Male. Bright bluish-green. Face and pectus with silvery tomentum. Proboscis testaceous. Antennæ testaceous; 3rd joint lanceolate; arista black, less than half the length of the body. Abdomen with broad deep black bands, partly æneous towards the tip. Legs testaceous; tarsi darker towards the tips. Wings nearly limpid; veins and halteres testaceous; fore branch of the præbrachial vein much curved; discal transverse vein undulating. Length of the body $3\frac{1}{2}$ lines; of the wings 6 lines.

83. *PSILOPUS ILLICIENS*, n. s., mas. Lætè cyaneo-*viridis*, antennis nigris articulo 3° brevi, aristâ sat longâ, abdomine lætè viridi segmentis atrofasciatis, pedibus nigris, tibiis fulvescentibus, alis cinereis apud costam fusciscentibus, venis halteribusque nigris.

Male. Bright bluish-green. Proboscis black. Antennæ black; 3rd joint short; arista more than half the length of the body. Abdomen emerald-green, with broad black bands. Legs black; tibiæ dull tawny. Wings grey, brownish along the costa; veins and halteres black; fore branch of the præbrachial vein curved; discal transverse vein undulating. Length of the body 3 lines; of the wings 6 lines.

84. *PSILOPUS DELECTANS*, n. s., mas. Lætè cyaneo-*viridis*, facie pectoreque argenteo-tomentosis, antennis nigris articulo 3° conico, aristâ sat longâ, abdomine lætè viridi segmentis nigro-fasciatis, pedibus nigris, alis subcinereis, venis halteribusque nigris.

Male. Bright bluish-green. Face and pectus with silvery tomentum. Proboscis black. Antennæ black; 3rd joint conical; arista black, more than half the length of the body. Abdomen bright green, with narrow black bands. Legs black. Wings greyish; veins and halteres black; fore branch of the præbrachial vein curved; discal transverse vein undulating. Length of the body 3½ lines; of the wings 6 lines.

85. *PSILOPUS PROLICIENS*, n. s., fœm. Lætè viridis robustus, capite cyaneo-*viridi*, facie pectore abdominisque lateribus argenteo-tomentosis, antennis nigris articulo 3° longi-conico, aristâ sat longâ, abdominis segmentis atrofasciatis, pedibus nigris, alis cinereis maculâ costali fuscâ venis nigris, halteribus fulvis.

Female. Bright green, stout. Head bluish-green; face with silvery tomentum. Proboscis black. Antennæ black; 3rd joint elongate-conical; arista full half the length of the body. Thorax with three bright cupreous stripes. Pectus and sides of the abdomen with silvery tomentum. Abdomen with broad deep black bands. Legs black. Wings grey, with an elongated brown spot towards the middle of the costa; veins black; fore branch of the præbrachial vein much curved; discal transverse vein nearly straight. Halteres tawny. Length of the body 2½ lines; of the wings 5 lines.

86. *PSILOPUS PROLECTANS*, n. s., fœm. Lætè cyaneo-*viridis*, antennis nigris articulo 3° conico, aristâ longissimâ, abdomine apicem versus purpureo, pedibus nigris, alis obscurè fuscis fasciis tribus abbreviatis apiceque sublimpidis, venis halteribusque nigris.

Female. Bright bluish-green. Proboscis black. Antennæ black; 3rd joint conical; arista nearly as long as the body. Abdomen purple towards the tip. Legs black. Wings dark brown, with three nearly limpid bands which do not extend to the costa; 1st band dilated along the hind border to the base of the wing; 2nd very short; 3rd much longer; tips nearly limpid; veins and halteres black; fore branch of the præbrachial vein very much curved; discal transverse vein very deeply undulating, angular, and emitting a short stump in the middle. Length of the body 3 lines; of the wings 6 lines.

87. *PSILOPUS COLLUCENS*, n. s., fœm. Lætè viridi-*cyaneus* brevis latus, vertice purpureo, facie pectoreque albedo-tomentosis, antennis nigris articulo

3° longi-conico, aristâ vix longâ, abdomine lætè viridi segmentis cupreo-fasciatis, pedibus nigris, tibiis testaceis, alis subcinereis, venis nigris, halteribus testaceis.

Female. Bright greenish-blue, short, broad. Vertex purple. Face and pectus with whitish tomentum. Proboscis black. Antennæ black; 3rd joint elongate-conical; arista about half the length of the body. Abdomen bright green, with cupreous bands. Legs black; tibiæ testaceous. Wings greyish; veins black; fore branch of the præbrachial vein very much curved; discal transverse vein almost straight. Halteres testaceous. Length of the body $1\frac{1}{2}$ line; of the wings 3 lines.

88. *PSILOPUS DERELICTUS*, n. s., mas. Lætè cyaneo-iridis gracilis, metathorace purpureo, abdomine lætè viridi segmentis cupreo-fasciatis, pedibus pallidè flavis, alis sublimpidis venis nigris, halteribus testaceis.

Male. Bright bluish-green, slender. Head wanting. Metathorax purple. Abdomen bright green, with cupreous bands. Legs pale yellow. Wings nearly limpid; veins black; fore branch of the præbrachial vein almost rectangular; discal transverse vein straight. Halteres testaceous. Length of the body $1\frac{1}{2}$ line; of the wings 3 lines.

Gen. DOLICHOPUS, *Latr.*

89. *DOLICHOPUS ELECTUS*, n. s., fœm. Lætè viridis robustus, capite antico albo, antennis pedibusque nigris, thoracis margine æneo, abdomine æneo-iridi maculis lateralibus albo-tomentosis, tibiis spinosissimis obscurè testaceis apice nigris, alis fusco-cinereis venis nigris, halteribus fulvis.

Female. Bright green, stout. Head white in front. Antennæ black; arista rather stout. Thorax æneous in front and on each side. Abdomen dark æneous-green, with spots of white tomentum along each side. Legs black; tibiæ dull testaceous with black tips, very spinose. Wings brownish-grey; veins black; præbrachial vein forming a very obtuse angle, nearly straight from thence to its tip; discal transverse vein straight, upright. Halteres tawny. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

90. *DOLICHOPUS ALLIGATUS*, n. s., mas. Æneo-iridis sat gracilis, capite argenteo, antennis nigris, pectore cæno, abdomine obscurè æneo, pedibus fulvis, tibiis subspinosis, tarsis nigricantibus basi fulvis, femoribus posterioribus nigris, mediis apice fulvis, alis fuscis sat latis venis nigris, halteribus fulvis.

Male. Æneous-green, rather slender. Head with silvery-white tomentum. Antennæ black. Pectus hoary. Abdomen dark æneous. Legs tawny; tibiæ slightly spinose; tarsi blackish, tawny at the base; posterior femora black; middle femora with tawny tips. Wings brown, rather broad, darker along the apical half of the costa; veins black; præbrachial vein and discal transverse vein straight. Halteres tawny. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

91. *DOLICHOPUS COLLECTUS*, n. s., mas. Lætè viridi-cyaneus gracilis, facie perangustâ, antennis nigris, abdomine cyaneo-purpureo, pedibus testaceis, tibiis vix spinosis, femoribus posticis nigris, tibiis posticis nigricantibus apice testaceis, alis subcinereis latiusculis apud costam fuscescentibus, halteribus testaceis.

Male. Bright greenish-blue, slender. Face extremely narrow. Antennæ black. Abdomen dark bluish-purple. Legs testaceous; tibiæ hardly spinose; hind femora black; hind tibiæ blackish, with testaceous tips. Wings greyish, rather broad, brownish along the costa; veins black; præbrachial vein hardly curved, forming an almost imperceptible angle at its junction with the discal transverse vein which is nearly straight. Halteres testaceous. Length of the body $1\frac{3}{4}$ line; of the wings $3\frac{1}{2}$ lines.

Gen. DIAPHORUS, *Meigen*.

92. DIAPHORUS DELEGATUS, n. s., fœm. Viridis albido-tomentosus, antennis nigris, abdomine æneo-viridi basi testaceo, pedibus testaceis, tarsis nigris, tibiis posticis fusciscentibus, alis subcinereis venis nigris, halteribus testaceis.

Female. Green, with whitish tomentum. Proboscis and antennæ black. Abdomen æneous-green, testaceous towards the base. Legs testaceous; tarsi black; hind tibiæ brownish. Wings greyish; veins black; præbrachial vein and discal transverse vein almost straight. Halteres testaceous. Length of the body $2\frac{1}{2}$ lines; of the wings 4 lines.

Fam. SYRPHIDÆ, *Leach*.

Gen. CERIA, *Fabr.*

93. Ceria Javana, *Wied.* See page 17.

Gen. ERISTALIS, *Latr.*

94. Eristalis niger, *Wied.* See page 17.

95. Eristalis arborum, *Fabr. Syst. Antl.* 235. 14.

Inhabits also Java and China.

96. Eristalis Andræmon, *Walk. Cat. Dipt.* pt. 3. 627.

Inhabits also Hindostan.

Gen. HELOPHILUS, *Meigen*.

97. Helophilus insignis, *Walk.* See page 17.

Gen. MERODON, *Fabr.*

98. MERODON VARICOLOR, n. s., fœm. Atrâ, antennis nigris, aristâ testaceâ, thorace postico cinereo, scutello fulvo, abdomine basi fulvo segmentis testaceo-fasciatis, pedibus nigris, alis subcinereis apud costam fuscis venis nigris, halteribus testaceis.

Female. Deep black. Head with hoary tomentum in front. Antennæ black; arista testaceous. Thorax cinereous towards the scutellum, which is tawny. Abdomen with testaceous bands; base tawny. Legs black. Wings slightly greyish, mostly dark brown along the costa; veins black. Halteres testaceous. Length of the body 8 lines; of the wings 12 lines.

Gen. XYLOTA, *Meigen*.

99. Xylota conformis, *Walk.* See page 18.

Gen. MILEZIA, *Latr.*

100. *Milesia macularis*, *Wied.* See page 18.
101. *Milesia Reinwardtii*, *Wied.* See page 18.
102. MILEZIA ZAMIEL, n. s., fœm. Atra, abdomine nigro-cupreo fasciis duabus angustis interruptis flavis, femoribus rufis basi nigris, alis luteis posticè subcinereis maculâ magnâ costali subapicali fuscâ, halteribus fulvis.
- Female.* Deep black. Head shining in front. Proboscis and antennæ black. Abdomen blackish cupreous, shining, with two slender interrupted yellow bands. Legs black; femora red, black at the base. Wings luteous, greyish along the hind border, with a large brown costal subapical spot; veins luteous, brown towards the tips. Halteres tawny. Length of the body 8 lines; of the wings 16 lines.

Gen. VOLUCELLA, *Geoff.*

103. *Volucella trifasciata*, *Wied. Auss. Zweifl.* ii. 196. 3.
Inhabits also Java.

Gen. BARYTEROCERA, n. g.

Fœm. *Corpus* sublineare, compactum. *Caput* thorace paullò latius; facies plana. *Antennæ* conspicuæ; articuli 1^{us} et 2^{us} brevissimi; 3^{us} longissimus, dilatatus, subarcuatus; arista nuda, basalis, articulo 3^o non longior. *Abdomen* subovatum, arcuatum, sessile, thorace paullò brevius et latius. *Pedes* validi, breviusculi. *Alæ* breviusculæ; venæ transversæ exteriores rectæ non obliquæ.

Female. Body compact, nearly linear. Head a little broader than the thorax; face flat; epistoma slightly prominent. Proboscis extending a little beyond the epistoma. Antennæ diverging; 1st and 2nd joints very short; 3rd very long, dilated, curved and slightly widened towards the tip; arista bare, seated on the base of the 3rd joint, which it does not exceed in length. Abdomen sessile, arched, nearly oval, a little broader and shorter than the thorax. Legs stout, simple, rather short. Wings somewhat short; exterior transverse veins straight, upright, forming almost right angles with the cubital, præbrachial and externo-medial veins.

104. BARYTEROCERA INCLUSA, n. s., fœm. Nigro-cuprea, capite antico albedo, antennis nigris articulo 3^o subtùs luteo, thorace pectoreque testaceo bivittatis, abdomine fasciis tribus testaceis, 1^a basali biguttatâ, 2^a interruptâ, 3^a apicali latissimâ trimaculatâ, pedibus testaceis, femoribus posticis apice tibiisque posticis nigris, alis subcinereis maculâ costali fasciâque exteriore pallidiore fuscis.

Female. Blackish cupreous, shining. Head whitish in front. Antennæ black; 3rd joint luteous beneath. Thorax with a testaceous stripe on each side. Pectus with a testaceous streak on each side. Abdomen with three testaceous bands; 1st basal, entire, dilated on each side, including a blackish-cupreous dot on each side; 2nd interrupted, dilated on each side and connected with the 3rd, which is apical, very broad, and includes three very large blackish cupreous spots. Legs testaceous; hind femora towards the tips and hind tibiæ black. Wings greyish, with a dark brown spot

beyond the middle of the costa, and with a paler incomplete exterior band; veins black, testaceous at the base. Halteres testaceous. Length of the body 3 lines; of the wings 5 lines.

Gen. CITIBÆNA, n. g.

Mas. Corpus sublineare, pilosissimum. *Caput* thorace vix latius; facies plana. *Oculi* villosissimi. *Antennæ* breves; articuli 1^{us} et 2^{us} transversi; 3^{us} conicus, longior et paulò latior; arista nuda, basalis, articulo 3^o duplò longior. *Abdomen* thorace multò longius. *Pedes* simplices, sat graciles. *Alæ* sat angustæ; vena transversa exterior inter cubitalem et præbrachialem angulata, ramulum emittens.

Male. Allied to *Chrysochlamys*. Body nearly linear, thickly pilose. Head hardly broader than the thorax; face flat. Proboscis short. Eyes very pubescent. *Antennæ* short; 1st and 2nd joints transverse; 3rd conical, longer and a little broader; arista bare, seated on the base of the 3rd joint, and about twice its length. Abdomen much longer than the thorax. Legs simple, pubescent, rather slender. Wings rather narrow; 1st externo-medial vein curved; transverse vein between it and the præbrachial nearly straight and upright; transverse vein between the cubital and the præbrachial forming an angle which emits a short stump; fore side of the angle straight; hind side curved.

105. CITIBÆNA AURATA, n. s., mas. Cuprea aureo-pubescent, capite aurato, oculis villosis, antennis pedibusque testaceis, thorace bivittato, femoribus basi cupreis, posticis cupreis apice testaceis, alis sublimpidis apice subcinereis, venis halteribusque testaceis.

Male. Cupreous, thickly covered with gilded down. Head with gilded tomentum in front. *Antennæ* testaceous. Eyes very pubescent. Thorax with two stripes of pale tomentum. Abdomen brighter than the thorax. Legs testaceous; anterior femora cupreous at the base; hind femora cupreous, with testaceous tips. Wings nearly limpid, greyish towards the tips; veins testaceous, black towards the tips. Halteres testaceous. Length of the body 4 lines; of the wings 7 lines.

Gen. SYRPHUS, *Fabr.*

106. *Syrphus ægrotus*, *Fabr. Syst. Antl.* 243. 48. (*Eristalis*.)

Inhabits also Hindostan, Java, and China?

107. *Syrphus alternans*, *Macq. Dipt. Exot.* ii. 89. 7.

Inhabits also Hindostan.

108. SYRPHUS DIVERTENS, n. s., fœm. Chalybæus æneo-varius, capite antico antennis thoracis vittis duabus scutelloque testaceis, abdomine subluteo fasciis tribus strigis sex obliquis vittaque brevi interruptâ apicali nigris, pedibus halteribusque testaceis, tibiis posticis fuscis, alis limpidis.

Female. Chalybeous, partly æneous. Head in front, antennæ, a stripe on each side of the thorax and scutellum testaceous. Abdomen pale luteous, with three black bands on the hind borders of the segments; a black basal forked streak; the two following segments with an oblique black streak on each side, and an apical interrupted black streak. Legs testaceous; hind

tibiæ brown. Wings limpid, rather long; veins black. Halteres testaceous. Length of the body 4 lines; of the wings 9 lines.

109. *SYRPHUS CYATHIFER*, n. s., fœm. Chalybæo-niger, antennis pedibusque fulvis, abdomine maculis sex subtrigonis duabusque minoribus apicalibus fulvis, alis fusco-cinereis, halteribus fulvis.

Female. Chalybeous-black. Head about the eyes and pectus chalybeous. Antennæ tawny. Abdomen with eight tawny spots; 1st, 2nd and 3rd pair large, nearly triangular; 4th smaller, semicircular. Legs tawny. Wings brownish-grey; veins black. Halteres tawny. Length of the body 3 lines; of the wings 6 lines.

Gen. *BACCHA*, *Fabr.*

110. *Baccha Amphithoë*, *Walk. Cat. Dipt.* pt. 3. 549.
Inhabits also Hindostan.

Gen. *ASCIA*, *Megerle.*

111. *Ascia brachystoma*, *Wied. Auss. Zweifl.* ii. 90. 1.
Inhabits also Hindostan.

Fam. *MUSCIDÆ*, *Latr.*

Subfam. *TACHINIDES*, *Walk.*

Gen. *EURYGASTER*, *Macq.*

112. *EURYGASTER SUBFERRIFERA*, n. s., fœm. Nigra cinereo-tomentosa, capite albo, palpis fulvis, thorace vittis quatuor angustis nigris, abdomine fasciis tribus vittæque angustâ nigris, maculis duabus ventre femoribusque ferrugineis, alis subcinereis.

Female. Black, with cinereous tomentum and long black bristles. Head white in front and about the eyes; frontalia black, nearly linear; facialia without bristles; epistoma not prominent, with a stout bristle on each side. Eyes pubescent. Palpi tawny. Antennæ extending to the epistoma; 3rd joint linear, rounded at the tip, full four times the length of the 2nd; arista slender, very much longer than the 3rd joint. Thorax with four slender incomplete black stripes. Abdomen obconical, hardly longer than the thorax, with three black bands and with a slender black stripe; a large ferruginous spot on each side of the 2nd segment; underside mostly ferruginous. Legs black; femora ferruginous. Wings greyish; veins black; præbrachial vein forming a somewhat rounded but hardly obtuse angle at its flexure, from whence it is nearly straight to its tip; discal transverse vein slightly curved inward near its hind end, parted by less than its length from the border and from the flexure of the præbrachial. Alulæ greyish. Length of the body 3 lines; of the wings 6 lines.

Gen. *MEGISTOGASTER*, *Macq.*

Corpus angustum, cylindricum. *Facies* obliqua. *Facialia* non setosa. *Antennæ* longæ; articulus 3^{us} linearis, 2^o sextuplò longior; arista nuda, gracilis, articulo 3^o paullò longior. *Pedes* longiusculi, setosi. *Alæ* angustæ.

Megistogaster, *Macq. Mém. Soc. Sci. Nat. de Lille*, 1850, 185.

Body narrow, cylindrical, slightly setose. Face slightly retracted and oblique; epistoma not prominent; facialia without bristles. Antennæ very long; 3rd joint nearly linear, six times the length of the 2nd; arista bare, slender, a little longer than the 3rd joint. Legs setose, rather long. Wings narrow; præbrachial vein forming an obtuse angle at its flexure, nearly straight from thence to its tip, joining the costal at somewhat in front of the tip of the wing; discal transverse vein undulating, parted by about half its length from the border and from the flexure of the præbrachial. Type. *Tachina Diabolus*, *Wied.*

113. *Megistogaster Imbrabus*, *Walk. Capt. Dipt.* pt. 4. 781. (*Tachina*.)

Inhabits also China.

The female has silvery-white tomentum in front of the head.

Subfam. DEXIDES, *Walk.*

Gen. DEXIA, *Meigen.*

114. *DEXIA MUNDA*, n. s., mas. Viridis, capite cano, frontalibus atris, oculis nudis, antennis pedibusque nigris, abdomine nigro albo-tomentoso fasciis duabus latissimis interruptis apiceque testaceis, alis fuscis, halteribus testaceis.

Male. Green, shining. Head with hoary tomentum in front and beneath, and with gilded tomentum along the eyes above; frontalia deep black, widening in front; facialia without bristles; epistoma not prominent. Eyes bare. Proboscis and palpi testaceous. Antennæ black; 3rd joint elongate; arista pubescent. Pectus and sides of the thorax with whitish tomentum. Abdomen black, shining, oblanceolate, about twice the length of the thorax, armed with several very stout spines; segments with whitish reflections, and with two very broad interrupted testaceous bands; tip testaceous. Legs black. Wings brown; veins black; præbrachial vein emitting a branch at its flexure which forms an almost right angle, from whence it is indistinctly undulating to its tip, which joins the costal at somewhat in front of the tip of the wing; discal transverse vein undulating, parted by less than half its length from the border, and by more than half its length from the flexure of the præbrachial. Alulæ slightly greyish. Halteres testaceous. Length of the body 6 lines; of the wings 8 lines.

115. *DEXIA EXTENDENS*, n. s. (gen. *Thelaira*, *Desv.*), fœm. Atra, capite cano-tomentoso, vertice cervino, palpis antennisque ferrugineis, thorace vittis tribus fasciâque testaceo-tomentosis, scutelli apice testaceo, abdomine fasciis duabus latis albido-tomentosis, pedibus piceis, femoribus fulvis, alis nigro-fuscis posticè cinereis, halteribus fulvis.

Female. Deep black. Head with hoary tomentum; vertex with fawn-coloured tomentum; frontalia broad; epistoma, proboscis and palpi ferruginous. Antennæ ferruginous, much shorter than the face; arista plumose. Thorax with three stripes and one hinder band of testaceous tomentum; scutellum testaceous at the tip. Pectus with whitish tomentum. Abdomen with some stout bristles, and with two broad bands of whitish tomentum,

the fore one interrupted. Legs piceous; femora tawny. Wings blackish-brown, dark cinereous along the hind border; veins black, tawny at the base; præbrachial vein emitting a short branch at its flexure which forms a slightly acute angle from whence the vein is curved to its tip, and joins the costal at somewhat in front of the tip of the wing; discal transverse vein undulating, parted by hardly half its length from the border, and by rather less than its length from the flexure of the præbrachial. Alulæ cinereous. Halteres tawny. Length of the body $5\frac{1}{2}$ lines; of the wings 12 lines.

Subfam. SARCOPHAGIDES, *Walk.*

Gen. CYNOMYIA, *Desv.*

116. CYNOMYIA FORTIS, n. s., mas. Latè cyaneo-viridis, capite testaceo-tomentoso, frontalibus nigris, palpis antennisque ferrugineis, abdomine cyaneo, pedibus nigris, alis fusco-cinereis, halteribus fulvis.

Male. Bright bluish-green, with black bristles. Head with shining testaceous tomentum; frontalia black, widening in front. Proboscis, palpi and antennæ pale ferruginous; 3rd joint of the antennæ very long; arista deeply plumose. Abdomen blue. Legs black, stout, very pilose. Wings brownish-grey, darker along the costa beyond the middle; veins black, ferruginous at the base. Halteres tawny. Length of the body 7 lines; of the wings 12 lines.

Gen. SARCOPHAGA, *Meigen.*

117. Sarcophaga aliena, *Walk.* See page 22.

118. SARCOPHAGA INDICATA, n. s., mas. Nigra, capite albo-tomentoso, frontalibus atris, thoracis vittis quatuor interlineatis pectoreque canis, abdomine apicem versus subferrugineo e maculis excavatis albidis quadrifariam tessellato, alis subcinereis, halteribus fulvis.

Male. Black. Head with shining white tomentum; frontalia deep black, linear, rather broad. Antennæ black. Thorax with four hoary stripes, which are interlined with black. Pectus hoary. Abdomen with a ferruginous tinge, which is most apparent towards the tip, distinctly tessellated with four rows of excavated whitish spots. Wings greyish; veins black; præbrachial forming an acute angle at its flexure, near which it is very much curved inward, and is thence straight to its tip; discal transverse vein slightly undulating, parted by less than its length from the border, and by much less than its length from the flexure of the præbrachial. Alulæ grey. Halteres tawny. Length of the body $4\frac{1}{2}$ lines; of the wings 8 lines.

Subfam. MUSCIDES, *Walk.*

Gen. IDIA, *Meigen.*

119. Idia discolor, *Fabr. Syst. Antl.* 295. 55. (Musca.)

Inhabits also Java.

120. *IDIA BIVITTATA*, n. s., fœm. Rufa subtùs testacea, capite antico nigro, thorace vittis duabus nigris, abdomine suprâ nigro vittâ brevi anticâ rufâ, pedibus testaceis, tarsis anticis nigris basi albidis, alis fusco-cinereis.

Var. β. Thorace nigro vittis duabus canis, abdominis dorso toto nigro.

Female. Red, testaceous beneath. Head black in front. Antennæ pale red. Thorax with two black stripes. Abdomen above black, with a short red stripe on the anterior part. Legs testaceous; fore tarsi black, whitish towards the base. Wings brownish-grey, darker along the costa towards the base; veins black. Halteres testaceous.

Var. β. Thorax black, with two hoary stripes. Abdomen wholly black above. Length of the body 3 lines; of the wings 5 lines.

Gen. *MUSCA*, *Linn.*

121. *Musca flaviceps*, *Macq.* See page 23.

122. *Musca chalybea*, *Wied. Auss. Zweifl. ii. 402. 30.*
Inhabits also Java.

123. *Musca micans*?, *Fabr. Syst. Antl. 291. 38* (genus *Silbomyia*, *Macq.*).
Inhabits also Hindostan, Sumatra and Java.

This is certainly the *S. micans* of Macquart, but does not quite agree with the descriptions of Fabricius and of Wiedemann.

124. *Musca trita*, *Walk.* See page 24.

125. *Musca diffidens*, *Walk.* See page 26.

126. *MUSCA EXEMPTA*, n. s. (n. subgen. allied to *Pyrellia*, *Desv.*), fœm. Lætè viridis, palpis antennisque nigris, abdominis disco purpureo, pedibus piceis, alis subcinereis basi fuscis, venis præbrachiali et cubitali conjunctis.

Female. Bright green. Palpi and antennæ black. Disk of the abdomen purple. Legs piceous; femora darker than the tibiæ. Wings slightly greyish, brown at the base and along nearly half the length of the costa; veins black; præbrachial vein curved, not angular, joining the cubital vein near the tip of the latter; discal transverse vein almost straight, parted by less than its length from the border, and by more than its length from the flexure of the præbrachial. Alulæ lurid. Length of the body 2 lines; of the wings 3½ lines.

127. *Musca domestica*, *Linn. Syst. Nat. ii. 990.*

Inhabits also Europe and some parts of Africa, Asia, and America.

Gen. *BENGALIA*, *Dev.*

128. *Bengalia Dioclea*, *Walk. Cat. Dipt. pt. 4. 869* (*Musca*).

Subfam. *ANTHOMYIDES*, *Walk.*

Gen. *ARICIA*, *Macq.*

129. *Aricia patula*, *Walk.* See page 28.

This may perhaps be a variety of *Anthomyia quadrata*, *Wied. Auss. Zweifl. ii. 428. 14.*

The latter inhabits Java.

130. *ARICIA INAPERTA*, n. s., mas et fœm. Testacea, capite suprâ et thoracis disco nigris, orbitis albis, pedibus testaceis, alis cinereis apud costam obscurioribus venis nigris basi fulvis. *Flem.* Abdominis disco nigro.

Male and Female. Testaceous. Head above and disk of the thorax black. Abdomen shining. Eyes bordered with white tomentum. Legs testaceous. Wings grey, darker along the costa; veins black, tawny at the base; discal transverse vein undulating, slightly oblique, parted by less than its length from the border, and by much more than its length from the præbrachial transverse vein. *Female.* Disk of the abdomen black. Length of the body 3 lines; of the wings $5\frac{1}{2}$ lines.

Gen. ANTHOMYIA, *Meigen.*

131. *ANTHOMYIA ILLOCATA*, n. s., fœm. Albida, capite albo, maculâ verticis subquadrata nigrâ; thorace fasciâ nigrâ, abdomine e maculis nigris trivittato, alis sublimpidis.

Closely allied to *A. tonitru*, Wied. *Female.* Whitish, with black bristles. Head white. Frontalia with a black subquadrate spot in front. Proboscis and legs black. Thorax with a black band in front of the wings. Abdomen with three rows of black spots; the middle spots lanceolate, the lateral triangular. Wings nearly limpid; veins black, testaceous at the base; discal transverse vein slightly curved and oblique, parted by much less than its length from the border, and by much more than its length from the præbrachial transverse vein. Length of the body $2\frac{1}{2}$ lines; of the wings 4 lines.

Gen. CÆNOSIA, *Meigen.*

132. *Cænosia macularis*, *Wied. Auss. Zweifl.* ii. 438. 2.

Inhabits also Hindostan.

133. *CÆNOSIA INSURGENS*, n. s., fœm. Nigra cinereo-tomentosa, orbitis albis, antennis testaceis, abdomine e maculis nigris trivittato, alis limpidis, halteribus pallidis.

Female. Black, with cinereous tomentum. Head white about the eyes. Antennæ dull testaceous. Abdomen with three black spots on each side. Wings limpid; veins black, testaceous at the base; discal transverse vein parted by full its length from the border and by nearly twice its length from the præbrachial transverse vein. Halteres pale. Length of the body 2 lines; of the wings 4 lines.

Subfam. HELOMYZIDES, *Fallen.*

Gen. HELOMYZA, *Fallen.*

134. *Helomyza orientalis*, *Wied. Auss. Zweifl.* ii. 575. 2. (*Sciomyza*.)

Inhabits also Java.

135. *HELOMYZA FUSCICOSTATA*, n. s., fœm. Fulva, facie orbitisque cano-tomentosis, abdomine nigro basi fulvo, tibiis tarsisque fusciscentibus, alis cinereis apud costam fuscis.

Female. Tawny with black bristles, paler beneath. Head with hoary tomentum about the eyes and in front. Abdomen black, tawny at the base. Tibiæ and tarsi brownish. Wings grey, brown along the costa; veins black,

tawny at the base; discal transverse vein oblique, hardly undulating, parted by full half its length from the border and by less than twice its length from the præbrachial transverse vein. Halteres testaceous, with darker knobs. Length of the body $3\frac{1}{2}$ lines; of the wings 7 lines.

136. *HELOMYZA ÆQUATA*, n. s., fœm. Ferruginea, facie cinereo-tomentosâ, antennis fulvis, scutelli apice pectoreque nigricantibus, abdomine nigro, pedibus piceis, alis luridis posticè cinereis.

Female. Ferruginous, with black bristles. Head with cinereous tomentum in front. Antennæ tawny. Scutellum towards the tip and pectus blackish. Abdomen black. Legs piceous. Wings lurid, grey along the hind border; veins tawny; discal transverse vein straight, oblique, parted by less than its length from the border, and by much more than twice its length from the præbrachial transverse vein. Halteres testaceous. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

137. *HELOMYZA LIMBATA*, n. s., fœm. Pallidè fulva, thorace abdomineque latè nigro-vittatis, pedibus testaceis, alis cinereis.

Female. Pale tawny, with black bristles, testaceous beneath. Arista black, deeply plumose. Thorax and abdomen with a broad black stripe. Legs testaceous. Wings grey; veins black, tawny at the base; discal transverse vein parted by much less than its length from the border, and by more than twice its length from the præbrachial transverse vein. Length of the body 2 lines; of the wings 4 lines.

138. *HELOMYZA PROVICTA*, n. s., fœm. Fulva, orbitis albidis, pedibus testaceis, tarsis obscurioribus, alis luridis posticè cinereis apice fuscis.

Female. Tawny, testaceous beneath. Head whitish about the eyes. Arista black, with long hairs. Legs testaceous; tarsi darker. Wings lurid, grey along the hind border, brown at the tips and along the adjoining part of the costa; veins tawny, black in the brown part and along the costa; discal transverse vein clouded with brown, parted by half its length from the border, and by twice its length from the præbrachial transverse vein. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

139. *HELOMYZA INVICTA*, n. s., fœm. Fulva, abdominis segmentis nigro-fasciatis, pedibus testaceis, alis cinereis dimidio apicali anticè fusco venâ discali transversâ fusco-nebulosâ.

Female. Tawny, testaceous beneath. Arista black, with long hairs. Abdomen with a blackish band on the hind border of each segment. Legs testaceous. Wings grey, brown on half the breadth behind the apical half of the costa; discal transverse vein clouded with brown, almost straight and upright, parted by its length from the border, and by more than twice its length from the præbrachial transverse vein. Length of the body 2 lines; of the wings 4 lines.

Gen. SAPROMYZA, *Fallen.*

140. *Sapromyza biguttata*, *Macq. Dipt. Exot.*

Inhabits also Java.

Gen. GAUZANIA, n. g.

Fœm. *Corpus* gracile, setosum, subcylindricum. *Oculi* nudi. *Antenna*

breves; articulus 3^{us} longè conicus; arista plumosa. *Abdomen* oblanceolatum, thorace angustius, vix longius. *Pedes* non setosi. *Alæ* angustæ, venis parallelis.

Female. Body slender, bristly, nearly cylindrical. Eyes bare. Antennæ short; 3rd joint elongate-conical; arista deeply plumose. Abdomen oblanceolate, shining, narrower but very little longer than the thorax. Legs not bristly. Wings narrow; præbrachial vein parallel to the cubital; discal transverse vein straight, parted by about its length from the border, and by much more than twice its length from the præbrachial transverse vein.

141. GAUZANIA DEVECTA, n. s., fœm. Nigra obscura, abdomine nitente, pedibus piceis, alis nigricantibus posticè pallidioribus, halteribus albidis.

Female. Black, dull. Abdomen shining. Legs piceous; femora darker than the tibiæ. Wings blackish, paler along the exterior border; veins black. Halteres whitish. Length of the body $1\frac{3}{4}$ line; of the wings $3\frac{1}{2}$ lines.

Subfam. LAUXANIDES, *Walk*.

Gen. LAUXANIA, *Latr*.

142. *Lauxania eucera*, *Walk*. See page 29.

Gen. CELYPHUS, *Dalman*.

143. *Celyphus scutatus*, *Wied. Auss. Zweifl.* ii. 601. 2.

Inhabits also Hindostan and the Philippine Islands.

Subfam. ORTALIDES, *Holiday*.

Gen. LAMPROGASTER, *Macq*.

144. *Lamprogaster zonata*, *Walk*. See page 30.

145. *Lamprogaster glabra*, *Walk*. See page 30.

"On decaying timber," *Wallace MSS*.

146. LAMPROGASTER BASILUTEA, n. s., ~~mas~~ fœm. Nigra, capite apud oculos vittisque duabus anticis testaceis, antennis piceis, thorace vittis quatuor pallidè flavis, abdomine fasciis duabus pallidè flavis posticè interruptâ, femoribus apice rufescentibus, tarsis albis apice nigris, alis cinereis fusco subnebulosis basi anticè luteis, halteribus testaceis.

Male. Very nearly allied to *L. zonata*, and perhaps the male of that species. Black, shining. Head testaceous about the eyes, and with two testaceous stripes in front. Antennæ piceous. Thorax with four pale yellow stripes, one on each side in front of the wings, and one on each side of the scutum. Abdomen with two slender pale yellow bands, the hind one interrupted. Femora reddish at the tips; tarsi white, with black tips. Wings grey, partly and very slightly clouded with brown, luteous along the basal part of the costa; veins black, tawny towards the base and along the costa; discal transverse vein like that of *L. zonata*. Halteres testaceous. Length of the body 3 lines; of the wings 6 lines.

147. LAMPROGASTER DIVISA, n. s., fœm. Nigra, tibiis testaceis nigro-fasciatis, tarsis albis apice nigris, alis nigricantibus guttis plurimis fasciâque interlineatâ limpidis, halteribus pallidis.

Female. Black. Abdomen shining. Tibiæ testaceous, with black bands; tarsi white, with black tips. Wings blackish, with numerous limpid dots, and with a limpid band which includes the discal transverse vein, and is intersected by an interrupted blackish line. Halteres pale. Length of the body 2 lines; of the wings 4 lines.

148. *LAMPROGASTER PUNCTATA*,* n. s., mas. Nigra, capite antico testaceo,* ^{Saprot} orbitis albidis, antennis halteribusque testaceis, pectore vittis duabus testaceis, pedibus piceis, alis nigro-fuscis guttis decem discalibus luridis guttâque apicali albâ.

Male. Black, slightly shining. Head very shining in front, testaceous about the mouth, whitish about the eyes. Antennæ testaceous. Pectus with a testaceous stripe on each side. Legs piceous. Wings blackish-brown, with about ten lurid dots on each, and with a larger white dot on each tip. Halteres testaceous. Length of the body $1\frac{3}{4}$ line; of the wings 3 lines.

149. *LAMPROGASTER GUTTATA*, n. s., mas. Nigra, orbitis albidis, epistomate antennis halteribusque testaceis, pectore vittis duabus vix determinatis testaceis, pedibus piceis, alis nigro-fuscis guttis plurimis apicibusque limpidis.

Male. Black, slightly shining. Head very shining in front, testaceous about the epistoma, whitish about the eyes. Antennæ testaceous. Pectus with an indistinct testaceous stripe on each side. Legs piceous. Wings blackish-brown, with many limpid dots, the largest on the hind border; tips limpid. Halteres testaceous. Length of the body $1\frac{1}{2}$ line; of the wings $2\frac{1}{2}$ lines.

The two preceding species may perhaps form a new genus, the peculiar characters of *Lampromyia* being hardly conspicuous in them.

Gen. SOPHIRA, *Walk.*

150. *SOPHIRA CONCINNA*, n. s., fœm. Testacea, frontalibus luteis, thorace fasciis duabus lateralibus vittisque duabus nigricantibus, pectore ex parte abdominisque vittis quatuor nigris, tibiis posticis fusciscentibus, alis obscure fuscis apices versus pallidè fuscis strigis basalibus fasciâque abbreviatâ limpidis.

Female. Testaceous, shining. Head with luteous frontalia. Thorax with two blackish stripes, and on each side with two blackish bands. Pectus partly black. Abdomen with four black stripes. Hind tibiæ brownish. Wings dark brown, pale brown on the apical third part, with limpid basal streaks, and with a limpid slightly abbreviated band beyond the middle; veins black. Length of the body 3 lines; of the wings 6 lines.

Gen. RIOXA, *Walk.*

151. *Rioxa lanceolata*, *Walk.* See page 35. This species is very variable in the breadth of the stripes of the thorax, and in the number and size of the spots on the wings.

152. *RIOXA CONFINIS*, n. s., fœm. Ferruginea, abdomine nigricante, alis nigro-fuscis basi guttisque octo limpidis.

Female. Ferruginous. Abdomen blackish. Wings blackish-brown, limpid towards the base, with three triangular limpid spots on the costa, with two limpid spots (one of them double) on the hind border, and with two on the disk; veins black. Length of the body 3 lines; of the wings 6 lines.

Gen. DACUS.

153. *Dacus æneus*, *Wied. Auss. Zweifl.* ii. 513. 2.

Inhabits also Java.

154. *DACUS DETERMINATUS*, n. s., mas. Nigro-æneus, capite antennis pedibusque fulvis, thorace vittis tribus albidis duabusque fulvis, abdomine ferrugineo basi nigro, tibiis anticis tarsisque fuscis, alis sublimpidis apice fasciisque duabus fuscis.

Male. Æneous-black. Head and antennæ tawny. Thorax with three whitish stripes and with two tawny stripes; the latter are united at the tip of the scutellum, and the whitish bands extend obliquely on each side to the pectus. Abdomen ferruginous, black above at the base. Legs tawny; tips of the femora darker; posterior femora minutely spinose beneath; tarsi and fore tibiæ brown. Wings nearly limpid, brown from the discal transverse vein to the tips, and with two brown bands; 1st band very imperfect; 2nd very pale and diffuse on the hind half of the wing. Halteres whitish. Length of the body $4\frac{1}{2}$ lines; of the wings 7 lines.

155. *DACUS FIGURATUS*, n. s., fœm. Niger, capite antennis pedibusque fulvis, vertice nigro, thorace vittis tribus (intermediâ quadriramosâ) pectoreque testaceis, abdomine vittâ anticâ fasciâque luteis, tibiis tarsisque posterioribus fuscis, alis subcinereis apice fuscis plagâ mediâ costali luridâ, halteribus albidis.

Female. Black, shining. Head and antennæ pale tawny; vertex black. Thorax with three testaceous stripes, the middle one emitting two oblique branches on each side. Pectus with two testaceous stripes. Abdomen with a luteous stripe extending from the base to the middle, where it is united to a luteous band. Legs tawny; posterior tibiæ and tarsi brown. Wings slightly greyish, with a large lurid space along the middle of the costa; tips brown; veins black. Halteres whitish. Length of the body $3\frac{1}{2}$ lines; of the wings 6 lines.

Gen. NOEETA, *Desv.*

156. *NOEETA LATIUSCULA*, n. s., mas. Nigra, capite testaceo, thorace cinereo, scutello nitido, tibiis tarsisque albidis, illis fusco-fasciatis, alis nigro-fuscis guttis plurimis limpidis apud costam dilatatis limpidis fusco-fasciatis.

Male. Black. Head testaceous, with white tomentum in front and beneath. Antennæ and halteres testaceous. Thorax with grey tomentum. Scutellum brilliant black. Abdomen shining. Tibiæ and tarsi whitish, the former with brown bands. Wings blackish-brown, with many limpid dots; costal part limpid, somewhat dilated, with transverse brown streaks. Length of the body $1\frac{1}{2}$ line; of the wings 3 lines.

Gen. TRYPETA, *Meig.*

157. *TRYPETA RUDIS*, n. s., fœm. Nigra cinereo-tomentosa, capite thoracis scapulis fasciâ interruptâ scutello abdominis apice pedibusque testaceis, alis sublimpidis fasciis duabus fuscis 1^a posticè abbreviatâ.

Female. Black, with cinereous tomentum. Head testaceous in front and beneath. Antennæ, legs and halteres testaceous. Scapulæ of the thorax,

an interrupted band, scutellum, and tip of the abdomen also testaceous. Wings nearly limpid, with two brown bands, the interior one abbreviated hindward; veins black, testaceous at the base. Length of the body 3 lines; of the wings 5 lines.

Gen. UROPHORA, *Desv.*

158. UROPHORA FASCIATA, n. s., fœm. Nigra nitens, capite antennis scapulis scutello abdominis terebrâ pedibusque testaceis, abdomine fasciis duabus albido-tomentosis, femoribus posterioribus piceis, alis nigro-fuscis vittâ latâ subobliquâ limpidâ apicem versus furcatâ et arcuatâ.

Female. Black, shining. Head testaceous, whitish in front and beneath. Antennæ, scapulæ, scutellum, legs and halteres testaceous. Abdomen with two bands of whitish tomentum. Terebra testaceous, long, slender. Posterior femora mostly piceous. Wings blackish-brown, with some paler spots along the costa, and with a broad, slightly oblique limpid stripe, which towards its tip is divided and curved to the hind border. Length of the body 4 lines; of the wings 6 lines.

Subfam. ACHIIDES, *Walk.*

Gen. ACHIAS, *Fabr.*

159. Achias maculipennis, *Westw.* See page 36.

There are two specimens of the male of this species, and the petiole with which the head is furnished on each side is much longer in one specimen than in the other, and in the latter is much longer than in the male from Singapore. I am indebted to Mr. Westwood for the correction of an error in page 33, where the female of this species is described by the name of *Themara ampla*.

Subfam. DIOPSIDES, *Walk.*

Gen. DIOPSIS, *Linn.*

160. Diopsis quinqueguttata, *Walk.* See page 36.

161. Diopsis quadriguttata, *Walk.* See page 37.

162. DIOPSIS DISCREPANS, n. s., mas et fœm. Nigra nitens, antennis fulvis, abdomine apud petioli apicem maculis duabus rufis tomento albo plagiatis, pedibus rufescentibus, tarsis testaceis, alis sublimpidis maculâ apud venam transversam præbrachialem fasciâque exteriore fuscis. *Mas.* Oculorum petiolis corpore paullò longioribus aut brevioribus. *Fœm.* Oculorum petiolis corporis dimidio brevioribus.

Male and Female. Black, shining. Antennæ tawny. Abdomen at the tip of the petiole with two red spots, each accompanied by a patch of white tomentum. Legs reddish; tarsi testaceous. Wings nearly limpid, with a brown spot on the præbrachial transverse vein, and with an exterior brown band; veins black. Halteres white.

Male. Petioles of the eyes a little longer or a little shorter than the body.

Female. Petioles of the eyes less than half the length of the body. Length of the body $2\frac{1}{2}$ lines; of the wings 4 lines.

Subfam. SEPSIDES, *Walk.*Gen. CALOBATA, *Fabr.*

163. CALOBATA STRENUA, n. s., fœm. Nigra sat valida, capite antico nigro-cyaneo, thorace subcinereo, femoribus mediis flavo unifasciatis posticis flavo bifasciatis, tarsis anticis albis, alis subcinereis fasciâ latâ fuscâ apice subfuscescentibus, halteribus piceis.

Female. Black, rather stout. Head shining, blackish-blue in front, with white tomentum about the eyes. Thorax slightly tinged with grey tomentum. Legs long, slender; middle femora with one yellow band; hind femora with two yellow bands, one of them at the base; fore tarsi white. Wings slightly greyish, with a broad brown band beyond the middle; tips slightly brownish; veins black. Halteres piceous. Length of the body 6 lines; of the wings 8 lines.

164. CALOBATA CEDENS, n. s., fœm. Nigro-cyanea nitens, antennis abdomine pedibusque nigris, pectore plagis duabus albo-tomentosis, femoribus anticis basi testaceis posterioribus testaceis nigro-fasciatis, tarsis anticis albis, alis subcinereis fasciâ fuscâ apice subfuscescentibus.

Female. Blackish-blue, shining. Antennæ, abdomen and legs black. Pectus with a patch of white tomentum on each side. Legs long and slender; fore femora testaceous towards the base; posterior femora testaceous, with blackish bands; fore tarsi white. Wings slightly greyish, with a brown band beyond the middle; tips slightly brownish. Halteres testaceous, with blackish knobs. Length of the body $3\frac{1}{2}$ –4 lines; of the wings 6–7 lines.

Gen. CARDIACEPHALA, *Macq.*

165. CARDIACEPHALA LONGICOLLIS, n. s., mas. Rufo-lutea, capitis maculis duabus facieque nigris, thorace longissimo lanceolato lineis duabus glaucis, abdomine apicem versus nigro, tibiis tarsisque nigricantibus, tarsis anticis basi albis, alis subcinereis apice fuscescentibus, apud costam subluteis.

Male. Reddish luteous. Head with a black spot on each side of the vertex; face black, with white tomentum on each side. Thorax very long, attenuated in front, with a glaucous stripe on each side. Abdomen black towards the tip, not longer than the thorax. Legs long and slender; tibiæ and tarsi blackish; fore tarsi white at the base. Wings slightly greyish, brownish at the tips, and with a luteous tinge along the costa; veins black, tawny towards the base. Length of the body 5 lines; of the wings 7 lines.

Subfam. PSILIDES, *Walk.*Gen. MICROPEZA, *Meigen.*

166. *Micropeza fragilis*, *Walk.* See page 37.

Gen. NERIUS, *Wied.*

167. *Nerius fuscipennis*, *Macq.* See page 38.

Gen. TEXARA, *Walk.*

168. *Texara compressa*, *Walk.* See page 38.

Subfam. GEOMYZIDES, *Fallen*.Gen. GYMNOPIA, *Fallen*.

169. GYMNOPIA? GUTTICOSTA, n. s., fœm. Nigra nitens, pectoris lateribus canis, thoracis fasciâ abdominisque basi pallidè flavis, tibiis tarsisque ferrugineis, alis subflavescentibus guttâ costali nigrâ.

Female. Black, shining. Head wanting. Thorax with a pale yellow band. Pectus hoary on each side. Abdomen blackish, cupreous towards the base, which is pale yellow. Tibiæ and tarsi ferruginous. Wings slightly yellowish, with a black dot on the costa before half the length; veins yellowish. Length of the body $1\frac{1}{2}$ line; of the wings 3 lines.

170. GYMNOPIA INFUSA?, n. s., mas. Nigra, thorace subpubescente, scutello longi-obconico, abdomine æneo-nigro, pedibus halteribusque testaceis, alis limpidis venis nigris.

Male. Black. Head wanting. Thorax slightly pubescent. Scutellum longi-obconic. Abdomen æneo-black, shining. Legs and halteres testaceous. Wings limpid; veins black; discal transverse vein parted by more than its length from the border, and by less than twice its length from the præbrachial transverse vein. Length of the body $1\frac{1}{2}$ line; of the wings $2\frac{1}{2}$ lines.

On a New Organ in Insects. By JOHN BRAXTON HICKS, Esq.,
M.D. Lond., F.L.S. &c.

[Read June 17, 1856.]

ABOUT a month since my attention was directed towards a peculiar structure in the *halteres* of the *Rhingia rostrata*, by Mr. Purkiss, who is an energetic and zealous searcher for microscopical objects, and who, from the position and structure of this organ, considered it to be the organ of smell. How far this is probable, I will leave the Society to judge at the termination of this paper. I instantly directed my attention to the subject, and I will endeavour to lay before the Society the results at which I have arrived up to the present time, apologizing for the incompleteness of the investigation, in consequence of my anxiety to bring it before the Society previous to the summer recess.

If we dissect a perfect fly, there will be seen in the centre of the thorax the great thoracic ganglion, which is formed by the fusion of the three thoracic ganglia into one. From thence it will be plainly seen that the first branch passes to the anterior leg; the second (much larger) enters the base of the wing after giving off a few branches to the muscles; the third branch passes

to the middle leg; and the fourth (the largest of all) passes straight into the *halteres*; the fifth set supplying the posterior legs. I have drawn the nerves of the Drone (Plate V. fig. 1) and Blow-fly (fig. 2).

In the *Lepidoptera* there are two thoracic ganglia. The first (the smaller) supplies the anterior legs. The second gives off the first pair to the anterior wings, the second pair to the middle legs, the third pair to the second wings, and the fourth to the posterior legs.

In the *Lucanus Cervus* (*Coleoptera*) we find three thoracic ganglia: the anterior supplies the first pair of legs; the second gives a pair to the elytra and a pair to the middle legs; while the third ganglion supplies a pair to the second wings and the posterior legs.

In the *Orthoptera*, in the Locust for example, the arrangement is similar as to the origin of the nerves.

In the *Hymenoptera* the arrangement is as in the *Lepidoptera*.

In the *Neuroptera* (Dragon-fly) there are three thoracic ganglia, the nerves passing off in the same manner as in the *Lucanus Cervus*.

In the *Hemiptera* the thoracic ganglia are fused into one, as in the Fly. But the nerve to the anterior wing is twice the size of that to the posterior.

From the above statement, it will be seen that we find in all insects—

1st, A pair of nerves going to and entering the base of each of the wings; and in the *Diptera*, of the *halteres* also.

2nd, The nerves supplying the posterior wings or *halteres* are generally the larger.

As there are no muscles in either the wings or *halteres*, these nerves must be sensory.

I shall now describe the curious organs to which they proceed.

And first as regards the *halteres*. Situated on the pleura, and closely adjoining a large spiracle, we find the joint very free, so that these organs can be moved with such rapidity as to render them invisible when in motion; and they are beautifully protected in the Fly by the scales, which in *Rhingia rostrata* form a very beautiful object.

The *halteres* consist of a base, shaft, and head; the relative proportion of each varying in different insects. On each side of the base is a ridge, and on these ridges are situated two similar structures. In the *Rhingia rostrata* (Plate V. fig. 3), for instance,

there are about twenty rows of vesicles, each row separated from the adjoining one by a slight distance. There is a row of hairs between each row of vesicles, the hairs arching over them, and thereby forming a protection from extraneous particles. These hairs are in pairs, one pair being opposite to each vesicle. The rows on the ridge are arranged transversely to the axis of the *halteres* (fig. 3 *a, c*). The vesicles themselves are very transparent, and hemispherical or even more nearly spherical projections, apparently cuticular. This is well seen by a profile view, fig. 3 *e*. Their diameter, in this fly, is about $\frac{1}{4000}$ th of an inch: each vesicle nearly touches its neighbour.

Beneath these, but on one side only, is a broader, flatter face, on which the vesicles are more distinct, and at a farther distance from each other, the rows arranged parallel to the axis of the *halteres*, and only one hair opposite each vesicle, there being some alternate. The diameter of each of these is about $\frac{1}{3700}$ th of an inch. There is a smaller group of vesicles situated on one side of this latter face, in number about ten; the individual vesicles are rather larger.

In the *Tabanidæ* the arrangement is very similar, with the addition of seven vesicles on the shaft of the *halteres*, to the upper part of the facet of the ridge, and another group of eight or nine beneath the ridge opposite the broader facet.

In *Tipula* the same general arrangement holds, except that in the facets on the ridge the vesicles are arranged in a quincuncial manner, and are larger than those on the broad facet, being about $\frac{1}{1900}$ th of an inch, with numerous hairs between each (fig. 4 *a*). The broader facet too is less extensive relatively to the others, and is also quincuncial in arrangement, of the diameter of $\frac{1}{3000}$ th of an inch (fig. 4 *b*). Besides these, in the largest Crane-fly, on the joint, there is a cone, having on its flattened apex a group of about eight or nine vesicles, with numerous very small hairs between them (fig. 4 *c*).

The shaft of the *halteres* is tubular, and through it apparently passes a branch of the nerve, which seems to expand as it reaches the head, and which head contains cellular substance, and has externally a groove on one side, just below its greatest diameter. The membrane lining the groove is apparently very delicate. A group of hairs is generally found at the end of the groove.

I have now described the principal features of these curious structures, as found in the *halteres* of the *Diptera*; none that I have examined have been free from them. The number of vesicles

in each of the *halteres* (in *Rhingia* for instance) is about 120 for each principal face, making for the three faces 360.

Thus we find a nerve, the largest nerve except the optic, entering the *halteres*, where there are no muscles, therefore this nerve must be one of sensation; and I think it will be allowed that it must be one of *special* sensation.

But as there is also a nerve going to the base of the wings, we might expect to find similar structures there, and we shall not be disappointed; for if we look on the subcostal nervure at the base, we shall see a group of vesicles of a similar character to those on the *halteres*,—not so beautifully arranged, but still very distinct, as is clearly shown in the *Tabanidæ* and some *Muscæ* (fig. 5). They extend in a single row some little distance up the nervure, and are found on both sides of the nervure, but principally on the *upper* side.

These organs are not confined to the *Diptera*, but I believe are to be found in all insects; at least I have found them as far as I have examined. They exist on both sides, but principally on the upper side of the base of the subcostal nervure; on the costal nerve in *Hemiptera*. Those on the second wing are generally the largest in number and size; but that, I suspect, is determined by the size of the nerve proceeding to them. In Moths they are very apparent, being greatest in the *Noctuæ* and *Bombycidæ*. There are about 100 vesicles on the upper surface of the posterior wing, and half that number beneath, besides some few on the nervures. (See fig. 7 *b*.) In the Butterfly they are smaller, but arranged in more definite groups, about three in number. In *Coleoptera* and *Neuroptera* they are arranged in long rows along the subcostal nerve; they are more apparent in *Coleoptera* than in *Neuroptera*. In the *Hymenoptera*, for instance the Bee, they are found in a rounded group of about forty on each side (fig. 6 *a*).

In a subsequent paper I hope to show a more extended analysis of this structure in the different tribes of Insects.

Now, what is the nature of these organs? Are they organs of smell, as suggested by Mr. Purkiss? As the olfactory organ has never yet been decided on, it seems to me not improbable that they may be the organs of that sense; for, first, it is not likely that they should be the organ of hearing, as they are in constant motion, and situated near the source of the hum of the wings, so that other sounds would be drowned. 2ndly. It is not necessary that the power of smell should be in the head. It is situated in

the commencement of the air-passages in the upper animals, probably because the current of air or water passing the olfactory nerves is there most powerful; but in the spiracle-breathing insect the greatest currents are in the neighbourhood of the wing, and near the greatest thoracic spiracle. The motion of the *halteres* also permits a greater exposure to odours floating in the air.

That the olfactory nerves should be necessarily, and by analogy, always before the optic, will not hold good below Fishes, where they first appear in that position. Otherwise the auditory apparatus in *Crustacea* ought to be behind the optic. In fact, there is no known analogy on this point, as no olfactory organs have yet been described below *Vertebrata*. Besides, if there are no nerves in front of the optic except those to the mouth and antennæ, either these latter must be olfactory organs, or the olfactory organs must be sought for elsewhere behind.

It may be added, that the respiratory apparatus is diffused (as are the nervous centres), and not connected with the oral or nasal aperture; and although the sensations be the same, analogy forms no sort of argument that the organs of sensation should always occupy precisely the same place.

DESCRIPTION OF PLATE V.

Fig. 1. Nervous system of the Drone-fly (*Eristalis tenax*): *a*, nerve of first leg; *b*, nerve of second leg; *c*, nerve of third leg; *d*, nerve of wing; *e*, nerve of one of the halteres.

Fig. 2. Nervous system of Blow-fly (*Musca vomitoria*); nerves lettered as above.

Fig. 3. Details of *Rhingia rostrata*; *3 a*, base of one of the halteres: *a*, group of vesicles on ridge; *b*, ditto on the broad facet; *b'*, a group of larger vesicles on the side of *b*. *3 b*, base of one of the halteres, another view, showing, *a'*, group of vesicles on the other ridge; *3 c*, magnified vesicles of the ridge, diameter 4000th of an inch; *3 d*, ditto on broad facet, diameter 3700th of an inch; *3 e*, profile of *3 c*.

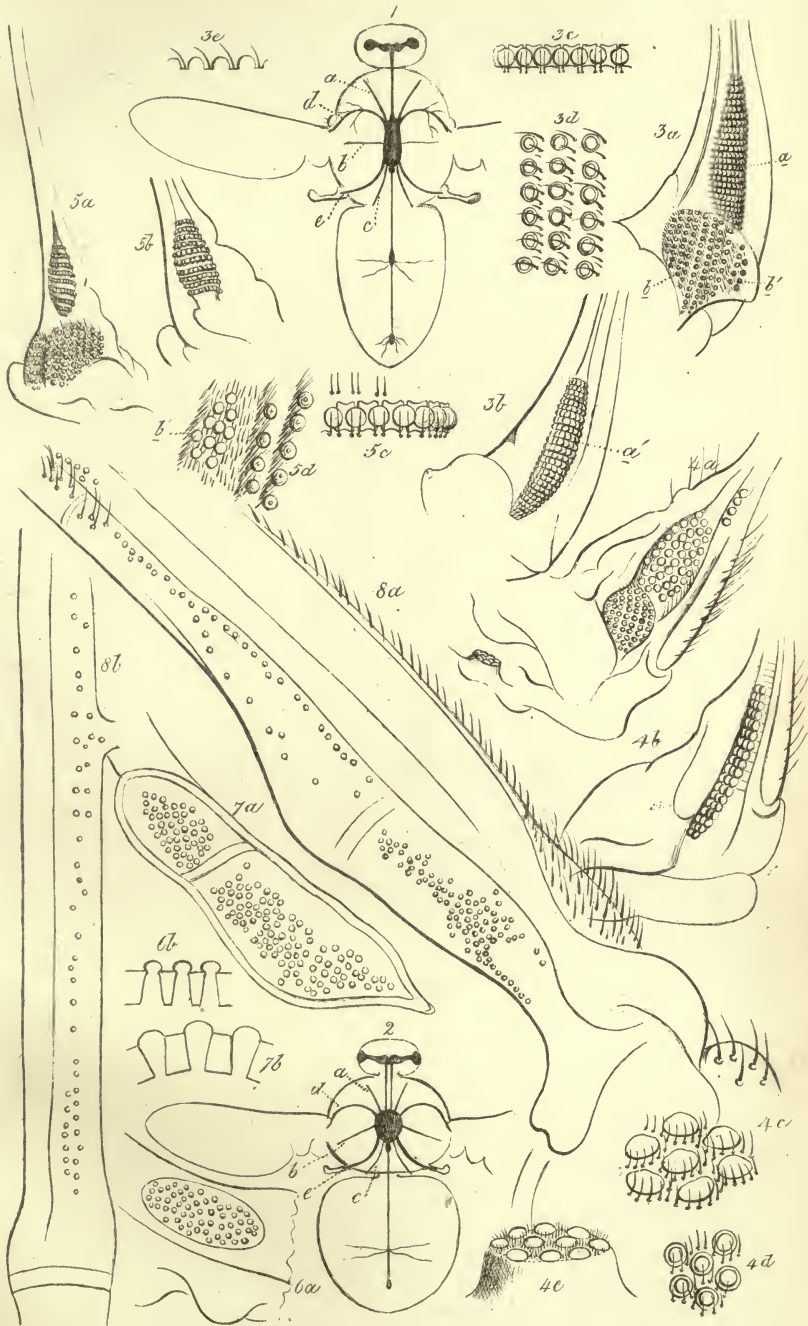
Fig. 4. Details of the largest Crane-fly (*Tipula oleracea*?): *4 a*, base of one of the halteres; *4 b*, ditto, another view; *4 c*, several of the vesicles on the ridge, diameter 1900th of an inch; *4 d*, ditto on broad face, diameter 3000th of an inch; *4 e*, ditto on the conical lobe at the junction of the halteres with the body.

Fig. 5. Details of Blow-fly (*Musca vomitoria*): *5 a*, base of one of the halteres; *5 b*, another view of ditto; *5 c*, vesicles on the ridge, diameter 2720th of an inch; *5 d*, ditto on the broad facet with the small lateral group, diameter 3730th of an inch.

Fig. 6. Details of Bee (*Andrena Mouffetella*): *6 a*, dorsal view of the vesicles on the costa of the hind wing; *6 b*, section of ditto.

Fig. 7 a, Subcostal nervure of the *Ermine Moth*, upper side; *7 b*, section of ditto.

Fig. 8 a, Base of anterior wing of *Leptis scolopacea*, showing the base of the subcostal nervure on the upper side; *8 b*, ditto on the under side.



Catalogue of the Homopterous Insects collected at Sarawak, Borneo, by Mr. A. R. WALLACE, with Descriptions of New Species. By FRANCIS WALKER, Esq., F.L.S. &c.

[Read January 20th, 1857.]

Ord. CICADINA, *Burmeister*.

Fam. STRIDULANTIA, *Burm.*

Gen. PLATYPLEURA, *Amyot et Serv.*

1. *Platypleura semilucida*, *Walk.* See page 83.

Gen. TACUA, *Amyot et Serv.*

2. *Tacua speciosa*, *Illiger* (*Tettigonia*).
Inhabits also Hindostan.

Gen. DUNDUBIA, *Amyot et Serv.*

3. *Dundubia immacula*, *Walk. Cat. Homopt.* pt. 1. 50.
Inhabits also Tenasserim.

4. *Dundubia phæophila*, *Walk. Cat. Homopt.* pt. 1. 52.
Inhabits also Corea.

5. *Dundubia Thalia*, *Walk. Cat. Homopt.* pt. 1. 72.

6. *Dundubia intemerata*, *Walk.* See p. 84.

7. DUNDUBIA DECEM, n. s., fœm. Ferrugineo-lutea lata, mesothoracis scuto viridi, scutello fasciâ latâ interruptâ nigricante, abdominis segmentis nigro marginatis, tibiis suprâ tarsisque nigris, alis vitreis; anticarum areolis marginalibus fuscis vittatis, venis viridibus nigro variis, venis transversis apice venulisque transversis nigricante maculatis.

Female. Ferruginous luteous, broad. Scutum of the mesothorax green; scutellum with a broad diffuse blackish band consisting of four parts, and with the apical ridges partly black. Hind borders of the abdominal segments, tibiæ above and tarsi black. Wings vitreous. Fore wings with an indistinct pale brown streak on each marginal areolet; veins green, partly black; transverse veinlets and tips of the marginal veins clouded with blackish-brown. Length of the body 18 lines; of the wings 58 lines.

8. DUNDUBIA DUARUM, n. s., mas. Fulva, capite vittis tribus angulosis fasciâque anticâ prothorace vittis quatuor mesothoracis scuto vittis duabus scutelloque vittis quinque nigris, tympanis abdominis apicem attingentibus apices versus nigris, abdominis segmentis testaceo aut viridi marginatis, pedibus nigro variis, alis vitreis, anticarum venis nigris ex parte rufescentibus, venulis transversis 1^a et 2^a nigricante maculatis.

Male. Tawny. Head above with three angular black stripes, and in front with a black band. Prothorax with four black stripes, which are dilated in front. Scutum of the mesothorax green, with a black stripe on each side; scutellum with five black stripes, the inner pair interrupted, the outer pair broad.

Opercula green; drums black towards the tips and along the inner border, extending to the tip of the abdomen. Legs testaceous, femora and tibiæ striped with black; tarsi black; hind tarsi testaceous. Wings vitreous. Fore wings green at the base; veins black, reddish along the costa and towards the base; 1st and 2nd transverse veinlets clouded with blackish-brown. Length of the body 15 lines; of the wings 46 lines.

Gen. FIDICINA, *Amyot et Serv.*

9. *Fidicina Aquila*, *Walk. Cat. Homopt.* pt. 1. 84.

Inhabits also Corea.

Gen. HUECHYS, *Amyot et Serv.*

10. *Huechys splendidula*, *Fabr. Syst. Rhyn.* 42. 49.

Inhabits also Hindostan and Java.

11. *HUECHYS FACIALIS*, n. s., mas. Atra, fronte facie mesothoracisque maculis duabus testaceis, pectoris maculis duabus et segmentorum abdominalium marginibus rufis, alis anticis fuscis, posticis subcinereis.

Male. Deep black, shining. Front and face testaceous. Scutellum of the mesothorax with a very large testaceous spot on each side. Pectus with a red spot on each side. Hind borders of the abdominal segments red. Fore wings brown. Hind wings slightly greyish. Length of the body 9 lines; of the wings 22 lines.

Fam. FULGORINA, *Burm.*

Subfam. FULGORELLÆ, *Spinola.*

Trib. FULGORITES, *Spinola.*

Subtrib. FULGOROIDES, *Spinola.*

Gen. HOTINUS, *Amyot et Serv.*

12. *Hotinus Sultana*, *White, Proc. Zool. Soc. Lond.* 1847, 83; *Ann. Nat. Hist.* xx. 204.

13. *HOTINUS INTRICATUS*, n. s., mas. Ferrugineus, rostro ascendente albo punctato apice luteo corpore vix brevior, abdomine nigro segmentorum marginibus viridibus, tibiis tarsisque nigris, alis anticis viridi-venosis fasciis interioribus testaceis, maculis exterioribus luteis, posticis lætè cyaneo-viridibus, margine latissimo purpurascente nigro.

Male. Ferruginous. Rostrum slightly curved and ascending, sprinkled with white flecks, rounded and luteous at the tip, a little shorter than the body. Abdomen black; hind borders of the segments green. Tibiæ and tarsi black. Fore wings black, with three testaceous interior bands, and with twelve exterior luteous spots; 3rd band interrupted; veins green, brighter on the interior part than on the exterior part, where they are differently arranged. Hind wings bright bluish-green, with very broad purplish-black borders. Length of the body without the rostrum 11 lines; of the wings 33 lines.

This species is closely allied to *H. maculatus*, Oliv., but in the latter species

the rostrum is wholly black and more slender at the tip; the fore wings have green spots and no bands, and the blue part of the hind wings extends more towards the borders in front and less so hindward.

14. *HOTINUS CULTELLATUS*, n. s., mas. Pallidè viridis, rostro compresso subascendente corporis ferè longitudine, abdomine testaceo, alis anticis guttis nonnullis testaceis fusco marginatis, posticis luteis.

Male. Pale green. Rostrum compressed, keeled, hardly ascending, acuminate at the tip, testaceous above, a little shorter than the body. Abdomen and legs testaceous. Fore wings with a few testaceous brown-bordered dots of various size. Hind wings luteous. Length of the body without the rostrum 8 lines; of the wings 28 lines.

Subtrib. *LYSTROIDES*, *Spinola*.

Gen. *APHÆNA*, *Guérin*.

15. *Aphæna scutellaris*, *White*, *Ann. Nat. Hist.* xvii. 330.

16. *Aphæna Saundersii*, *White*. See page 84.

17. *Aphæna basirufa*, *Walk. Cat. Homopt.* pt. 2. 278.

It differs slightly from the three Silhet specimens in the British Museum, which are exactly alike.

18. *APHÆNA SATURATA*, n. s., mas. Nigra, thoracis lateribus ferrugineis, alis anticis viridi-nigris e lineâ transversâ arcuatâ lutescente in areas duas divisâ, areâ interiore longiore semicirculis rufescentibus ornatâ, exteriore subrotundâ creberrimè luteo-venosis, posticis lineâ rectâ divisâ, marginis interioris dimidio basali flavo plagiato.

Male. Black. Ferruginous piceous, black beneath. Wings greenish-black, divided into two areas by a transverse line, which is curved and pale luteous in the fore wings, straight and rather darker in the hind wings; interior area longer than the other one, adorned in the fore wings with various little luteous half-ringlets which are accompanied by dots, in the hind wings with partly green veins, and with a yellow patch towards the base of the interior border; exterior area nearly round, most thickly crowded with luteous veins; a glaucous bloom covering the interior area on the under side, and forming a semicircle on the exterior one. Length of the body 11 lines; of the wings 30 lines.

This species and *A. rosea*, Guér., are closely allied in structure and in the disposition of the colours, and are distinguished from the two preceding species by their much more ample wings.

19. *APHÆNA VERIS-AMOR*, n. s., mas et fem. Nigra, facie pedibusque ferrugineis, abdomine rufo, alis anticis saturatè et lætissimè viridibus, costâ lineâ arcuatâ exteriore maculâque basali flavis, subtùs tomento albo variis, posticis niveis apice fulvis.

Male and Female. Black. Face and legs ferruginous. Abdomen red. Fore wings intensely grass-green, with the costa, a basal spot, a few dots in the disk, and an exterior curved transverse line yellow; tips tawny; under side with various marks of white tomentum, which also appears on

the costa above at the base. Hind wings snow-white, with tawny tips. Length of the body 11 lines; of the wings 26 lines.

This species has narrow fore wings like *A. scutellaris*, but belongs to a distinct group.

20. *APHÆNA UNIFORMIS*, n. s., fœm. Fusca, capite thorace antico pedibusque fulvis, alis fulvo venosis, anticis basi nigris fasciâ contiguâ flavâ.

Female. Brown. Head, fore part of the thorax and legs tawny. Abdominal segments with red borders. Wings with tawny veins. Fore wings narrow, black at the base, near which there is a yellow band. Length of the body 8 lines; of the wings 22 lines.

This species will form a fourth group in the genus. The veins of the fore wings have the same structure over the whole surface.

Subtrib. DICTYOPHOROIDES, *Spinola*.

Gen. DICTYOPHORA, *Germar*.

21. *Dictyophora speilinea*, *Walk*. See page 84.

22. *DICTYOPHORA SPEICARINA*, n. s., mas. Testacea, capite thoraceque viridi carinatis, capite lanceolato tricarinato subascendente apice fusco, thorace septem-carinato, tibiis tarsisque rufis, alis hyalinis venis fulvis apice fusco nebulosis, stigmatè fulvo.

Male. Testaceous. Head and thorax with green keels. Head lanceolate, very slightly ascending, with three ridges, brown at the tip, as long as the breadth of the thorax. Thorax with seven ridges, three dorsal and four lateral. Tibiæ and tarsi red. Wings hyaline; veins and stigma tawny; apical transverse veinlets clouded with brown. Length of the body 5 lines; of the wings 12 lines.

Gen. LEUSABA, n. g.

Dictyophora affinis. *Caput* arcuatum, breve, vertice marginato, fronte planâ longi-subquadrata anticè latiore, facie lanceolata fronte paullò breviorè. *Prothorax* marginatus, valdè arcuatus, margine postico excavato et intùs angulato. *Mesothorax* tricarinatus. *Pedes* longi. *Alæ* anticæ extùs latiores, areolis basalibus longissimis, discalibus et marginalibus brevioribus, venis marginalibus nonnullis furcatis, venulis transversis costalibus et submarginalibus nullis.

Allied to Dictyophora. Head short, arched; vertex with an elevated border, about four times broader than long; front smooth, subquadrate, much longer than broad, slightly widening in front, with two indistinct furrows which converge forwards; face lanceolate, a little shorter than the front. Prothorax much arched, with an elevated border, excavated and much arched on the hind side. Mesothorax with three keels. Legs long. Fore wings widening towards the tips; five basal areolets very long; six discal areolets a little longer than the marginal areolets, the latter numerous, and four of them forked; no transverse costal or submarginal veinlets.

23. *LEUSABA MARGINALIS*, n. s., mas. Viridis, capitis thoracisque marginibus et carinis ex maximâ parte testaceis, thorace guttis nonnullis nigro-fuscis,

alis hyalinis, anticis apud marginem exteriorem fuscis, venis nigris basi fulvis, stigmatè fusco.

Male. Green. Borders and keels of the head and of the thorax for the most part testaceous. Thorax with a few blackish-brown dots. Wings hyaline. Fore wings brown along the exterior border; veins black, tawny towards the base; stigma brown. Length of the body 5 lines; of the wings 14 lines.

Gen. ISPORISA, n. g.

Leusabæ affinis. *Caput* breve, valdè arcuatum, vertice posticè excavato et marginato, fronte facieque marginatis et medio carinatis, fronte subquadrata anticè latiore, facie trigonâ. *Thorax* brevis. *Prothorax* et *mesothorax* tricarinati, carinis lateralibus valdè obliquis. *Alæ* anticæ angustæ, areolis basalibus longissimis, discalibus et marginalibus brevioribus, venis marginalibus simplicibus, venulis transversis costalibus nonnullis exterioribus, submarginalibus nullis.

Allied to *Leusaba*. Head short, much arched; vertex with three angles in front; hind part excavated, and with an elevated border; front and face with elevated borders and with a middle keel; front subquadrate, a little longer than broad, slightly widening in front, its sides indistinctly concave; face triangular, a little broader and longer than the front. Thorax short. Prothorax and mesothorax with three keels, the lateral pair very oblique. Wings narrow. Fore wings with the five basal areolets very long; six discal areolets hardly longer than the marginal areolets, which are rather more numerous; all the latter are simple, and form a continuous row with the few very oblique exterior costal veinlets; no submarginal veinlets.

24. ISPORISA APICALIS, n. s., fœm. Viridis, capite thorace pectoreque nigro maculatis, abdomine nigro, segmentorum marginibus posticis viridibus, pedibus nigro notatis, alis subluridis, anticis apice fuscis, venis nigris basi fulvis, stigmatè nullo.

Female. Green. Head with three black spots in front of the vertex; front and face with reddish borders, each with two black spots. Prothorax and mesothorax with a black dot on each side. Pectus with black spots. Abdomen black; hind borders of the segments green. Legs marked with black. Wings slightly lurid. Fore wings with brown tips; veins black, tawny towards the base; no stigma. Length of the body 3 lines; of the wings 8 lines.

Gen. EPORA, n. g.

Dictyophoræ affinis. *Caput* tricarinatum, suprâ transversum; vertex conicus; frons longissima, linearis; facies brevior, lanceolata. *Prothorax* quadricarinatus, valdè arcuatus. *Mesothorax* tricarinatus. *Pedes* longiusculi. *Alæ* anticæ sat angustæ, areolis basalibus longissimis, longitudinis bis trientem occupantibus, discalibus et marginalibus subæqualibus, venulis transversis costalibus obliquis parallélis, submarginalibus nullis.

Allied to *Dictyophora*. Head with three keels, transverse above; vertex conical; front very long, with parallel sides; face lanceolate, much shorter than the front. Prothorax much arched, with four keels. Mesothorax with three keels.

Legs rather long. Fore wings rather narrow; basal areolets as long as two-thirds of the length of the wing; marginal areolets a little longer than the discal areolets, all of them simple; transverse costal veinlets oblique, parallel except towards the tip.

25. *EPORA SUBTILIS*, n. s., mas et fœm. Viridis (mas) aut testacea (fœm.), alis hyalinis, venis viridibus, stigmatè nullo.

Male and Female. Green (*male*) or testaceous (*female*). Wings hyaline; veins green; no stigma. Length of the body $2\frac{1}{2}$ –3 lines; of the wings 6–7 lines.

Gen. DARADAX, *Walk.*

26. *DARADAX ACRIS*, n. s., mas. Viridis, mesothorace tricarinato, abdomine albo-tomentoso, alis anticis fuscescente marginatis, posticis albis.

Male. Green. Head much longer than broad; vertex and front lanceolate, with a keel in the middle and one on each side. Mesothorax with 3 keels. Abdomen with whitish tomentum. Fore wings with brownish borders. Hind wings white. Length of the body 3 lines; of the wings 7 lines.

Subtrib. CIXIOIDES.

Gen. CIXIUS, *Latr.*

27. *Cixius pustulatus*, *Walk.* See page 87.

28. *CIXIUS FERREUS*, n. s., mas. *C. efferato* valdè affinis. Ferrugineus, fronte facieque subcarinatis, pedibus fulvis, alis subcinereis, anticis maculâ discali interiore guttâque costali exteriorè fuscis, venis fulvis.

Male. Very nearly allied to *C. efferatus*. Ferruginous. Head convex between the eyes; front and face with a slight middle keel; front much broader than long; face lanceolate, much longer than the front. Abdomen with the apical appendages much developed. Legs tawny. Wings slightly greyish. Fore wings slightly greyish, with a brown spot in the disk before the middle, and with a brown dot on the costa near the tip; veins tawny. Length of the body $3\frac{1}{2}$ lines; of the wings 7 lines.

29. *CIXIUS DIFFINIS*, n. s. Fuscus, subtùs testaceus, fronte perangustâ, thorace vittâ dorsali fusiformi interlineatâ stramineâ, pedibus testaceis, alis fuscis, anticis fasciis duabus interruptis guttisque nonnullis pallidè viridibus.

Brown, testaceous beneath. Head narrow; vertex slightly concave; front very long and narrow, with three keels. Thorax with a fusiform straw-coloured dorsal stripe, divided longitudinally by a brown line. Legs testaceous. Wings brown. Fore wings with two pale green bands, and with a few pale green dots, of which the largest is on the costa near the tip; 1st band quite interrupted; 2nd slightly interrupted. Length of the body $3\frac{1}{2}$ lines; of the wings 7 lines.

30. *CIXIUS GUTTIFER*, n. s., fœm. Testaceus, capite suprâ subquadrato subtùs lanceolato, pectore guttis duabus anticis lateralibus nigris, alis anticis

pallidè testaceis subhyalinis nigro triguttatis, venis testaceis, posticis cinereis, venis nigricantibus.

Female. Testaceous. Head with elevated borders; vertex subquadrate; front and face with a middle keel; front full thrice longer than broad, slightly increasing in breadth towards the face, which is lanceolate and shorter than the front. Pectus with a black dot on each side in front. Fore wings pale testaceous, nearly hyaline, with a slightly darker spot near the tip of the costa, and with three black dots which form a curved line in the disk; veins testaceous. Hind wings grey with black veins. Length of the body 3 lines; of the wings 7 lines.

31. ^{gen. ?} CIXIUS ÆQUUS, n. s., mas. Testaceus rufo varius, albido tomentosus, capite toto valdè angusto lateribus valdè elevatis, alis cinereis, anticarum venulis transversis costalibus duabus, exterioribus paucis.

Male. Testaceous, with some red marks, slightly covered with whitish tomentum. Vertex, front and face very narrow; their borders much elevated. Wings greyish, with two oblique costal veinlets, and with a few discal exterior veinlets. Length of the body 2-2½ lines; of the wings 6-7 lines.

32. ^{Hamba} CIXIUS PERPLEXUS, n. s., mas. Niger, capitis lateribus elevatis carinâque testaceis, fronte testaceo conspersâ, vertice perangusto, abdominis segmentis testaceo marginatis, pedibus testaceis, alis anticis cervinis fusco conspersis, costâ margineque interiore pallidioribus guttis nigro-fuscis magis determinatis, posticis nigricantibus.

Male. Black. Head with testaceous elevated borders; vertex very narrow; front and face forming an elongated fusiform compartment with a testaceous keel and testaceous marks. Hind borders of the abdominal segments and legs testaceous. Fore wings fawn colour, sprinkled with brown, paler towards the tips; costa and interior border pale testaceous, with blackish-brown dots. Hind wings blackish. Length of the body 2 lines; of the wings 5 lines.

33. CIXIUS INCLINATUS, n. s., mas. Niger, capitis lateribus elevatis carinâque testaceis, vertice perangusto, frontis lateribus nigro punctatis, abdominis segmentis testaceo marginatis, pedibus testaceis, alis anticis testaceis fusco conspersis et nebulosis, stigmatè obscuriore, posticis cinereis.

Male. Black: like the preceding species in structure. Borders of the head and middle keel testaceous; borders of the front with minute black dots. Borders of the abdominal segments and legs testaceous. Fore wings testaceous, sprinkled and clouded with brown; stigma darker. Hind wings grey. Length of the body 1¼ line; of the wings 3½ lines.

34. CIXIUS SIMPLEX, n. s., mas. Niger, carinis pedibusque piceis, thorace tricarinato, abdomine subtus testaceo, apice albo densè floccoso, alis cinereo-hyalinis, venis nigris, stigmatè fusco.

Male. Black. Ridges of the head and of the thorax, and legs piceous. Head with the borders much elevated; vertex subquadrate, a little narrower in front; front and face together fusiform, with a rather deep keel. Prothorax extremely short. Mesothorax with three parallel keels. Abdomen

testaceous beneath; tip thickly covered with white flecks. Wings hyaline, slightly cinereous; veins black; exterior transverse veinlets and tips of the apical veins of the fore wings clouded with brown; stigma brown. Length of the body 3 lines; of the wings 7 lines.

- mutillata*
35. *CIXIUS VILIS*, n. s., fœm. Niger, frontis lateribus femoribusque fulvis, thorace tricarinato, segmentorum abdominalium marginibus albidis, tibiis tarsisque testaceis, alis hyalinis apice fuscis, venis nigris basi fulvis, stigmatè sordidè testaceo posticè nigro.

Female. Black. Head with elevated borders; vertex very narrow; front with tawny sides, forming with the face a fusiform compartment which has a middle ridge. Prothorax extremely short. Mesothorax with three parallel keels. Segments of the abdomen with whitish borders. Legs testaceous; femora tawny. Wings hyaline, slightly greyish, with brown tips; veins black, tawny at the base; stigma dingy testaceous, black hindward. Length of the body 2 lines; of the wings 5 lines.

- Oliarus*
36. *CIXIUS MODICUS*, n. s., mas. Testaceus, capite suprâ angusto subtùs fusiformi, thoracis disco abdomineque suprâ fuscis, thorace tricarinato, alis subhyalinis; anticis fusco vix trifasciatis apice fuscescentibus, venis nigris basi testaceis.

Male. Testaceous. Head with elevated borders; vertex narrow; front and face together fusiform with a middle ridge. Mesothorax with three parallel keels; its disk brown. Abdomen above brown; hind borders of the segments testaceous. Wings nearly hyaline; fore wings with three slender and very incomplete brown bands; tips brownish; veins black, testaceous at the base. Length of the body 2 lines; of the wings 5 lines.

- Brixia*
37. *CIXIUS NEXUS*, n. s., fœm. Testaceus, capite subtùs perangusto, abdomine nigro marginibus testaceis, alis hyalinis, anticis testaceo fasciatis, fasciis interioribus nigricante marginatis exterioribus fusco nebulosis.

Female. Closely allied to *C. Meander*, Walk. Testaceous. Head with elevated borders, slightly ascending and conical above; front and face very narrow. Abdomen black; hind borders of the segments testaceous. Wings hyaline. Fore wings with irregular testaceous bands, of which the interior have incomplete blackish borders, and the exterior are partly clouded with brown; veins testaceous. Length of the body 2 lines; of the wings $4\frac{1}{2}$ lines.

- mutillata*
38. *CIXIUS DESPECTUS*, n. s., fœm. Nigricans, carinis abdomine subtùs pedibusque testaceis, alis cinereo-hyalinis, anticis latis, fasciis plurimis transversis intùs nigricantibus extùs fuscis, venis nonnullis marginalibus furcatis.

Female. Blackish. Ridges of the head, abdomen beneath and legs testaceous. Head slightly conical and ascending above; front and face together almost lanceolate, with a rather high middle keel. Wings hyaline, slightly cinereous; fore wings broad, with several slender and interrupted bands, which are blackish towards the base and brown towards the exterior border; veins testaceous. Length of the body 2 lines; of the wings 5 lines.

This and some of the following species differ slightly from the typical *Cixii* in the veins of the wings, but hardly sufficiently to form new genera.

Multitaled
39. *CIXIUS DEDUCTUS*, n. s., fœm. Piceus, capitis marginibus pedibusque testaceis, vertice subquadrato, fronte breviusculâ, facie lanceolatâ, alis subcinereis, anticarum venis marginalibus apice venulisque transversis infuscatis, margine exteriori albo punctato.

Female. Piceous. Head with elevated testaceous borders; vertex short; front and face with a testaceous keel, the former short, the latter lanceolate. Legs testaceous. Wings greyish; veins of the fore wings black, punctured with testaceous; transverse veinlets and tips of the marginal veins clouded with brown; a row of whitish dots along the exterior border. Length of the body $1\frac{1}{2}$ line; of the wings 4 lines.

Multitaled
40. *CIXIUS MUNITUS*, n. s., fœm. Ferruginosus, capite perangusto lateribus elevatis nigro guttatis, alis fuscis, anticis chalybeo-cinereo quinque-fasciatis.—*Var.* Fronte facieque nigris.

Female. Ferruginous. Vertex, front and face very narrow, with elevated black dotted borders. Wings brown; fore wings with five incomplete grey bands, which are shining and have a chalybeous tinge; veins black, ferruginous towards the base.—*Var.* Front and face black, with ferruginous borders. Length of the body 2 lines; of the wings $5\frac{1}{2}$ lines.

Bajaiana
41. *CIXIUS TRAHENS*, n. s., mas. Niger, subtus ferrugineus, capite perangusto lateribus elevatis, pedibus ferrugineis, alis nigricantibus, venis nigris.

Male. Black, ferruginous beneath. Vertex, front and face very narrow, with elevated borders. Legs ferruginous. Wings blackish; veins black. Length of the body $1\frac{1}{2}$ line; of the wings 4 lines.

Mundipa
42. *CIXIUS PALLENS*, n. s., mas. Testaceus, capite sat lato, vertice brevi, fronte longi-subquadratâ, facie lanceolatâ, alis hyalinis, anticis subttestaceis, venis pallidis, areolis basalibus longissimis, discalibus nullis, marginalibus sat longis.

Male. Testaceous. Head moderately broad, with elevated borders; vertex very short; front and face with a middle keel, the former elongate-quadrate, the latter lanceolate. Wings hyaline, with pale veins; fore wings with a slight testaceous tinge, and with only one row of transverse veinlets; basal areolets very long; marginal areolets moderately long, some of their veins forked. Length of the body $1\frac{1}{4}$ line; of the wings 4 lines.

Borysthenes
43. *CIXIUS FINITUS*, n. s., fœm. Testaceus, capite thorace pedibusque testaceis, vertice transverso, fronte longi-subquadratâ, facie lanceolatâ, alis nigro-fuscis albo guttatis, anticis latis, venulis transversis vix ullis, venis marginalibus versus costam flexis.

Female. Testaceous. Head with an elevated border; vertex transverse; front and face with a very slight keel; front elongate-subquadrate; face lanceolate. Wings blackish-brown, with several whitish hyaline spots in the disk and along the exterior border; fore wings broad; veins black, ferruginous at the base, mostly simple; subcostal marginal veins curved; only one transverse veinlet. Length of the body 2 lines; of the wings 6 lines.

Borghesensis
44. *CIXIUS DILECTUS*, n. s., mas et fœm. Testaceus, *C. finiti* structurâ, alis hyalinis, anticis latis fusco subfasciatis, venis nigris basi testaceis.

Like *C. finitus* and *C. nexus* in structure. *Male* and *Female*. Testaceous. Wings quite hyaline; veins black, testaceous at the base; fore wings broad, with some irregular and incomplete pale brown bands. Length of the body $1\frac{1}{4}$ line; of the wings 4 lines.

Mendosa
45. *CIXIUS DOTATUS*, n. s., mas et fœm. Nigricans, facie pectore pedibusque albidis, alis fuscis, anticis basi fasciâ latâ interiore maculis quinque exterioribus apiceque hyalinis, stigmatè fusco, posticis basi latè hyalinis.

Male and *Female*. Blackish. Face, pectus and legs whitish. Vertex short; front and face with a middle keel; front elongate-subquadrate, with whitish elevated borders; face lanceolate. Wings brown; fore wings with the base, a broad band, five exterior dots and the tips hyaline; veins black, several of them forked; one row of transverse veinlets; stigma black; hind wings hyaline for nearly one-third of the length from the base. Length of the body 1 line; of the wings $3\frac{1}{2}$ lines.

Mutilated
46. *CIXIUS INSUETUS*, n. s., mas. Testaceus, fronte facieque longis perangustis, alis hyalinis albo tomentosus, venis albis.

Male. Testaceous. Head with an elevated border, transverse above; front and face long and very narrow, with a slight middle keel. Wings hyaline, but thickly covered with white tomentum; veins white, much like those of *C. dilectus* in structure. Length of the body $\frac{3}{4}$ line; of the wings 3 lines.

Ugypus Guer
Gen. *BIDIS*, Walk.

47. *BIDIS PICTULA*, n. s., mas et fœm. Viridis rufo nigroque vittata, verticis apice, pectoris maculis duabus abdomineque nigris, alis hyalinis, anticis strigâ apicali guttisque marginalibus fuscis, venis nigris albo fasciatis.

Male and *Female*. Green, with red and black stripes. Head with much elevated borders; vertex narrow in front, black at the tip; front and face narrow and very long, with red disks. Antennæ long, filiform; 2nd joint much longer than the 1st; seta much longer than the 2nd joint. Pectus with two black spots. Abdomen black. Wings hyaline, with brown marks along the borders, and with a brown streak which extends from two-thirds of the length to the tip; veins black, with white bands. Length of the body 3 lines; of the wings 7 lines.

47 = 48. *BIDIS PUNCTIFRONS*, n. s., mas et fœm. Testacea rufo vittata, fronte nigro punctatâ, thoracis carinis pallidioribus, alis subhyalinis, anticis guttis marginalibus strigâque apicali dilatatâ fuscis, venis nigris testaceo fasciatis.

Male and *Female*. Testaceous, with red stripes, in structure like *B. pictula*. Front with three rows of black transverse dots; face with black dots at the base. Thorax with three brown stripes. Wings nearly hyaline; fore wings with marginal brown dots, and with an irregular brown streak, which is dilated towards the tip of the wing; veins black, with testaceous bands. Length of the body $3-3\frac{1}{2}$ lines; of the wings $7-7\frac{1}{2}$ lines.

49. *BIDIS CONTIGUA*, n. s., mas. Testacea, rufo vittata, fronte nigro punctatâ, alis subhyalinis, anticis vittâ posticâ nigrâ, venis testaccis.

Male. Testaceous : in structure like *B. pictula*. Head and thorax with red stripes. Front with three rows of black transverse dots. Prothorax with black dots on each side. Mesothorax with three pale brown stripes. Wings nearly hyaline ; fore wings with a black stripe along the interior border ; veins testaceous. Length of the body 3 lines ; of the wings 7 lines.

Gen. OSTAMA, n. g.

Caput breve ; vertex subquadratus lateribus subelevatis ; frons plana, longi-subquadrata, anticè latior ; facies lanceolata. *Antennæ* longiusculæ, filiformes ; articulus 2^{us} 1^o non longior ; seta brevis. *Mesothorax* tricarinatus. *Alarum* anticarum areolæ basales marginalibus multò longiores ; venæ marginales plurimæ, nonnullæ furcatæ.

Head short ; vertex subquadrate, with elevated borders ; front smooth, elongate-subquadrate ; face lanceolate, a little shorter than the front. *Antennæ* filiform, rather long ; 2nd joint as long as the 1st ; seta short. Mesothorax with three slight parallel keels. Fore wings with a row of transverse veinlets which divides the basal veins from the marginal veins, the former nearly twice the length of the latter, which are rather numerous, and some of them forked.

50. *OSTAMA JUNCTA*, n. s., mas. Ferruginea subtùs nigra, abdominis dorso tibiisque rufis, alis anticis fuscis testaceo conspersis, apices versus hyalinis vittâ arcuatâ strigâque nigro-fuscis, posticis cinereis.

Male. Ferruginous, black beneath. Borders of the thorax testaceous. Abdomen above and tibiæ red. Fore wings brown, with numerous testaceous punctures ; part beyond the transverse veinlets hyaline, with a curved stripe and a streak of a blackish-brown hue ; hind wings grey. Length of the body 2½ lines ; of the wings 7 lines.

Gen. ERANA, n. g.

Caput lateribus elevatis carinâque mediâ ; vertex subconicus ; frons subquadrata, faciem versus latior ; facies lanceolata. *Antennæ* longæ, validæ, filiformes ; articulus 1^{us} brevis ; 2^{us} longus ; seta nulla. *Mesothorax* carinis tribus parallelis. *Alarum* anticarum areolæ basales discalibus et marginalibus triplò longiores ; venulæ transversæ costales paucæ perobliquæ.

Head with elevated borders and with a middle keel ; vertex nearly conical ; front elongate-subquadrate, broader towards the face which is lanceolate. *Antennæ* elongated, stout, filiform ; 1st joint short ; 2nd long ; no arista. Mesothorax with three parallel keels. Fore wings with the basal areolets full thrice longer than the discal and marginal areolets together ; the marginal areolets as long as the discal areolets and not more numerous ; costal transverse veinlets few and very oblique.

51. *ERANA OPEROSA*, fœm. Ferruginea ; aliis anticis apud venas chalybeo notatis, posticis nigricantibus.

Female. Ferruginous. Fore wings with chalybeous spangles on the veins ; hind wings blackish. Length of the body 2½ lines ; of the wings 6 lines.

Gen. RHOTALA, n. g.

Caput suprâ conicum, lateribus elevatis, fronte facieque planis, elongatis, punctulatis. *Antennæ* breviusculæ, filiformes; articulus 2^{us} 1^o longior; arista longa, gracilis. *Prothorax* sat magnus; arcâ mediâ conicâ, tricarinatâ. *Alæ* anticæ areolis basalibus longissimis, venulis transversis plurimis exterioribus nonnullisque costalibus.

Vertex conical, with elevated borders; front and face forming a fusiform compartment which is flat and punctured. *Antennæ* cylindrical, rather short; arista long, slender. *Prothorax* well developed; middle part conical, with three keels. Fore wings with very long basal areolets, and with several transverse veinlets on the marginal areolets; exterior part of the costa with some oblique parallel veinlets.

52. RHOTALA DELINEATA, n. s., mas et fœm. Testacea, vertice thorace alisque anticis crebrè ferruginco conspersis, fronte facie pectoreque nigris, pedibus ferrugineis nigro variis, anticis testaceo fasciatis, alis posticis nigricantibus.

Male and *Female*. Testaceous. Vertex, thorax and fore wings thickly covered with ferruginous dots. Fore wings with three short black streaks forming an oblique transverse line. Head beneath and pectus black. Legs ferruginous, with black marks; fore legs with testaceous bands. Hind wings blackish. Length of the body 4 lines; of the wings 10 lines.

Trib. ISSITES, *Spinola*.Gen. ISSUS, *Fabr*.

✓ 53. ISSUS PRÆCEDENS, n. s., fœm. Piceus, capitis lateribus elevatis, vertice longi-subquadrato, fronte anticè dilatatâ testaceâ, pectore pedibusque testaceo notatis, alis anticis nitentibus testaceo subobsoletè guttatis, posticis nigricantibus.

Nearly allied to *I. sinensis*. *Female*. Piceous. Head with elevated borders; vertex elongate-subquadrate; front broader and testaceous in front. Pectus and legs with testaceous marks. Fore wings shining, with indistinct testaceous dots. Hind wings blackish. Length of the body 3 lines; of the wings 6 lines.

~~*Jylana*~~
54. ISSUS COMPOSITUS, n. s., mas. Obscurè testaceus, capite thorace alisque anticis nigro confertissimè conspersis, capitis lateribus elevatis, vertice transverso, fronte tricarinatâ, alis anticis latis plagâ nigrâ submarginali, angulo interiore acuto, posticis cinereis.—*Var.* Alis anticis pallidioribus plagâ nullâ.

Male. Dull testaceous. Head, thorax and fore wings thickly sprinkled with black. Head with elevated borders; vertex transverse; front with three keels, slightly broader in front. Legs with a few black marks. Fore wings broad, with a black patch near the interior border; interior angle prominent, almost acute; hind wings grey.—*Var.* Fore wings paler, with no black patch. Length of the body 4 lines; of the wings 8 lines.

~~*Yctinea*~~
55. ISSUS RETRACTUS, n. s., mas. Piceus latus, capitis lateribus elevatis fulvis, vertice transverso, fronte latâ, carinâ mediâ subobsoletâ carinâque

transversâ posticâ, facie, mesothoracis disco pedibusque fulvis, alis anticis non angulatis, posticis nigro-cinereis.

Male. Piceous, broad. Head with elevated tawny borders; vertex much broader than long; front hardly longer than broad, very slightly broader in front, with a slight middle keel and a more distinct transverse keel towards the vertex; face, disk of the mesothorax and legs tawny. Fore wings not angular, conical towards the tips; hind wings blackish grey, with many transverse veinlets. Length of the body 3 lines; of the wings 6 lines.

✓ 56. *ISSUS FURTIVUS*, n. s., fœm. Cervinus, capitis lateribus elevatis, vertice subquadrato, fronte anticè latiore lateribus tuberculatis concavis carinâ mediâ subobsoletâ, alis anticis fusco variis non angulatis, posticis nigro-cinereis.

Female. Fawn-colour. Head with elevated borders; vertex a little longer than broad, indented behind with a corresponding angle in front; front elongate-subquadrate, broader towards the face, with concave minutely tuberculated sides and with a nearly obsolete middle keel. Fore wings with various brown marks, not angular; hind wings blackish-grey. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

Shabena
57. *ISSUS PATULUS*, mas. Piceo-ferrugineus, capite testaceo, marginibus elevatis, vertice parvo quadrato, fronte longâ carinatâ anticè latiore, pedibus fulvis, alis posticis nigro-cinereis.

Male. Pitchy ferruginous. Head testaceous, with elevated borders; vertex small, quadrate; front more than twice longer than broad, a little broader towards the face, with a distinct middle keel. Legs tawny. Hind wings blackish-brown. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

✓ = 58. *ISSUS INERS*, mas. Piceo-ferrugineus, capite fulvo lateribus testaceis, marginibus elevatis, fronte longâ carinatâ anticè dilatâ, pedibus fulvis, alis posticis nigro-cinereis.

Male. Pitchy ferruginous. Head tawny, with elevated borders; sides testaceous; vertex small, quadrate, dilated towards the face, with a distinct middle keel. Legs tawny. Hind wings blackish-grey. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

59. *ISSUS GRAVIS*, n. s., mas. Ferrugineus, capitis marginibus elevatis, vertice conico, fronte carinatâ obconicâ, facie transversâ disco nigricante, alis anticis venulis transversis nullis, posticis subhyalinis, venis venulisque perpaucis.

Male. Ferruginous. Head with elevated borders; vertex conical, with a brown mark on each side; front obconical, with a distinct middle ridge and a slight oblique ridge on each side; face transverse, blackish, with a testaceous border. Legs tawny, with some ferruginous marks. Fore wings with no transverse veinlets; hind wings subhyaline, with very few veins and veinlets. Length of the body 3 lines; of the wings 6 lines.

60. *ISSUS ARCTATUS*, n. s., fœm. Ferrugineus, capitis marginibus elevatis, vertice transverso, fronte carinatâ subquadratâ anticè latiore, facie carinatâ brevi-lanceolatâ, pedibus testaceis, alis posticis cinereis.

Female. Ferruginous. Head with elevated borders; vertex much broader

than long; front a little longer than broad, slightly wider in front, with a slight keel; face keeled, short-lanceolate. Legs testaceous. Hind wings grey. Length of the body 3 lines; of the wings 7 lines.

61. ^{Jun?} *ISSUS SOBRIUS*, n. s., mas. Fulvus, capitis lateribus albidis, marginibus elevatis, vertice transverso minimo, fronte longâ carinatâ anticè latiore, facie lanceolatâ carinatâ, alis posticis nigro-cinereis.

Male. Tawny. Head with whitish sides and elevated borders; vertex transverse, very small; front twice longer than broad, slightly widening in front, with a distinct keel; face keeled, lanceolate. Hind wings blackish-grey. Length of the body 2 lines; of the wings 5 lines.

62. ^{Setina} *ISSUS OVALIS*, n. s., mas. Sordidè testaceus, capite latissimo lateribus elevatis, vertice transverso punctis duobus nigris, fronte transversâ carinatâ, alis anticis plagâ costali sordidè albidâ, posticis nigro-cinereis.

Male. Dinky testaceous. Head very broad; vertex, front and face transverse, with elevated borders; vertex twice broader than long, with a minute black dot on each side in front; front and face with a slight keel, the former a little broader than long, the latter lanceolate. Fore wings with a dinky whitish patch by the middle of the costa; hind wings blackish-grey. Length of the body 2 lines; of the wings 5 lines.

63. ^{Setina} *ISSUS LITEROSUS*, n. s., mas. Testaceus, capitis marginibus elevatis, vertice transverso, fronte quadratâ carinatâ, carinâ transversâ guttisque duabus posticis, facie lanceolatâ, alis anticis nigro plagiatis, posticis fusco-cinereis.

Male. Testaceous. Head with elevated borders; vertex much broader than long; front subquadrate, with a slight middle keel, and a more distinct transverse keel near the vertex, where there is a black dot on each side; face lanceolate. Fore wings with a few black patches; hind wings brownish-grey. Length of the body 3 lines; of the wings 6 lines.

64. ^{Helalonia} *ISSUS LINEATUS*, n. s., mas. Testaceus nigro varius, capitis marginibus elevatis, vertice conico depresso, fronte longâ subcarinatâ anticè latiore, facie lanceolatâ, abdominis dorso rufo, segmentis testaceo marginatis, alis testaceo reticulatis, anticis nigro-fuscis, posticis rufescentibus.

Male. Testaceous, with black marks. Head with elevated borders; vertex conical, depressed, with a black spot on each side; front twice longer than broad, with a slight middle keel, much wider towards the face which is lanceolate. Abdomen red above; hind borders of the segments testaceous. Wings with testaceous veins and veinlets, the latter numerous; fore wings blackish-brown; hind wings reddish. Length of the body 4 lines; of the wings 8 lines.

Gen. *HIRACIA*, n. g.

Corpus ellipticum, convexum. *Caput* marginibus vix elevatis; vertex conicus, tricarinatus; frons faciesque carinis tribus vix conspicuis, hæc lanceolata, illa obconica anticè excavata. *Prothorax* transversus, quinque-carinatus, anticè angustior. *Mesothorax* trigonus, tricarinatus, apice acutus. *Alæ* anticæ venis venulisque transversis plurimis elevatis, apice acuminatæ.

Body elliptical, convex. Head with the borders hardly elevated; vertex conical, with three distinct keels; front and face with three indistinct keels, the former obconical, excavated next the face, which is lanceolate. Prothorax full twice broader than long, narrower in front, with five keels. Mesothorax triangular, acuminated, with three keels. Fore wings acuminated, with numerous rugulose veins and transverse veinlets.

65. *HIRACIA IGNAVA*, n. s., fœm. Cervina, verticis apice nigro, pedibus et alis anticis nigro guttatis, alis posticis nigris nigris.

Female. Fawn-colour. Vertex black at the tip. Legs and fore wings with a few black dots. Hind wings blackish. Length of the body 5 lines; of the wings 10 lines.

Gergithus Gen. HEMISPHERIUS, *Schaum*.

66. *HEMISPHERIUS NIGER*, n. s., mas et fœm. Niger nitens subtus fulvescens aut testaceus, alis anticis confertissimè cribratis, posticis nigrocinereis.

Male and Female. Black, shining, tawny or testaceous beneath. Fore wings thickly covered with minute punctures; hind wings blackish-grey. Length of the body 1-1½ line; of the wings 3-3½ lines.

✓ 67. *HEMISPHERIUS TYPICUS*, n. s., mas. Testaceus, alis anticis fusco bifasciatis, fasciâ 2^a arcuatâ, posticis subcinereis.

Male. Testaceous. Fore wings with two brown bands, the hind one undulating; hind wings greyish. Length of the body 1 line; of the wings 3 lines.

✓ 68. *HEMISPHERIUS TORPIDUS*, n. s., mas. Testaceus nitens, alis anticis confertissimè cribratis, posticis subcinereis.

Male. Testaceous, shining. Fore wings thickly covered with very minute punctures; hind wings greyish. Length of the body ¾-1 line; of the wings 2½-3 lines.

Gen. EURYBRACHYS, *Guérin*.

69. *Eurybrachys insignis*, *Westw. Ann. Nat. Hist.* 1842, 119; *Hope, Trans. Linn. Soc.* xix. 134. 27. pl. 12. f. 9.

Inhabits also Manilla. *E. multicolor*, p. 88, may be a variety of this species.

✓ 70. *EURYBRACHYS CONSERATA*, n. s., fœm. ^{*Attractis*} ^{*tuberculosa Walk.*} Testacea, capite truncato-conico, fronte obconicâ subcarinatâ sulco antico transverso, facie basi sulcatâ, prothorace vittis duabus obliquis nigris, alis anticis reticulatis nigro variis costâ dilatâ, posticis albis.

Closely allied to *E. tuberculosa*? *Female*. Testaceous. Head above truncate-conical; front obconical, with a short keel behind and with a transverse furrow in front; face lanceolate, with a short furrow behind. Prothorax with two black oblique stripes. Fore wings with various black marks, reticulated with numerous transverse veinlets, slightly tuberculated; costa dilated, with very numerous transverse veinlets; hind wings white. Length of the body 7 lines; of the wings 16 lines.

- ✓ ^{Atracis} 71. EURYBRACHYS VETUSTA, n. s., fœm. Viridescens subtùs testacea, capite truncato-conico, fronte obconicâ carinatâ, facie carinatâ, mesothorace fusco notato, alis anticis reticulatis, posticis subcinereis.
Female. Pale dull green, testaceous beneath. Head above truncate-conical; front elongate-obconical, with a keel, which does not extend to the fore border; face lanceolate, with a keel in front. Mesothorax with some brown marks on each side. Fore wings reticulated with numerous transverse veinlets, slightly tuberculated; costa slightly dilated, with very numerous transverse veinlets; hind wings pale greyish. Length of the body 5 lines; of the wings 14 lines.
- ✓ ^{Atracis} 72. EURYBRACHYS INTERCEPTA, n. s., mas. Pallidè viridis subtùs testacea, capite brevi-conico subtùs lanceolato plano lateribus elevatis, alis anticis strigâ basali guttisque duabus apud marginis interioris apicem nigris, posticis albidis.
Male. Pale green, testaceous beneath. Head above short-conical; front and face together lanceolate and with elevated borders, but not keeled. Fore wings with a black basal streak and with two black dots near the end of the interior border. Hind wings whitish. Length of the body 3½ lines; of the wings 9 lines.
- ✓ ^{Atracis} 73. EURYBRACHYS SURRECTA, n. s., mas. Pallidè cervina subtùs pallidè testacea, capite lateribus elevatis, vertice conico carinato, fronte facieque planis, illâ lineari, alis anticis maculâ basali guttisque duabus discalibus exterioribus nigris, costâ undulatâ, posticis albis.
Male. Pale fawn-colour, pale testaceous beneath. Head with elevated borders; vertex conical, with a middle keel; front and face not keeled, the former linear. Fore wings with a black basal spot, and with two black discal dots; costa undulating; hind wings white. Length of the body 3½ lines; of the wings 9 lines.

Subtrib. FLATOÏDES, *Spinola*.Gen. FLATOÏDES, *Guérin*.

74. Flatoïdes guttatus, *Walk. Cat. Homopt.* pt. 2. 408. 9.
 Inhabits also China.

75. Flatoïdes marginalis, *Walk.* See page 89.

76. Flatoïdes discalis, *Walk.* See page 89.

✓ ^{Ricania} 77. FLATOÏDES VETERATOR, n. s., mas. Niger, capite thoracisque lateribus testaceis, alis anticis apud margines nitentibus, fasciâ interiore plagâque exteriore cinereis, guttâ discali atrâ, posticis nigro-cupreis.

Male. Black. Head and sides of the thorax testaceous. Fore wings shining about the borders, with an inner cinereous band, and an outer cinereous patch, the latter including a deep black dot. Hind wings blackish cupreous. Length of the body 4 lines; of the wings 10 lines.

✓ ^{Ricania} 78. FLATOÏDES POSTERUS, n. s., mas. Piceus, pedibus fulvis, alis nigricantibus, anticis apud marginem interiorem nigro-fuscis, fasciâ brevi anticâ strigisque duabus marginalibus hyalinis.

Male. Piceous. Legs tawny. Wings blackish; fore wings blackish-brown

about the interior border, with a hyaline band extending from the middle of the costa to the disk, and with two marginal hyaline streaks. Length of the body 3 lines; of the wings 8 lines.

Ricania

79. FLATOÏDES LIMITARIS, n. s., mas. Piceus subtùs testaceus, alis anticis apud margines nitentibus, plagâ cinereâ maculâque nigrâ discalibus, maculâ costali albâ.

Male. Piceous; under side and legs testaceous. Thorax with three keels. Fore wings shining about the borders; middle of the disk cinereous, and including a black spot; a white spot on the middle of the costa. Length of the body 3-4 lines; of the wings 8-10 lines.

Ricania

80. FLATOÏDES STUPIDUS, n. s., fœm. Fulvus subtùs testaceus, alis nigro-æneis, apud margines nitentibus, anticis guttis duabus (unâ costali, alterâ subcostali) albidis, subapicali nigrâ.

Female. Tawny, testaceous beneath. Wings blackish æneous, shining about the borders; fore wings with a black subapical dot, with two indistinct whitish dots, one costal, the other subcostal. Length of the body 3 lines; of the wings 8 lines.

This species and the preceding and *F. veterator* are very closely allied.

Gen. RICANIA, *Germar.*

Sassula

81. RICANIA OSMYLOIDES, n. s., mas. Testacea, capite thoraceque nigro maculatis, alis hyalinis, anticis maculis marginalibus fasciisque duabus incompletis nigris, stigmatè albido, posticis nigro marginatis.

Male. Testaceous. Vertex arched, with two black stripes; front with five black stripes, the middle one and the exterior pair shortened in front; four spots in front and the borders also black; face with a black stripe. Prothorax with two black stripes; mesothorax with eight black spots. Wings hyaline, with two incomplete black bands; veins black; fore wings with black marginal spots, and with a whitish stigma; hind wings with black borders. Length of the body 4 lines; of the wings 12 lines.

82. RICANIA SUBACTA, n. s., fœm. Testacea, fronte carinatâ, abdominis apice nigro nitido, alis hyalinis nigro-venosis, anticis stigmatè nigro.

Female. Testaceous. Head with elevated borders; vertex arched; front with a middle keel. Abdomen black and shining at the tip. Wings hyaline; veins black; fore wings with a black stigma. Length of the body 3 lines; of the wings 8 lines.

Gen. BENNA, *Walk.*

83. BENNA CANESCENS, n. s., mas et fœm. Testacea, capitis marginibus elevatis, fronte facieque perangustis, halteribus apice albis, alis subcinereis, anticis guttâ basali nigrâ, stigmatè albido.

Male and Female. Testaceous. Head with elevated borders; front and face very narrow. Halteres with white tips. Wings very pale cinereous; veins blackish, testaceous at the base; fore wings with a black basal dot and with a whitish stigma, their transverse veinlets fewer than those of *B. capitulata*. Length of the body 3 lines; of the wings 8 lines.

84. *BENNA CLARESCENS*, n. s., mas. Testacca, halteribus apice albis, alis subcinereis, anticis extùs albido lituratis, fasciâ interiore fuscâ.

Male. Testaceous; like the preceding species in structure. Halteres with white tips. Wings greyish; fore wings with a brown band before the middle, and with exterior whitish marks; veins testaceous. Length of the body $2\frac{1}{2}$ lines; of the wings 7 lines.

85. *BENNA PRÆSTANS*, n. s., fœm. Ferruginea subtùs fulva, alis subhyalinis, anticis triente basali ferrugineâ fusco marginatâ.

Femâle. Ferruginous, tawny beneath; like the two preceding species in structure. Wings nearly hyaline; third part from the base of the fore wings ferruginous with a brown border; veins testaceous. Length of the body $2\frac{1}{2}$ lines; of the wings 7 lines.

Gen. SERIDA, n. g.

Caput subascendens, lateribus elevatis angulum acutum utrinque fingentibus; vertex linearis; frons angusta, carinata, anticè dilatata; facies lanceolata, subcarinata. *Thorax* tricarinatus. *Alæ* anticæ angulis rotundatis, venulis costalibus venisque marginalibus plurimis.

Head slightly ascending, with elevated borders, forming a slightly acute angle on each side in front of the vertex which is linear; front narrow, with a distinct keel, widening towards the face which is lanceolate, and has a slight keel. Thorax with three slight keels. Fore wings moderately broad, with rounded angles; marginal veins and costal veinlets very numerous, the latter oblique and parallel.

86. *SERIDA LATENS*, n. s., mas. Fulva, frontis lateribus basi prothoraceque nigro guttatis, alis anticis guttis paucis discalibus costâ lineisque transversis exterioribus nigricantibus, apice cinereo-hyalinis lineolis duabus obliquis nigricantibus.

Male. Tawny. Sides of the front at the base and prothorax with black dots. Fore wings with the costa, some discal spots, and some exterior transverse lines blackish; tips cinereous hyaline, with two short oppositely oblique black lines. Length of the body 4 lines; of the wings 10 lines.

87. *SERIDA FERVENS*, n. s., mas. Fulva, fronte viridi sat latâ, marginibus carinâque fulvis, alis apice fuscis, anticis fusco bifasciatis.

Male. Tawny. Front green, moderately broad, with the borders and the keel tawny. Wings with brown tips; fore wings with two brown bands, one near the base, the other oblique irregular and beyond the middle. Length of the body 3 lines; of the wings 8 lines.

This species differs much in the structure of the front from *S. latens*, which is the type of the genus.

Gen. PARICANA, n. g.

Caput læve, planum; vertex brevis; frons longi-subquadrata; facies lanceolata. *Antennæ* aristâ longâ gracili. *Thorax* tricarinatus. *Alæ* anticæ apice latæ rotundatæ, areolis mediis et marginalibus longitudine subæqualibus.

Head smooth, not keeled nor with elevated borders; vertex short; front

elongate-subquadrate; face lanceolate. Antennæ with a long and slender arista. Thorax with three keels. Fore wings broad and rounded towards the tips; basal areolets about half the length of the wing; middle and apical areolets of nearly equal length; a few oblique costal transverse veinlets beyond the middle.

88. *PARICANA DILATIPENNIS*, n. s., fœm. Testacea, fronte facie apice pectorisque fasciâ nigris, alis hyalinis, anticis fasciis duabus (unâ basali, alterâ mediâ) fuscis.

Female. Testaceous. Head shining; front and tip of the face black. Pectus with a black band. Wings hyaline; veins black, tawny at the base; fore wings with a black band near the base and another across the middle. Length of the body $2\frac{1}{2}$ lines; of the wings 7 lines.

Gen. *NICERTA*, n. g.

Corpus gracile. *Caput* compressum, perangustum; vertex lateribus valdè elevatis; frons cultriformis; facies lanceolata. *Antennæ* articulo 2^o longo, cylindrico. *Alæ* angustæ; anticæ venis paucis, venulis nonnullis transversis exterioribus posterioribus.

Body slender. Head much compressed, very narrow; vertex with the borders much elevated; front forming an acute edge; face lanceolate. Antennæ with the 2nd joint long and cylindrical. Wings narrow; fore wings with few veins; hind part beyond the middle with some transverse veinlets.

89. *NICERTA SUBMENTIENS*, n. s., mas. Albida, oculis fulvis, alis albo-hyalinis, venis albis.

Male. Whitish. Eyes tawny. Wings whitish hyaline; veins white. Length of the body 3 lines; of the wings 7 lines.

90. *NICERTA FLAMMULA*, n. s. Lætè et saturatè rosea, tarsis albidis.

Very bright rosy-red. Tarsi whitish. Length of the body $1\frac{1}{2}$ line; of the wings 5 lines.

91. *NICERTA FERVENS*, n. s. Testacea, capite elongato strigis rufis, alis anticis rufis hyalino guttatis, posticis hyalinis.

Testaceous. Head much elongated, conical when viewed laterally, streaked with red. Fore wings red, with very numerous hyaline spots. Hind wings hyaline. Length of the body $2\frac{1}{2}$ lines; of the wings 7 lines.

Gen. *EUCARPIA*, n. g.

Caput breve, marginibus valdè elevatis; vertex transversus, subquadratus; frons et facies carinata, hæc lanceolata, illa subquadrata. *Thorax* brevis, bicarinatus. *Pedes* breves, tenues. *Alæ* angustæ; anticæ areolis discalibus perpauca, marginalibus plurimis.

Head short, with the borders much elevated; vertex and front subquadrate, the former transverse; front and face keeled, the latter lanceolate. Thorax short; scutum with two parallel keels. Legs short, slender. Wings narrow. Fore wings slightly widening from the base to the tips which are rounded; discal areolets very few; marginal areolets large, numerous.

92. *EUCARPIA UNIVITTA*, n. s. Ferruginea subtùs testacea, capitis thoracisque

carinis pedibusque testaceis, alis anticis fuscis, disco margineque tenui flavis, posticis cinereo-hyalinis.

Ferruginous, testaceous beneath. Borders and keels of the head and of the thorax and legs, testaceous. Fore wings brown; the middle of the disk and a slender stripe along the border yellow. Hind wings greyish hyaline. Length of the body $1\frac{1}{4}$ line; of the wings 4 lines.

Gen. RHOTANA, n. g.

Capitis vertex cultriformis; frons trigona; facies lanceolata. *Prothorax* brevissimus. *Mesothorax* carinis duabus vix conspicuis, lateribus elevatis. *Alæ* latæ; anticæ venis venulisque transversis paucis.

Vertex of the head forming a sharp edge; front triangular, acuminate towards the vertex; face lanceolate. Prothorax very short. Mesothorax with elevated borders and with two indistinct keels. Wings broad; fore wings with a few veins, some of which are forked, and with only one line of transverse veinlets.

93. RHOTANA LATIPENNIS, n. s., mas. Testacea, capitis margine rufo, alis hyalinis, anticis cervino nebulosis maculâ posticâ subapicali nigrâ, posticis maculâ magnâ apicali nigrâ.

Male. Testaceous. Head red along the edge. Wings hyaline; veins testaceous; fore wings slightly clouded with fawn-colour, with a black posterior subapical spot; hind wings with a large black apical spot. Length of the body 2 lines; of the wings 5 lines.

Gen. POHAZIA, *Amyot et Serv.*

94. Pochazia fumata, *Amyot*. See page 91.

✓ 95. POHAZIA CONVERGENS, n. s., mas. Nigra, fronte latissima, abdominis apice albo floccoso, alis anticis vittâ discali arcuatâ hyalinâ, posticis hyalinis ex parte nigro marginatis.

Male. Black. Front very broad. Abdomen with white flecks at the tip. Fore wings with a curved hyaline discal stripe which is attenuated at each end; hind wings hyaline, bordered with black except along the costa and at the tips. Length of the body 4 lines; of the wings 15 lines.

Gen. NEPHESA, *Amyot et Serv.*

✓ 96. NEPHESA GRATA, n. s. Pallidè viridis, pedibus testaceis, alis anticis purpureo marginatis angulo exteriore rotundato interiore acutiore, posticis albis.

Pale green. Legs testaceous. Fore wings with narrow purple borders; apical angle rounded; interior one rectangular, well defined; hind wings white. Length of the body 4-5 lines; of the wings 12-14 lines.

✓ 97. NEPHESA GUTTULARIS, n. s. Pallidè testacea, alis albis, anticis nigro guttatis angulo exteriore rotundato interiore subobtusato.

Cryptoflata
Pale testaceous. Wings white; fore wings with about eighteen black dots; apical angle rounded, interior one slightly obtuse. Length of the body 3 lines; of the wings 10 lines.

~~Repheana~~ *Kayania*

✓ 98. *NEPHESA VOLENS*, n. s. Pallidè testacea, alis anticis subobsoletè luteo marginatis angulo exteriore rotundato interiore subobtusò, posticis albis.

Pale testaceous. Fore wings indistinctly bordered with luteous; apical angle rounded; interior one slightly obtuse. Length of the body 3 lines; of the wings 9 lines.

Oryza

✓ 99. *NEPHESA LUTEA*, n. s. Lutea, alis anticis angulo exteriore valdè rotundato interiore producto acuto, posticis albis.

Luteous. Fore wings with fewer veins than those of the three preceding species; apical angle very much rounded; interior one produced, acute. Hind wings white. Length of the body 3 lines; of the wings 8 lines.

100. *Nephesa marginella*, *Guér. Icon. Règne Anim. Ins.* pl. 58. f. 6. *texte*, 359 (*Ricania*).

Inhabits also Cochin China:

The acute front of this species distinguishes it from every other in the genus.

*Melicharia**= Nicotina Walk.*

✓ 101. *NEPHESA DEDUCTA*, n. s. Viridis, alis anticis luteo marginatis, angulis rotundatis, posticis albis.

Green. Fore wings with luteous borders; apical angle much rounded; interior one slightly rounded. Hind wings white. Length of the body $2\frac{1}{2}$ lines; of the wings 7 lines.

Melicharia

✓ 102. *NEPHESA TRIPARS*, n. s., mas. Viridis subtùs pallida, alis anticis deflexis luteo marginatis angulo exteriore rotundato interiore vix rotundato, posticis albis.

Male. Green, pale green beneath. Fore wings with luteous borders; apical angle rounded; interior one almost rectangular, hardly rounded. Hind wings white. Length of the body 3 lines; of the wings 11 lines.

The fore wings of this species are deflexed in repose, not vertical as in the other species of the genus.

Gen. FLATA, *Fabr.*

103. *Flata obscura*, *Fabr.* See page 92.

Gen. COLOBESTHES, *Amyot et Serv.*

104. *Colobesthes albiplana*, *Walk.* See page 92.

Gen. PÆCILOPTERA, *Latr.*

105. *Pæcilopectera circulata*, *Guér. Icon. Règne Anim. texte*, 361.

Inhabits also Java.

106. *Pæcilopectera maculata*, *Guér.* See page 92.

Var. More like the Java specimens than those from Malacca, but differing from both.

✓ 107. *PÆCILOPTERA ROBIDA*, n. s., mas. Testacea subtùs albida, alis anticis subfuscis albo guttatis, vittâ undulatâ pallidissimè purpurascente, margine interiore albido punctato, posticis albis.

Male. Testaceous, whitish beneath. Abdomen and hind wings white. Fore

Fam. MEMBRACINA, *Burmeister*.Gen. CENTROTUS, *Fabr.*

112. *Centrotus Taurus*, *Fabr.* See page 93.

Septocentrus or Selungana (type mutilated)
113. *CENTROTUS SUBSIMILIS*, n. s., fœm. Niger obscurus, thorace scabro gibboso, cornubus lateralibus rectis acutis, cornu postico abdominis apicem superante, scutello pectorisque maculis duabus albidis, alis subluridis, costâ venisque nigris.

Female. Black. Thorax scabrous, elevated; lateral horns acute, extending at right angles to the body; scutellum, and a spot on each side of the pectus whitish. Wings slightly lurid; costa and veins black. Length of the body 3 lines; of the wings 7 lines.

Very nearly allied to *C. Taurus*, from which it is distinguished by its shorter, straight, and horizontal lateral horns.

Centrotypus
114. *Centrotus lamifer*, *Walk.* See page 93.

Exceeding in size the specimen from Malacca.

115. *Centrotus vicarius*, *Walk. Cat. Homopt.* pt. 2. 605.

Inhabits also Java.

Penaman

— 116. *CENTROTUS LIMBATUS*, n. s. Niger, thoracis vittis tribus, abdomine subtus pedibusque albidis, cornubus lateralibus parvis, cornu postico abdominis apicem vix attingente.

Black. Thorax with three white stripes which are united in front and behind; the lateral pair curved, including the lateral horns, and dilated at the base of the hind horn; lateral horns acute, as long as half the space between them; hind horn extending nearly to the tip of the abdomen, which is whitish beneath. Legs whitish. Wings greyish hyaline, with black veins. Length of the body $3\frac{1}{2}$ lines; of the wings 8 lines.

Centrotypus

— 117. *CENTROTUS LATIMARGO*, n. s. Ater, thoracis cornubus lateralibus latis planis acuminatis bicarinatis, cornu postico abdominis apicem non attingente, tarsis posticis albidis, alis testaceo-hyalinis, anticis apud costam latè nigris.

Deep black, scabrous. Lateral horns of the thorax broad, flat, acuminate, with two ridges, slightly inclined backward, each as long as the space between them; hind horn extending nearly to the tip of the abdomen. Hind tarsi whitish. Wings testaceous hyaline. Fore wings with a broad black costal stripe. Length of the body 3 lines; of the wings 7 lines.

Nearly allied to *C. Assamensis*, *Fairm.*

Cufairmaeria

118. *CENTROTUS DENSUS*, n. s., mas. Niger obscurus scabrosus, thoracis cornubus lateralibus acuminatis carinatis subascendentibus, cornu postico abdominis apicem superante, scutello maculis duabus albidis, alis posticis cinereo-hyalinis.

Male. Black, dull, scabrous, stout. Lateral horns of the thorax acute, ridged, obliquely ascending, each a little shorter than the space between them; hind horn extending a little beyond the tip of the abdomen; scutellum

with a whitish spot on each side. Hind wings greyish hyaline. Length of the body $2\frac{3}{4}$ lines; of the wings 7 lines.

- Leptocentrus* or *Selajana* (type mutilated)
119. *CENTROTUS VARIPES*, n. s., fœm. Niger obscurus scabrosus, thorace carinato, cornubus lateralibus acuminatis carinatis subrecurvis, cornu postico brevi, tibiis tarsisque posterioribus albidis, his apice nigris, alis subcinereo-hyalinis, anticis costâ nigrâ.

Female. Black, dull, scabrose. Thorax with a slight keel; lateral horns acute, ridged, slightly curved backward and ascending, each as long as the space between them. Hind tibiæ and hind tarsi whitish, the latter black towards the tips. Wings hyaline, slightly cinereous; veins black; costa of the fore wings black for two-thirds of the length from the base. Length of the body $2\frac{1}{2}$ lines; of the wings 6 lines.

120. *Centrotus caliginosus*, Walk. See page 93.

- hilaudama* (mutilated type)
121. *CENTROTUS CICADIFORMIS*, n. s., fœm. Niger obscurus scabrosus, thoracis cornubus lateralibus subobsoletis, cornu postico nullo, abdominis apice suprâ pedibusque fulvis, alis subcinereo-hyalinis, anticis costâ basique nigris.

Female. Black, dull, scabrous. Lateral horns of the thorax almost obsolete; no hind horn. Abdomen tawny towards the base above. Legs tawny. Wings hyaline, slightly greyish; veins black; fore wings black at the base and along the costa. Length of the body $1\frac{3}{4}$ line; of the wings 4 lines.

- Gargara*
122. *CENTROTUS CONSOCIUS*, n. s., fœm. Niger obscurus punctulatus, thorace anticè inermi, cornu postico abdominis dimidium superante, pedibus fulvescentibus, alis hyalinis, anticis basi fasciis duabus maculâque subapicali nigris.

Female. Black, dull, minutely punctured. Thorax unarmed in front; hind horn extending to a little beyond half the length of the abdomen. Legs dingy tawny. Wings hyaline; veins pale; fore wings with the base, two irregular bands, and a subapical spot black. Length of the body 1 line; of the wings $2\frac{1}{2}$ lines.

Very nearly allied to *C. semifascia*, Walk.

Gen. MICREUNE, Walk.

123. *Micreune formidanda*, Walk. See page 94.

- Leptobelus*
124. *MICREUNE METUENDA*, n. s., mas et fœm. Atra, thoracis maculis duabus lateralibus posticis testaceis, cornu erecto spinis duabus lateralibus acutis subarcuatis, cornu postico abdominis apicem superante, alis cinereo-hyalinis, venis nigris.

Male and Female. Deep black. Thorax with a testaceous spot on each side hindward; the erect horn armed with two acute, horizontal, slightly curved spines; hind horn extending a little beyond the tip of the abdomen. Wings cinereous hyaline; veins black. Length of the body 3 lines; of the wings 6 lines.

C. dama, Germar, and *C. gazella*, Hoffm., probably belong to this genus.

Fam. CICADELLINA, *Burm.*Trib. LÆVIPEDES, *Amyot et Serv.*Subtrib. CERCOPIDES, *St. Farg. et Serv.*Gen. CERCOPIIS, *Fabr.*

125. *Cercopis tricolor*, *St. Farg.* See page 94.

126. *Cercopis submaculata*, *Walk. Cat. Homopt.* pt. 3. 657. 27.
Inhabits also Java.

127. *Cercopis flavifascia*, *Walk. Cat. Homopt.* pt. 3. 654. 16.
Inhabits also Java.

128. *Cercopis costalis*, *Walk.* See page 95.

The marks on the thorax and on the fore wings are occasionally white.

129. *Cercopis dorsimacula*, *Walk.* See page 95.

130. *Cercopis rugulosa*, *Walk.* See page 95.

131. *CERCOPIIS SEMIPARDALIS*, n. s. Cuprea pubescens, abdomine subtùs rufo nigro maculato, pedibus rufis, alis anticis fulvis nigro maculatis apice cupreis, posticis cinereis.

Cupreous, pubescent. Abdomen beneath red, with black spots. Legs reddish. Fore wings tawny, with nine black spots; apical third part cupreous. Hind wings cinereous. Length of the body 5 lines; of the wings 14 lines.

132. *CERCOPIIS DELINEATA*, n. s., fœm. Nigro-cyanea pubescens, capitis vittâ thoracisque fasciâ posticâ flavis, pedibus rufis, alis anticis purpureo-cupreis luteo trivittatis, posticis cinereis.

Female. Blackish, pubescent. Head with a lanceolate yellow stripe in front. Scutum with a curved yellow band. Abdomen tawny beneath. Legs red. Fore wings purplish cupreous, with three luteous bands, one along the basal part of the interior border, the other two at right angles to the costa. Hind wings grey. Length of the body 4 lines; of the wings 10 lines.

133. *CERCOPIIS SEMIROSEA*, n. s. Rufo-lutea, alis anticis testaceis basi costâ que rufescentibus apice roseis, posticis albidis.

Reddish luteous. Fore wings testaceous, rosy towards the tips, reddish at the base and along the costa. Hind wings whitish. Length of the body 3 lines; of the wings 8 lines.

134. *CERCOPIIS UNDULIFERA*, n. s., fœm. Nigra, frontis maculâ thoracis fasciâ et alarum anticarum lineis duabus transversis undulatis testaceis, tibiis tarsisque fulvescentibus, alis posticis cinereis.

Female. Black. Vertex piceous, with a testaceous border; front with a testaceous spot behind. Thorax with a broad testaceous band. Tibiæ and tarsi dark tawny. Fore wings with two undulating transverse testaceous lines. Hind wings cinereous. Length of the body 3 lines; of the wings 8 lines.

135. *CERCOPIIS SUBDOLENS*, n. s. Rufa, capite pectore pedibusque nigris, femoribus tibiisque posticis rufis, alis posticis cinereis.

Red. Head, pectus and legs black. Hind femora and hind tibiæ red. Hind wings grey. Length of the body 2 lines; of the wings 6 lines.

Subtrib. APHROPHORIDES, *Amyot et Serv.*Gen. PTYELUS, *St. Farg. et Serv.*

- ✓ *Plinia*
136. *Ptyelus amplus*, *Walk. Cat. Homopt.* pt. 3. 706. 11.
Inhabits also Java.
- ✓ *Plinia*
137. *PTYELUS INEFFECTUS*, n. s., fœm. Piceus, tibiis posticis fulvis, alis anticis lineâ transversâ angulosâ subobsoletâ fulvâ, posticis nigro-cinereis.
Female. Piceous. Pectus with a tawny spot on each side. Hind tibiæ dull tawny. Fore wings with an indistinct transverse zigzag tawny line. Hind wings blackish-grey. Length of the body $3\frac{1}{2}$ lines; of the wings 8 lines.

Gen. AMARUSA, n. g. = *Ptyelus*

Corpus longum. *Caput* breve, arcuatum, lateribus vix brevioribus; frons sulcis transversis. *Scutum* anticè impressum, margine postico excavato; scutellum oblanceolatum. *Pedes* brevissimi. *Ala* longi-fusiformes.

Body long. Head short, convex in front, concave behind, hardly longer in the middle than on each side; its breadth more than four times its length. Scutum impressed in front; middle part of the hind border excavated; scutellum oblanceolate. Legs very short. Wings elongate-fusiform.

- Ptyelus*
138. *AMARUSA PICEA*, n. s. Nigra, capite suprâ thoraceque obscurè fulvis, thorace maculis duabus lateralibus piceis, alis anticis piceis, posticis nigro-cinereis.

Black. Head above and thorax dark tawny. Thorax with a piceous spot on each side. Fore wings piceous. Hind wings blackish-grey. Length of the body 4 lines; of the wings 10 lines.

Gen. PERINOIA, *Walk.*

- Cloveria*
139. *PERINOIA EXCLAMANS*, n. s., fœm. Fusca, capite suprâ thoraceque testaceo septem-vittatis, capite subtùs pectoreque testaceo bivittatis, alis anticis nigro-fuscis vittis tribus basalibus duabusque apicalibus maculisque quatuor intermediis testaceis, posticis cinereis.

Female. Brown. Head above and scutum with seven testaceous stripes which extend to the scutum and to the interior base of the fore wings. Head beneath and pectus with a testaceous stripe on each side. Fore wings blackish-brown, pale brown like the thorax at the interior base, with three basal and two apical testaceous stripes, and with four intermediate elongated testaceous spots. Hind wings cinereous. Length of the body $3\frac{1}{2}$ lines; of the wings 8 lines.

- Cloveria*
140. *PERINOIA SIGNIFERA*, n. s., fœm. Nigra, capite suprâ thoraceque testaceis cervino sex-vittatis, capite subtùs pectoreque testaceo bivittatis, pedibus testaceis, alis anticis margine interiore vittâ basali arcuatâ vittisque duabus apicalibus testaceis, posticis cinereis.

Female. Black, narrower than the preceding species, and with a more conical head. Head above and thorax testaceous, with six fawn-coloured stripes

which extend to the scutum and to the interior border of the fore wings. Head beneath and pectus with a testaceous stripe on each side. Legs testaceous. Fore wings with the interior border, a curved basal stripe, and two apical stripes testaceous. Hind wings cinereous. Length of the body 3 lines; of the wings 6 lines.

141. *PERINOIA EXPRESSA*, n. s., fœm. Nigra, capite subtùs pectoreque albido bivittatis, ventre pedibusque obscurè fulvis, alis anticis maculis duabus strigâque exteriore subarcuatâ albido-testaceis, posticis cinereis.

Female. Black. Head piceous above; under side and pectus with a whitish stripe on each side. Abdomen beneath and legs dark tawny. Fore wings with two whitish testaceous spots, and with an exterior somewhat paler slightly curved streak which joins the costa and extends nearly to the tip of the wing. Hind wings blackish-grey. Length of the body $3\frac{1}{2}$ lines; of the wings 8 lines.

Subtrib. *SERRIPEDES*, *Amyot et Serv.*

Coh. *TETTIGONIDES*, *Amyot et Serv.*

Gen. *TETTIGONIA*, *Germar.*

142. *Tettigonia farinosa*, *Fabr.* See page 97.

143. *Tettigonia ferruginea*, *Fabr.* See page 97.

144. *Tettigonia suavissima*, *Walk.* See page 97.

145. *TETTIGONIA ELONGATA*, n. s. Fulva subtùs testacea, capitis disco fasciisque duabus anticis necnon scuti maculâ anticâ margineque postico scutellique disco nigris, abdomine nigro, margine fasciisque subtùs rufis, pedibus albidis, tibiis tarsisque apice nigris, alis anticis ferrugineis basi fulvo nigro glaucoque maculatis apice posticisque nigricantibus.

Tawny, testaceous beneath. Disk of the head and two bands beneath, a spot in front of the scutum and its hind border, and the disk of the scutellum black. Abdomen black; under side with red bands and a red border. Legs whitish; tips of the tibiæ and of the tarsi black. Fore wings ferruginous, blackish towards the tips, with three spots at the base; 1st spot tawny, 2nd black, 3rd glaucous. Hind wings blackish. Length of the body 6 lines; of the wings 14 lines.

146. *TETTIGONIA LINEOLATA*, n. s. Glauco-nigra, capite subtùs fasciis duabus flavis, pectoris abdominisque lateribus flavis, ventre subtùs fasciâ posticâ flavâ apice albo, pedibus piceis, anticis flavo variis, alis posticis basi cinereis.

Black, with a glaucous tinge. Head beneath with two yellow bands. Pectus and abdomen yellow along each side; the latter with a yellow band near the tip, which is white. Legs piceous; fore legs marked with yellow. Hind wings cinereous hyaline towards the base. Length of the body 6 lines; of the wings 14 lines.

147. *TETTIGONIA ANGULARIS*, n. s. Nigra albo tomentosa subtùs picca,

thorace cupreo, vittis obscurioribus guttisque albis, margine antico nigro, alis anticis cupreo-rufis apice cinereis, posticis nigro-cinereis.

Black, with whitish tomentum, piceous beneath. Thorax cupreous, with darker stripes and with white dots, black along the fore border. Fore wings cupreous red, grey towards the tips, with a dotted pale lilac band at the base. Hind wings blackish-grey. Length of the body 5 lines; of the wings 10 lines.

148. *TETTIGONIA INVADENS*, n. s., fœm. Ochracea, tibiis anticis intus nigro lineatis, alis anticis apice posticisque cupreo-cinereis.

Female. Ochraceous. Fore tibiæ with a black line on the inner side. Fore wings at the tips and hind wings cupreous-cinereous. Length of the body 4 lines; of the wings 10 lines.

149. *TETTIGONIA SCITIPENNIS*, n. s., mas. Lætè flava, subtus nigra, abdomine nigro apice albido, pedibus flavis, alis anticis maculis quatuor fasciâque exteriore nigris, apice cinereis, posticis nigro-cupreis apice cinereis.

Male. Bright yellow, black beneath. Abdomen black, whitish at the tip. Legs yellow. Fore wings with four black spots and with an exterior black band, grey at the tips. Hind wings blackish-cupreous, with grey tips. Length of the body $3\frac{1}{2}$ lines; of the wings 8 lines.

150. *TETTIGONIA LEPIDIPENNIS*, mas. Flava, thorace ochraceo-vittato, abdomine pedibusque albidis, alis anticis æneo-testaceis subhyalinis, maculis quinque elongatis ochraceis, posticis albo-hyalinis.

Male. Yellow. Thorax with an ochraceous stripe. Abdomen and legs whitish. Fore wings æneous testaceous, subhyaline, with five elongated irregular ochraceous spots, the subapical one indistinct. Hind wings white, hyaline. Length of the body 4 lines; of the wings 10 lines.

151. *TETTIGONIA EBURNEA*, n. s., mas et fœm. Albida, capite conico, alis lacteo-albis.

Male and Female. Whitish. Vertex of the head conical. Wings milk-white. Length of the body $2\frac{3}{4}$ lines; of the wings 7 lines.

✓ 152. *TETTIGONIA SIGNIFERA*, n. s. ^{sem.} Æneo-cinerea, capitis maculis quatuor, thoracis vittis duabus alisque anticis vittâ interruptâ rufis, alis posticis cinereis.

Æneous-cinereous. Head conical, with four red stripes. Thorax with two red stripes and a red dot on the hind border between them. Fore wings with a red stripe composed of five streaks. Hind wings greyish-hyaline. Length of the body $3\frac{1}{2}$ lines; of the wings 7 lines.

153. *TETTIGONIA POLITA*, n. s. ^{Kolla} Ochracea subtus albido-flava, capite guttis septem thoraceque duabus atris, alis anticis nigris costâ testaceâ margine interiore ochraceo, posticis nigricantibus.

Ochraceous, whitish-yellow beneath. Head with seven black dots, three in front and four behind. Thorax with two black dots. Fore wings black; costa testaceous; interior border ochraceous. Hind wings blackish. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

154. *TETTIGONIA GLABRA*, n. s. ^{Jassus} Testacea, capite guttis duabus lateralibus

nigris, thorace fulvo, abdomine nigro, alis anticis cupreis, guttis duabus marginalibus testaceis, posticis nigro-cinereis.

Testaceous. Head with a minute black dot on each side near the eye. Thorax tawny. Abdomen black. Fore wings cupreous, shining, with two elongated testaceous dots; one on the costa, opposite to the other which is on the interior border. Hind wings blackish-grey. Length of the body $2\frac{3}{4}$ lines; of the wings 6 lines.

Jaxsus
155. TETTIGONIA INCLINANS, n. s. Cuprea, capite pedibusque testaceis, capite subtùs vittis duabus rufis, abdomine nigro, alis posticis nigricantibus. Cupreous. Head testaceous; front with two red stripes. Abdomen black. Legs testaceous. Hind wings blackish. Length of the body $2\frac{3}{4}$ lines; of the wings 6 lines.

Daherous
156. TETTIGONIA DIFFICILIS, n. s. Nigro-ænea subtùs testacea, capitis fasciâ interruptâ thoracis vittis duabus angulatis scutellique guttis ochraceis, pedibus testaceis, alis cinereo-hyalinis, anticis nigricante guttatis.

Blackish-æneous, testaceous beneath. Head with an interrupted ochraceous band. Scutum with an angular ochraceous stripe on each side; scutellum with ochraceous dots. Legs testaceous. Wings greyish-hyaline; fore wings with a blackish dot on each areolet. Length of the body 3 lines; of the wings 6 lines.

Coh. SCARIDES, *Amyot et Serv.*

Gen. LEDRA, *Fabr.*

157. LEDRA TUBERCULIFRONS, n. s., fœm. Ferruginosa, capite lato tuberculato, scuto quadricarinato, alis cinereo-subhyalinis, anticis ferrugineo variis tuberculis duobus nigris, areolis plurimis.

Female. Ferruginous, paler beneath. Head short-conical, tuberculated, slightly keeled, much broader than long, with a short oblique ridge on each side behind. Scutum transverse subquadrate, with four keels. Wings cinereous-hyaline; fore wings varied with ferruginous, slightly tuberculated at the base, and with two more distinct black tubercles in the disk; areolets irregular and very numerous. Length of the body 6 lines; of the wings 10 lines.

158. LEDRA DILATIFRONS, n. s., fœm. Obscurè ferruginea confertissimè punctata subtùs nigra, capite latissimo subtùs anticè testaceo, facie flavâ, scuto quadrirugoso, femoribus apice tibiisque albidis, alis posticis cinereis.

Female. Dark ferruginous, very thickly punctured, black beneath. Head and thorax with a slight middle keel. Head a little broader than the thorax, twice broader than long, very obtusely angular in front; disk on each side with an impression containing a black forked line; under side testaceous along the fore border; face yellow. Scutum more than twice broader than long, a little broader in front, with four broad ridges. Legs black; femora towards the tips, tibiæ and posterior tarsi whitish. Fore wings with ridged veins. Hind wings cinereous. Length of the body 5 lines; of the wings 8 lines.

Petaloccephala
 159. LEDRA TENUIFRONS, n. s., mas. Cervina albido varia subtùs albido-testacea, capite transverso brevi-conico, angulis tribus anticis perobtusis, scuto anticè convexo maculis duabus lateralibus fuscis, scutello maculis duabus fuscis nitidis, abdomine suprâ pallidè luteo, alis hyalinis, anticis cervino-venosis basi cervinis punctulatis, posticis nigro-venosis.

Male. Fawn-colour, whitish testaceous beneath. Head and thorax partly whitish. Head very thin, with a slight keel, nearly twice broader than long, with three very obtuse angles in front. Scutum convex and with a brown spot on each side in front; scutellum with a brown shining spot on each side. Abdomen pale luteous above. Legs whitish. Fore wings hyaline, with fawn-coloured veins, fawn-coloured and punctured at the base. Hind wings with black veins. Length of the body $4\frac{1}{2}$ lines; of the wings 7 lines.

Petaloccephala
 160. LEDRA LONGIFRONS, n. s., fem. Ferruginea subtùs sordidè albido-testacea, capite thorace alisque anticis apud costam testaceo guttatis, capite longi-conico, scuto anticè convexo, abdomine longo, suturis chalybeo-albidis nitentibus, alis anticis vittâ discali apicibusque subhyalinis, posticis hyalinis nigro-venosis.

Female. Ferruginous, dingy whitish testaceous beneath. Head, thorax and fore wings along two-thirds of the costa with testaceous dots. Head elongate-conical, rather broader than long, with an almost obsolete keel. Scutum convex in front. Sutures of the abdomen chalybeous-white, shining; tip testaceous. Legs whitish. Fore wings with a discal stripe and with the apical third part nearly hyaline. Hind wings hyaline, with black veins. Length of the body 5 lines; of the wings 8 lines.

Petaloccephala ? maculata
 161. LEDRA CONICIFRONS, n. s. Pallidè fulva subtùs sordidè albido-testacea, capite thorace alisque anticis confertissimè punctulatis, capite conico, scuto anticè convexo, pedibus albidis, alis anticis testaceis, apicibus posticisque hyalinis.

Pale tawny, dingy whitish testaceous beneath. Head, thorax and fore wings along two-thirds of the length very thickly and minutely punctured. Head and scutum with an indistinct keel; head conical, a little shorter than that of the preceding species; scutum convex in front. Legs whitish. Fore wings testaceous, hyaline towards the tips; veins testaceous. Hind wings hyaline, with black veins. Length of the body $4\frac{1}{2}$ lines; of the wings 8 lines.

162. LEDRA PLANIFRONS, n. s., mas. Testaceo-viridis subobsoletè punctulata subtùs viridi-alba, capite scutoque ferrugineo marginatis, illo brevi, hujus lateribus angulatis, abdomine pallidè rufo, pedibus albidis, alis posticis albido-hyalinis venis albis.

Male. Testaceous-green, very minutely punctured, greenish-white beneath. Head and scutum with a ferruginous border. Head rounded in front, full thrice broader than long, indistinctly keeled. Scutum hardly convex in front, slightly concave behind, with a distinct angle on each side. Abdomen pale red. Legs whitish. Fore wings more green than the thorax. Hind wings whitish-hyaline, with white veins. Length of the body $4\frac{1}{2}$ lines; of the wings 8 lines.

163. *LEDRA ARCUATIFRONS*, n. s. Pallidè viridis subobsoletè punctulata subtùs albida, capite conico, scuto anticè non convexo posticè vix concavo, pedibus albidis, alis posticis albo-hyalinis venis albis.

Pale green, whitish beneath. Head and scutum with an almost obsolete furrow. Head conical, very much broader than long. Scutum not convex in front, very slightly concave behind. Legs whitish. Fore wings greyish towards the tips; hind wings whitish-hyaline, with white veins. Length of the body 4 lines; of the wings $7\frac{1}{2}$ lines.

164. *LEDRA RANIFRONS*, n. s., mas. Ferruginea, capite subtùs abdomineque rufis, thorace fascià posticà viridi piceo marginatà, pectore pedibusque testaceis, alis anticis fulvis, margine postico viridi strigà exteriore fuscà, posticis cinereis.

Male. Ferruginous. Head short-conical, much more than twice broader than long, red beneath. Scutum hardly convex in front, green along the hind border, and with an intermediate transverse piceous line. Pectus and legs testaceous. Abdomen red. Fore wings tawny, green along the hind border, and with a brown streak towards the tip which is paler. Hind wings cinereous, with black veins. Length of the body 3 lines; of the wings 6 lines.

165. *LEDRA OBTUSIFRONS*, n. s., fœm. Viridis lata subtùs testacea, capite brevi subtùs ferrugineo, scutello fusco, alis anticis lineà basali aream pallidam includente fasciàque subapicali fuscis, posticis hyalinis nigro-venosis.

Female. Green, broad, testaceous beneath. Head much more than twice broader than long, rounded in front, ferruginous beneath. Scutum hardly convex in front and as little concave behind; scutellum brown. Fore wings with a brown basal line including a pale space along the hind border, and with a brown subapical band. Hind wings hyaline, with black veins. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

166. *LEDRA TRUNCATIFRONS*, n. s., mas. Picea lata punctulata subtùs nigra, capite perbrevis, abdomine basi pedibusque testaceis, alis anticis apice pallidioribus, posticis cinereis nigro-venosis.

Male. Piceous, broad, black beneath. Head, thorax and fore wings very minutely punctured. Head about four times broader than long. Scutum short. Abdomen at the base and legs testaceous. Fore wings paler at the tips. Hind wings greyish-hyaline, with black veins. Length of the body $1\frac{1}{2}$ line; of the wings 3 lines.

Gen. EPICLINES, *Amyot et Serv.*

167. *EPICLINES OBLIQUA*, n. s. Viridis subtùs testacea, capite conico, scuto fasciis duabus anticis rufis posticè fusco, scutello et alarum anticarum margine postico basi vittàque discali obliquà luteis, alis posticis cinereo-hyalinis nigro-venosis.

Green, testaceous beneath. Head conical, indistinctly keeled, nearly twice broader than long. Scutum obtusely angular on each side, with two red bands in front, brown along the hind border. Scutellum luteous. Fore wings luteous along the hind border towards the base, and with an oblique

luteous band which extends from the base of the costa to nearly two-thirds of the length of the hind border. Hind wings cinereous-hyaline, with black veins. Length of the body 7 lines; of the wings 14 lines.

Gen. ISACA, n. g.

Corpus breve. *Caput* transversum, convexum; frons transversa; facies transversa, trigona. *Antennæ* brevissimæ; arista gracillima, corporis dimidio longior. *Pedes* anteriores breves; postici longi, tibiis spinosissimis. *Alæ* sat angustæ, venis paucis.

Body short. Head transverse, convex; vertex short; front and face transverse, the latter triangular. *Antennæ* very short; arista very slender, more than half the length of the body. Anterior legs short; hind legs long; their tibiæ very spinose. Wings rather narrow, with few veins.

168. ISACA BIPARS, n. s. Nigra nitens glabra, facie pectore abdomine pedibusque albidis, alis hyalinis, anticis strigâ latâ basali fasciâque latissimâ exteriore nigro-fuscis, posticis disco nigro-fusco.

Black, shining, smooth. Face, pectus, abdomen and legs whitish. Wings hyaline. Fore wings with a broad blackish-brown basal streak, and with a very broad exterior blackish-brown band. Hind wings with a blackish-brown disk. Length of the body $1\frac{1}{2}$ line; of the wings 4 lines.

Coh. IASSIDES, *Amyot et Serv.*

Gen. ACOCEPHALUS, *Germar.*

169. Acocephalus olivaceus, *Walk.* See page 98.

170. Acocephalus stramineus, *Walk. Cat. Homopt.* pt. 3. 847. 2.
Inhabits also Java.

Fulvitic
171. ACOCEPHALUS DISCIGUTTA, n. s., mas. Testacea brevis, abdominis dorso nigro, alis anticis albis fusco reticulatis, maculâ discali nigrâ, plagâ posticâ testaceâ, posticis hyalinis albo-venosis.

Male. Testaceous, short. Abdomen black above. Fore wings white, with brown transverse marks which are most frequent at the tips; a black discal spot and a posterior testaceous patch. Hind wings quite hyaline, with white veins. Length of the body $1\frac{1}{2}$ line; of the wings 3 lines.

Jasius
Gen. CÆLIDIA, *Germar.*

172. CÆLIDIA DIRIGENS, n. s., fœm. Fusca subtùs alba, vertice albo anticè nigro, capite subtùs fasciis ferrugineis, scuto albo consperso, abdomine nigro-vario, tibiis tarsisque apice albis, alis anticis maculis nigris albisque, venis albo punctatis.

Female. Brown, white beneath. Vertex white, black along the fore border; front with three ferruginous bands. Scutum sprinkled with white. Abdomen varied with black. Tibiæ and tarsi with black tips. Fore wings slightly mottled, with black costal spots, and with white hyaline discal spots; veins with white dots. Length of the body $3\frac{1}{2}$ lines; of the wings 7 lines.

Jassus
173. *CÆLIDIA PARDALIS*, n. s. Fulva subtùs testacea, fronte facieque vittis duabus rufis, alis anticis fuscis maculis variis luridis, posticis cinereis.

Tawny, testaceous beneath. Front and face with two red stripes. Fore wings brown, with lurid spots of various size and shape. Hind wings grey. Length of the body 3 lines; of the wings 6 lines.

Jassus
174. *CÆLIDIA ALBISIGNA*, n. s. Nigra, capite albedo, facie nigrâ, abdominis segmentis albido marginatis, tibiis anterioribus albidis, alis anticis nigro-fuscis, guttis plurimis luridis maculis quatuor marginalibus albis, posticis cinereis.

Black. Head whitish; face black. Segments of the abdomen with whitish borders. Tarsi whitish, with black tips; anterior tarsi whitish; hind tibiae partly whitish. Fore wings with several lurid dots, with two irregular white spots on the costa, and with two more on the interior border. Hind wings grey. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

Jassus inclinans Walk. (1857)
=175. *CÆLIDIA CUPRARIA*, n. s., fœm. Testacea, capite subtùs fulvo bivittato, pectore plagis quatuor nigris, alis anticis nigro-cupreis costâ testaceâ, posticis nigro-cinereis.

Female. Testaceous. Front and face with two tawny stripes. Pectus black; segments with testaceous borders. Legs tawny. Fore wings blackish-cupreous; costa testaceous. Hind wings blackish-grey. Length of the body 4 lines; of the wings 8 lines.

Gen. BYTHOSCOPIUS, Germar.

Group 1. *Arista brevis*. *Arista short*.

176. *Bythoscopus ferrugineus*, Walk. Cat. Homopt. pt. 3. 865. 31.

Inhabits also Java.

Krona stricollis
177. *BYTHOSCOPIUS TESTACEUS*, n. s., mas. Luteo-testaceus nitens subtùs pallidè testaceus, capite brevi, thorace subpunctulato, abdominis segmentis rufo marginatis apice rufo, alis anticis apice cinereo-hyalinis, posticis nigro-cupreis.

Male. Luteous-testaceous, shining, pale testaceous beneath. Head very little longer in the middle than on each side. Thorax very minutely punctured. Abdominal segments with red borders; tip red. Fore wings greyish-hyaline towards the tips. Hind wings blackish-cupreous. Length of the body 4 lines; of the wings 8 lines.

Dabrosus
178. *BYTHOSCOPIUS METALLICUS*, n. s., fœm. Cupreus subtùs ferrugineus, capite fulvo brevissimo latissimo, vertice scutoque anticè testaceis, illius margine antico nigro, alis anticis fasciâ maculâque exteriore discali albido-hyalinis, posticis nigro-cinereis.

Female. Cupreous; ferruginous beneath. Head tawny, very short and broad; vertex with a black line along the fore border which is testaceous. Scutum testaceous in front. Fore wings with a whitish-hyaline band, and with an exterior discal spot of the same hue. Hind wings blackish-grey. Length of the body $4\frac{1}{2}$ lines; of the wings 9 lines.

Paralimnus
179. *BYTHOSCOPIUS LATERALIS*, n. s. Cupreus subtùs fulvus, capite brevi-

conico lineâ anticâ transversâ nigrâ, alis anticis apices versus cinereo-notatis, strigis duabus costalibus hyalinis, posticis nigro-cinereis.

Cupreous, tawny beneath. Head short-conical, rather longer than in most species of the genus; vertex with a transverse black line in front. Fore wings towards the tips with some cinereous marks and with two more distinct hyaline costal streaks. Hind wings blackish-grey. Length of the body 2 lines; of the wings 4 lines.

180. BYTHOSCOPIUS CEPHALOTES, n. s. Pallidè flavus, capitis disco testaceo, punctis duobus anticis nigris, strigis duabus subtùs facieque nigris, abdomine testaceo, alis anticis fulvis, margine postico basi pallidè flavo, posticis cinereo-hyalinis.

Pale yellow. Head testaceous in the disk above, with two minute black dots in front, and with two black streaks towards the face, which is also black. Abdomen testaceous. Fore wings tawny, pale yellow at the base of the hind border. Hind wings greyish-hyaline. Length of the body $1\frac{1}{2}$ line; of the wings 3 lines.

Group 2. *Arista perlonga. Arista very long.*

181. BYTHOSCOPIUS BIARCUATUS, n. s., fœm. Albido-testaceus, vertice scutoque lineâ transversâ arcuatâ rufâ, alis anticis maculis duabus costalibus exterioribus apiceque fuscis, posticis subhyalinis pallido-venosis.

Female. Whitish-testaceous. Head arched, about four times broader than long, a little more convex in front than concave behind. Vertex and scutum each with a transverse red arched line. Arista about three-fourths of the length of the body. Fore wings with brown tips, and with two exterior brown costal spots. Hind wings nearly hyaline, with brown tips. Length of the body $2\frac{1}{2}$ lines; of the wings $5\frac{1}{2}$ lines.

Dabrescus
182. BYTHOSCOPIUS LÆTISIGNA, n. s., mas. et fœm. Cinereo-cupreus subtùs cinereus, capitis lineâ anticâ thoracis fasciâ anticâ interruptâ arcuatâ maculisque posticis ochraceis, tibiis anticis ochraceis, alis cupreo-hyalinis, anticis costâ ochraceâ maculis duabus exterioribus costalibus apiceque nigro-fuscis.

Male and Female. Cupreous, with a cinereous tinge; cinereous beneath. Head with an ochraceous line in front of the vertex. Arista about half the length of the body. Thorax with an arched interrupted ochraceous band and some hinder ochraceous spots. Fore tibiæ and tips of the fore femora ochraceous. Wings cupreous-hyaline. Fore wings with the costa and the interior border ochraceous, with two exterior blackish-brown costal lines, with blackish-brown tips, and with a blackish-brown dot by the interior border. Length of the body 3 lines; of the wings 7 lines.

Dabrescus
183. BYTHOSCOPIUS NIGRILINEA, n. s. Æneo-fulvus, capite lineis duabus transversis nigris, alis anticis æneo-luridis, guttis tribus apud marginem posticum nigris.

Æneous-tawny. Head with two black transverse lines. Arista a little more than half the length of the body. Wings lurid, with an æneous tinge; interior border of the fore wings with three black dots. Length of the body $2\frac{1}{2}$ lines; of the wings 6 lines.

184. *BYTHOSCOPIUS IGNICANS*, n. s. Ochraceus subtus testaceus, scutello albo, alis anticis guttis discalibus maculisque marginalibus albis, maculis apicalibus fuscis, posticis cinereis.

Ochraceous, testaceous beneath. Arista longer than the body. Scutellum white. Legs testaceous. Fore wings with white brown-bordered discal dots, and with some white spots on the costa and on the interior border; disks of the exterior areolets brown. Hind wings grey. Length of the body $1\frac{3}{4}$ line; of the wings 4 lines.

DESCRIPTION OF PLATE VI., illustrating New Genera of Bornean *Diptera*, described in Mr. WALKER'S Memoir, pp. 105-136.

PLATE VI.

- Fig. 1. *Calcuca simulans*, magnified, p. 109: 1 a, the head seen sideways; 1 b, the antenna more strongly magnified.
- Fig. 2. *Evaza bipars*, magnified, p. 109: 2 a, the head seen sideways, showing the large facets of the eyes; 2 b, the antenna.
- Fig. 3. *Citibana aurata*, magnified, p. 124, showing the spinose posterior femora: 3 a, the head seen in front; 3 b, the same seen sideways; 3 c, the antenna.
- Fig. 4. *Baryterocera inclusa*, magnified, p. 123: 4 a, the head seen sideways; 4 b, the same seen in front; 4 c, the antenna.
- Fig. 5. *Gauzania depecta*, magnified, p. 130, showing the large middle legs: 5 a, the head seen in front; 5 b, the same seen sideways; 5 c, the antenna.

ILLUSTRATIVE DESCRIPTION OF PLATES VII. & VIII. of Bornean *Homoptera*, described in the foregoing Paper.

PLATE VII.

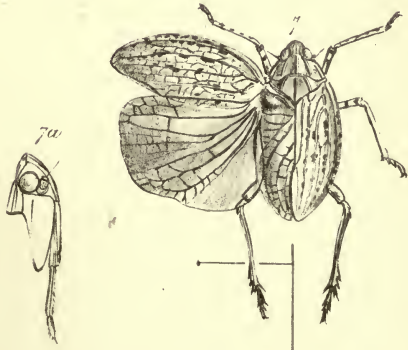
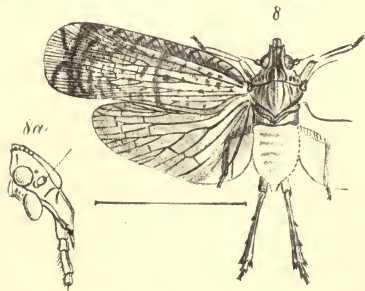
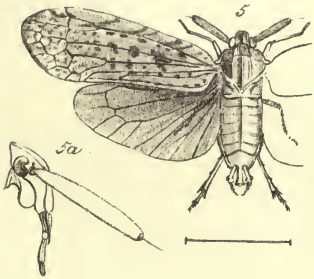
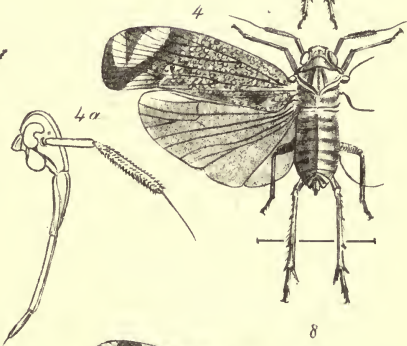
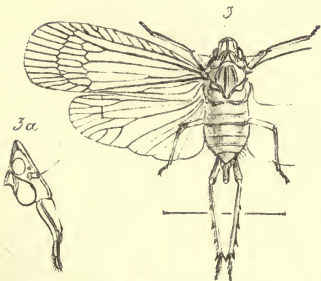
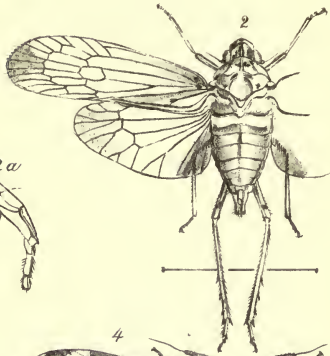
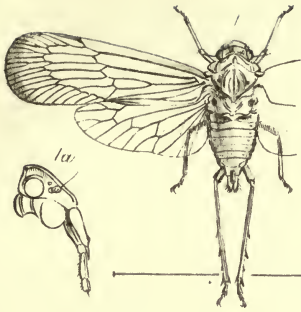
- Fig. 1. *Leusaba marginalis*, p. 144: 1 a, the head and prothorax seen sideways.
- Fig. 2. *Isporisa apicalis*, p. 145: 2 a, the head and prothorax seen sideways.
- Fig. 3. *Epورا subtilis*, p. 146: 3 a, the head and prothorax seen sideways.
- Fig. 4. *Ostama juncta*, p. 151: 4 a, upper wing; 4 b, face seen in front.
- Fig. 5. *Erana operosa*, p. 151: 5 a, upper wing; 5 b, face seen in front.
- Fig. 6. *Rhotala delineata*, p. 152: 6 a, the head and prothorax seen sideways.
- Fig. 7. *Hiracia ignava*, p. 155: 7 a, the head and prothorax seen sideways; 7 b, the fore and hind wings expanded.
- Fig. 8. *Lerida fervens*, p. 158: 8 a, head and prothorax seen sideways.

PLATE VIII.

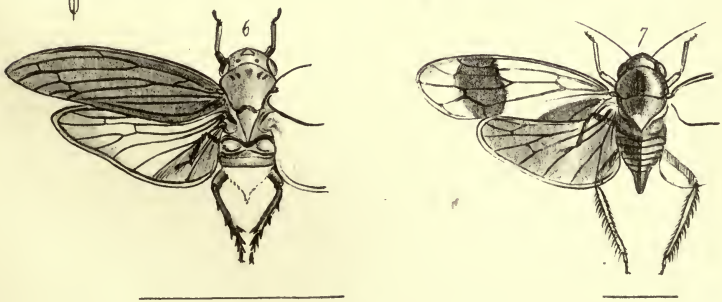
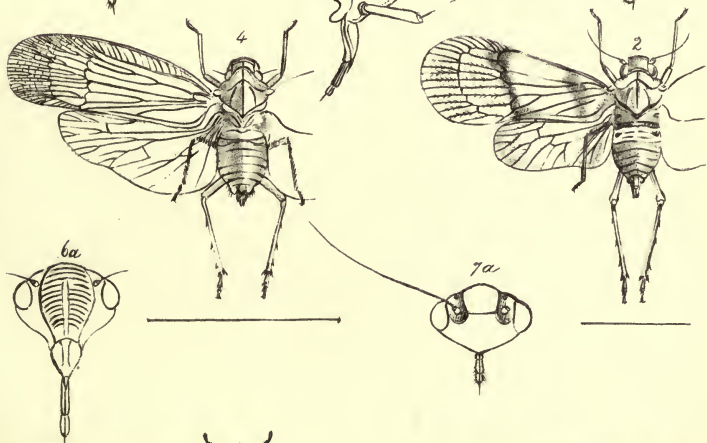
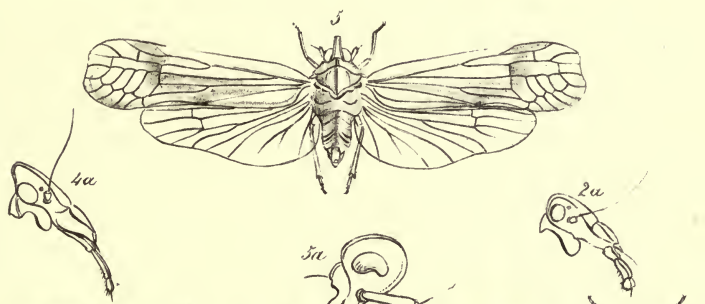
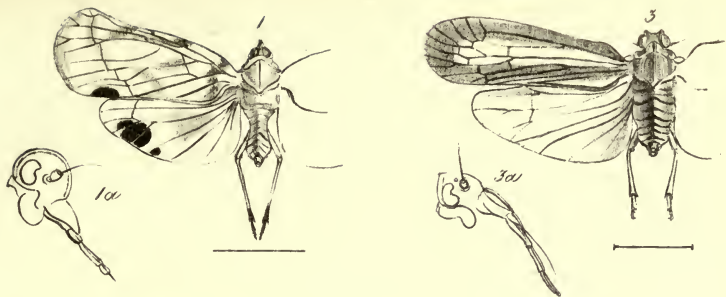
- Fig. 1. *Paricana dilatipennis*, p. 159: 1 a, head and prothorax seen sideways.
- Fig. 2. *Rhotana latipennis*, p. 160: 2 a, head and prothorax seen sideways.
- Fig. 3. *Eucarpia univitta*, p. 159: 3 a, head and prothorax seen sideways.
- Fig. 4. *Ficarasa pallida*, p. 162: 4 a, head and prothorax seen sideways.
- Fig. 5. *Nicerta submentiens*, p. 159: 5 a, head and prothorax seen sideways; 5 b, hind leg.
- Fig. 6. *Amarusa picea*, p. 166: 6 a, face seen in front.
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JOURNAL OF THE PROCEEDINGS

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LINNEAN SOCIETY OF LONDON.

Remarks on the Botany of Madeira and Teneriffe. By CHARLES
J. F. BUNBURY, Esq., F.R.S., F.L.S. &c.

[Read March 6th and April 3rd, 1855.]

I OFFER to the Linnean Society the botanical observations made during my recent visit to Madeira and Teneriffe. Some apology may perhaps be necessary for writing anything on the botany of islands so well known and so much frequented. But, numerous as may be the botanists that have visited Madeira, I must say that I have been able to find but very little *published* information, of a satisfactory kind, relating to its vegetation. In the beginning of my visit to that island, I felt much the want of some memoir which might give me a general idea of its leading botanical features, and serve as a guide to my researches. Madeira is not like the neighbourhood of Cape Town, in which the botanist can hardly take a wrong direction, or make an unproductive excursion. I lost much time for want of such information as I have here endeavoured in some measure to supply. Mr. Lowe's researches in the island have indeed been so careful and persevering, that there is little likelihood of the detection of any absolute novelty, unless perhaps in the minuter cryptogamic tribes; but what he has published on the subject, as far as I am aware, consists chiefly in the description of some new species. A few general remarks on the Flora of

Madeira, prefixed to his 'Primitiæ,' are indeed useful, as are also his remarks on some particular species in the 1st volume of Sir W. Hooker's 'Journal of Botany;' and there are some excellent observations on Madeira botany by Dr. J. D. Hooker, in the 6th volume of the 'London Journal of Botany;' but all these still leave much room for further illustration of the subject. I have endeavoured to add something to the information hitherto published, in relation both to the distribution of species in the island, and to the connexion of its Flora with those of other countries, though my materials are insufficient for thoroughly working out either of these subjects.

My notes on Teneriffe must be considered as merely supplementary to the excellent accounts of that island by Von Buch, Webb, and Berthelot.

The first thing that strikes a botanist on landing at the capital of Madeira, is the thoroughly tropical aspect of the cultivated vegetation. The Banana, the Sugar-cane, the Coffee, the Guava, and the Custard-apple, are seen in all the gardens; the *Datura arborea*, *Poinciana pulcherrima*, *Linum trigynum*, *Bignonia venusta*, several Ipomæas and Passion-flowers, two or three species of *Hedychium*, the *Duranta Ellisia*, *Erythrina Corallodendron*, and *Cæsalpinia Sappan*, flourishing luxuriantly in the open air, delight the eye of a botanical visitor from more northern climates. On the lower slopes of that sunny amphitheatre of mountains which rises from the Bay of Funchal, most of the productions of the tropics are cultivated with success. The Papaw is frequent in the gardens, and ripens its fruit abundantly. *Pandanus odoratissimus* grows to a great size, and occasionally ripens fruit. The Bananas of Funchal, though not large, are of excellent flavour; the *Anona reticulata* arrives at great perfection; the Guava is half naturalized; and the Rose-apple is a common garden tree, attaining to great size and beauty.

In the fields, and in the little plots and terraces of soil which are cultivated with infinite industry amidst the basaltic rocks, we see the plants of the tropics mixed with those of the temperate zone. The Banana, the Sugar-cane, the Coffee, the Orange, and the Guava are frequently seen, in sunny nooks of the ravines, in company with the Peach, the Vine, the Fig, and the tall Italian Reed*. The Sugar-cane is grown to a considerable extent on the warm sunny slopes of the coast to the westward of Funchal, between that town

* *Arundo Donax*, L.

and Camara dos Lobos; its peculiarly light and lively yellow-green colour makes it conspicuous even in a distant view. In that situation it flowers in February.

Two of the characteristic field-crops in Madeira are the Sweet Potato (*Batatas dozes*, *Convolvulus Batatas*, L.?), and what is there called the *Inhame*, or Yam, which is an Aroideous plant (*Caladium nymphæifolium*?) with beautiful large leaves of a peculiarly soft and tender green. The *Convolvulus* thrives best in the lower and more sunny region, below the elevation of 1000 feet: being easily propagated, and yielding a large produce, it is of great value to the inhabitants; and, since the failure of the vine in particular, its culture is said to have been much extended. The *Caladium*, which requires a moist soil, is cultivated especially along the margins of the torrents, and up to a considerable elevation on the mountains.

The culture of the Cactus, or *Opuntia* (*O. Tuna*, DC. according to Mr. Lowe), has of late been much extended, and carried on with new zeal, since hopes have been entertained that the rearing of the *Cochineal* insect may prove a valuable branch of industry in Madeira, as it has in Teneriffe. Whatever may be the success of this speculation, it is certain that the plant thrives exceedingly in the coast region of Madeira, where it is indeed so well established, that it may almost be reckoned among the naturalized species.

When, leaving the beautiful gardens of Funchal, I began to search for the native vegetation of the neighbourhood, I at first experienced considerable disappointment. This was partly, indeed, owing to the season; for the winter has a much more decided effect on the condition of the vegetable world in that island, than might have been inferred from its latitude. The profusion of blossom in the gardens of Funchal, in December and January, is indeed strikingly contrasted with the scantiness of wild flowers at the same season. In this latter respect, Madeira has little advantage over the south coast of France. Of the more peculiar and characteristic, and unquestionably native plants of the island, very few, comparatively, are winter flowerers; most of those which are to be found in blossom at that season are either evidently or probably naturalized.

Besides, cultivation has extended so far around Funchal, and has taken such entire possession of the soil, that one has far to go before reaching any good botanizing ground. The sea-cliffs are in most places inaccessible; sandy shores (which in most warm countries afford so many peculiar plants) there are none; and in

whatever direction the botanist proceeds inland, he finds himself sorely hampered by far-stretching stone walls and paved roads. The majority of the wild plants that grow about Funchal, in the coast-region, are such as come under the common denomination of *weeds*, most of them wide-spread European species; together with some naturalized colonists from South America and the Cape.

One of the first excursions generally made from Funchal by strangers is that to Nossa Senhora do Monte, upwards of 1900 feet above the sea-level. This is an excursion very unprofitable to the botanist, although he will meet with a few Ferns on the walls by the roadside, and will notice, along the margins of the little watercourses, great abundance of a delicate *Commelyna**, a plant of an exotic aspect, and of a non-European family. This is one of the characteristic plants of the lower region of the south side of Madeira, and, together with *Ageratum conyzoides*, *Bidens leucantha*, *Gnaphalium luteo-album*, and *Oxalis corniculata*, is seen in all wet places, especially in the beds of torrents and on the margins of brooks and watercourses. All of the plants just enumerated are species very widely distributed.

One striking characteristic of Madeira is the rapidity with which exotic plants become naturalized. This process is going on so fast, that it is difficult, and is constantly becoming more difficult, to judge *what* plants are really native, and what are introduced. For example: a beautiful cherry-coloured *Oxalis* (*O. speciosa* ?), from the Cape of Good Hope, was introduced into the island by a lady still living there, and is now thoroughly established as a wild plant, and very abundant in many places, not only in cultivated fields, but on rough, wild, broken ground amidst the fir plantations. So also the *Pelargonium capitatum* and the *Salvia pseudo-coccinea* are completely naturalized in various places. The *Datura arborea* and *Fuchsia coccinea* are rapidly establishing themselves: the former grows apparently wild, and forms whole thickets, on the bank of a stream in the Boa Ventura Valley; the *Fuchsia* grows like a native, and in great abundance, among the *Vaccinium* and other indigenous shrubs, on the hills near Santa Anna.

It is very probable that many other plants, of which the exotic origin cannot so easily be traced, may in like manner have been introduced into Madeira in modern times, through the agency, either voluntary or accidental, of man. Perhaps even the greater number of those South European species, which are the "weeds" of cultivated lands in Madeira, ought to be placed in the category

* *C. agraria* (Kunth, Enumeratio Plantarum), if I am not mistaken.

of "colonists." Such are *Calendula arvensis* (one of the commonest winter-flowering plants about Funchal), *Setaria verticillata*, *Lathyrus sativus*, *Galactites tomentosa*, *Galium saccharatum*, *Echium violaceum*, *Anchusa Italica*, *Anagallis arvensis* var. *cærulea*, and many others. There are, however, very many plants, common to Europe and Madeira, the introduction of which cannot so easily be ascribed to the agency of man; of these I shall speak more particularly afterwards.

Gomphocarpus fruticosus, a very common Cape plant, which seems to have spread widely through Africa and parts of Asia, grows wild in several places about Funchal, particularly amidst the volcanic cinders of the little cone called Pico de S. João. Its feathered seeds may easily have been transported by the winds from the continent of Africa. In spite of the wide distance between the two localities, there is no appreciable difference between the Madeira specimens and those from the Cape of Good Hope.

In speaking of the naturalized plants of Madeira, I must not omit to mention the Sweet or Spanish Chestnut, and the common Broom (*Cytisus scoparius*, DC.); both of which, it is said, are certainly known to have been introduced into the island, though now so well established as to have all the appearance of true natives, widely spread, and covering great tracts of ground.

On the sea-coast near Funchal there are a few localities where the purely native and peculiar plants may still be found. One of these is the spot long since mentioned by Mr. Lowe* as producing the rare *Chamæmeles coriacea*; namely the edge of the sea-cliff a little way east of the city, on the road to Santa Cruz and Machico. Here the *Chamæmeles* still grows, as well as the splendid plant commonly called the "Pride of Madeira" (*Echium fastuosum*?), the *Plantago Maderensis*, Decaisne, and a shrubby Cassia (*C. bicapsularis*), which, though probably an introduced plant, is well established, and plentiful in many places along the cliffs. The pretty *Lavandula pinnata* is also to be found on the same part of the coast, on rocks above the Lazaretto. On the other side of Funchal, near the Ponta da Cruz, the rugged lava rocks surrounding that singular crater-like chasm which opens to the sea, produce a few interesting plants: the *Helichrysum obconicum* is abundant, a fine shrubby plant, very conspicuous from the contrast of its excessively white woolly leaves with the black lava; *Lotus glaucus* also grows there, and *Matthiola Maderensis*; this latter not in flower at the time of my visit, but

* Linnean Transactions, vol. xvi.

showing the dry withered remains of its long seed-vessels. The most abundant maritime plant, however, here and on the sea-rocks near Funchal generally, is a fleshy-leaved Plantain, which appears to be merely an excessively luxuriant variety of *P. Coronopus*.

The culture of the vine hardly extends above 2000 feet. Beyond this height there is still some cultivation, but it is in scattered patches, no longer so continuous and extensive as to exclude the native vegetation. The mountain sides are in part covered with open woods of chestnut, nowhere so thick as to prevent herbage from growing under them; in parts there are large plantations of Pinaster; but on the whole the general appearance of the upper region of the mountains, on the southern side of the island, is rather bare, and strikingly so when compared with the northern side. The above-mentioned Pinasters seem to have been mistaken by Spix and Martius* for *Pinus Canariensis*, which I never saw in Madeira. In the chestnut woods, and in the ravines of this region of the mountains, one meets with some of the characteristic plants of the island, such as *Hypericum grandifolium*, Choisy (*Androsæmum Webbianum*, Webb and Berthelot), *Cedronella triphylla*, Benth., *Sibthorpia peregrina*, and *Micromeria varia*; this last, indeed, a common plant on rocks, even down to the coast. The Sweet Violet (called *Viola Maderensis*, but which I do not see how to distinguish from *V. odorata*) grows in profusion, beginning at an elevation of about 1000 feet above the sea. *Vinca major* abounds here and there, but not far from houses or gardens, and probably naturalized. Of the *Amaryllis Belladonna*, which is said to be the most beautiful ornament of the chestnut woods, I saw only the leaves. There seems to be no doubt of its being the same species that grows at the Cape; its occurrence in two such distant localities is puzzling to account for on any theory of migration, unless we suppose it to have been purposely introduced; for its large bulbs would with difficulty be conveyed to great distances, either by any natural means of transport or by the unconscious agency of man. On the other hand, if we resort to the hypothesis of independent creations, it seems strange that a local plant, very fastidious as to soil and situation, should be common to the dry parched sands of the Cape Flats and the damp cloudy mountains of Madeira.

Of Ferns, the *Polystichum aculeatum* (*Aspidium angulare*, Sm.) and *Lomaria Spicant* (*Blechnum boreale*, Sm.) are very common in the chestnut woods; *Asplenium anceps*, Lowe, *Aspl. acutum*,

* Travels in Brazil, vol. i.

Bory, and *Polypodium vulgare*, frequent on rocks in this as well as in the lower region; *Nephrodium affine*, Lowe, and *Polystichum falcinellum* (*Aspidium*, Sw.), more local, This last is an interesting plant, remarkable for its very rigid texture, and its resemblance at first sight to the leaves of a *Zamia*; I found it sparingly in the woods about the Jardim da Serra (Mr. Veitch's country house, about 2500 feet above the sea), and in a more dwarfish state amidst the crowning rocks of the Arrebeirão Peak, at the elevation of more than 3800 feet. In general, the chestnut woods on the south side of the island are too dry and open to be rich in Ferns or Mosses. In many parts, particularly in the woods above N. S. do Monte, I observed that the trunks of the chestnut trees, though of considerable size, were quite clean and bare, without a moss, without even a lichen except minute crustaceous species.

It is only in some few deep and sheltered ravines that the cryptogamous plants are to be found in abundance and in fine condition, and that a few remnants are still to be seen of the primitive forests which seem to have formerly clothed the southern as well as the northern face of Madeira. Such is the case in the beautiful ravine commonly called the Little Curral, from which the Ribeiro de João Gomez descends to Funchal. I do not know any other place, so easily accessible from the city, so attractive to a botanist, and especially to a lover of Ferns. Here, *Woodwardia radicans*, *Adiantum reniforme*, *Pteris arguta*, *Cystopteris fragilis*, *Athyrium Filix-femina*, *Nephrodium elongatum*, *Davallia Canariensis* may all be found, with abundance of *Lycopodium denticulatum*. Here, too, are still growing a few trees of Vinhatico, *Laurus* (*Persea*) *Indica*, one of the beautiful Laurels of the native forests.

The fine ravine of the Santa Luzia torrent, at the head of which is a remarkable waterfall, is still more rich in Ferns; but though not many miles distant from the city, it is much less easy of access than the Little Curral. *Woodwardia radicans*, *Allantodia umbrosa*, and *Pteris arguta* grow in most luxuriant beauty about the foot of the waterfall, at an elevation of about 2600 feet above the sea. *Adiantum reniforme* is plentiful on the cliffs that bound the ravine; and *Ad. Capillus-Veneris*, which at Funchal grows close to the actual sea-shore, extends even up to the waterfall. In this one ravine, and in one day's excursion, I observed twenty-two species of Ferns.

The Tea-tree is cultivated with great success by Mr. Veitch at the Jardim da Serra, and its produce is of excellent flavour. At

Funchal he finds that it does not succeed. *Fuchsia coccinea* grows most luxuriantly at the Jardim, where Mr. Veitch cultivates it for food for cattle. He informed me that, in consequence of the scarcity of grass, the cattle are generally fed during winter on the leaves and young branches of trees or bushes, and that there is nothing which they eat with so much eagerness as the Fuchsia.

I observed that the Sweet Chestnut trees, which are cultivated here and there in the lower grounds in the neighbourhood of Funchal, retain most of their leaves through the winter, the foliage being partly green even in January, while those on the mountains are as completely deciduous as in Europe.

The highest parts of the southern mountains above the chestnut woods have a very bare appearance, and, at the season of my visit, exhibited very few plants in a recognizable state. Large spaces are covered with low stunted bushes of *Erica scoparia* and *Laurus Canariensis*; the margins of the little mountain streams are fringed with Brambles (*Rubus fruticosus*?) and a few Ferns, particularly *Gymnogramme Loweii* and *Lomaria Spicant**; the earthy banks are covered with small *Jungermanniæ*, and the rocks with crustaceous Lichens, among which *Lecidea geographica* is abundant and conspicuous. A very handsome bushy white *Stereocaulon* grows in profusion on the rocks. Mosses are not plentiful in this bare and exposed region, with the exception of *Polytrichum nanum* and the ubiquitous *P. juniperinum*.

When we cross the watershed of the mountains, and begin to descend towards the northern side of Madeira, the appearance of the vegetation changes remarkably. In consequence, probably, of the less attractive climate, and the frequency of rains and storms, the quantity of cleared and cultivated land is comparatively very small on the northern side of the island, and the greatest part remains in its original state, while this same abundance of moisture promotes a luxuriant growth of native vegetation. There is, indeed, on the southern side of the watershed one great valley, the Serra d'Agoa, which sends its waters to the south, and which yet remains as much in a state of nature, and is as richly wooded, as any of the northern valleys. But the upper part of the Serra d'Agoa valley, to which this observation applies, is a basin of immense depth, almost surrounded by high mountains of excessive steepness, and in great measure sheltered from the effects of the southern winds and sun by a ridge which, branching

* These two ascend to upwards of 3800 feet.

from the central range, projects from E. to W. almost across the valley. The circumstances are therefore exceptional. As a general rule, the native forests characterize the northern face of the island.

These evergreen woods are remarkably beautiful and picturesque, though they have not the overwhelming luxuriance and almost awful grandeur of the tropical American forests. They are principally composed of four species of Laurel: the Til, *Laurus* (*Oreodaphne*) *fætens*; the Vinhatico, *Laurus* (*Persea*) *Indica*; the *Laurus Canariensis*, Webb and Berth.; and the *Laurus* (*Phæbe*) *Barbusana*. All these are noble trees, of great size, of free and picturesque growth, and of rich, massy, glossy foliage. Old trees of Til and Vinhatico*, with rugged and cavernous trunks, are as fine objects as any trees I have ever seen. These two species predominate in the woods of the Serra d'Agua valley, while the *Laurus Canariensis*, which likewise grows to a very large size, is the prevailing tree in those of Ribeiro Frio and the Metade. Another beautiful tree of these forests, but a less abundant one, is the Fohado, *Clethra arborea*, the wood of which is much used for hammock-poles and walking-sticks. The undergrowth consists mainly of two Heaths, *Erica scoparia* and *arborea*, and the Madeira Whortleberry, *Vaccinium padifolium*, Sm.†; with *Hypericum grandifolium*, and a profusion of Ferns. The *Erica arborea* grows really to a tree, and a very picturesque one, but I did not myself see in Madeira any specimens of it as large as some in the wood of Agua Garcia in Teneriffe. All the old trees in the Madeira woods are most beautifully draped with ferns (especially *Davallia Canariensis* and *Polypodium vulgare*), mosses and lichens.

Madeira is famous for its abundance of Ferns. This character is deserved chiefly by the northern side of the island, which, owing to its wild and wooded condition and very moist climate, is indeed a choice situation for these beautiful plants. The southern side, more exposed to the sun, may perhaps have always been less suited to them; and the destruction of the woods, and extensive spread of cultivation, have left comparatively few localities favourable to their growth. On the northern slope they grow in surprising profusion. In all the ravines which intersect that coast we see them clothing the rocks and shady banks, the roots and trunks of trees, the margins of the innumerable rapid streams,

* The young stems of the Vinhatico have a very smooth bark, but that of the old trunks is peculiarly rugged and knotty.

† *V. Maderense*, DC.

and the moist and mossy walls. Even in the villages they abound. The beautiful Hare's-foot Fern, *Davallia Canariensis*, and the *Polypodium vulgare*, appeared to me the most generally common ferns throughout the island; they are frèquent even in the immediate neighbourhood of Funchal; and on the northern side of the island, there is hardly a damp wall or an old mossy tree on which they do not flourish. Near the mouth of the S. Vicente river I saw them growing (in a stunted condition certainly) among the loose stones of the actual sea-beach. It is on old trees in the mountain woods of Serra d'Agoa and Ribeiro Frio that they are most luxuriant and beautiful; and there they ascend to an elevation of at least 3000 feet above the sea-level.

I will here bring together the rest of the observations I made on the Ferns of Madeira.

Nothochlæna lanuginosa, R. Br. In the crevices of old walls here and there in the city of Funchal.

Gymnogramme Loweii, Hooker. On wet rocks near the waterfall of Santa Luzia, elev. about 2600 feet. On the margin of a small stream on the Arrebentão, a little below the summit, the elevation of which is 3844 feet*; also at Ribeiro Frio. Its resemblance at first sight to *Nephrodium molle* is very striking.

Gymnogramme leptophylla, Desv. In the crevices of walls near the church of S. Antonio, on the south side of the island; but the young plants (for it appears to be an annual fern) were only beginning to appear before I left Madeira.

Acrostichum squamosum, Swartz? (*A. paleaceum*, Hook. and Grev.). Ribeiro Frio, very sparingly, at the roots of decayed trees, by the *levada* or aqueduct.

Lomaria Spicant, Desv. Common in the mountain woods on both sides of the island, also on shady banks in lanes; more common, and descending to a lower level, on the north side.

Woodwardia radicans, Sm. In great plenty on the plateau of Santa Anna, about 1000 feet (more or less) above the sea, on shady hedge-banks and the margins of streams; this was the lowest level at which I saw it. Very fine at Ribeiro Frio (elev. about 3000 feet) and in the Metade Valley. On the south side: on the margins of streams descending from the Arrebentão; in the Little Curral, below the mill; and in great beauty about the Santa Luzia waterfall. It is certainly one of the handsomest of ferns. It is very remarkable, that, among the impressions in the bed of fossil leaves discovered by Sir C. Lyell in the ravine of

* Captain Vidal's Map.

S. Jorge, I observed some fragments closely agreeing in form and venation with the leaflets of this *Woodwardia*.

Pteris aquilina, L. Very common in the island.

Pteris arguta, Vahl. In the wet shady ravines, very common on the north side of the island, down nearly to the sea-level; extremely abundant and fine at Ribeiro Frio (3000 feet), and in the woods at the head of the Serra d'Agoa valley. On the south side: in great plenty and luxuriance in the Santa Luzia ravine; in a dwarf state on rocks in the Little Curral.

Cheilanthes fragrans (Hook. Spec. Fil.: Ch. *Maderensis*, Lowe). On old walls at Funchal, sparingly; sometimes in company with *Nothochlæna lanuginosa*.

Adiantum reniforme. Under the shade of overhanging rocks, and on rocks constantly wet with the spray of waterfalls and torrents; plentiful in many of the ravines of the north side of the island, mostly at a low or moderate level, but certainly not (as represented by M. Höll) confined to the region of the Cacti. At Ribeiro Frio (though very sparingly), and on the precipice immediately below Pico Grande, at an elevation probably exceeding 4000 feet. Very local on the southern side, though plentiful in some particular ravines, especially in that of Santa Luzia.

Adiantum Capillus-Veneris. Very common on both sides of Madeira, chiefly in the coast region, but ascending to nearly 2600 feet in the Santa Luzia ravine. Particularly fine and luxuriant in some of the wet ravines of the north coast.

Asplenium palmatum. Very plentiful along the northern coast, generally below, or not much above, 1000 feet of elevation, descending indeed to a very low level; but I saw it also in the mountain woods at the head of the Serra d'Agoa valley, and I was told it had been found at Ribeiro Frio. I never saw it to the south of the central range of mountains.

Asplenium anceps, Lowe. Seemingly very general in the island, from the rocks of the coast region (between Funchal and Camara dos Lobos) to the Laurel forests at 3000 feet and even higher. The figure in the 'Icones Filicum' represents an *extreme* specimen; the ordinary Madeira state of the plant is much more like *A. Trichomanes*.

Asplenium monanthemum, Sm. Much more local than the preceding, but abundant in some places: particularly abundant and fine at Ribeiro Frio (about 3000 feet). In some lanes near S. Jorge and Santa Anna, perhaps below 1000 feet. On the south side of the mountains: in company with *Woodwardia radi-*

cans and *Gymnogramme Loweii*, on the shaded margins of small streams below the Arrebentão Peak.

Asplenium marinum. Frequent on the north coast, especially near the mouth of the S. Vicente River*. I nowhere saw it much above the sea-level. It has been found on the south coast, at Camara dos Lobos and Santa Cruz.

Asplenium Canariense, W. On moist mossy stone walls and rocks, on the north side of the island, in many places: Punta Delgada, Boa Ventura, Arco de S. Jorge, and in the ravines that run down to Fayal; most commonly at a moderate elevation, like *A. palmatum*. I understand it has been found at Ribeiro Frio. To the south of the dividing range it is wanting or very rare.

Asplenium lanceolatum, Huds. On walls near N. S. do Monte, and in one or two other places not far from Funchal.

Asplenium acutum, Bory (according to Webb and Berthelot, and to Newman, Brit. Ferns, ed. 3) (*A. productum*, Lowe). One of the most common Ferns throughout Madeira, from the coast up to at least 4000 feet of elevation. In the neighbourhood of Funchal it is the most common of all. It is very difficult to decide whether this be really distinct from *A. Adiantum-nigrum*. The latter is a plant so excessively variable, that it seems hardly possible to set limits to its sportiveness; but on the other hand, much as the plant of Madeira and Teneriffe varies in size and development, I have never seen it assume exactly the common appearance of *Adiantum-nigrum*. The differences are not owing merely to luxuriance, for some of my Madeira specimens, not above 8 inches high, have all the characters of *acutum* strongly marked, while some of *Adiantum-nigrum* from Ireland, 14 or 15 inches high, have all the characteristic marks of *that* species.

Athyrium Filix-femina. Frequent in moist and shady places on both sides of Madeira.

Allantodia umbrosa, R. Br. In very wet and shady ravines: Ribeiro Frio, Metade Valley, and near the Santa Luzia waterfall. A very beautiful Fern.

Scolopendrium vulgare, Sm. Seemingly rare in Madeira: I saw it only in the Santa Luzia ravine, where it grows sparingly and small.

Ceterach officinarum, W. On walls here and there in the neighbourhood of Funchal. It is remarkable, that this, which is one of the most common Ferns in the south of Europe, should occur so sparingly in Madeira.

* Some of the specimens gathered here are as much as 2 feet high.

Polystichum falcinellum, Sw. In the chestnut woods at Jardim da Serra, and amidst the crowning rocks of the Arrebentão (see before, p. 7).

Polystichum aculeatum (*Aspidium angulare*, Sm.). Very common in the mountain woods; also in lanes and hedge-banks on the north side of the island. I did not see in Madeira any specimens referable to *Aspidium lobatum*, Sm., or even approaching to it.

Nephrodium molle. On wet banks and under dripping rocks, in the neighbourhood of Funchal; mostly, if not exclusively, below 1000 feet of elevation.

Nephrodium affine, Lowe. Here and there in the chestnut woods, at 2000 feet and upwards, but sparingly. It does not appear to me distinct from *N. Filix-mas*; but whether species or variety, I have found in North Wales (near Dolgelly) a Fern perfectly agreeing with the *N. affine* of Madeira.

Nephrodium elongatum, Lowe. Common in moist shady places in the mountain woods; particularly fine by the side of the *levada* near Ribeiro Frio. Besides the characters pointed out by Hooker and Greville, and by Lowe, as distinguishing this from *N. Filix-mas*, the stalk, below the first pinnæ, is much longer in proportion, so that the general form is more like *N. cristatum* or *dilatatum* than *Filix-mas*; and the paleæ on the midribs of the pinnæ are of quite a different shape.

Nephrodium fœnisecii, Lowe. Very plentiful in the Laurel forests of the Metade Valley and Ribeiro Frio; also above the forests, amidst the bushes of *Vaccinium padifolium*, Sm., quite up to the Poizo Pass, nearly 4600 feet above the sea.

Cystopteris fragilis. Very abundant on wet and shaded rocks and banks, from very near the level of the sea (on the north coast) to 3000 feet and upwards in the Laurel forests.

Davallia Canariensis, Sm. One of the most common Ferns in Madeira (see p. 7).

Trichomanes speciosum, W. (*T. radicans*, var., Hook. Sp. Fil.) On very wet shaded rocks, by the side of the *levada* or aqueduct, between the Ribeiro Frio and Metade valleys; very sparingly. The specimens gathered here are much less luxuriant than those I collected in the wood of Agua Garcia, in Teneriffe; the stipes shorter, and more broadly winged.

Hymenophyllum Tunbridgense, Sm. In the same locality with the *Trichomanes*, and rather more plentifully. All the Madeira specimens I have seen are well-marked examples of *H. Tunbridgense*, not approaching to *H. Wilsoni*.

The Ferns of Madeira altogether amount to 40 species, according to Mr. Lowe; and it is not very likely that, after his zealous and persevering researches, carried on for many years, any new ones should remain to be discovered. Taking the number of phænogamous plants, on the same authority, at about 700, the proportional number of Ferns is nearly twice as great as in Britain, though still very small if compared with the proportion in many of the Pacific islands, or in St. Helena. The Canary Islands, with a much larger phænogamous flora, have, according to Webb and Berthelot, only 34 Ferns.

The Azores * have 28 Ferns to about 400 flowering plants. Of the 40 Madeira Ferns, 15 at least are found in Britain †; perhaps more, but there may be different opinions as to the distinctness of some of the species. I am myself strongly inclined to believe that *Asplenium anceps*, Lowe, is only a variety of *A. Trichomanes*, and *Nephrodium affine*, Lowe, of *N. Filix-mas*. *Asplenium acutum*, Bory, whether it be a true species, or a variety of *A. Adiantum-nigrum*, appears to have been found in Ireland, and is therefore included in the 15. Of the Ferns of the Canary Islands, *Hymenophyllum unilaterale*, W. ‡ (= *H. Wilsoni*, Hook.), *Pteris longifolia*, *Pteris caudata* §, and *Cheilanthes pulchella*, have not, as far as I know, been discovered in Madeira. On the other hand, the Madeira Ferns, which appear to be strangers to the Canaries, are

<i>Polypodium drepanum.</i>	<i>Gymnogramme Loweii.</i>
<i>Polystichum falcinellum.</i>	<i>Scolopendrium vulgare.</i>
<i>P. frondosum.</i>	<i>Acrostichum squamosum.</i>
<i>Nephrodium affine.</i>	<i>Dicksonia Culcita.</i>
<i>N. fæniseeii.</i>	

The Ferns found in the Azores, and not in Madeira, are *Osmonda regalis*, *Ophioglossum vulgatum* (if *O. Lusitanicum* be really distinct from it), and perhaps *Hymenophyllum Wilsoni*. A much greater number belong to Madeira, and not to the Azores.

Dr. Hooker || enumerates 5 species of Ferns which are common

* Watson in Hook. Lond. Journ. Bot. vol. iii. p. 615.

† Excluding the Channel Islands, which do not naturally belong to this country.

‡ This may likely enough exist in Madeira, and have been confounded with *H. Tunbridgense*.

§ There may be some doubt, whether the Canary plant so called be distinct from *Pt. aquilina*.

|| London Journ. Bot. vol. vi. *Gymnogramme Loweii* should be added to the list, according to Lowe, Primitiæ, Appendix A, Note 4; he says it has been found in Jamaica.

to Madeira and the West Indies, but not found on the continent of Europe, nor in North Africa. The identity, however, of *Asplenium Canariense* with *A. furcatum*, and of *Trichomanes speciosum* with *T. radicans*, may be open to some dispute.

Polypodium drepanum, *Polystichum falcinellum* and *P. frondosum* appear to be really peculiar to Madeira; while the Canaries have, as it seems, no peculiar Fern except *Cheilanthes pulchella*; and the Azores none at all. Some species which are common to Madeira and the Canaries are confined to these two groups, or only straggle into the westernmost part of Europe, and do not reach the Azores; such are *Davallia Canariensis*, *Adiantum reniforme*, *Nephrodium elongatum*, and *Asplenium Canariense* (if it be distinct from *A. furcatum*). On the other hand, *Dicksonia Culcita* is common to Madeira* and the Azores, and peculiar to them. Species common to all three groups, and scarcely to be found elsewhere, are *Allantodia umbrosa*, *A. axillaris*, and *Pteris arguta*.

It is worthy of notice, that, with the single exception of *Ophioglossum Lusitanicum*, all the Madeira Ferns are *Filices Gyrateæ*, or *Polypodiaceæ*. There are no *Osmundaceæ*, no *Schizæaceæ*, no *Gleicheniaceæ*. The absence of *Osmunda regalis*, a plant so widely distributed, and which is found in Northern Africa and in the Azores, is perhaps to be accounted for by the want of marshes and pools. It is also remarkable, that, with so large a number of Ferns, Madeira has only two *Lycopodiaceæ*. In general, the same localities are favourable to both families. *Lycopodium (Selaginella) denticulatum* abounds everywhere in the mountain woods and deep shady ravines, and even carpets the moist stone walls close to the sea, on the north coast; in the neighbourhood of Funchal it is less frequent. *Lycopodium suberectum*, Lowe, appears to be rare, and I never met with it.

The Mosses, Hepaticæ, and Lichens of Madeira offer a fine field of research to a botanist who has plenty of leisure to search for them. They are very abundant and beautiful in the Laurel woods of the central range, but I had not time to do more than collect a few of the more conspicuous kinds. The following are the principal Mosses and Lichens that I observed in the island:—

Fissidens serrulatus, Bridel. Abundant on very wet and shady banks in the Laurel forests; in fruit in a small gully amidst the chestnut woods above N. S. do Monte.

Hypnum purum. On the ground in the Laurel forests, Ribeiro Frio, and at the head of the S. Vicente valley. I did not find it in

* In Madeira, however, it is very rare.

fruit, but the stems and leaves agree so well with our common *purum*, that I have little or no doubt of its identity.

Hypnum Illecebrum, L. ? Common on the mountains, on moist shady banks ; but barren.

Hypnum alopecurum, L. Ribeiro Frio ; barren.

Hypnum strigosum ? Moist rocks, Ribeiro Frio ; finely in fruit, February 11.

Neckera crispa, Hedw. In great profusion and beauty on old trees in the Laurel forests, especially at Ribeiro Frio, often entirely clothing the trunks ; bearing ripe capsules in January.

Neckera pennata ? Sparingly on old trees in the forests below Pico Grande ; not in fruit.

Leptodon longisetus, Montagne (in Webb and Berthelot, Hist. Nat. Canar.). On old *Til* trees below the precipice of Pico Grande ; very sparingly in fruit.

Leucodon sciuroides var. ? (The capsules roundish-ovate, shorter and broader than in any other specimens I have seen of *L. sciuroides* ; but all the other characters agree with the variety called *L. Morensis* by Bridel.) On trees near Santa Anna, and on moist rocks in the Little Curral ; bearing fruit plentifully in January.

Polytrichum juniperinum. Very common on the upper parts of the mountains, especially in the bare region above the forests.

Polytrichum nanum. Common on the mountains.

Bartramia stricta, Brid. On moist rocky banks on the mountains about the Great Curral, but rather sparingly. (In Teneriffe I found it in great abundance.)

Bartramia rigida, Mont. (*Philonotis rigida*, Brid.) On wet rocks near Santa Anna, and at Ribeiro Frio.

Trichostomum polyphyllum, Turn. (*Ptychomitrium*, Mont.) Abundant on rocks at Ribeiro Frio.

Sticta macrophylla. Plentiful on rocks at Ribeiro Frio, and fructifying abundantly.

Sticta damæcornis. On old mossy trees, Ribeiro Frio.

Sticta aurata. On trees, Ribeiro Frio ; very sparingly in fruit. The upper side of the frond, when fresh and growing, is of a rather bright green colour, much like that of *S. macrophylla* ; but after it has been dried some time, it turns to a reddish-brown, as represented in Von Martius's 'Icones Plant. Crypt. Brasil.'

Parmelia caperata. On rocks.

Parmelia parietina. On rocks, especially near the sea.

Parmelia plumbea. On rocks, Great Curral.

Parmelia affinis (*Squamaria*, Hook. Brit. Fl.). Among moss on trees near Santa Anna.

Borrera leucomela, Ach. On old trees at Ribeiro Frio, abundant, but barren.

Borrera flavicans, Ach. On trees in the mountain forests.

Ramalina scopulorum? On rocks, Great Curral.

Usnea barbata. Extremely common on trees and shrubs in the mountain forests.

Usnea articulata. In the forests at the head of the Serra d'Agea valley.

Alectoria Canariensis? On trees and shrubs in the above-mentioned forests.

Cladonia rangiferina (a variety of rather small growth, with the branchlets scarcely bending down). Frequent on open ground on the mountains, even below 2000 feet of elevation, as for instance near the Palheiro.

Stereocaulon paschale? Very abundant on rocks on the mountains, above 2000 feet.

Sphærophoron —? On rocks in the Laurel forests.

Above the Laurel forests, in ascending from Ribeiro Frio to the Poizo Pass, are extensive low thickets of the *Vaccinium padifolium* (or *Maderense*), which is here as thoroughly a social plant as the *V. Myrtillus* with us; it covers the upper slopes and plateaux of the mountains to a great extent, and is very conspicuous in January and February, when its foliage assumes a rich vinous red colour. It ascends, in a more scattered manner, to the top of the Poizo Pass, 4560 feet above the sea; while, on the north coast, it grows in the ravines about Santa Anna, at an elevation scarcely exceeding 1000 feet. *Erica arborea* also is pretty plentiful about Santa Anna. On the south side of the island it is confined to much higher regions, and is by no means as general as *E. scoparia*. *Myrica Faya* (*Faya fragifera*, Webb and Berth.) abounds, particularly along the cliffs of the northern coast, between S. Vicente and S. Jorge.

Two large and remarkable species of *Sempervivum* form, by their size, abundance, and peculiar appearance, very conspicuous features in the botanical scenery of Madeira: one of them in particular (*S. tabulæforme*), spotting the rocks with its broad, flat, compact rosettes of light green leaves, has a very singular effect. Both are exceedingly plentiful along the north coast, on the bare precipitous rocks of all the ravines and headlands; they abound also in the

ravine of Santa Luzia; and *S. glutinosum*, the more general of the two, is frequent in various places on the southern coast.

The flora of Madeira seems to be made up of three principal elements: the first, and numerically much the greatest, portion consisting of South-European, or Mediterranean plants; the second, of plants characteristic of the *Macaronesian* region (as Mr. Webb has named it), that is to say, plants either peculiar to Madeira, or common to it and the Canaries or Azores, but not natives of any of the continents. The third division consists of tropical or subtropical species, American or Indian, or, in some few cases, African, but not European; most, if not all of these, are probably introduced plants.

1. The large proportion of South-European plants in Madeira—480 out of less than 700 phænogamous species*—is very striking; and the space they occupy is not less remarkable than the number of generic and specific forms. In the lower region of the southern side especially, although the climate and the cultivated vegetation are nearly tropical, the general aspect of the wild plants constantly reminds one of the Mediterranean. A large proportion of these South-European species, it is true, are plants of cultivated ground, or of road-sides, and may have been introduced accidentally since the island has been colonized by Europeans. But there are others, such as *Cotyledon Umbilicus*, *Lavandula Stæchas*, *Salvia clandestina*, *Psoralea bituminosa*, *Ruta angustifolia*, *Phagnalon saxatile*, DC., the sea-side variety of *Plantago Coronopus*, and many more, to which this supposition is less applicable; and the number altogether seems too great to be explained by mere accidental transport through the agency of cultivation. One is rather tempted to speculate on the operation of some greater and more extensive cause, and to think of the bold hypothesis of Bory de St. Vincent and Edward Forbes, concerning the former existence of an *Atlantic Continent*, by which the three *Macaronesian* groups† might have been connected with western Europe and north-western Africa. Supposing the existence of such a continent, the presence of so great a proportion of plants common to Europe and the three groups aforesaid would be easily and simply explained, as they might have migrated by degrees, in the course of ages, by this *overland route*; whereas, in many cases, it is difficult to understand how they could have crossed the great breadth of sea at present

* J. D. Hooker, in 'London Journal of Botany,' vol. vi. p. 126.

† Namely, Madeira and Porto Santo, the Canaries, and the Azores.

intervening. This remark applies, of course, equally, whether we suppose species to have migrated from Europe to the islands, or from the islands to Europe. There are instances in which the latter supposition seems the more probable. *Erica arborea*, for example, though widely spread through the south of Europe, nowhere (I believe) predominates so remarkably, or grows to so extraordinary a size, as in Madeira and the Canaries; whence one is tempted to conclude, that these islands were its true original native country. It is doubtless within the limits of possibility, that the small seeds of this plant may have been transported by violent winds across the intervening sea; but the migration would be much more easily explained on the hypothesis of a former land communication.

On the other hand, there are botanical anomalies difficult to explain on this supposition. One would have expected, if such a communication had existed, that the plants common to Europe and Madeira would have been more particularly those of the *west* of Europe; whereas, in fact, the great majority of them are species general through the Mediterranean region; and few, if any, of the more characteristic plants of Spain and Portugal occur in Madeira. In particular, that island seems entirely to want the *Cistus ladani-ferus* (which is described as covering leagues and leagues of country in Portugal), and indeed all the *Cisti*, as well as *Erica ciliaris*, *Erica vagans*, and a great number more of the most characteristic *west-European* species. Dr. Hooker* has already remarked the singular fact, that out of the 480 European species common to Madeira, only 170 are found in the neighbourhood of Gibraltar, although this latter locality has as many as 456 indigenous plants. It is puzzling to understand how so many of the 480 (most of them common South-European plants), in their supposed migration from Europe to Madeira, or *vice versa*, should have *missed* Gibraltar.

Again, one of the prominent botanical characters of the south of Europe is the great number and variety of *Ophrydeæ*, especially of the genera *Orchis* and *Ophrys*. A striking contrast in this respect is presented by the *Macaronesian* groups, which are remarkably poor in Orchids. Supposing a former connexion by intervening land, one would have expected to meet with many European species of this, as of other families.

On the whole, I can hardly say that the botanical evidence afforded by Madeira, and the other groups in question, in their present state, gives very decisive support to the theory of an

* In London Journal of Botany, vol. vi.

Atlantic continent. It is probable that the botanical character of the lower parts of those islands has been very materially changed since they were first occupied by Europeans, and we can hardly now hope to determine with precision how much of the European element of their flora is due to transport by winds or by birds, how much to the indirect agency of man, and how much to other causes.

2. The second, and most interesting element of the flora of Madeira, consists of *Macaronesian* plants; species either peculiar to that island, or common to it with the Canaries, or with the Azores, or with both, but confined to those groups. To this category belong several of the Ferns already enumerated, and the following phænogamous plants may serve as further examples* :—

I. PLANTS APPARENTLY PECULIAR TO MADEIRA.

Sinapidendron frutescens, Lowe.

Matthiola Maderensis, Lowe (the distinctness of this species may perhaps be doubtful).

Lotus glaucus, Soland.

Chamæmeles coriacea, Lindl.

Sempervivum glutinosum, Soland.

S. tabulæforme, Haw.

Saxifraga Maderensis, Don.

Helichrysum obconicum, DC.

H. melanophthalmum, DC.

Calendula Maderensis, DC.

Senecio crassifolius, var. β , DC. (*S. incrassatus*, Lowe.)

Tolpis pectinata, DC.

T. macrorrhiza, DC.

T. fruticosa, DC.

Sonchus ustulatus, Lowe.

Musschia aurea, DC. (= *Campanula aurea*, L.)

Sibthorpia peregrina, L. (= *Disandra prostrata*, Linn. fil.)

Echium fastuosum.

Sideritis Massoniana, Benth.

Teucrium betonicum.

Plantago Maderensis, Decaisne (is it really distinct from *P. arborescens*?).

* I am not at present able to give complete lists of the plants comprehended in these several categories, but must content myself with enumerating a few conspicuous examples.

Obs.—The number of species of flowering plants *peculiar* to Madeira is stated* at 85; but this number may probably be rather too high; at least, the distinctness of several of Mr. Lowe's new species appears doubtful. In fact, in all estimates of botanical statistics, we are met at every step by the difficulty of deciding what *are* distinct species. The differences of opinion among eminent botanists on this point, and the want of anything like a fixed rule, throw an uncertainty upon all numerical comparisons of the floras of different countries.

II. PLANTS COMMON TO MADEIRA AND THE CANARIES, AND CONFINED TO THEM.

Cheiranthus mutabilis.

Hypericum floribundum.

H. glandulosum.

Geranium anemonifolium.

Rhamnus glandulosus.

Celastrus cassinoides.

Phyllis Nobla, L.

Clethra arborea (found in the Canaries, according to Von Buch).

Globularia longifolia, Soland.

Lavandula pinnata, L.

Teucrium heterophyllum.

Micromeria varia, Benth.

Cedronella triphylla, Benth.

Laurus Canariensis, Webb and Berth.

L. (Phœbe) Barbusano.

L. (Oreodaphne) fœtens.

Euphorbia piscatoria.

Carlowitzia salicifolia, Mœench.

III. PLANTS COMMON TO MADEIRA AND AZORES, NOT FOUND IN CANARIES.

Vaccinium padifolium, Sm. (= *V. Maderense*, DC.)

Ilex Perado, Soland. (In the Azores, according to Watson, in 'Hook. Lond. Journ.' vol. iii. The *Ilex Perado* of Von Buch's list of Canary plants is *I. Canariensis*, Webb and Berth.)

Melanoselinum decipiens, Hoffm.

* Hook., Lond. Journ. Bot. vol. vi. p. 126.

IV. PLANTS COMMON TO ALL THE THREE GROUPS, SCARCELY
FOUND ELSEWHERE.

Ranunculus cortusæfolius (= *R. grandifolius*, Lowe).

Hypericum foliosum, Soland. (= *H. grandifolium*, DC.; see
Watson in 'Lond. Journ. Bot.' iii. 588).

Frankenia ericifolia, Chr. Smith.

Faya fragifera, Webb (= *Myrica Faya*, Soland.).

Persea Indica, Spreng.

Ruscus androgynus, L.

The Madeira plants belonging to this Macaronesian flora are inhabitants either of the sea-cliffs, or of the mountain woods and rocks in the interior, here and there descending along the deep rocky ravines towards the coast. From the region lying between the actual sea-cliffs and the upper limits of vine culture, on the southern side of the island, they have been mostly expelled by cultivation or by plants of European origin. *Micromeria varia* is perhaps more generally diffused through the island than any other phænogamous species of this peculiar flora, growing on almost all the rocks, as well near the coast as in the ravines of the mountains. *Davallia Canariensis* is another very general Madeira plant which may fairly be included in this category, since its head-quarters are evidently in Madeira and the Canaries, and it appears a straggler in Europe, where it is confined to the corner nearest to the islands in question. The most remarkable and striking features of this flora are the trees which compose the principal part of the native forests, namely the four species of Laurel, and the *Clethra arborea*; the more remarkable, because they appear to have no affinity with the flora of the neighbouring continent of Africa. The singular fact of the absence of *Laurineæ* from tropical Africa was long since pointed out by Mr. Brown, and has been confirmed by subsequent researches. At the Cape of Good Hope, indeed, there is a solitary species* (*Ocotea bulata*), and it is worth notice that this resembles the *Til* of Madeira and the Canaries in the qualities of its wood. Otherwise, very little analogy can be perceived between the truly indigenous flora of Madeira and that of South Africa.

The genus *Erica*, indeed, holds a conspicuous place in the floras of both these countries, but in very different ways. Madeira has two species only of Heath, but these cover a vast extent

* Besides the anomalous *Cassytha*.

of ground, and form most conspicuous features in the physiognomy of vegetation. At the Cape, on the other hand, the species of *Erica* are almost innumerable, but none of them are very conspicuously abundant, nor cover much ground. The large Sem-pervivums of Madeira (*S. glutinosum* and *tabulæforme*) remind one of the *Crassulaceæ* of South Africa, and are perhaps in reality the closest link between the two floras.

The *Clethra arborea*, an outlying species of a genus otherwise entirely American, is very remarkable. The *Vaccinium*, which is one of the most characteristic plants of Madeira, likewise deserves notice, on account of the rarity of that genus in Africa. Four species indeed are recorded from Madagascar, but not one, as far as I know, from the continent of Africa. *Vaccinium* indeed is principally an American genus*, though not as strictly so as *Clethra*.

The Madeira flora, at least the non-European element of it, has much of a fragmentary character; made up of a few species from each of a great number of families and genera, none (unless perhaps the Ferns and the *Cichoraceæ*) having any remarkable numerical preponderance. Moreover, the families richest in species are not (with the exception of the Ferns) those which have the greatest influence on the physiognomy of the vegetation. In the flora of the Canaries, on the other hand, there is a much more decided preponderance of particular families and genera.

3. The plants composing the third portion of the Madeira flora, namely such as appear to be immigrants from tropical countries, or from the southern hemisphere, are comparatively few in number, but several of them are conspicuous from their abundance. Among the number are *Bidens leucantha*, *Ageratum conyzoides*, *Commelyna agraria* (?), *Gomphocarpus fruticosus*, *Penisetum cenchroides*, *Solanum Pseudo-capsicum*, *Cassia bicapsularis*, *Amaryllis Belladonna*, *Sida rhombifolia*, *Achyranthes argentea*, *Chenopodium ambrosioides*; not to mention others more evidently and recently introduced (see pp. 4, 5). Most of those above enumerated are plants widely diffused† over the warmer parts of the world, and several possess evident facilities for spreading themselves, either by the appendages of their fruits, seeds, or inflorescence, or by their rooting stems.

Seeing the rapidity with which exotic plants of late introduction

* Out of 85 species enumerated by DeCandolle, 62 are peculiar to America, North or South.

† The *Amaryllis* is an exception.

naturalize themselves in Madeira (of which I have already given some instances), we may fairly suppose that the plants included in this category are not strictly indigenous, but have been introduced since the island has been brought, through human agency, into communication with America and with the southern hemisphere.

Some of the Madeira plants might almost equally well be classed under this division or the first; for, though frequent in southern Europe, they are so universal throughout the warm temperate and tropical zones, that they are as likely to have been originally introduced *into* Europe, as *from* it. Such are *Cynodon Dactylon*, *Senebiera didyma*, *Oxalis corniculata*, and *Gnaphalium luteo-album*.

The botany of Teneriffe has been so fully and so well illustrated, first by Von Buch and since by Webb and Berthelot, that it would be superfluous to attempt any general review of it; I will accordingly content myself with offering a few detached observations.

It has been remarked*, that the neighbourhood of Santa Cruz in Teneriffe is one of the most barren localities of the whole Canary group. It is so in appearance, and perhaps actually is so in an agricultural view. To a botanist, however, Santa Cruz is very far from being a barren or uninteresting station. Even the appearance of the coast, as seen from the water at the season of my visit, was far less barren than I had expected from descriptions to find it. The coast mountains, though excessively rugged, abrupt and wild, are (at least in the early spring) far from being destitute of verdure; and beautifully green and fertile spots are discerned in the deep narrow valleys between them. A very singular appearance is given to the littoral mountains by the round pale green bushes or clumps of *Euphorbia Canariensis*, which are dotted over them in such a way as to produce a curiously spotty effect, that strikes the eye at a considerable distance.

The immediate neighbourhood of Santa Cruz is much more productive in a botanical view than that of Funchal. In the very outskirts of the town, as for instance around the Lazaretto, one finds some of the endemic Canarian species, such as *Aizoon Canariense*, *Notoceras Canariensis*, mingled with a great number of South-European plants, such as *Lamarckia aurea*, *Polycarpon tetraphyllum*, *Picridium Tingitanum*, *Erodium malacoides*, *Medicago*

* London Journal of Botany, vol. vi. p. 137.

orbicularis and *minima*, *Plantago Lagopus*, *Bromus Madritensis*, and many more.

The rugged cliffs eastward of the town, and the mouths of the little valleys that intersect them, afford an abundance of curious and interesting plants. One is struck at first sight with the peculiarity of the flora; one sees at once that it is far more exotic than that of Madeira, and has much less in common with Europe, whether in its general physiognomy or its specific details. The uncouth *Euphorbia Canariensis**, one of the most abundant plants on the sea-cliffs and on all the rocky and rugged parts of the coast, up to the tops of the hills commanding Santa Cruz, immediately reminds us of the South-African flora; it has indeed a very close resemblance to the numerous succulent and prickly Euphorbias which form a material part of the extraordinary vegetation of Caffraria.

The singular and graceful *Plocama pendula*, another of the most abundant and characteristic plants of the coast near Santa Cruz, is, on the contrary, a thoroughly peculiar Canarian type, not connected with any other flora. The two other plants which especially characterize this part of the coast, and which, together with the two just mentioned †, give to it its distinctive botanical physiognomy, are the *Kleinia neriifolia* and *Euphorbia piscatoria*; the latter resembling, on a greater scale, the *Euphorbia dendroides* of the Mediterranean, while the *Kleinia*, which has the look of a Dragon-tree in miniature, is a truly African type. When, as often happens, the *Plocama* and the *Kleinia* grow in close contact with the clumps of *Euphorbia Canariensis*, the effect is singular; the light weeping form and lively green colour of the *Plocama* being strongly contrasted with the grey hue and gouty branches of the *Kleinia*, and with the stiff columns of the *Euphorbia*.

Other plants, which, by their abundance, particularly characterize this part of the coast, are *Artemisia argentea* ‡, *Chrysanthemum fœniculaceum*, and the beautiful *Lavandula abrotanoides*. *Fagonia Cretica* also grows along the edges of the cliffs, as well as *Aizoon Canariense*, *Plantago amplexicaulis*, *Lotus sessilifolius*, *Portulaca oleracea*, and a pretty little *Cyperus*, which one is surprised to see flourishing on such arid rocks.

* This plant is admirably well described by Vop Buch.

† The physiognomy of these four plants is extremely well represented in the plates to Webb and Berthelot's great work.

‡ The people call it *Inciense*, and consider it an excellent remedy for colds and headaches.

The deep valleys which open on the coast north-eastward of Santa Cruz are full of interest to the botanist as well as the geologist. The picturesque Val Bufadera, rich in beautiful orange gardens, is one of the best examples. In the lower part of it, the shingle of the dry torrent bed, which occupies the flat bottom, is overspread with a thick growth of *Plocama pendula*, *Artemisia argentea*, *Euphorbia piscatoria*, *Lavandula abrotanoides*, mixed with some herbaceous Composites and Leguminous plants. The steep rocky hills on either side are dotted over with bushes of the *Euphorbia Canariensis* and *piscatoria*, the *Kleinia* and *Plocama*; and the *Opuntia*, an introduced plant, spreads in many places up the hill sides, and mingles with the native growth. Higher up, where the valley narrows, and a clear and rapid stream flows along the bottom, the native vegetation is very rich and interesting. The rocks, carpeted with *Selaginella denticulata*, are ornamented with a variety of fine plants, among which *Echium giganteum* and *strictum*, *Cineraria Tussilaginis*, *Andryala pinnatifida*, and various shrubby *Cichoraceæ*, *Lavandula pinnata*, *Messerschmidtia fruticosa*, *Rubia fruticosa*, *Hypericum Canariense*, *Jasminum humile*, *Globularia longifolia*, *Ranunculus cortusæfolius* var. (*R. Teneriffæ*, Pers.), and various *Sempervivums*, are conspicuous. *Periploca lævigata* forms beautiful wreaths amidst the thickets. Several Ferns also grow on the rocks in this valley; in particular, *Notholæna Marantæ*, *Ceterach aureum* (which appears to me a variety of *C. officinarum*), *Gymnogramme leptophylla*, *Adiantum Capillus*, *Davallia Canariensis*, and *Polypodium vulgare*. Baron Humboldt was certainly misinformed when he restricted the list of Ferns found in the region of the Vine in Teneriffe, to two *Acrostichums* (*Notholæna*) and an *Ophioglossum*. The six that I have enumerated all grow within the region of *Euphorbias**, and much below its upper limit.

Besides the endemic Canarian or *Macaronesian* species above noticed, a great many South-European plants grow along the bottoms of these valleys, especially near their mouths, such as *Asphodelus ramosus*, *Echium violaceum*, *Trifolium glomeratum*, *tomentosum* and *stellatum*, *Silene Gallica*, *Dianthus prolifer*, *Linum angustifolium*, *Plantago Psyllium* and *P. Lagopus*, *Briza maxima* and *minor*. *Achyranthes argentea*, a frequent plant in the valleys of this part of Teneriffe, is perhaps of African origin.

The beautiful neighbourhood of Orotava, on the north-west coast, has quite a different botanical character from that of Santa

* The "Subtropical or African Region" of Von Buch.

Cruz. As the climate is less dry, and more temperate, so the vegetation, even in the lower region, has less of an African aspect, and reminds us rather more of Madeira and of Southern Europe. Some of the characteristic plants, which stamp the flora of the south-eastern coast with its most marked peculiarities, are either wanting or rare about Orotava. The *Kleinia* and the *Euphorbia piscatoria*, indeed, are abundant, but the *Euphorbia Canariensis* occurs only in a few places on the sea-cliffs*, and the *Plocama* I saw nowhere but near Icod de los Viños. Some of the most characteristic plants of the coast near Orotava are, the beautiful little *Frankenia ericifolia*, *Statice pectinata*, *Paronychia Canariensis*, *Crithmum maritimum*, *Lotus sessilifolius*, *Artemisia argentea*, and a glaucous-leaved *Pyrethrum*. *Argemone Mexicana*, a wanderer from the tropics (within which it appears to be very widely diffused), grows on the sea-shore at the mouth of the Barranco Ruiz, near S. Juan de la Rambla, and more abundantly at Garachico.

The great abundance of Date Palms in the valley of Orotava and some of the other valleys of that coast, forms a striking feature in the landscape, and distinguishes it particularly from the scenery of Madeira, where there are comparatively very few of these trees. The *Phœnix*, however, does not appear to be indigenous to Teneriffe, as it is to the islands of Canaria and Palma. The *Dracæna* is a scarcely less conspicuous feature in the scenery of Orotava, but although it is ascertained to be indigenous to the island of Teneriffe, almost all the trees which occur in this valley are evidently cultivated.

The famous Dragon-tree of Villa de Orotava, so well known through Humboldt's description, is still in existence; a ruin indeed, but a noble ruin. Its foliage is still fresh and vigorous, but the tree has been much shattered, and has lost many branches within the last few years, and a gentleman who has long known it is of opinion that it will not last another century. By my measurement, the part that remains entire of the trunk is 30 feet round, that is, from edge to edge of the hollow; and the width across the hollow is 12 feet. This measurement was taken at $8\frac{1}{2}$ feet above the roots. I measured another Dragon-tree, a flourishing and comparatively young one, which stands beside a convent at Realejo de Arriba, and found the circumference of the trunk to be 14 feet 4 inches, at 4 feet from the ground. There is a still finer one at Icod de los Viños.

The remarkable ravines, or *Barrancos*, which are most charac-

* Particularly near La Paz, a little way to the east of the Puerto de Orotava.

teristic features of the physical geography of Teneriffe, are rich in curious plants. In their lower parts (below 1000 feet or thereabouts), one of their peculiarly characteristic plants is the *Rumex Lunaria*, a fine shrub with broad glossy bright green leaves and ample spreading panicles; certainly the handsomest of its genus. The *Ricinus communis* (Palma-Christi) is frequent and ornamental, and whether originally introduced or not, has all the appearance of a wild plant. A fine large, shrubby, prickly Solanum, with showy purple flowers (*S. Vespertilio*), has quite a tropical aspect, strongly reminding one of some of the Brazilian Solanums; while on the other hand, the *Aloë vulgaris*, which is seen here and there in some of the barrancos near Orotava, is a South-African form; and the shrubby *Sonchi* are peculiarly Canarian. Some conspicuous plants of the forest region straggle far down these ravines to an elevation of only a few hundred feet; as is the case with the beautiful *Escobon* (*Cytisus proliferus*), and the *Erica arborea*, in the Barranco de S. Felipe near Orotava.

About the level of Villa de Orotava (1000 feet), or a little below it, the Ferns begin to be very abundant and beautiful, and, in company with Houseleeks, profusely adorn the rocky banks and stone walls. *Polypodium vulgare** and *Davallia Canariensis* are, here as in Madeira, the most abundant kinds; *Gymnogramme leptophylla*, *Notholæna Marantæ*, *Asplenium palmatum*, and *Nephrodium elongatum*, frequent and fine. Some of these occur here and there at a much lower level; and near Garachico the *Asplenium palmatum* descends even to the sea-shore. *Pteris longifolia* is rare; I saw it only in one spot, on the margin of a rivulet that crosses the road between Garachico and Icod de los Viños. *Cheilanthes pulchella* grows in rather arid rocky spots, among the *Cistus Monspeliensis*, in the wild rugged country (overspread with obsidian) between Icod de los Viños and the village of La Guancha.

Towards the level of Villa de Orotava, too, one begins to meet with the *Hypericum grandifolium*, and the beautiful crimson Cinc-raria (*C. Tussilaginis* †), which is one of the greatest ornaments of the lower part of the woody zone.

Although there has been a lamentable waste of the beautiful forests of Teneriffe, yet there are still some accessible spots where the woodland vegetation may be seen in all its luxuriance. Such is the wood of Agua Mansa, above Orotava, which is fortunately

* It is very singular that Von Buch should have entirely omitted this *Polypodium* in his lists of Canarian plants.

† *Senecio Tussilaginis*, DC.

preserved unhurt, through a belief (doubtless well-founded) that the destruction of the shade would lead to the failure or diminution of the fine spring which supplies the town and valley with water. The elevation of Agua Mansa is rather more than 4000 feet * above the sea-level.

The large trees in the wood are principally Viñaticos, *Persea Indica*, and some of them are indeed of great size and noble aspect. Beneath them is a luxuriant and beautiful undergrowth of *Erica arborea*, *Myrica Faya*, *Viburnum rugosum*, *Ilex Canariensis*, Webb and Berth. (the *Aceviño* of the Canarians), *Hypericum grandifolium*, and one or two species of *Cistus*. Few herbaceous plants were in flower at the season of my visit, except a beautiful Forget-me-not, considered by Webb and Berthelot as identical with our *Myosotis sylvatica*. Ferns are abundant and fine, particularly *Pteris arguta*, *Asplenium acutum*, and *Cystopteris fragilis*. *Gymnogramme leptophylla* ascends to this elevation. The ground, the rocks, and the trunks of trees, are richly carpeted with Mosses: of these the most remarkable is the *Glyphocarpus Webbiai* †, Mont., which is in great abundance, covering the moist rocks with broad cushion-like patches of a rich yellow hue; this seems to have been hitherto found nowhere else. With this exception, the hypnoid mosses predominate greatly; but the variety of species did not appear to be in proportion to the extent of surface they covered. *Pterogonium gracile* and *Hypnum cupressiforme* are especially abundant, covering the trunks of the trees; the latter of them, as with us, sporting into many varieties. Other Mosses which I found here were:—

Hypnum Illecebrum (*H. blandum*, Lyell): abundant, but I could find no fruit; the leaves, however, agree with those of authentic specimens from the late Mr. Lyell.

H. alopecurum? (var. with compressed branches and bifarious leaves): on very wet rocks; barren.

Leskea sericea.

Neckera pennata? : on trees, sparingly and barren.

Neckera (*Antitrichia*, Brid.) *curtispendula*: on rocks, not in fructification.

Leucodon sciuroides.

Leptodon Smithii, Brid. (*Pterogonium*, Sm.): on trees.

* 3820 French feet, according to Von Buch.

† Montagne, in Webb and Berthelot, Hist. Nat. Canar., Cryptog. p. 28. pl. 2. fig. 2.

Leptodon longisetus, Mont.: in abundance on some large old trees, but producing fructification very sparingly.

Schistidium ciliatum, Brid.: on rocks.

On the mountain side near the wood of Agua Mansa, but separately, not intermixed with the other trees, grow a number of fine pines, *Pinus Canariensis*: this is the nearest spot to Orotava, and the most accessible, in which they are to be seen in a state of nature. This species of Pine is a noble and picturesque tree, perhaps the finest that I have seen of its genus. The representations of it in the Atlas to Webb and Berthelot's work do not give a good idea of its appearance, at least as I have seen it; it has not the stiff and formal regularity there represented, but rather the free and bold style of branching of the finest states of *Pinus sylvestris*; while the very long, slender, drooping and almost pendulous leaves give it a distinct and peculiar character.

The prevalence of the *Erica arborea* is one of the most striking characteristics of the forest zone in this part of Teneriffe. This beautiful shrub or tree forms a broad and continuous belt along the face of the great screen of mountains which half encloses the valley of Orotava. Whether one ascends towards the Peak by the usual route, or along the Tigayga ridge, in either case, after passing the limits of cultivation, one proceeds for hours through a dense and uninterrupted shrubbery of this Heath. The larger trees having been destroyed, the *Erica* now predominates over everything else. The *Myrica Faya* (*Faya fragifera*, Webb), the *Aceviño* (*Ilex Canariensis*), the *Pteris aquilina*, and one or two *Cisti*, grow intermixed with it, but in smaller quantity. A similar and most luxuriant shrubbery of *Erica arborea* and *Myrica Faya* is crossed before arriving at the wood of Agua Mansa. The Heath here grows ten or twelve feet high, and the effect of its countless myriads of white bells is quite charming. The lower limit of this great zone of *Erica* is probably not much below 3000 feet, but whether it would not extend lower if not interfered with by cultivation, may be doubtful. In the deep *barrancos*, as I have already remarked, the *Erica* flourishes in a scattered manner down to a much lower level.

The *Erica scoparia*, which in Madeira generally accompanies the *arborea*, appears to be scarce or local in Teneriffe. In the Azores, on the other hand, the *scoparia* prevails to the exclusion of the *arborea**. The prodigious abundance of these Heaths in Madeira and the Canaries, while the species are so few, is very remarkable.

* Watson, in Hook. Lond. Journal of Botany.

It exemplifies in a striking manner the two different ways in which the botany of a country may be looked at. If we consider only the number of species, the *Ericaceæ* form but an insignificant part of the vegetation of the islands in question; and so a botanist judging from dried collections would consider them; whereas, from the extraordinary multiplication of one or two species, they form, in another point of view, a most important element in the vegetation.

The well-marked succession of different zones of vegetation, as one ascends from Orotava towards the Peak, is very interesting, although its effect must have been more striking before the destruction of the great trees. Starting from amidst the gardens of the coast, where the Banana, the Date Palm, the Orange, and the Coffee flourish in luxuriant beauty, we ascend for more than 2000 feet through cultivated grounds, the aspect of which becomes progressively more and more like that of Middle Europe. One can hardly define the limit between the zone of tropical, and that of European culture; the one seems to melt gradually into the other. Wheat is grown from the coast up to the beginning of the Heath zone, but the difference of climate is well shown by its state of forwardness; at the time of my visit it was in full ear, and approaching to ripeness in the valley, whereas at the upper limit of its zone it was only peeping above the ground. At this higher level, Lupins are the principal crop. The commencement of the woody zone is marked by the Tree Heath clothing all the waste and stony ground between the fields. Presently we come to the very extensive zone of shrubbery composed of this Heath (*Erica arborea*), together with the *Myrica Faya*, *Ilex Canariensis*, and *Hypericum grandifolium*. This shrubbery here seems to represent both the woody zones,—that of the Laurels and that of the Pine; for on this part of the mountain range the woods have been all cut down, and a solitary Pine, high up in the savage ravine on the left of our path, is the only tree to be seen in the whole ascent after we have left the cultivated fruit-trees. The case is nearly the same in ascending by the other route, from the Tigayga and Icod el Alto; only here, there still remain a few large Viñaticos around the fine spring called Fuente de Pedro.

To the region of the Heath succeeds, as we ascend, that of the *Codeso del Pico*, *Adenocarpus frankenioides*, DC. The limit of this is particularly well-marked. For a little space it is intermixed with scattered and stunted bushes of the Heath, but this soon thins out and disappears, and for miles the whole slope is covered

with the *Adenocarpus* alone, as some of our commons and wastes in England are covered with Furze. It is in general a low compact rigid bush, peculiar in its multitude of short lateral branches and the minute closely-crowded grey-green leaves; by no means a handsome plant when out of flower; but here and there, in sheltered spots, it assumes the character of a little tree. It is very surprising to me, that Von Humboldt, in his famous description of the Peak, should have omitted all mention of this plant, which occupies by itself so wide a tract of ground. It is one of the most eminently *social* plants in the world.

The first bushes of the *Retama blanca*, *Cytisus nubigenus* (*Spartium nubigenum*, Soland.), appear immediately below the *Cumbre*, or ridge surrounding the actual Peak. Here the *Adenocarpus* is thinly scattered amidst the wilderness of loose stones and rugged rocks; and when the ridge is surmounted, and we enter the great *plateau* of pumice-stone (*Las Cañadas*), no vegetation is to be seen except the *Retama*, forming large isolated bushes at considerable distances apart. These bushes are of a very regular hemispherical form. I was assured by a most intelligent observer, that the fragrance of the flowers of this plant is so powerful, that in the early morning it may sometimes be distinctly perceived at the Port of Orotava.

To a botanist acquainted with the Alps, there is something very striking in the entire absence, from the upper regions of Teneriffe, of all those forms which we are accustomed to consider as *alpine*. In place of the fine close carpet of small grasses, and dwarf herbaceous plants with brilliant flowers, which clothes the heights above the region of trees on the European mountains, we see here a very few species of rigid shrubs, monopolizing vast spaces. For although, according to the observations of Von Buch, and of Webb and Berthelot, the region of the *Cumbre* is not entirely destitute of herbaceous plants, yet they are rare, and occur only as single individuals, thinly scattered. Nowhere is there anything like a turf. Even mosses occur only in small scattered tufts on the larger rocks. The peculiar aridity and unstable character of the soil are evidently the causes of this. The mountain vegetation most analogous to that of the Peak of Teneriffe is (as Webb and Berthelot have shown) that of Etna. The upper region of Pico, in the Azores, seems very different in its botanical physiognomy*, being characterized by *Calluna vulgaris*, *Erica scoparia*, *Vaccinium Madeirense*, a *Myrsine*, and a Juniper; while it is entirely wanting

* Watson, in Hooker's London Journ. Bot. ii. 401-405.

in the shrubby *Leguminosæ*, which form the whole of the ligneous vegetation of the highest parts of Teneriffe.

In the prevalence of Leguminous shrubs, the Teneriffe flora shows an analogy to that of Spain. Besides the two already mentioned, which are confined to heights above the region of the Heath, several other *Genistææ* abound at lesser elevations, especially the beautiful *Adenocarpus foliolosus* and *Cytisus proliferus*. Another point of resemblance between the Teneriffe flora and that of Spain, is the abundance, in some parts of the island, of various species of *Cistus*. The *Cistus Monspeiliensis*, in particular, is the prevailing shrub of the wild, rugged, rocky country between Icod de los Viños and Icod el Alto; and the curious *Cytinus Hypocistis* grows plentifully on its roots, as in the south of Europe. These analogies between the vegetation of the Canaries and that of the Iberian Peninsula are the more remarkable, as they seem to be wanting in Madeira.

The beautiful wood of Agua Garcia, of which a glowing (but not exaggerated) description is given by Webb and Berthelot, is the finest example I saw of the forest vegetation of Teneriffe. It is especially remarkable for the profusion of Ferns and Mosses, and for the gigantic growth of *Erica arborea*. Towards the outskirts of the forest, in particular, this Heath grows to a surprising size, even to the height of 40 feet; it is however always slender in proportion, and none of the trunks that I measured were more than four feet round. The forest consists entirely of evergreen trees: the most abundant, as far as I saw, appeared to be the *Laurus (Persea) Indica* (Viñatico), *Laurus Canariensis*, *Ilex platyphylla*, Webb and Berth., *Myrica Faya*, and *Viburnum rugosum*,—for this last grows here quite to the size of a tree. The variety of species, however, is greater than I was able, in one hasty visit, to ascertain: M. Berthelot told me that he had found in that wood not less than 25 species of trees; but all are evergreen, and all (with the exception of the Heath) have a great general resemblance of physiognomy. All (with the aforesaid exception) belong to the Laurel form or type of vegetation, having broad, undivided, deep green, shining leaves, more or less coriaceous, and approaching to an elliptical or lanceolate form, in no degree lobed or cut. This prevalence of one particular type of foliage distinguishes in a marked manner the forest vegetation of Teneriffe from that of the tropics; as, on the other hand, its evergreen character contrasts with the woods of Europe. In tropical forests, indeed, there is a great abundance of trees of the Laurel type,—*Laurineæ*, *Gutti-*

feræ, Figs, and others; but they are always mixed with various other well-marked forms, particularly with that beautiful form of the *Mimoseæ*, which is entirely absent from the Canaries.

Of herbaceous flowering plants, in the wood of Agua Garcia, one of the most ornamental and interesting is the *Geranium anemonefolium*. The profuse abundance and luxuriant growth of the Ferns are very striking. The *Woodwardia radicans* and *Polystichum aculeatum* grow to extraordinary size and beauty; and the *Trichomanes speciosum* mantles the wet overhanging banks with its dark green glistening fronds.

The most abundant moss, by far, is *Hypnum cupressiforme*, which, in many varieties, entirely clothes the trunks of the largest trees.

Of the other mosses that I observed in my hasty visit to this locality, the most interesting was *Fissidens serrulatus*, Brid., growing in profusion on the wet rocks and banks, often in company with the *Trichomanes speciosum*, and bearing abundant fructification.

To sum up my observations on Teneriffe, I may say, that the botanical features most striking to me were:—1. In the coast region, the remarkable forms of the *Euphorbia Canariensis*, *E. piscatoria*, *Kleinia neriifolia*, and *Plocama pendula*; the social growth of the *Artemisia argentea*, covering great spaces of rocky and stony ground with its whitish foliage; the conspicuous abundance (especially on the Orotava side of the island) of cultivated Date Palms and Dragon-trees; and, in the ravines, the striking and peculiar forms of shrubby species of *Rumex*, *Echium*, *Solanum*, and *Sonchus*. 2. In the woody region, the prevalence of trees of the Laurel type of foliage; the vast extent of ground occupied by the *Erica arborea*, and the surprising size to which it grows in favourable localities; the abundance of Ferns and Hypnoid Mosses in the more damp and shaded situations, and of *Cistineæ* and *Genisteæ* on the dry and open grounds; and the noble form of the Canary Pine in the upper part of this zone. 3. The great zone occupied by the *Adenocarpus frankenioides* above the region of trees, and that of the *Cytisus nubigenus* at a still higher level.

The striking botanical features of Madeira may be summed up thus:—1. The tropical cultivation in the lower region, contrasted with the South-European or Mediterranean character of the native vegetation. 2. The frequency, in that same region, of plants evidently or probably introduced, and belonging to very different countries. 3. The abundance and variety of Ferns, more particu-

larly indeed in the forest region, but also in the ravines at lower levels, and even down to the coast on the northern side. 4. The great abundance of two large and conspicuous species of *Sempervivum*, especially in the ravines of the north side. 5. The forests of Laurel-like trees; and 6. The prevalence of *Vaccinium padifolium*, *Erica arborea* and *E. scoparia*, not only as undergrowth in the forests, but almost entirely covering the upper mountain-region.

The most remarkable *negative* characteristics of Madeira botany, as compared with that of Teneriffe, are, the absence of most of the peculiar and striking forms belonging to the coast-region of the latter country, especially of the succulent *Euphorbia*, the *Kleinia*, and the *Plocama*; the absence of Pines and *Cisti*; and the small number of shrubby *Leguminosæ*.

On some New Species of *Chamælauciæ*. By Dr. C. F. MEISNER.

[Read November 20th, 1855.]

AMONG those natural orders or tribes of plants which are particularly characteristic or exclusively peculiar to the Flora of New Holland, the Myrtaceous group established by DeCandolle under the name *Chamælauciæ* is one of the more remarkable, as well for the numerous and curious modifications of structure it presents, as also for the uncommon elegance and loveliness of its flowers. In the latter respect it is surprising, indeed, that although several of the finest species are not uncommon in the Swan River colony, and long since well-known to botanists, especially through the collections made and distributed by Drummond and Preiss, these charming shrubs have not yet found their way to our greenhouses, where they would certainly be admired as a most valuable and highly ornamental acquisition. Whether it be that the seeds of these mono- or oligospermous shrubs are perhaps scarce or difficult to procure, or that the transport of living individuals and their culture offer peculiar difficulties (which however can hardly be supposed, considering their close affinity of structure and similarity of growth with the other New Holland Myrtaceæ, of which so many are common and perfectly thriving in our greenhouses), or whatever reason there be, I must leave undecided; but the fact is, that, as far as I have been able to ascertain, the only representatives of *Chamælauciæ* introduced until the last year into European

gardens were two or three species of *Calycotrix*, to which have been quite recently added two fine species of *Genetyllis*, published with beautiful figures in the 'Botanical Magazine' for July, plates 4858 and 4860. On comparing these plates with the specimens in Mr. Drummond's last (6th) collection, I have been led to examine also the whole of the *Chamælauciæ* it contains, and have found almost all of them to be new species, the characters of which form the subject of this paper. It will show at the same time that in the beautiful genus *Verticordia* certain details of structure appear to have remained unnoticed till now, while others have been explained in a wrong or at least unsatisfactory manner, and that both these circumstances will render necessary certain alterations in the character and subdivision of the genus. To conclude these introductory lines with a survey of the progress our acquaintance with *Chamælauciæ* has made during the last twenty-seven years, we find that in 1828 (DeC. Prodr. vol. iii.) there were only ten species known, distributed in five genera. To these were added by Dr. Schauer, in his 'Monograph' (1841) and in the 'Plantæ Preissianæ' (1844) six new genera, including sixty-two species, mostly discovered by Baron von Hügel, Drummond and Preiss, and partly previously published by Endlicher and Prof. Lindley. Another addition of twenty-six new species from Drummond's collections was published in 1849 by Turczaninow in the 'Bulletin de la Soc. Imp. d'Hist. Nat. de Moscou,' tomes xx. and xxii. (1847-49), and of one *Genetyllis* by Lindley in Mitchell's Exped. ii. p. 178 (which Dr. Müller refers to his *Lhotskya genetylloides* in the Transact. Philos. Soc. of Victoria, no. 1. p. 16), so that, with the following twenty-two new species, the total number of *Chamælauciæ* described up to this day amounts to 121 species, comprised in eleven genera.

1. *GENETYLLIS (Involucrata) SPECIOSA*, nob. (non Turcz.), glaberrima, foliis oppositis sessilibus imbricatis internodia æquantibus v. superantibus oblongis obtusis integerrimis supra concavis, involuero ovato-oblongo pollicari 3-5-floro, bracteis interioribus conniventibus sanguineis ovato-oblongis apice attenuatis, floribus sessilibus 2-bracteolatis, calycis tubo turbinato 5-costato, lobis 5 oblongis acutiusculis dimidium tubi corollæque subæquantibus, staminodiis lineari-oblongis stamina æquantibus, stylo incluso supernè barbato.

Hab. "Plentiful on the sand-plains to the east and west of the Hill River." *Drummond*, coll. 6. n. 34!; *Hook. Journ.* 1853, p. 118.

Although agreeing in many points with the plant figured in Bot. Mag. t. 4860, which is considered as *G. macrostegia*, Turcz.,

our plant sufficiently differs from it to justify its being established as a distinct and new species. Its leaves are much smaller, only 2-3 lines long, $1-\frac{5}{4}$ line broad, everywhere opposite (not alternating, as the figure shows them, especially on the upper part of the branches), more crowded and adpressed, less flat, and there is no trace of a serrulate margin; the inner bracts of the involucre are tapering towards their end, not rounded or emarginate; and the lobes of the calyx, which in the figure appear quite short and semicircular, are narrower and more than twice as long. Moreover, Drummond's plant (if we are correct in referring his notice in Hook. Journ. 1853, p. 118, to no. 34 of the collection) seems to differ also in habit, being only about 1 foot high, with numerous short, erect, flowerless shoots, densely crowded in the centre, around which the flowering branches are prostrate and bearing *erect* flower-heads, whereas the plant figured t. 4860 appears to be a taller shrub and shows *hanging* capitula, a difference hardly attributable to the mere effect of cultivation. Turczaninow's description of his *G. macrostegia* differs from our plant partly in the same points as that of the Bot. Mag. t. 4860, and moreover in having the tube of the calyx carved with ten ribs at the lower and twenty at the upper part, a character in which it equally disagrees with the latter, which therefore I suspect to be a distinct species, for which I would propose the name of *G. Hookeriana*. Drummond's n. 34 comes also very near *G. æderioides*, Turcz., which however is easily distinguished by subtriquetrous leaves, ciliated bracts, &c.

2. *G. (Involucrata) HELICHRYSOIDES*, nob., glaberrima, foliis oppositis patulis acerosis carinato-triquetris apice truncato-bicuspidulatis marginibus (sub lente) ciliolato-serrulatis, capitulis nutantibus 4-floris, involucre ovato-oblongo subclauso, bracteis interioribus sanguineis v. roseis ovato-oblongis haud ciliatis apice virescenti subcarinato obtusiusculè acuminatis, exterioribus brevioribus semiherbaceis, bracteolis flores sessiles subæquantibus, calyce campanulato lævissimo, lobis tubo dimidio brevioribus rotundatis integerrimis, staminodiis subulatis glanduloso-subcapitatis stamina æquantibus, stylo apice barbellato.

Hab. cum præcedente. *Drummond*, coll. 6. n. 35!

Probably the plant alluded to by Drummond in the 'Journal of Botany,' 1853, p. 118, in these words:—"Another pretty species of this genus grows about a foot high, with heath-like leaves; the drooping heads of the flowers are surrounded by glabrous bracts of a deep rose-colour." It is very near *G. speciosa* and *æderioides*, but differs from the former in the triquetrous,

thinner and ciliate leaves, from the latter in having the bracts not ciliated, and from both in the tube of the calyx being without any trace of ribs or furrows.

3. *G. (Bracteata) SANGUINEA, nob.*, humilis decumbens glaberrima, foliis oppositis patulis lanceolatis acutiusculis margine subrecurvo minutè ciliolato-serrulatis subtùs subcarinato-uninerviis, capitulo terminali brevissimè pedunculato hemisphærico cernuo composito, partialibus 3-5 obovato-globosis densè congestis 2-4-floris subsessilibus, bracteis membranaceis sanguineis adpressis, primariis lanceolatis subcarinatis, secundariis brevioribus latioribusque subrotundis brevè acuminatis florem amplectentibus et subæquantibus, calyce obconico infernè 5-costato inter costas papilloso, lobis 5 erectis ovatis acuminatis dimidium tubum petalæque æquantibus, staminodiis subulatis stamina æquantibus, stylo exserto compresso glabro apice obtuso barbellato.

Hab. cum præcedente. *Drummond*, coll. 6. n. 36!

Caules spithamæi v. vix pedales, apice adscendentes, secundè ramulosi, cicatricibus parvulis tuberculosi. Folia 2-4 lin. longa, $\frac{1}{2}$ -ferè 1 lin. lata, subtùs glandulis fuscis punctata, juniora subimbricata. Pedunculus communis 2-3 lin. longus. Capitulum magnit. cerasi majoris, bracteis primariis 3 lin. longis basi 1 lin. latis, secundariis petaloideis roseis diaphanis. Calyx ferè 3 lin. longus, obsoletè 10-nerviis, fauce leviter constrictâ, lobis petalisque ovatis integerrimis stylo dimidio superatis.

Approaching *G. (Polyzonæ) purpurea*, Endl., which however differs in the leaves and inflorescence, and especially in the annulate calyx.

4. *G. (Bracteata) VIRESCENS, nob.*, humilis glaberrima, foliis patulis triquetro-linearibus obtusiusculis lævibus, capitulo terminali subsessili sphæroideo cernuo simplici multifloro, bracteis subherbaceis ovato-lanceolatis enerviis demum patulis, bracteolis flore dimidio brevioribus, calyce subcampanulato ecostato, lobis 5 brevissimis erectis petalisque ovato-oblongis obtusis, staminodiis subulatis stamina æquantibus, stylo longè exserto crassiusculo compresso apice tenui barbellato.

Hab. cum præcedente. *Drummond*, coll. 6. n. 37!

Although very similar to *G. sanguinea*, this is easily distinguished from it by the smooth and triquetrous leaves and the inflorescence. The receptacle is convex, about 6 lines in diameter and somewhat crenate on the margin, thus showing a tendency to divide into several short peduncles, and to form a compound capitule, as in the preceding species. The bractæ are of a greenish colour, 5-6 lines long and 2-3 lines broad at the base. The style is half an inch long.

5. *VERTICORDIA STELLULIGERA, nob.*, glabra, foliis triquetro-linearibus obtusissimis, corymbis terminalibus divaricato-trifidis, floribus subcapitato-

racemosis (parvis citrinis), pedicellis folio brevioribus, bracteolis caducis, calycis tubo sphæroideo ecostato infernè patenti-piloso, limbo uniseriali 5-partito, lobis subunguiculatis palmatim 3-5-partitis, lacinulis longiusculè pinnatim fimbriatis mollibus, petalis subrotundis brevè fimbriato-ciliatis glabrieusculis, staminodiis subulatis acutis stamina æquantibus glanduloso-verruculosis, stylo brevè exserto infra stigma obtusum hispidulo.

Hab. cum præcedente. *Drummond*, coll. 6. n. 50!

Affinis *V. densifloræ* Lindl. (ad quam referenda videtur planta Drummondii coll. 6. n. 49) et *V. fimbripetalæ* Turcz., sed a posteriore distincta calyce ecostato, loborum lacinulis non aristatis, stylo apice tantum pubescente, stigmate simplici nec capitato, etc.; a priore floribus luteis (nec roseis), staminibus corolla dimidio brevioribus (nec æqualibus), etc. Folia 2-3 lin. longa, $\frac{1}{2}$ - $\frac{2}{3}$ lin. lata demum patula, novella pseudo-fasciculata. Capitula 4-8-flora. Calycis limbus patens, diametro vix 3 lin., lobis pallide citrinis stellulam referentibus, fimbriis radiantibus vix 1 lin. longis. Antheræ subglobosæ, muticæ.

6. *VERTICORDIA NOBILIS*, nob., glabra, foliis triquetro-linearibus obtusis submucronulatis, corymbis terminalibus simplicibus brevibus, bracteolis 2 connatis diù persistentibus, calyce majusculo, tubo turbinato glaberrimo infernè 10-costato, limbo petaloideo aureo 1-seriali 5-fido, lobis subrotundis sessilibus palmatim multifidis, lacinulis rectis linearibus planis pinnato-ciliatis, petalis ovatis longe fimbriato-ciliatis, staminodiis lanceolatis utrinque 1-2-dentatis filamentis fertilibus subulatis nudis brevè superatis, antheris pendulis ovalibus inflexo-bicornutis, stylo tenui stigmatæque imberbi.

Hab. in planitie prope Smith River. *Drum. in Hook. Journ.* 1853, p. 120. coll. 6. n. 47!

A beautiful species, closely approaching *V. grandiflora*, Endl. (*V. heliantha*, Lindl.), but differing in its higher growth, larger leaves and flowers, and in the shape of the sterile filaments, which are subulate, not cuneato-trifid. The anthers are exactly as figured in *V. grandiflora* by Schauer, Monogr. t. 4. B. f. 7. Leaves 3-4 lines long, $\frac{1}{2}$ -1 line broad, with a very minute mucro, the younger ones imbricate. Peduncles 1-flowered, about an inch long, compressed. Bracteoles at last half separating, cut off from the peduncle, and falling off as a bifid calyptra. Expanded calyx 7 lines in diameter, without a trace of outer appendages.

7. *VERTICORDIA CALLITRICA*, nob., glabra, foliis linearibus compresso-triquetris obtusis minutè mucronulatis basi attenuatis marginibus carinâque integerrimis acutis, faciebus planis, superiore lateralibus dimidio angustiore, corymbis terminalibus simplicibus 6-8-floris densis, pedicellis folia parùm superantibus, bracteolis caducis, calycis tubo campanulato-turbinato supra basin hemisphæricam densè villosulam glabro colorato 10-costato sursum breviter dilatato, limbo biseriali, utriusque seriei lobis 5 capillaceo-multifidis roseis, lacinulis indivisis mollibus comam densam formantibus, lobis serie

exterioris a sinibus interioris deflexis subunguiculatis calycis tubum subæquantibus et abscondentibus, seriei interioris sessilibus patulis, petalis ovatis indivisis toto margine densè fimbriato-ciliatis, staminibus 10 styloque tenui glabro exsertis, filamentis capillaribus cum staminodiis conformibus dimidio brevioribus basi monadelphis, antheris ovalibus muticis, stigmatè subcapitato.

Hab. cum præcedente. *Drumm.* coll. 6. n. 48!

Corymboso-ramulosa. Folia viridia, 4-7 lin. longa, faciebus lateralibus $\frac{1}{2}$ - $\frac{3}{4}$ lin. latis. Pedicelli 6-8 lin. longi, teretes, deflorati apice truncato-patelliformes. Flores pallidè rosei v. ferè albi, expansi diam. 5 lin., calycis fimbriis 2-3 lin. longis haud nitentibus, petalorum ciliis mollibus calycem æquantibus. Genitalia florem superantia.

This pretty species agrees in the essential points of structure of the calyx with *V. insignis*, Endl. (Schauer, Monogr. t. 4. B. f. 10, 11), but differs from it in the shape and size of the leaves, in the exterior (reflexed) lobes of the calyx being neither connected with the base of the tube nor divided into recurved lobules, in the simple and filiform staminodia, &c. It has also some affinity with *V. compta* and *Hügelii*, Endl., and *V. Lehmanni*, Schauer, and consequently must belong to Schauer's section *Catocalypta*, the characters of which however, as given by the author, would scarcely be recognized in our plant without the assistance of the quoted figure.

8. *VERTICORDIA OVALIFOLIA*, *nov.*, glabra, ramis gracilibus apice corymboso-ramulosis, foliis imbricatis glaucis ovalibus suborbicularibusque obtusissimis integerrimis planis, racemis brevibus pedunculatis in corymbum congestis, pedicellis folio vix longioribus, bracteolis caducis, calycis tubo obconico glaberrimo basi tenui rugoso-striato, limbo biseriali, lobis 5 exterioribus deflexis dimidio tubo brevioribus albo-membranaceis ciliatis, interioribus 5 brevibus patulis subtruncatis palmatim inciso-multifidis, laciniis pinnatim 2-3-fidis, lacinulis setaceis densè brevèque plumoso-ciliatis pallidè roseis, petalis coriaceo-scariosis ovatis apice irregulariter inciso-3-5-fidis, laciniis setaceis rigidulis fimbriatis v. passim simplicibus, filamentis staminodiisque subæquilongis subulatis corollâ brevioribus, antheris ovatis apiculatis, stylo infra stigma obtusum hispidulo.

Hab. cum præcedente. *Drumm.* coll. 6. n. 45!

Rami longi simplices. Folia $2\frac{1}{2}$ -3 lin. longa et plerumque vix angustiora dorso leviter 1- passim basi 3-nervia, subglandulosa, margine vix diaphano. Pedicelli crassiusculi, deflorati apice truncato brevissime bilobi. Calycis tubus 2 lin. longus, lorum exteriorum ciliis tubum subæquantibus, lobis interioribus 3 lin. longis nitidis. Petala basi lata sessilia infernè maculâ rubrâ? notata, excepto apice integerrima. Staminodia glandulâ minutâ rubrâ capitata.

This species is very distinct from any other, and although approaching in habit and foliage *V. oculata*, and at first sight

almost like it in the flowers, it differs so materially in the structure of the flowers, that it cannot even take its place in the same section of the genus.

9. *VERTICORDIA CHRYSOSTACHYS*, *nob.*, glaberrima, ramis gracilibus, junioribus imbricato-foliosis, foliis glaucis? orbicularibus planis enerviis margine integerrimo haud diaphanis demùm patulis, racemis terminalibus spiciformibus foliosis densis apice sterilibus, pedunculis folium æquantibus, bracteolis 2 cucullatis apiculatis, calycis tubo glabro obconico 5-costato, limbo 3-seriali, seriei exterioris lobis 5 deflexis herbaceis semirotondis integerrimis tubo dimidio brevioribus ejusque valleculis semiadnatis, seriei secundæ lobis illis alternis deflexis tubum æquantibus totumque obvelantibus petaloideis luteis sessilibus cordato-subrotundis toto ambitu integro brevè ciliatis, seriei tertiæ (intimæ) lobis 5 illis alternis brevibus margine truncato subpalmatim 7-partitis, laciniis setaceis densè plumoso-ciliatis citrinis, petalis ovatis acutis indivisis toto margine longiuseculè ciliatis, filamentis staminodiisque subæqualibus subulatis, antheris ovalibus muticis, stylo tenui glabro apice sigmoideo hinc densè barbellato.

Hab. cum præcedente. *Drumm.* coll. 6. n. 46!

Rami corymboso- v. fastigiato-ramulosi. Folia subcarnosa? 2-3 lin. longa, basi obtusa v. vix emarginata, dorso glandulis fuscis punctata. Racemi aurei, 1-2½ poll. longi, pedicellis apice brevissimè bilobis (2-bracteatis?). Alabastra magnit. pisi, obovato-subglobosa, bracteolis 2 enerviis membranaceis tecta, prope apicem 2-mucronulata, lutea v. hinc sanguinea. Calycis expansi diameter 5-6 lin.

A very elegant and quite distinct species, resembling the two following ones in the shape of the leaves and inflorescence, but very different in the smaller size of the leaves and flower, in the colour of the calyx, and the form of the lobes or appendages of the second series. From all the yellow-flowered species it is widely different in the leaves.

10. *VERTICORDIA OCLATA*, *nob.*, glaberrima, ramis gracilibus imbricato-foliosis, foliis glaucis orbicularibus planis basi emarginatis enerviis margine angustè albido-diaphanis, racemis terminalibus foliosis, pedunculis folio subduplò longioribus, bracteolis 2 cucullatis apiculatis, calycis tubo glabro obconico 5-costato, limbo 3-seriali, seriei exterioris lobis 5 deflexis herbaceis integerrimis tubo adpressis et parùm brevioribus, seriei secundæ lobis 5 paullò brevioribus deflexis patulisve scariosis nitidis subspathulatis longè fimbriato-ciliatis albis, seriei tertiæ lobis 5 brevibus latis (maculâ violaceâ reniformi notatis) inciso-serratis, dentibus 7-11 argenteis in aristam tenuem indivisam plumoso-ciliatam nitentem productis, petalis subrotundis fimbriato-multifidis, fimbriis setaceis indivisis ciliatis, filamentis staminodiisque æqualibus subulatis semimonadelphis, stylo complanato glabro, stigmate obtuso barbâ densâ crispâ cincto.

Hab. in planitie arenosâ inter flum. Hutt et Murchison, *Drummond in Hook. Journ.* 1853, p. 119. coll. 6. n. 43!

Frutex (fide *Drumm. l. c.*) 5-6-pedalis, gracillimus, ramis numerosis, floribus copiosis lilacinis in centro sanguineis, colore scil. loborum calycis per petala transparente. Folia 3-4 lin. longa lataque, sessilia, glandulis nigris punctata. Pedicelli, bracteolæ, alabastra præcedentis. Calycis expansi diam. 9-10 lin., lobis 2dæ et 3tiæ seriei argenteo-nitidis, dentium pennulis 3 lin. longis. Antheræ muticæ.

Closely allied to the following, but with smaller leaves and flowers, and differing besides in the lobes and colour of the calyx, and in the fringed petals.

11. VERTICORDIA GRANDIS, *Drummond in Hook. Journ.* 1853, p. 119, glaberrima, ramis virgatis gracilibus, foliis imbricatis glaucis orbicularibus planis basi emarginatis tenuiter 5-7-nerviis margine angustè scarioso diaphanis, racemo folioso apice sterili, pedunculis folium æquantibus, bracteolis membranaceis cucullatis infra apicem mucronatis, calycis tubo obconico lævi glabro infernè obsoletè 5-costato, limbo 3-seriali, seriei exterioris lobis 5 deflexis coriaceis ovato-oblongis integerrimis tubum æquantibus eique dorso semiadnatis basi contiguas, seriei secundæ lobis 5 petaloideis subspathulatis tubum subæquantibus fimbriato-ciliatis (roseis), seriei tertie lobis 5 patentibus purpureis latis truncatis inciso-multidentatis, dentibus palmatim multipartitis roseis nitidis, lacinulis setaceis densè plumosociliatis, petalis obovatis minutè serrulatis, filamentis subulatis, sterilibus antheras muticas subsuperantibus, stylo pollicari compresso infra apicem obtusiusculum pilosiusculo.

Hab. secus Hill River. *Drumm. l. c.* coll. 6. n. 44!

A most splendid species, much resembling *V. oculata* in habit and characters, but of a stouter growth and with larger leaves and flowers, the former being 6-8, the latter 10-12 lines in diameter. The branches are often densely covered for a foot or more in length with scarlet flowers, which however appear never to reach to their top, which continues to grow on, and is thickly covered with leaves only. The beautiful and delicate feather-like divisions of the inner lobes of the calyx are 4-5 lines long, and quite straight. The peduncles are compressed, and show at their top two very short and rounded opposite lobes, which are probably rudimentary exterior bracteolæ. The flower-buds in their bimucronate involucre are globose, rose-coloured, and the latter, cut off as it were at the base, is thrown off later than in other species, either in form of a half-split calyptra, or separated into two cucullate bracteoles.

Obs. From the above descriptions it will be seen that the calyx of *Verticordia* shows a variety of structure sufficiently notable even to suggest the idea of dividing the genus into three or four distinct ones, instead of which however,—and in our opinion quite

wisely,—Schauer, the monographer of *Chamælauciæ* (Nov. Act. Acad. Leopold.-Car. vol. xix. suppl. 2) has only subdivided it into three sections, characterized partly by the structure of the calyx and partly by that of the anthers. As however the anthers show but very minute and (except in two species only, viz. *V. grandiflora* and *nobilis*) by no means striking characters, we should have thought it preferable to establish the sections chiefly, if not exclusively, on the structure of the calyx, according to its having three or two or only one series of lobes or appendages. Of these different series of lobes, the innermost, and often the sole existing, *i. e.* that whose lobes alternate with the petals and are always coloured and deeply divided or fringed, is undoubtedly formed by the free ends of the five sepals, and continuous with the tube formed by the coalition of their inferior portion. But what are the lobes of the accessory second and third series? Without presuming to decide this question, I may only say that, instead of regarding them as a second and third whorl of (more or less altered) sepals, we would rather consider them as mere appendages of the calycinal leaves, analogous to those so commonly occurring in *Lythrarieæ*, in certain *Melastomaceæ* (*Otanthera*, Blume; *Leandra*, Raddi; *Melastoma*, &c.), and even in some *Myrtaceæ* (species of *Astartea*, D.C.; *Lophostemon*, Schott), or to the scales on the calyx of certain species of *Osbeckia*, although the fixity of their number and position (those of one series constantly alternating in the most regular manner with those of the next series) would perhaps speak against our opinion; while on the other hand the 10-lobed, 2-seriate calyx of *Pileanthus*, and the doubled, trebled, quadrupled, or even more increased number of stamens in the plurality of genera of *Myrtaceæ*, seem to indicate a tendency in this order to multiply the number and most probably also the series or whorls of these organs. At all events, that interpretation of the appendages in question which Dr. Schauer has given in his Monograph, appears, to say the least, very unsatisfactory and arbitrary. What I have designated (in *V. chryso-stachys*, *oculata* and *grandis*) as the lobes of the first series, Dr. Schauer mentions (though only *en passant*, in the description of *V. Lindleyi*, *pennigera* and *Drummondii*) under the name of "*ungues loborum*" (they are distinctly figured on his tab. 4. B. fig. 8, 9. litt. *b*), although they evidently do not originate from the base, but from the upper part of the calyx, and always have their apex free, not adnate to the tube. What I have described as the reflexed and fringed membranous or petaloid lobes

of the second or middle series in *V. chrysostachys*, *oculata* and *grandis*, and of the first or exterior series in *V. callitricha* and *ovalifolia*, exist in the whole section *Catocalypta*, and are correctly figured by Schauer (t. 4. B. fig. 10); but these lobes are considered by him as an *involucre* (!), and described as originating from the "margo exterior lorum," whereas in reality they distinctly spring from the narrow sinus *between* the lobes, and are perfectly free from the latter: nor do they adhere to the base of the calyx, except in *V. insignis*, and even here but very slightly. The idea of an *involucre springing from the limbus calycis* is certainly new, but altogether untenable. According to the differences of the calyx above mentioned, I would propose to divide the genus *Verticordia* into the following four sections:—

I. EUVERTICORDIA, nob. Calycis limbus 1-serialis.

To this belong Schauer's whole Sect. I. *Euverticordia* and III. *Chrysoma*, and our *V. nobilis* and *stelluligera*.

II. VERTICORDELLA, nob. Calycis limbus 2-serialis, serie mediâ deficiente, exterioris lobis reflexis integerrimis tubo semiadnatis, &c.

Of this section I know only *V. Drummondii*.

III. CATOCALYPTA, Schauer. Calycis limbus 2-serialis, serie primâ (lobis reflexis integris, &c.) deficiente, &c.

To this belong all the species of Schauer's second section, and our *V. callitricha* and *ovalifolia*.

IV. PENNULIGERA, nob. Calycis limbus 3-serialis, &c.

Of this we know only the three last species here described, *V. chrysostachys*, *oculata* and *grandis*.

12. CHAMÆLAUCIUM DRUMMONDII, nob., glabrum, foliis sparsis passimque oppositis linearibus triquetris minutè mucronulatis subtùs obtusè carinatis margine densè ciliatis carinâ glabrâ, corymbis densè multifloris, floribus subsessilibus, calyce turbinato 10-nervio demùm basi obsoletè 10-costato, limbi lobis ovalibus obtusis minutè ciliolatis, petalis sessilibus orbicularibus minutè ciliato-serrulatis calycis lobos dimidio superantibus, filamentis fertilibus basi dilatatis sterilibusque ligulæformibus subæqualibus, stylo stamina superante petala æquante, stigmatè capitato coronâ pilorum cincto. *Hab.* in planitie arenosâ prope Colbourn Springs. *Drummond in Hook. Journ.* 1853, p. 119. coll. 6. n. 41!

Frutex 2-pedalis. Rami virgati, ramulis gracilibus subcorymbosis. Folia 3-4 lin. longa, $\frac{1}{3}$ - $\frac{1}{2}$ lin. lata, obtusiuscula cum mucronulo minuto subrecurvo, suprâ plana v. subconcava, marginis ciliis albidis latitudinem folii subæquantibus, punctis glandulosis prominulis fuscis utrinque satis copiosis.

Corymbi capitulum hemisphæricum simulantés, magnit. cerasi majoris, floribus albis demùm roseis, magnit. *Verticordia insignis*. Bracteolæ caducæ.

From *Ch. ciliatum* and *virgatum* this is easily distinguished by the ciliated leaves and petals; from the former, moreover, by the subcapitate and larger flowers, the bearded stigma, &c.; from the latter by the ciliated lobes of the calyx, smaller leaves, &c.

13. CHAMÆLAUCIUM AFFINE, *nob.*, glaberrimum, foliis oppositis subfiliformibus semiteretibus recurvo-mucronulatis dorso convexis marginibus obtusis, corymbis paucifloris laxiusculis, pedunculis folio parùm brevioribus, calyce obovato leviter 10-costato, inter costas infernè minutè foveolato, lobis brevissimis semilunaribus margine subscariosis petalisque latè obovatis integerrimis, filamentis subulatis basi dilatatis sterilia conformia brevè superantibus stylum æquantibus, stigmatè capitato basi barbula cincto. *Drumm.* coll. 6. n. 40!

Folia semipatentia, stricta, parùm rigidula, 8–12 lin. longa, $\frac{1}{3}$ – $\frac{1}{2}$ lin. crassa, floralia conformia sed breviora. Pedicelli 2–3 lin. longi, crassiusculi, deflorati apice truncato-subbilobi.

This seems to be the plant mentioned by Drummond in Hooker's Journ. 1853, p. 118. in these words:—"By far the largest shrub of the order known to me is found on sandy ground on all the rivers, from the Moore to the Irwin; it grows from 15 to 20 feet high, bearing numerous corymbs of large lilac flowers; the sepals are broad and very short, without cilia," &c. It differs from all the other species in its thin and longer leaves, and from *C. uncinatum*, Schauer, which seems to be its nearest relation, by the larger petals, the rounded (not truncate) lobes of the calyx, and the antheræ being not apiculate.

14. PILEANTHUS FILIFOLIUS, *nob.*, glaber, foliis oppositis tereti-v. semiteretifiliformibus subpollicaribus obtusis muticis, pedunculis in summis axillis solitariis 1-floris folia æquantibus, involuero calyptræformi bicornuto prope basin circumscisso, basi persistente brevi turbinata leviter 5-crenatâ, calyce obovato-oblongo ecostato flavido-sericeo basi attenuato, limbi lobis 10 biseriatis obovato-subrotundis minutè serrulatis, petalis obovato-oblongis unguibus latis nudis, laminâ subrotundâ brevè ciliatâ, antherarum loculis connectivo lato subdivaricatis, stylo stigmatèque simplici glabris.

Hab. cum præcedente. *Drumm.* coll. 6. n. 42!

Rami graciles, laxiusculè foliosi. Folia 6–11 lin. longa, $\frac{1}{3}$ lin. crassa, lætè viridia, parcè glanduloso-punctata. Alabastra obovata, ferè 4 lin. longa, involucri a basi demùm fissi bracteis 2 supra cohærentibus, marginibus tamen distinctè conspicuis. Petala lilacina v. rosea, 4 lin. longa.

Very distinct from *P. limacis* and *pedunculata*, especially in the leaves and involucre.

15. *CALYCOTHRIX TENUIFOLIA*, nob., glaberrima, ramulis lævibus, foliis semipollice brevioribus acutè triquetro-filiformibus obtusis muticis demùm semipatulis, floribus infra apicem ramulorum axillaribus subsessilibus 20-andris, bracteolis scariosis oblongis cuspidatis vix basi connatis subcarinatis, calycis tubo bracteolas demùm parùm superante angulato, lobis subrotundis acuminatis, aristis petala (rosea) dimidio superantibus.

Hab. cum præcedente. *Drumm.* coll. 6. n. 57!

Folia 3–4 lin. longa, $\frac{1}{4}$ lin. lata, recta, sessilia, opposita et sparsa. Flores in spicam circ. pollicarem foliosam comatam congesti, calycis tubo 3–4 lin. longo, setis 5–6 lin. longis. Petala lanceolato-oblonga, glabra, staminibus subduplò longiora.

Approaching *C. glutinosa*, Lindl., which differs by 10-androus flowers, &c., and *C. tenuiramea*, Turcz., which differs in having no stipules, pointed leaves, connate and ecarinate bracteoles and ciliate aristæ.

16. *CALYCOTHRIX ROSEA*, nob., glaberrima, ramulis densè cicatrisato-tuberculatis, foliis imbricatis semipollicaribus triquetro-linearibus acutiusculis muticis dorso obtusis, floribus infra apicem ramulorum paucis axillaribus subsessilibus folia vix superantibus, bracteolis scariosis vix basi connatis oblongis attenuato-acutis subcarinatis, calycis tubo bracteolas subdimidio superante angulato, lobis emarginato-subrotundis, aristis petala (rosea) vix dimidio superantibus.

Hab. cum præcedente. *Drumm.* coll. 6. n. 56!

Folia 5–7 lin. longa, $\frac{1}{4}$ lin. lata. Spicæ breves, capitulum comatum mentientes. Stamina 20 v. plura, petalis ovato-oblongis acutis glabris sanguineo-roseis dimidio breviora.

Very near the preceding species, but easily distinguished by the larger, blunter, adpressed leaves, &c.

17. *CALYCOTHRIX LASIANTHA*, nob., foliis nanis triquetro-linearibus obtusis muticis semipatulis ramisque lævibus puberulis demùm glabratibus, racemis terminalibus multifloris, bracteolis cum pedicello brevissimo folium subæquantibus basi connatis ovali-oblongis acutis medio puberulis apice subcarinatis divergentibus, calycis tubo bracteolis triplò longiore puberulo infernè angulato, lobis ovatis setaceo-acuminatis plumoso-pilosiusculis corollâ (rosæâ v. lilacinâ?) extùs puberulâ parùm brevioribus.

Hab. cum præcedente. *Drumm.* coll. 6. n. 53!

Folia opposita et sparsa, $1\frac{1}{2}$ –2 lin. longa, $\frac{1}{4}$ lin. lata, stipulis exiguis caducis. Calycis tubus 4–5 lin. longus, tenuis, eglandulosus. Petala 3 lin. longa, oblonga, acuta, eglandulosa. Stamina 20 v. plura.

A very pretty species, resembling certain *Tremandræ*, and allied to *C. breviseta*, Lindl. and *C. strigosa*, Cunn., but quite distinct.

18. *CALYCOTHRIX BREVIFOLIA*, nob., glaberrima, foliis nanis triquetro-oblongis obtusis submuticis, floribus infra ramorum apicem paucis axilla-

ribus, pedicello folium subæquante, bracteolis subcoriaceo-scariosis obovatis infra medium connatis brevè mucronato-acuminatis haud carinatis, calycis tubo tereti bracteolas vix dimidio superante, lobis scariosis rhombeo-orbicularibus, aristis corollam (roseam) duplò superantibus.

Hab. cum præcedente. *Drumm.* coll. 6. n. 58!

Folia 1-1½ lin. longa, ½-¾ lin. lata, brevissimè petiolata, margine dorsoque acutiuscula, glanduloso-punctata, interdùm minutè mucronulata, passim subrotunda. Bracteolæ rubræ, medio dorso virides et glanduloso-punctatæ, 2½ lin. longæ. Calycis tubus ruber, eglandulosus, lævis, aristis capillaribus 6-7 lin. longis. Stam. 20. Stipulæ vix conspicuæ, caducissimæ.

This comes near *C. Leschenaultii*, which however differs in having scabrid leaves, carinate bracteolæ, only 8-13 stamens, &c.

19. CALYCOTHRIX DRUMMONDII, *nob.*, glaberrima, foliis erecto-imbricatis unguicularibus acutiusculè triquetro-linearibus subacutis muticis suprâ planis, corymbo subterminali densifloro, bracteolis vix basi connatis lineari-lanceolatis complicato-subcarinatis setaceo-acuminatis dimidium calycis tubum vix superantibus, calycis lobis subrotundis acuminatis aristis petala (citrina) glabra dimidio superantibus.

Hab. cum præcedente. *Drumm.* coll. 6. n. 52!

Folia subsessilia, 3-6 lin. longa, ¼ lin. lata, lævia, obsoletè glanduloso-punctata. Calycis tubus 4 lin. longus, foliis brevior, angulatus, infernè glanduloso-punctatus, lobis scariosis subdecoloribus, aristâ 5 lin. longâ. Petala ovato-oblonga, acuta, glabra. Stamina 20 v. plura.

Closely allied to *C. luteola*, Schauer (in Pl. Preiss. i. p. 106), and perhaps a mere variety of it, differing in longer leaves, keeled bracteolæ, &c.

20. CALYCOTHRIX TENELLA, *nob.*, glaberrima, foliis patentibus semiunguicularibus linearibus complicatis triquetrisve obtusis, mucronulo exiguo deciduo, corymbis subterminalibus paucifloris, bracteolis folio calyceque dimidio brevioribus basi connatis suprâ divergentibus lanceolatis carinatis, acumine brevi setaceo recurvo-patulo, calycis tubo angulato, lobis subtruncato-obovatis, aristâ petalis (citrinis) duplò longiore.

Hab. cum præcedente. *Drumm.* coll. 6. n. 55!

Ramuli corymbosi tenelli, leviter et remotiusculè cicatrisato-denticulati. Stipulæ minutæ, setacæ, caducæ. Folia sparsa, brevissimè petiolata, 2-4 lin. longa, ¼-½ lin. lata, obsoletè punctata. Bracteolæ 2 lin. longæ, albæ, carinâ viridi, glanduloso-punctatâ. Calycis lobi lutei, aristâ 4-5 lin. longâ. Petala et stam. præcedentis.

Perhaps a mere variety of *C. flavescens*, Cunn. (Fielding, Sert. t. 38), which however differs in the form and length of the bracteolæ, racemose flowers, and ovate acuminate calycinal lobes.

21. CALYCOTHRIX TETRAGONOPHYLLA, *nob.*, ramulis apice puberulis, foliis patentissimis nanis oblongo-linearibus acutiusculè tetraquetris obtusis mu-

cronulatis basi attenuatis minutè ciliolatis demùm glabratís, spicâ subterminali pauciflorâ, bracteolis subliberis angustè lanceolatis setaceo-acuminatis complicatis puberulis, apice subrecurso patulo, calycis tubo angulato bracteolis vix dimidio longiore, lobis obovato-triangularibus emarginatis, aristâ petala (lutea) dimidio superante.

Hab. cum præcedente. *Drumm.* coll. 6. n. 54!

Ramuli tenues, corymbosi, densè cicatrisato-denticulati. Folia sparsa et opposita, 1-2½ lin. longa, ½ lin. lata, subimpunctata, faciebus glabris. Flores subsessiles. Bracteolæ 2 lin. longæ, virides, margine albidæ. Calycis lobi lutei. Petala glabra. Stamina 20.

This approaches chiefly *C. aurea*, Lindl. and *C. flavescens*, Cunn., but the former differs in having imbricated concave leaves, and the bracteoles as long as the tube of the calyx; and the latter in being glabrous, and in the shape of the leaves and bracteolæ.

22. CALYCOTHRIX PUBERULA, *nov.*, foliis imbricatis demùm semipatulis linearibus carinato-triquetris acutiusculis submucronulatis undique hispidopuberulis, corymbis subterminalibus paucifloris, bracteolis erectis calycis tubum subæquantibus subliberis foliaceis puberulis subulato-linearibus complicatis, calycis lobis truncato-obovatis acuminatis, aristâ petalis (aureis) vix dimidio longiore.

Hab. cum præcedente. *Drumm.* coll. 6. n. 51!

Ramuli præcedentis, apice puberuli. Folia sparsa, circ. 3 lin. longa, ½ lin. lata, subsessilia, dorso quasi 2-sulco, mucronulo minuto deciduo, pube patulâ brevissimâ albidâ. Bracteolæ virides, puberulæ, margine albidæ. Calycis tubus circ. 3 lin. longus, angulatus, glaber, lobis luteis suborbicularibus, aristis 3-4 lin. longis. Stamina 20.

This is also closely allied to *C. aurea*, Lindl., but easily distinguished by the leaves, bracteolæ, &c.

Notice of two apparently undescribed species of *Genetyllis*, from S.W. Australia. By RICHARD KIPPIST, Esq., Libr. L.S.

[Read November 20th, 1855.]

THE *Chamælaucicæ* described by Dr. Meisner in the foregoing paper were all contained in a collection (the 6th) formed by Mr. Drummond during a journey of eighteen months' duration, to the northward of Swan River. On comparing the MS. with the specimens of *Chamælaucicæ* recently presented to the Society by Mr. W. W. Saunders, as well as with those already contained in our herbarium, I was somewhat surprised to find two very distinct and beautiful species of *Genetyllis*, collected by Mr. Drummond in a previous journey to the south of the colony, which appear to

be still undescribed. Of these I have prepared the following characters, at the request of Dr. Meisner, he not having been able to obtain access to specimens of the plants. They both belong to the group with enlarged and coloured bracts, of which two very ornamental species have been recently introduced to our gardens, and figured in the number of the 'Botanical Magazine' for July last.

1. *GENETYLLIS (Involucrata) FIMBRIATA*, erecta, ramosa, glabra; foliis confertis, plerumque oppositis, decussatis, ellipticis, obtusis, supra convexis, subtus pallidis, margine ciliatis; capitulis terminalibus cernuis, 8-10-floris; involucri campanulato pollicari; bracteis ecarinatis, elliptico- v. ovato-oblongis, margine fimbriatis; interioribus membranaceis, roseis, apice hiantibus; exterioribus ovatis, herbaceis, quadrifariam imbricatis; bracteolis lanceolatis, acuminatis, carinatis, flores sessiles subæquantibus; calyce ovato-cylindrico, basi lævissimo, crustaceo, minutè punctato, fauce contractâ, corrugatâ, lobis minutissimis; petalis ovatis, acutis, membranaceis; staminodiis filiformibus, filamenta subulata æquantibus; stylo filiformi, longè exserto, apice hispido.

Hab. in Australiâ austro-occidentali. *Drummond*, coll. 5. no. 99!

This appears to be the plant with thyme-like ciliated leaves and large rose-coloured bracts, mentioned by Mr. Drummond (in a letter, dated Cape Riche, Oct. 29, 1848, and published in the 'Journal of Botany' for 1849) as having been gathered by him on Congineerup, in company with another large-bracted *Genetyllis* with heath-like leaves, and bracts without cilia, which I believe to be the following species.

Genetyllis fimbriata may be readily distinguished from all its congeners of the '*Involucrata*' section by its leaves and bracts both being beautifully ciliated; *G. æderioides*, Turcz., of which the bracts are even more strongly fringed, having entire triquetrous leaves, while those of *fimbriata* are elliptical, revolute, and somewhat like those of *G. citriodora*, but smaller.

2. *GENETYLLIS (Involucrata) MEISNERI*, erecta, fruticulosa, 2-3-chotomè ramosa, glaberrima; foliis sparsis, patulis, lineari-lanceolatis, acutis, margine revolutis integerrimis, dorso subcarinatis; capitulis terminalibus nutantibus multi- (8-10-) floris; involucri campanulati bracteis interioribus (6-8) elliptico-oblongis, membranaceis, roseis, integris v. apice serrulatis, brevè mucronatis; exterioribus duplò minoribus, subherbaceis, ovatis, longè acuminatis; bracteolis lineari-lanceolatis acutis, floribus sessilibus purpureis vernicosis paullò longioribus; calyce ovato-cylindrico lævi, lobis exiguis petalis ovatis multò brevioribus; filamentis staminodia superantibus; stylo subulato longè exserto, apice barbato.

Hab. cum præcedente. *Drummond*, coll. 5. no. 100! (& 101!).

In the structure of its flowers, and more particularly in the extremely minute and nearly obsolete calyx-lobes, as well as in the form of the style and hispid stigma, this species, which I have much pleasure in naming after the indefatigable author of the paper just read, agrees with the preceding: in habit it most nearly approaches *G. helichrysoides*, Meisn., which, however, is readily distinguished by its smaller size, less branched stems, triquetrous serrulate leaves, gradually tapering bracts, and much more conspicuous elliptical calyx-lobes. No. 101 of Drummond's 5th collection seems to be merely a less luxuriant state of the same plant, with more thinly scattered leaves, and paler bracts and flowers; but I have been unable to detect any difference of structure sufficiently important to justify its separation as a distinct species.

In conclusion, I may, perhaps, be allowed to add a few words, by way of endorsing the opinion expressed by Dr. Meisner in the foregoing paper, viz. that the *Genetyllis macrostegia* of the 'Botanical Magazine' (t. 4860) does not appear to be the plant originally described under that name by Turczaninow; an opinion at which I had arrived prior to the receipt of Dr. Meisner's MS., but which, without such a confirmation, I should scarcely have ventured to express in opposition to those of Dr. Lindley and Sir William Hooker. The former, however, evidently entertained some doubts on the point, as he suggests, when writing on the *Genetyllis tulipifera* (his *Hedarome tulipiferum*), that that plant should be compared with the *G. macrostegia* of Turczaninow. A constant interchange of publications having been carried on between the Linnean Society and the Natural History Society of Moscow, I have fortunately been enabled to refer to Turczaninow's original paper in the 'Bulletin' of that Society for the year 1849; and a comparison of his description (at tome xxii. pt. 2. p. 18) with Mr. Saunders's very complete set of Swan River *Chamælaucieæ*, in which Drummond's Nos. (quoted in the Moscow 'Bulletin,' but omitted by Walpers) have been carefully preserved, and the different series distinguished; as well as with the descriptions and figures of the two species given in the 'Botanical Magazine' for July last, has satisfied me that the plant with broad party-coloured bracts, described and figured at tab. 4858 as a new species, under the name of *G. tulipifera*, is identical with *G. macrostegia*, Turcz.; while the narrow-leaved plant with self-coloured bracts (t. 4860), to which Sir W. Hooker assigns that name, was probably unknown to the Russian botanist, since it does not occur in Drummond's

4th series *, the latest, apparently, which had reached him when writing his "Decas 6^{ta} generum Plantarum hucusque cognitarum," in which the name in question was first promulgated. He there cites, as belonging to his *G. macrostegia*, No. 40 of Drummond's 4th collection; and with the single exception that the leaves are not, for the most part, opposite (a point, by the way, in which these plants vary extremely, even on the same branch), our specimen so numbered corresponds perfectly with his description, as it also does with that of *G. tulipifera*, Hook., in the 'Botanical Magazine.'

The two recently introduced species being very closely allied, and Turczaninow having had only one of them before him when framing his definition, it can hardly be a matter of surprise that much of that definition is equally applicable to both: still it appears to me that, in addition to the very important character already pointed out by Dr. Meisner, "calycis tubo basi *decemcostato*" (while Sir William Hooker states that he can find only *five* furrows in the lower part of the tube of his *G. macrostegia*), there are one or two other points in which it accords better with the *G. tulipifera* of the 'Botanical Magazine' than with the *macrostegia* of that work. For instance, the leaves are described as *broadly* linear; the capitula as *cernuous*; the bracts of the general involucre as *obovate obtuse, thrice as long* as the flowers, "colore purpureo plus minus tinctis," and the partial bracts as "basi roseis, apice *atro-purpureis*;" while in the specimens of No. 98 of Drummond's 5th series, unquestionably identical with the *G. macrostegia* of the 'Botanical Magazine' (for which Dr. Meisner proposes the name *G. Hookeriana*), the leaves are much narrower, the heads of flowers nutant rather than merely cernuous; the bracts of the involucre are elliptical, much less obtuse, and concolorous, scarcely more than twice as long as the flowers (exclusive of the style, which in both species eventually becomes nearly as long as the involucre), and the partial bracts show no indication of the dark purple colour at their tips, which is so obvious in the dried specimens of the broader-leaved plant, as well as in Mr. Fitch's very characteristic figure of it. In this, which I take to be the true *G. macrostegia*, the base of the calyx-tube appears to me rather

* In Drummond's 5th series, both *G. tulipifera* and *G. macrostegia*, Hook. (*G. Hookeriana*, Meisn.), occur, in company with the two very ornamental and well-marked species just described by myself, which surely would not have been overlooked by Turczaninow, had that series, where the '*macrostegia*' of the Bot. Mag. *first* occurs, reached Moscow in time to admit of his inserting them in his paper.

punctate than transversely rugose; while that of *G. Hookeriana*, Meisn., is distinctly marked between the *five* ribs, with prominent transverse wavy ridges, showing an approach to the peculiar structure which occurs in the lower part of the calyx of *G. diosmoides* and *Drummondii*; the "calycis tubus polyzonatus" of Schauer's Monograph in the 'Nova Acta Academiæ Naturæ Curiosorum,' where (vol. xix. suppl. 2. tab. 2, A. & B.) this structure is very accurately represented.

Note on a *Fungus* found imbedded in the Fens of Cambridgeshire.
By the Rev. M. J. BERKELEY, F.L.S. &c.

[Read February 5th, 1856.]

FUNGI are so rare in a fossil state, if indeed any undoubted cases occur before the post-pleiocene period, that no apology need be made for recording so trifling a matter as the present. Moulds are occasionally well preserved in amber, and a diligent search would probably detect species of other groups amongst the vegetable relics in the London clay. In the Museum at Kew there is a specimen of *Polyporus fomentarius*, Fr., communicated from the Fens of Cambridgeshire by the Rev. Mr. Hailstone, where it occurred with bog-oak, and must have been buried for many centuries. The specimen is so perfect that it shows the peculiar substance of the pileus in admirable condition, both as regards colour and texture. It may be remarked, that the specimen, which is attached by the centre and unguate, is far more strongly lacate than any British individuals which have passed through my hands, and in fact accords perfectly with one which was gathered in Sikkim by Dr. Hooker, and which may be seen in the same compartment of the Museum. It must have been dependent from some large branch, a situation in which the species seldom if ever occurs in Great Britain, and was probably surrounded by a moister atmosphere, in consequence of the prevalence of extensive forests, than exists at present in the same or neighbouring districts.

Notes on *Loganiaceæ*. By GEORGE BENTHAM, Esq., F.L.S. &c.

[Read February 5th and 19th, 1856.]

THE group of plants collected under the name of *Loganiaceæ* can scarcely be said to constitute a natural order, but rather one of

those artificial assemblages, which, in the present state of our knowledge of plants, we are obliged to interpose between some of the great families, to receive anomalous genera rejected from them. Our natural orders, with all the improvements they have received from the most philosophical of modern botanists, are yet as dissimilar in definiteness of circumscription and apparent conformity to nature, as they are in extent. Some indeed, including the two most numerous of all, are so well characterized as to admit of no doubt. The *Cruciferæ*, *Leguminosæ*, *Umbelliferæ*, *Compositæ*, *Labiataæ*, *Palmæ*, *Orchideæ*, *Cyperaceæ*, *Gramineæ*, and several others, comprehending two-thirds of the known species of plants, are admitted by all botanists without any variation, and although, amidst the thousands of species comprised in each, there may be some one or two which may offer an exceptional character or anomalous structure, indicating some slight approach to other groups, yet we cannot have the least hesitation as to where to draw the line of demarcation. The Himalayan *Megacarpæas*, although polyandrous, are still decidedly Cruciferous, not Capparideous. The distinction between *Leguminosæ* and *Rosaceæ*, although so difficult to be expressed in words, is yet so clearly defined, that we find no single genus or species ever considered as intermediate, and although the passage from the former into *Terebinthaceæ* through *Copaifera* and *Connarus* be really more gradual, yet it is still between those two genera that the limits are placed by universal consent; so are they as irrevocably fixed between the closely allied genera *Teucrium* and *Vitex*, which form the connecting link between *Labiataæ* and *Verbenaceæ*. The vast orders of *Umbelliferæ* and *Compositæ* are equally isolated, notwithstanding the anomalous inflorescences of *Horsfieldia* and some others in the former and *Xanthium* in the latter, which at first sight disguise their characters. The few species of *Apostasiæ* are but anomalous *Orchideæ*, rather explaining their structure than connecting them with any particular order. *Cyperaceæ* and *Gramineæ* retain their typical structure through all the singular modifications hitherto observed.

There are other orders again, even amongst the most numerous in species after the *Compositæ* and *Leguminosæ*, which are admitted on all sides to be natural, but upon whose precise limits few botanists can be made to agree, an almost continuous chain of intermediate groups connecting them with adjoining ones. Here the severance has generally been made wherever the links have appeared the weakest; but as these weak points have been variously appreciated by different minds, and no definite standard has been

adopted for testing them, the greatest uncertainty has been the consequence. *Malvaceæ* are connected with *Tiliaceæ* by numerous genera which some would unite into one intermediate order, whilst others consider them as constituting from two to six or seven independent ones, and others again propose uniting more or less of these groups with *Malvaceæ*. The *Memecyleæ* are in the eyes of some botanists one or two intermediate families between *Melastomaceæ* and *Myrtaceæ*, whilst for others they are but a tribe of the former. So it is with the connecting groups between *Myrtaceæ* and *Passifloreæ*, between the latter and *Cucurbitaceæ*, &c. Amongst some of the largest and most universally recognized Monopetalous orders the connexion is still more gradual and the limits proposed more arbitrary. There can be no doubt that *Rubiaceæ*, *Apocynæ*, *Gentianeæ*, and *Scrophularineæ* are large independent orders indicated in nature, yet those genera now amalgamated under the name of *Loganiaceæ* bind them so firmly together, that some of these genera will be found even more closely allied to certain others of each of the above orders respectively than they are to each other. On the other side, *Scrophularineæ* themselves pass imperceptibly into *Solaneæ*, *Bignoniaceæ* or *Convolvulaceæ*, and through these into several others.

Since the metaphor of a chain or linear series has been found inadequate for the illustration of the connexion of the natural groups, that of a geographical area or map has been more generally resorted to. In following out this idea, we may compare the natural system to an extensive country more or less densely wooded. Here the *Compositæ*, *Leguminosæ*, and other well-defined orders may be represented by dense forests clearly separated from all others by open spaces all around them, although here and there a solitary tree or a small cluster may stand a little out from the general boundary-line. The *Malvaceæ* and *Tiliaceæ*, the *Melastomaceæ* and *Myrtaceæ*, the *Myrtaceæ* and *Passifloræ*, these again and the *Cucurbitaceæ* would not be separated by any clear open space, but by a tract still wooded, but of less density, in which here and there the trees would be so thinly scattered as almost to break the connexion. So the above-mentioned Monopetalous orders, the *Rubiaceæ*, *Apocynæ*, *Gentianeæ*, and *Scrophularineæ* would be typified by large and dense woods rather widely separated from each other, but the intervening space would be dotted over with solitary trees or small clusters representing our *Loganiaceæ*. Many of these may be very near to the surrounding woods, and considerable clear spaces may intervene between some of them; yet, in mapping out

the country, it may be more convenient to draw the line close round the frontiers of the whole space, than to portion it out into projecting parcels annexed to the adjoining woods.

On a careful examination, it will be found that almost the whole of the *Loganiaceæ* lie very near to some part or other of the vast field of *Rubiaceæ*, although by their free ovary they are absolutely and with very few exceptions clearly separated. The connecting genera with *Apocynææ*, *Gentianææ*, and *Scrophularinææ* are on the other hand much fewer, but the union is much closer. With *Scrophularinææ* in particular, although the general affinity is more remote, the few intermediate genera and species are intermediate in every respect, in habit as in technical character. The main distinction, the presence of stipules in *Loganiaceæ*, disappears very gradually, and the difficulty of drawing the line is the greater from there being no general habit or family resemblance to unite the several members of the *Loganiaceæ*. A somewhat arbitrary decision is therefore here unavoidable, and we can only direct our best endeavours to the adoption of that demarcation which shall interfere the least with the circumscription of the allied orders.

Opposite leaves, interpetiolar stipules (represented occasionally by a mere line connecting the petioles), epipetalous stamens alternating with the lobes of a regular gamopetalous corolla, a free ovary divided into two or rarely more cells, a style cleft at the top into as many lobes, an axile placentation and albuminous seeds with a comparatively small straight embryo, may be said to be the main features of *Loganiaceæ*; and wherever these characters can be undoubtedly recognized, there will be no difficulty as to the identification of the order. But where the stipules become rudimentary, the case is very different, and secondary characters, such as æstivation of the corolla, regularity in the flower, dehiscence of the capsule, peculiarities of placentation variously combined, must be resorted to, as will be seen when we come to examine into the various tribes into which the order is divided.

In DeCandolle's 'Prodromus' eleven distinct tribes are adopted, showing but little of that philosophical method which usually characterized his systematical works. This was, however, the natural consequence of the process by which the amalgamation was formed. A number of detached genera rejected from very different orders were provisionally associated with others which had been published by various botanists as separate families; and as the materials he possessed did not admit of his taking a comprehensive view of the whole, he thought it necessary to retain as tribes whatever had

been established as orders, adopting as essential those characters which had occasioned their separation from *Apocynææ*, *Gentianeæ*, or other free Monopetalous orders. As they were now, however, brought into contact with a new set of affinities, many of these characters became much altered in value. Thus, æstivation of the corolla, for instance, is of great value among *Scrophularineæ*, *Apocynææ*, and their allies, in the distinction of tribes or even of orders, but among *Rubiaceæ* is available for little more than for the separation of genera; and as long as *Loganiaceæ* were thought to be most closely connected with the former families, near which the elder DeCandolle placed them, he very naturally attached great importance to this character. But now that we bring them into contact rather with *Rubiaceæ*, that importance, as observed by Alphonse DeCandolle in his notes, becomes much lessened in our eyes. Regarding indeed *Loganiaceæ*, as now generally admitted, as *Rubiaceæ* with a free ovary,—a sort of artificial offset from that family, it appears to be the more philosophical as well as the more practically convenient course, to divide them as nearly as possible according to the same principles as those adopted in classing *Rubiaceæ* themselves.

Of the thirteen tribes adopted by DeCandolle in the division of *Rubiaceæ*, there are a few, founded chiefly on number of parts, which subsequent experience has not confirmed. But the most important, artificial as they are in some respects, are yet by far the best that have been proposed. And if the whole number be thus reduced to seven, or perhaps eight, it will be found that the four largest of them have a close parallel among *Loganiaceæ*, as may be seen by the following comparative statement:—

		RUBIACEÆ.	LOGANIACEÆ.	
Ovules several in each cell.	Seeds winged...	{ Flowers numerous on globular receptacles	Naucleææ.
		{ Flowers distinct	Cinchonææ.	Antonieæ.
	Seeds not winged...	{ Fruit capsular.....	Hedyotideæ.	Euloganiææ.
		{ Fruit succulent, indehiscent.....	Gardeniææ.	Fagræææ.
Ovules solitary, or rarely two collateral.	Fruit succulent	Coffeææ.	Gærtneriææ.	
		Fruit dry	{ Stipules interpetiolar, not foliaceous	Spermacocææ.
	{ Stipules similar to the leaves, forming a whorl with them...		Stellatææ.

The nearest approach to *Spermacocææ* among free *Monopetalææ* must be sought for among *Verbenacææ*, although I am not aware of any of them having a sufficiently marked tendency to stipular appendages and regular flowers to be referred to *Loganiacææ*, and I know of no genera whatever with free ovaries representing either *Naucleææ* or *Stellatææ*.

The following table will best show the double arrangement of the known genera of *Loganiacææ* according to the nature of the fruit, or according to the æstivation of the corolla:—

	Æstivation contorted.	Æstivation valvate.	Æstivation imbricate.
ANTONIEÆ.		Antonia. Usteria. Norrisia.	Gelsemium.
EULOGANIEÆ.	Geniostoma.	Spigelia. Mitreola. Mitrasacme.	Polypremum. Logania. Gomphostigma. Nuxia. Chilianthus. Buddleia.
FAGRÆÆ.	Desfontainea. Fagræa. Potalia. Anthocleista.	Strychnos. Brehmia. ? Labordea.	Nicodemia.
GÆRTNERIEÆ.		Gardneria. Pagamæa. Gærtnera.	

I shall now proceed to enter into some details with regard to each of these tribes and genera.

Tribe I. ANTONIEÆ.

Of the *Antonieææ*, or *Cinchoneææ* with a free ovary, we have four genera. Three of them, the South American *Antonia*, the African *Usteria*, and the Asiatic *Norrisia*, each with a single species, agree with some of the smaller-flowered *Cinchonas* in inflorescence, in the valvate æstivation of the corolla and general habit; the fourth, *Gelsemium*, North American and Asiatic, corresponds with *Manettia* in its climbing habit, inflorescence, and imbricated (quin-cuncial) æstivation of the corolla. In all, the stipules are much less developed than in the corresponding Rubiaceous genera, being almost reduced to an elevated line connecting the stipules, and thus showing some approach to *Apocynææ*.

1. ANTONIA, *Pohl.*

The peculiar characters of this plant consist in the numerous imbricated bracts surrounding the calyx, the short tube of the corolla, and the broad peltate placentæ, producing numerous ovules, of which only one or two in each cell are ever found to enlarge into seeds. It has been hitherto supposed that there are two species, the one glabrous, the other more or less hairy, especially on the under side of the leaves; but the numerous specimens we now possess from various parts of Brazil and Guiana show a gradual passage from the one into the other, and it is seldom, even in Pohl's original specimens, that the under side of the leaves is absolutely without hairs.

2. USTERIA, *Willd.*

The great development of one lobe of the calyx, a circumstance of which several examples exist in *Rubiaceæ*, and the constant abortion of three out of the four stamens, afford good generic characters in *Usteria*, although they do not appear of sufficient importance to separate this single species into a distinct tribe. The corolla, excepting in the number of its parts, and the placentas, are as in *Norrisia*, with the capsule and seeds common to that genus and *Antonia*. With regard to the reduction of the stamens, it cannot be considered as any approach to the irregular flowers of *Scrophularineæ*, as it shows no tendency to didynamy, but it is rather one of those exceptional anomalies such as that observable in *Carlemania* among *Hedyotideæ*, where the stamens are reduced to two, without any irregularity in the corolla.

3. NORRISIA, *Gardn.*

Well described by Gardner, this plant differs from *Antonia*, with which Wight proposed to unite it, in the want of the imbricated bracts, in the slender tube of the corolla, and in the linear placentæ. Gardner describes and Wight figures the embryo as reversed with the radicle uppermost, contrary to what we observe in all allied *Cinchoneæ* and *Antonieæ*; but this may be a mistake. The seeds of Griffith's specimens are almost all loose, and the two ends are generally so exactly alike, that it is very difficult in dissecting to be certain which end really lie uppermost in the capsule.

4. GELSEMIUM, *Juss.*

This genus, most accurately described and properly placed by Alph. DeCandolle in the 'Prodromus,' corresponds, as already

observed, very closely with *Manettia*, but differs from all *Rubiaceæ* and *Loganiaceæ* known to me in the bifid lobes of the style. That this character, however, when it does occur, is of not more than generic importance is evidenced by the analogous case of *Cleonia* among *Labiataë*. One only species, from North America, has hitherto been referred to *Gelsemium*, but I have no hesitation in adding to it as a second species a plant gathered by the late Major Champion in Hong Kong and by Blume in Sumatra. Gardner, in describing Major Champion's specimens under the name of *Medicia elegans*, did not fail to observe its affinities with the old *Gelsemium*, but, not having specimens to compare, thought himself justified in distinguishing it generically, 1st, "by its imbricated not quincuncial æstivation of the corolla," which, however, is decidedly quincuncial in the Chinese as in the American plant; 2nd, by its "inflated capsule," which certainly is more inflated and less coriaceous in the Chinese species than in *G. nitidum*, but this is a character of degree, which appears rather specific than generic; 3rd, by its "numerous peltate compressed seeds, surrounded on all sides by a broad inciso-dentate membranous wing." I have no seeds of *G. nitidum*, but Alph. DeCandolle describes them as "erecta, compressa, minutissimè muricata, infernè breviter marginato-alata, apice in alam amplam obliquè oblongam expansa, hilo laterali paullò inferiore inter alam superiorem et marginem inferiorem." This agrees with the seeds of the Chinese plant, except that in the latter the wing is nearly equal in breadth all round, with a slight interruption near the hilum. These trifling differences do not at all appear to me sufficient to warrant the generic separation of two species in other respects so similar. The climbing habit, the texture of the leaves, the form of the corolla are the same. In the Chinese plant the leaves are rather broader, the inflorescence looser, more regular and more generally terminal, and the bracts, which are only to be found at the ramifications of the cyme, are smaller. But in *G. nitidum*, although the peduncles are generally axillary, but little branched with numerous bracts, yet they vary much in all these respects. The real specific distinction lies in the capsules, which are very turgid and blunt in the Chinese plant, more compressed and ending in a prominent point in the American one. The flowers of the former are also smaller, and the fleshy base on which the ovary rests is less prominent. I have only seen the capsules of *G. nitidum* in two specimens; in one they are of a hard texture and about 9 lines long; in the other they are much thinner and barely half that size, but had perhaps dried

up before arriving at maturity. In both cases the seeds had been already shed.

I have not seen the Sumatra plant published by Blume under the name of *Leptopteris Sumatrana*; but neither in his description, nor in his figure of the flower and its analysis can I find anything to distinguish it specifically from the Hong Kong plant.

Tribe II. EULOGANIEÆ.

This, the original group upon which the order was constituted, presents also in the strongest degree its peculiarities and difficulties. Representing on the one hand the *Hedyotideæ* among *Rubiaceæ*, and passing into them by the most gradual steps through *Houstonia*, it is, on the other hand, as closely connected through *Buddleiæ* with *Scrophularineæ*, and through *Geniostoma* forms the nearest approach to *Apocynæ*. Towards *Rubiaceæ*, a slight adherence of the ovary at its base will perhaps justify the including *Houstonia*, as proposed by Torrey and Gray, within the boundaries of that family, to the exclusion of *Spigelia* and *Mitreola*; but, on the opposite extremity, I see no way of establishing a distinctive character between *Loganiaceæ* and *Scrophularineæ* without bringing over *Buddleia* and its allies into the domain of the former. The æstivation, upon which I had formerly relied, under the mistaken supposition that it was, as described by Endlicher, contorted in *Logania* as in *Geniostoma*, proves of no avail. I had then overlooked the observations of Alph. DeCandolle, which I have since verified in a number of species, that it is imbricated with one external lobe in *Logania* as in *Buddleia*. The stipules are occasionally reduced in *Logania* to a slight connecting line, which always exists in *Buddleia*, and in some species is expanded into foliaceous appendages, which, although not called by the name of stipules, appear to be of the same nature. The capsules and seeds are essentially the same in both genera, and even in inflorescence and general habit some species of *Logania* differ very little from *Gomphostigma* and some of the entire-leaved *Buddleias*. It is true that most species of the latter genus have dentate leaves, an element hitherto unknown in *Loganiaceæ*, and till lately also in the vast family of *Rubiaceæ*; but now, in the instance of *Carlemannia*, we are obliged to admit dentate leaves as an exceptional character in *Hedyotideæ*, and by analogy we cannot exclude it from *Euloganieæ*. The line of demarcation between *Loganiaceæ* and *Scrophularineæ* cannot therefore be drawn between

Logania and *Buddleia*. Either *Logania* must be transferred to *Scrophularineæ* and a new name be given to the free *Rubiaceæ*, or *Buddleia* and its allies must be brought over to *Loganiaceæ*. I should prefer the latter course, for I think that better characters can thus be given to the two orders. The irregular more or less personate corolla, sometimes indicated only by its bilabiate æstivation or by the absence of one or of three of the stamens, and the absence of any stipular connexion between the petioles, would be indicative of *Scrophularineæ*, and any trace of stipules accompanied by a regular corolla isomerous with the stamens and quincuncial in æstivation would refer to *Loganiaceæ*. It is true, there would even then remain some intermediate genera among *Scopariæ*, where the quincuncial passes gradually into the bilabiate æstivation, the regular into the personate corolla, but the absence of the stipular line and the tendency to alternation in the leaves would leave these among *Scrophularineæ*. So also *Microcarpæa* and *Bryodes*, which I had included among *Buddleiæ*, would, notwithstanding the presence of the connecting line and a general resemblance to some *Mitrasacmes*, be rejected from *Loganiaceæ* on account of their diandrous or didynamous flowers.

The approach to *Apocynæ* is indicated in *Geniostoma* by the contorted æstivation of the corolla, and in *Mitrasacme* by the partial separation of the ovaries, whilst the styles are joined at the apex; but, as in neither instance are the two characters combined, there is little hesitation as to their retention within the boundary-line of *Loganiaceæ*.

Several of the *Euloganiæ* had been formerly placed among *Gentianeæ*, but have been judiciously rejected by the able monographist of that order on account of their axile placentation, besides that they want the bitter principle so universal in *Gentianeæ*. It is true that the *Rubiaceæ* also include a few genera (such as *Gardenia*, *Amaioua*, &c.) where the placentation is parietal, as an exception to the almost universal central placentation of the order; that this exceptional character shows itself occasionally also in the corresponding genus *Fagraea*, and that it cannot in either case be treated as even of tribual importance; yet here, among free capsular *Monopetalæ*, we must give it a much higher value, in order to find a tangible character for the definition of such an eminently natural family as the *Gentianeæ*.

Although æstivation of the corolla does not in *Loganiaceæ* any more than in *Rubiaceæ* afford good tribual characters, yet in both instances it is a convenient one for the subdivision of the tribes.

Accordingly in *Euloganiæ* we may distinguish three groups: the first with a valvate æstivation, corresponding with *Hedyoteæ*, includes the American *Spigelia*, the American and East Indian *Mitreola*, and the Australian and Indian *Mitrasacme*; the second with an imbricate quincuncial æstivation, approaching *Scrophularinæ*, comprises the Australian *Logania*, the North American *Polypremum*, the South African *Gomphostigma*, *Nuxia* and *Chilianthus*, and the almost cosmopolitan *Buddleia*; the third, with a contorted æstivation like that of *Apocynæ*, is limited to the Asiatic and Australian *Geniostoma*.

5. SPIGELIA, Linn.

This genus, in its habit, inflorescence and broad capsule, closely corresponds with *Ophiorrhiza* among *Rubiaceæ*. The peculiar dehiscence of the capsule and the articulate style are its readily recognizable characters, and the species are well worked up by Alph. DeCandolle in the 'Prodromus.' Since then, few if any really new ones have appeared, nor have we more than one in the herbaria I have access to. There are, however, several described species to suppress. Some of the perennial herbaceous species will flower the first year, so as in that state to have been described as annuals, and it would seem that the common herbaceous ones have usually a large- and a small-flowered variety. *S. anthelmia*, a common weed in tropical America, includes *S. nervosa* and *S. multispicata* of Steudel, which are not even marked varieties; my *S. Schomburgkiana* is the same as *S. Humboldtiana*, and *S. Mexicana* seems to be but the larger-flowered form of the same species. My *S. humilis* varies in the same manner in the length of the flowers both in Spruce's and in Schomburgk's specimens. *S. gracilis*, DC., is the same as *S. spartioides*, Cham. et Schl. I am unacquainted with the two Mexican plants of Galeotti, described by Martens as new *Spigeliæ*, for I cannot find them in Sir W. Hooker's herbarium, whose set is in general nearly complete.

6. MITREOLA, Linn.

This genus, well characterized by Torrey and Gray and by Alph. DeCandolle, very closely resembles some species of *Oldenlandia*; but the ovary is free, and the two-horned capsule readily distinguishes it from all others. The styles, separating at the base whilst they still adhere under the stigma, recall a very common structure in *Apocynæ*, with which, however, *Mitreola* has little else in common. Four species are described in the 'Prodromus,'

and a fifth is added by Zollinger and Moritzi in their Catalogue of Java plants, but of these, *M. paniculata*, supposed to be common to Brazil and India, appears to have been founded on insufficient materials. All Gardner's Brazilian specimens which I have seen have the fruit and all other characters of *M. petiolata*, which has a wide range from the Southern United States over the West Indies to equatorial America, whilst Wallich's Indian specimens do not appear to differ from his *M. oldenlandioides**. It is to that species also that I would refer Zollinger's plant. It has a much larger capsule than *M. petiolata*, narrowed at the base, with longer horns, which, as the fruit enlarges, become very broadly divergent at the base; the pod of *M. petiolata* is smaller, more globular, and the short horns, at first erect, diverge but slightly as the fruit enlarges. In both species the horns often curve more or less inwardly, but more so in *M. petiolata* than in the majority of specimens of *M. oldenlandioides*, and in neither is it a constant character. The seeds of the American species are always much broader than in the Indian one, although both vary in this respect. To these annuals I have to add a very distinct perennial species gathered by Drs. Hooker and Thomson in Khasiya.

7. MITRASACME, Labill.

Mitrasacme is closely allied to *Mitreola* in flowers and in fruit, and partakes of its affinities. The technical distinction, consisting in its tetramerous, not pentamerous flowers, is however accompanied by a difference in habit which approaches rather to that of some slender Gratioloid genera than to *Oldenlandia*, which, in that respect, is its Rubiaceous representative. The capsule is also more variable in form than in *Mitreola*, and the tube of the corolla is occasionally elongated. I find the æstivation of its lobes always valvate, as suspected by Alph. DeCandolle.

Nineteen Australian species distributed in four divisions were enumerated by Brown. To these have since been added four Australian ones, of which, however, two only prove to be really distinct from Brown's, and three Asiatic species published under eight names. I shall now describe three more from Australia which I find in our herbaria; but as I propose to reduce to varieties three of the older species, the total number now stands at twenty-four.

Brown's divisions have been adopted by subsequent botanists

* In Wight's 'Icones,' t. 1601, a curious mistake of the artist has occurred in the flowers of the general figure of *M. paniculata*; the analysis, however, drawn by Dr. Wight himself, correctly represents the true structure.

as sections, under names given by Don or by Endlicher; but a few only of his species have been hitherto accurately identified, our herbaria not generally possessing authentic specimens. As I have now had an opportunity of seeing nearly the whole of them in the Banksian herbarium, I subjoin a few notes derived from a cursory inspection of the original specimens, and a more detailed examination of such as are contained in the herbaria at Kew.

Brown's fourth division (*Plecocalyx*, Don) is limited to the single *M. ambigua*, a small slender plant with the habit of some other annual *Mitrasacmes*, but the four small lobes of the calyx are somewhat dilated and concave. The corolla is very small with a slender tube. The second division (*Dichelocalyx*, Don) has only two dilated and concave lobes to the calyx, which has a truncate or two-horned aspect; the two other lobes are usually entirely abortive, although in some luxuriant specimens of *M. paradoxa* I have seen very minute traces of them. This section consists now of two or three species; the original *M. paradoxa*, Br., which includes *M. divergens*, Hook. fil.; the *M. distyla*, F. Müll., a minute species remarkable for its styles entirely free; and *M. nuda*, Nees ab E., closely allied to *M. paradoxa*, but which, from the specimens of Preiss's which I have seen, I cannot venture to unite with that species.

Brown's third division (*Hologyne*, Don) is distinguished by the style not split at the base till after flowering. This is not an easy character to ascertain, for the separation takes place very soon after fecundation, and I have sometimes opened several flowers before finding one in which the styles appeared perfectly joined. Brown's *M. connata*, the only species he refers to the division, is in other respects so closely allied to *M. elata*, and the *M. nudicaulis* to *M. pygmæa*, that I have no hesitation in proposing that the first and third divisions be united into one section under Endlicher's name *Mitragyne*; the more so, as the two Indian species with styles connate from the base have the stigma decidedly two-lobed, not entire as in *M. connata*.

Of the sixteen species referred by Brown to his first section, we easily recognize in our herbaria the *M. elata*, remarkable for its long corolla; as in *M. connata*, the tube varies from 4 to 6 lines in length. *M. stellata* appears to vary in its leaves ovate-oblong or linear-lanceolate, smooth or hairy, but to be always known by its dense umbels of small flowers, either solitary or several together forming a compound umbel at the end of a long bare erect peduncle. *M. pilosa*, Labill., agrees with *M. serpyllifolia*, Br., the since

published *M. perpusilla*, Hook. fil., and *M. diffusa*, described below, in its diffuse, much branched habit and short peduncles in the upper axils; but these four species differ too much in their leaves and calyx to be united into one. *M. montana*, Hook. fil., another new species, has also a similar habit, but the flowers appear terminal, and the capsule is of a very singular shape, something like that of the broad-fruited Veronicas, but with two styles at the external angles instead of one in the middle. *M. serpyllifolia*, Br., of which I have only seen small flowering specimens, is very much like *M. montana*, but comes from a very different locality, and I have not been able to ascertain the structure of its flowers. *M. alsinoides*, Br., is a little annual near *M. indica*, but with broader leaves chiefly in the lower part of the stem and longer slender peduncles. Some specimens gathered by Bidwill at Wide Bay appear to belong to a slight variety somewhat hairy in the lower part of the stem and leaves. The species described below as *M. lævis* differs in the shape of the corolla. *M. pygmæa*, Br., is very slender with the leaves all radical. It has all the appearance of the small specimens of *M. nudicaulis*, and may possibly prove to be specifically identical, in which case Brown's name, as the oldest, should be adopted. *M. paludosa*, Br., is also near *alsinoides*, but is much branched with narrow leaves. *M. ramosa*, Br., and *laricifolia*, Br., are very distinct little annuals, with very narrow leaves and very small flowers, differing from each other chiefly in the shape of the corolla. *M. phascoides*, Br., is certainly the smallest of the genus; the whole plant in full flower is scarcely more than a quarter of an inch high.

The commonest of the Port Jackson species in our herbaria, distributed by Sieber as *M. prolifera*, n. 170, and published by Presl under the name of *M. hirsuta*, is the *M. polymorpha*, Br., a species varying much in hairiness, and running quite into the *M. canescens*, Br. Among the numerous specimens I have seen from various collections, there are some which might be equally well determined to be *M. squarrosa*, Br., *M. cinerascens*, Br., or *M. Sieberi*, DC., of none of which I have seen authentic specimens, but a careful examination of which would, I have little doubt, show the propriety of uniting all these supposed species into one.

8. POLYPREMUM, Linn.

This genus, referred by the elder DeCandolle to *Rubiaceæ*, by his son to *Loganiaceæ*, and by myself to *Scrophularineæ*, must accompany *Logania* and *Buddleia*, of which it has the æstivation

and connected petioles. As a genus it differs from them essentially in the loculicidal dehiscence of the capsule, which only becomes at length septicidal by the splitting of the valves, instead of the two cells separating in the first instance. On this account *Polypremum* was associated by Alph. De Candolle with his *Spigeliæ*, and the æstivation supposed to be valvate. It proves, however, to be as strongly imbricate as in *Logania*. The habit of the plant is unlike that of any of the allied genera, and reminds rather of a *Minuartia*, or of some *Paronychieæ*. In this respect it also forms some approach to *Gilia* among *Polemoniaceæ*; and the tendency to a loculicidal dehiscence of the capsule, abnormal in *Loganiaceæ*, but characteristic in *Polemoniaceæ*, would add the latter to the number of families with which *Polypremum* might be associated, were it not for the quincuncially imbricate æstivation of the lobes of the corolla, which are, I believe, without exception contorted in *Polemoniaceæ*. The genus contains but a single species, for the *P. Schlechtendahlîi* of Walpers appears to be merely an accidental form of the common one.

9. LOGANIA, Br.

I have already shown that the affinities of *Logania* are rather with the *Scrophularineæ* than with the *Rubiaceæ* or *Apocynææ*. From *Gomphostigma*, hitherto placed in the former family, there is indeed little to distinguish it but the usually pentamerous, not tetramerous flowers, and even this character fails in the *Logania micrantha* mentioned below. The same circumstance also separates *Logania* from the other *Buddleiææ*, except that in *Buddleia* itself some species have often an admixture of pentamerous flowers. In these cases the toothed leaves, indumentum, and general habit are very different from those of *Logania*.

The species of *Logania* are now rather numerous. In addition to the twelve Australian ones, enumerated by DeCandolle, four from Swan River have been described by Nees, one from South Australia by Schlechtendahl, a very distinct one from subtropical Australia by Hooker, and a doubtful garden one by Kunth and Bouché. There are also one or two in our herbaria which appear to be undescribed, but, without more numerous specimens in all states of some of the commoner species, it is very difficult as yet to make out a good monograph. Some species are evidently very variable. There appears to be a regular gradation among the Eastern ones, from *L. floribunda* to *L. angustifolia*, *L. revoluta*, and *L. linifolia*; so also between *L. latifolia*, *L. longifolia*, and their

allies in South-western Australia. The distinction of the species allied to *L. campanulata*, Br., from the same part of the country, is likewise involved in much obscurity.

One species from the same district again which I have ventured to describe as new, under the name of *L. micrantha*, is very remarkable from the ovules as well as the seeds being solitary in each cell, which would technically exclude the plant not only from the genus, but from the tribe, and place it in a new one to correspond in *Loganiaceæ* with *Spermaceoæ* among *Rubiaceæ*. But I should regard it as rather a specific anomaly in *Logania*, similar to what we observe in *Hedyotis monosperma*, W. & Arn., where the ovules are likewise solitary. For the great development of the placenta and the position of the seed seem to point to the abortion of other ovules, which the observation of the ovary in a living state at a very early period of growth might probably enable us to detect.

Dr. Hooker has described a species from New Zealand, so far extending the limits of the genus beyond Australia itself. On the other hand, it is probable that there is some mistake in the supposed South African species described by Ecklon. No one appears to have since seen it, although the Uitenhage flora is now pretty well known; nor have Ecklon's specimens been re-examined by any competent botanist.

10. GOMPHOSTIGMA, Turcz. 11. NUXIA, Lam.—and
12. CHILIANTHUS, Burch.

I have nothing to add to the distinctive characters of these three genera as given in the tenth volume of the 'Prodromus,' nor have any new species been added either to *Gomphostigma* or *Chilianthus*. Sonder has in the twenty-third volume of the 'Linnæa' described three South African *Nuxias* as new. His *N. pubescens*, which we have from Burke and Zeyher, is a well-marked one, of which *N. tomentosa* appears, as suspected by Sonder, to be a mere variety. The third, *N. emarginata*, is unknown to me.

13. BUDDLEIA, Linn.

In this genus we have the addition of Dr. Hooker's beautiful and splendidly illustrated *B. Colvillei* from the Himalaya, two Bolivian species described by Remy, and both unknown to me, and no less than thirteen supposed new species from Mexico,—three published by Martens from Galeotti's dried collection, and ten by Kunth and Bouché, from specimens cultivated in the Berlin garden.

Of the former, *B. pseudoverticillata*, Mart. & Gal., is a not uncommon state of *B. sessiliflora*, H. B. K.; *B. obtusifolia* is identical with *B. microphylla*, H. B. K.; the third, *B. elliptica*, is unknown to me. The ten published by Kunth appear to be chiefly slight varieties of some of the common Mexican species, but, for want of a critical comparison with wild specimens of these very variable plants, it is impossible to form any plausible opinion respecting them, and they must remain as so many puzzles until authentic specimens shall have been examined by some one well acquainted with the genus in general.

On the other hand, two Madagascar plants retained as *Buddleias* in the 'Prodrômus,' *B. diversifolia* of Vahl and my own *B. rondeletiaeflora*, must be removed, as forming Tenore's genus *Nicodemia*. With precisely the flowers and ovary of *Buddleia* they bear, instead of a capsule, an indehiscent berry, not perhaps so fleshy as in most of the *Fagrææ*, but white, and filled with a juicy pulp in which the seeds are immersed. This increases much the difficulties of classification; for by adhering to the tribal characters, these plants must be classed amongst *Fagrææ*, although in everything but the fruit they are so perfectly *Buddleias*, that it seems very unnatural to remove them so far from that genus. Many such unnatural separations are, however, absolutely unavoidable in all classifications of *Rubiaceæ* hitherto proposed.

In Griffith's posthumous 'Icones,' t. 422, the *Teucrium macrostachyum*, Wall., is figured as a *Buddleia*, a name probably provisionally given to the plant without examination in the hurry of a mountain excursion, and never intended to be retained. The unrevised publication of all these fugitive memoranda is much to be regretted, as tending to do irreparable and most undeserved injury to the reputation of so eminent a botanist, with those who are unacquainted with the circumstances of the case.

14. GENIOSTOMA, Forst.

This genus has the stipules and habit of some *Rubiaceæ*, but the ovary is superior, although attached by a very broad fleshy base. The corolla has the contorted æstivation of the *Apocynææ*, and the fruit is not so unlike as has been generally supposed. The two thick concave valves cohering at the base and curved outwards, each crowned by one of the styles, which, though also long cohering, ultimately separate, are very much like two follicles. The placentæ generally form one central column, but in some species they separate and turn back with the valves. *Genio-*

stoma is therefore more exactly intermediate between *Rubiaceæ* and *Apocynæ* than any other known genus.

The corolla is usually described as “subinfundibuliformis, fauce barbatâ.” The tube is, however, so short that it is often almost rotate, and the hairs, when they exist, are rather on the upper surface of the lobes than in the throat.

Of the species enumerated by DeCandolle six are from the Mauritius, but of these the *G. parviflorum* does not appear to differ from *G. pedunculatum*, and *G. lanceolatum* is probably a mere variety of the common *G. ovatum* which varies much in the shape of the leaf. On the other hand, some specimens transmitted by Bojer under the name of *G. obovatum* belong to a really distinct species with larger flowers, anthers terminated by a long linear appendage, and pods more than twice the length of those of the other species.

From the five Polynesian species must be deducted *G. acuminatum*, Wall., described from male specimens of a species of *Urophyllum* (*Axanthes*, Bl.) allied to *U. glabrum*; and *G. hæmospermum* does not appear to me specifically to differ from Forster’s original *G. rupestre*, of which I have seen the specimen in the British Museum, and which I have also from the Feejee Islands, gathered by the American Exploring Expedition. It is well described by Blume, and, besides the varieties alluded to by him, the branches often become glabrous. I have three new species to add: one from the Philippine Islands with the leaves of *G. ligustrifolium*, but differently shaped calyxes, a thick-leaved sea-coast one from the Isle of Pines off New Caledonia, and a very large-leaved one from Bonin.

Tribe III. FAGRÆEÆ.

This tribe corresponds with *Gardeniæ*, characterized by an indehiscent fleshy fruit with several ovules in each cell of the ovarium. The affinities, however, with *Rubiaceæ*, except in the case of *Fagraea* itself, are not so close as in the case of the other tribes. *Strychnos* is in the tribe the representative of *Apocynæ*, and *Nicodemia* of *Scrophularinæ*, but in both instances the connexion is rather remote; nor are all these genera very naturally associated with each other, but I have been unable to discover any better arrangement. Like the other tribes, it may be divided according to the æstivation of the corolla; contorted in the Asiatic *Fagraea*, the American *Desfontainea* and *Potalia*, and the African

Anthocleista; valvate in *Strychnos*, a genus spread over the whole of the tropics, *Brehmia*, peculiar to Africa, and possibly also in *Labordea* from the Sandwich Islands, and imbricate in the Mascarene *Nicodemia*.

15. DESFONTAINEA, *Ruiz et Pav.*

This plant, for the genus consists but of a single species, although repeatedly described and figured, has given rise to much difference of opinion as to its affinities, and even to considerable uncertainty as to the real structure of its ovary. Referred by some from its foliage to *Ilicineæ* or *Theophrasteæ*, by others from its fruit to *Solaneæ*, from its bitter principle to *Gentianeæ*, from some supposed affinities quite unintelligible to me, to the vicinity of *Diapensia* and *Galax*, it is only recently that its real place among *Loganiaceæ* has been pointed out in the 'Gardener's Chronicle,' although even there an affinity is also suggested with *Legnotideæ*, whose connexion with *Loganiaceæ* I have already said I am unable to comprehend. I have now been enabled to clear up all doubts as to the structure of the flower; the rich materials at Kew, where the Hookerian herbarium alone contains specimens from seventeen different collections, have given me the means of examining several ovaries taken from the most different-looking forms, and all confirm the association of *Desfontainea* with *Loganiaceæ*, showing the closest affinity with *Fagræa*, and like *Fagræa* forming a connecting link between *Loganiaceæ* and *Gentianeæ*. Indeed, besides the dentate leaves and the colour of the flowers, almost the sole generic distinction between *Desfontainea* and *Fagræa* consists in the number of cells of the ovary, which in the former are usually five, although sometimes reduced to four or even three, whilst in *Fagræa* they are always two only. The raised line connecting the petioles, the five-leaved calyx, the æstivation of the corolla, the form and position of the stamens as well as the structure of the gynœcium (always excepting its number of parts), are the same in both. In both genera, although the ovary is completely divided into cells at its base, the dissepiments show an occasional tendency to separate from each other in the upper part. In some species of *Fagræa*, as I have already observed, they do not even meet in the centre; in *Desfontainea* I have always found them to meet, but they are often very easily separable, and if the ovary under examination has not been thoroughly soaked, they appear on a transverse section to leave a vacuity in the centre. This has probably been the cause of the

ovary having been described by Don as unilocular with parietal placenta, contrary to the more accurate characters given by Ruiz and Pavon, and by Bonpland.

The geographical range of the species is extensive,—along the whole length of the Andes of South America, from New Grenada to the Straits of Magellan; and, as might be expected, there are considerable variations in the foliage, although much less than in some of our own shrubs, such, for instance, as our common Holly. The connecting line of the petioles often shows on each side two minute teeth or protuberances, from whence two prominent lines are more or less decurrent along the young branches, disappearing entirely on the older ones. In the small-leaved specimens gathered at great elevations within or near the tropics these lines are particularly prominent, and characterize the *D. acutangula* of Dunal. The southern specimens have usually a luxuriant foliage and broader and more ciliate lobes to the calyx, constituting the *D. Hookeri*, Dun. Specimens similar to these, but with unusually large leaves and more numerous teeth, were originally selected by Ruiz and Pavon to figure as their *D. spinosa*; and when Bonpland had only before him the commoner Columbian form with few large teeth to the leaves and narrow scarcely ciliate lobes to the calyx, he did not venture to identify them as the species figured in the 'Flora Peruviana,' and therefore published them as a distinct one under the name of *D. splendens*. But all these trifling differences are so variously combined in the numerous specimens before me, that I cannot but regard them as mere variations of one species which will retain the older name of *D. spinosa*.

16. FAGRÆA, Thunb.

Fagræas may be almost characterized as *Gardenias* with a free ovary. The habit and flowers are very similar; there is in both an occasional tendency to an increase in the number of lobes of the corolla and consequently of the stamens; some few species of *Fagræa* have even the peculiar exceptional character of *Gardenia*, an incompletely divided ovary, the parietal placenta not reaching quite to the centre. But in *Fagræa* the ovary is completely free, and the stipules are reduced to mere auricular expansions of the base of the petiole, like those of some East Indian *Tabernæmontanas*. In other respects *Fagræa* has less in common with *Apocynæ* than several other Loganiaceous genera, but it forms in the whole family the nearest real approach to *Gentianeæ*. Comparing it

with some species of *Lisyanthus*, the chief ordinal distinction consists in the greater development of the placentæ and fleshy fruit, and the habit is by no means dissimilar.

The known species of *Fagræa* are all Asiatic or Polynesian. They are all thick-leaved trees or shrubs with a more or less tendency to pseudo-parasitism, or to a somewhat climbing habit; the inflorescences and flowers are apt to be thick and succulent, so as to be difficult to dry; many of the species run much one into another, and herbaria specimens are very unsatisfactory for distinguishing them. That an erect or climbing habit is not in this case a good specific difference, we have not only the presumption derived from the inspection of specimens, but the positive evidence of the late Col. Champion, a most careful observer, who found both the common Ceylonese species to vary as stunted shrubs, weak trees, or woody climbers, or perhaps rather trees with sarmentose branches. Blume, who has with perfect justice included *Cyrtophyllum* and *Picrophlæus*, enumerates thirty-three species, besides seven others contained in DeCandolle's *Prodromus*, the *F. coromandeliana* since published by Wight, and three new ones which I now propose. But it is probable that several of the above will have to be reduced when better known. Some are described from specimens in leaf only, others in fruit without flowers, or from manuscript descriptions and figures, and there appears reason to believe that the characters derived from the leaves are not more constant in this than in other genera.

The division proposed by Blume into three groups according to the inflorescence is a very good one. The first, with few-flowered terminal cymes or corymbs and large flowers, contains the greatest number of species. These may be subdivided, or rather arranged, according to the length of the tube of the corolla before it expands into a campanulate throat. In *F. carnosa*, Jack, of which we have specimens from Moulmeyn, gathered by Lobb, it is near 5 inches long; *F. tubulosa*, Blume, is said to be very near that one; *F. zeylanica* of Thunberg, very well figured by him in the 'Stockholm Transactions,' and by Blume in the 'Rumphia,' although often confounded by others with a short-flowered species, has the tube full 3 inches long. In the *Carissa grandis* of Bertero, from the Society Islands, which is an unpublished *Fagræa*, and in *F. lanceolata*, Blume, the tube is shorter, but still it does not expand till above the middle; so it is also in *F. lanceolata*, Wall., a Penang plant with smaller flowers, which DeCandolle had on that account placed in *Cyrtophyllum*, but which has

them still near twice as long as in *F. fragrans*, while the inflorescence is that of Blume's first group.

All the remaining species of this first group, as far as they are known to me, have the tube of the corolla expanded from below the middle. Of these, *F. auricularia*, Jack, a common Molucca species, and *F. plumeriæflora*, A. DC., from the Philippines, are not easily mistaken; but we have next a set of East Indian ones which present the greatest difficulty in defining. *F. obovata*, Wall., from Khasiya, is well figured in the 'Botanical Magazine,' t. 4205. *F. coromandeliana*, Wight, Ic. t. 1316, of which I have seen but a single very poor specimen, is very like it in the flowers, but the petioles of the leaves are very short. *F. crassifolia*, Bl., gathered in Malacca by Griffith, has the leaves and calyx of *F. obovata*, but only one or three sessile flowers and apparently a shorter tube to the corolla. *F. globosa*, Wall., from Tavoy, only known in fruit, is perhaps identical with the last. *F. malabarica* of Wight or of Blume, for both have given it that name with reference to Rheede's figure of *Modagam*, vol. iv. t. 58, has again the foliage of *F. obovata*, and some specimens from the Calcutta Garden have been so named in some herbaria, and figured as such in Griffith's *Icones*; but the flowers are rather smaller and more slender, the calyx shorter, and the inflorescence often, but not always, looser. Specimens from Ceylon again, gathered by Champion, have the short calyx and the corolla of *F. malabarica*, but with the short petioles of *F. coromandeliana*, and Blume's *F. obovato-javana* from Java appears intermediate between several of these, so that it is not improbable that the whole of these may ultimately prove to be varieties of *F. obovata*. All appear to have a globular or somewhat ovoid fruit at least an inch in diameter.

The Khasiya collections contain another species, near to *F. obovata* in foliage, but with a more lax inflorescence, smaller flowers, and especially a much smaller ovate-oblong fruit. In this the ovary is bilocular only at the base. In the upper part the parietal placentæ do not meet.

The only two remaining species of this group of which I have seen specimens, are one gathered by Lowe in Borneo, which, from the form of its leaves and flowers, may be the *F. minor* of Blume, and one from the Feejee collection of the American Exploring Expedition, which may be new, but which I am afraid to characterize without comparison with some of Blume's evidently allied to it.

In the second group, or so-called *Racemosæ*, the short few-

flowered cymes are arranged in opposite pairs along a common peduncle, so as to form a kind of compound raceme. The typical species are, *F. volubilis*, Wall., *F. racemosa*, Jack, and *F. morindæfolia*, Blume, which constitute probably but one species spreading all over the Moluccas. We have Jack's own authority that the *F. volubilis* (of which he had sent the specimens to Wallich) is the same species as his *racemosa*, and some specimens of the latter can by no means be distinguished from the smaller ones of *F. morindæfolia*. Both have precisely the same foliage; and if in *F. volubilis*, besides the compact inflorescence, the leaves are more acuminate and more contracted at the base than is usually the case with *F. racemosa*, still there are specimens of that and of *F. morindæfolia* which have a similar tendency.

Blume has seven other species of this group, of none of which we have any specimens; but we have two well-marked ones, perhaps both new; one is from Mr. Motley's Borneo collection, and must be near *F. coarctata*, Blume, but with flowers very much larger and differently shaped from those of *F. morindæfolia*, with which those of *F. coarctata* are compared; the other, as it were, a miniature representation of *F. racemosa*, gathered in Singapore by Mr. Lobb, which may be a form of *F. ligustrina*, Bl., with three flowers instead of one or two to each of the cymes forming the raceme.

Of the third group with small flowers in supradecomposed corymbs our herbaria possess two species. One is *F. fragrans*, Roxb., introduced into the Moluccas from China, with which *F. peregrina*, Blume, appears identical. The other is *F. speciosa*, Blume, from Java, which is most likely to be the true *F. elliptica*, Roxb., only known by his very short and incomplete diagnoses. The *F. kimangu* and *F. picrophlœa* referred to this section by Blume are entirely unknown to me; the author himself has only seen the foliage of one and the foliage and fruit of the other.

A Penang plant occurs in some herbaria distributed from the Horticultural Society's collections under the name of a *Fagræa*, of which it has the stipular expansions of the petiole. Can this be the one shortly described by Martius as *Fagræa malayana*? If so, that species must be rejected from the genus, as upon a careful examination it proves to be merely a few-flowered form of *Tabernæmontana corymbosa*, Roxb.

17. POTALIA, Aubl.

This genus is very well characterized by the great number

(usually ten) of the lobes of the corolla and of the stamens, whilst that of the lobes of the calyx is four only. But all the other characters are too near to those of *Fagraea* to justify its removal into another tribe, more especially as, according to Blume, *Fagraea* itself has occasionally six or seven lobes to the corolla.

There appears to be but one species of *Potalia* known from tropical America; at least I can find no difference between Martin's Cayenne specimens, which are evidently Aublet's *P. amara*, and Spruce's Rio Negro ones, corresponding with Martius' *P. resinifera*. Both are low weak shrubs (1 to 3 feet high according to Aublet, about 4 feet high according to Spruce), of which the short flowering branches are said to wither and fall off with the inflorescences, as is the case with a great number of other shrubs and even trees. The plant figured in Griffith's 'Icones Plantarum Asiaticarum,' t. 383. fig. 1, as a *Potalia*, appears to be a species of *Ehretia* allied to *E. longiflora*, Champ.

18. ANTHOCLEISTA, Afz.

The great difference between this African genus and *Potalia* consists in the greater development and singular arrangement of the placentæ, well figured in Hooker's Icones, t. 793, 794 (Niger Flora, t. 43, 44). They appear to be two parietal placentæ twice bifid and connected together by a spurious dissepiment dividing the ovary into two cells, thus giving the appearance of two pairs of opposite bifid placentæ placed at some distance from each other on the dissepiment, whilst in *Potalia* there are but two bifid placentæ in the centre of the dissepiment. This difference is, however, not greater than those observable in the placentation of different species of *Fagraea*, and had the genus *Anthocleista* not been already established, I should certainly have considered it as a second species of *Potalia*.

On a further examination, I see no reason to alter the opinion I had already expressed in Hooker's 'Niger Flora,' that the three supposed species of *Anthocleista*, *A. nobilis* and *macrophylla* of Don, and *A. Vogelii* of Planchon, are in fact but one, the distinctive characters given being liable to variation even in the same specimen.

19. STRYCHNOS, Linn.

The genus *Strychnos* appears to have no very exact parallel in either of the allied families *Rubiaceæ* or *Apocynææ*. In the former, the combination of a succulent indehiscent many-seeded fruit with

a valvate æstivation of the corolla is rare, and occurs chiefly among the genera with more than two cells in the ovary, usually classed among *Isertiæ* and *Hamelieæ*. In *Apocynæ* we have a somewhat similar fruit in *Melodinus*. In external appearance those of the common species of both genera are described as exactly like oranges, and the strong poisonous properties of *Strychnos* occur also in several Apocynous genera; but the æstivation of the corolla forms a decided separation, confirmed by the peculiar foliage, and *Strychnos* (including *Brehmia*) stands more isolated than almost any other Loganiaceous genus.

The species more or less known, both in the new and the old world, are now numerous. Unfortunately the great similarity of their foliage, the impossibility of preserving their ripe fruits in herbaria, and the difficulty of obtaining even good flowering specimens of large woody climbers, render the discrimination and identification of many of them a difficult task. The arboreous or climbing habit, which has been adopted as one of the first principles of division, is very difficult to judge of from dried specimens. The presence or absence of the peculiar hooked tendrils of the genus is by no means a safe criterion. They are sometimes so few in some of the most climbing species that herbarium specimens are mostly without them, whilst, on the other hand, some of the smaller American kinds are described by all collectors as erect shrubs, although the specimens bear several cirrhi. There is reason indeed to believe, that some species which are erect and bushy in open situations become more or less scandent when growing in moist woods or thickets. A much more marked distinction lies in the shape of the corolla. The tube is sometimes so short as to make it almost rotate, sometimes four or five times the length of the lacinia; in some species it is slender and equal to the top, in others it is gradually enlarged. The hairs of the lacinia occupy either nearly the whole inner surface, or the base only, or form a ring round the throat or a curved line across the middle of the lobe, or again are wanting altogether. But all these distinctions pass so gradually one into the other, that, however different for instance may be the flowers of *S. nux-vomica* from those of *S. rubiginosa*, no good sectional line can be drawn between them. The number of parts of the flower, quaternary or quinary, is barely of specific value; it has no relation to habit, and both numbers are occasionally to be found on the same species, although it may often occur in two species otherwise very nearly allied that the one or the other may

be the prevailing number. I have therefore been unable to retain even as a section the genus *Rouhamon*, adopted with some hesitation by Alph. DeCandolle; and if *Brehmia* may yet be maintained as distinct, it is not on account of its supposed tetramerous flowers, for I find almost as often five as four parts; but because a combination of minor characters gives to the flower so different an appearance, that I have been unwilling to suppress it so long as no second species is discovered to connect it more closely with other *Strychni*. There are also among *Strychni* considerable differences in inflorescence, yet seldom in sufficient accord with other characters to make good sections. I have therefore, in the subjoined enumeration of species, thought it most convenient to commence by separating those of the old world from the American ones; in the former case to adopt DeCandolle's division into arborescent and climbing species, and to arrange these as nearly as possible according to the form of the corolla. Among the American species, inflorescence combined with the form of the corolla appears to afford the best primary characters.

The Asiatic species present some difficulty in the identification of those already published. The *S. nux-vomica*, a common tree on the Indian coasts, is indeed easily recognized, not only by its arborescent stem and corymbose inflorescence, but essentially by the long tube and naked throat of the corolla. It has, however, frequently been confounded with *S. colubrina*, a scandent short-flowered species, and several of the figures usually quoted do not help to clear up the confusion. Rheede's *Caniram*, vol. i. t. 37, represents the leaves as alternate, although he describes them as opposite, and the flowers are very rudely drawn. Wight's plate 434 of his 'Icones' is a very good representation of the foliage and flowers of a luxuriant specimen; but there is a tendril represented on the stem, and the figure is therefore referred to *S. colubrina*, though quoted by DeCandolle under *S. nux-vomica*. The drawing was one of Roxburgh's, and it is impossible now to say whether the tendril was an error of the artist having mixed up specimens of two species, or whether in the individual represented a tendril had been accidentally formed, as occurs occasionally in some of the erect American species, or whether again it was really a somewhat anomalous specimen of one of the long-flowered scandent species, such as *S. ovalifolia*. Roxburgh's own plate 4 of his Coromandel plants is an excellent representation of *S. nux-vomica*.

Blume's figure and description of his *S. ligustrina* (Rumphia,

t. 25) do not in any respect differ from a stunted state of *S. nux-vomica*, which, according to Dr. Wight, is not uncommon about Madras. All writers describe the leaves and fruit of *S. nux-vomica* as very variable in size. DeCandolle says, indeed, that the colour of the fruit of *S. nux-vomica* is of a brown-red, and that of *S. ligustrina* of a yellow-green; but we learn from Roxburgh and Rheede, as well as from verbal communications of those who are familiar with the tree, that the fruit of *S. nux-vomica*, at first of a yellow-green, assumes at length a rich orange-yellow. The figure of Rumphius, vol. ii. t. 38, quoted for the *S. ligustrina*, evidently represents some totally different plant. It is without flowers, and has neither the foliage nor the fruit of a *Strychnos*.

S. colubrina is generally supposed to be a scandent *nux-vomica* with simple tendrils, and is consequently placed among the long-flowered species by DeCandolle. The original must be taken to be Rheede's *Modira Caniram* from Malabar, vol. viii. t. 24, which has not been identified by subsequent writers; for the only Malabar species like it which is known has been universally distinguished under Leschenault's name of *S. bicirrhosa*, as having the tendrils forked instead of simple as figured by Rheede. I find them, in such specimens as our herbaria afford, almost universally forked, but I have also met with simple ones even on the same specimen. The *S. bicirrhosa* has a very short tube to the corolla, but so also may *S. colubrina* for anything in Rheede's figure or description to the contrary, and I feel little doubt in my own mind of the identity of these two species.

Linnæus, in quoting Rheede's *Modira Caniram*, refers by mistake to another plate of the 'Hortus Malabaricus,' vol. vii. t. 5, which represents his *Tsjeri Katu Valli Caniram*, a smaller species from the islands off the coast, which Rheede clearly distinguishes. Blume has identified this with a not uncommon Cingalese species which he has described under the name of *S. minor*, and which, besides minor differences, appears to have the flowers almost universally tetramerous instead of pentamerous.

Wallich has described under the name of *S. colubrina* a Silhet species which I am unable to identify, there being no specimens of it in his collections, and none answering to his description in either Griffith's, Hooker and Thomson's, or any other of our Khasiya collections. It must be very near to the true Malabar species; Wallich does not indeed particularly describe the corolla, but says generally that the flowers are small. A Malacca plant in Griffith's collection agrees, however, still better with Wallich's

detailed description. It has appeared to me to be a good species, which I have described under the name of *S. malaccensis*. Possibly this and Wallich's latter plant may ultimately prove to be mere varieties of the true *colubrina*, but, I repeat it, the specimens I have seen in the several herbaria at Kew, London, or Paris, are wholly insufficient to afford any satisfactory evidence of the real value of the characters assigned by myself or others to the *S. colubrina*, *bicirrhosa*, *minor*, and *malaccensis* respectively.

S. ovalifolia, Wall., and *S. Wallichiana*, Steud. (*S. lucida*, Wall., not of Brown), are both long-flowered climbers, differing slightly from each other in foliage, but more decidedly in the corolla, hairy at the base of the limb in one, naked in the other. * Of *S. acuminata*, Wall., published as distinct, neither flowers nor fruit are known, and there is nothing in its foliage to separate it from *S. ovalifolia*.

S. Tieute, Blume, from Timor and other islands between that and Java, and *S. lucida*, Br., from tropical Australia, are both unknown to me.

S. grandis, Wall. Cat. n. 4454, from Penang, referred to *Strychnos* in the haste of a first sorting, on account of its ribbed leaves, must be at once rejected as having them alternate. It is the same plant as the *Cocculus flavicans*, Wall. Cat. n. 4976; and, as mentioned in Hooker and Thomson's 'Flora Indica,' belongs to *Anisophyllum*, Don, or *Tetracrypta*, Gardn., a curious genus referred by Gardner to *Hamamelideæ*, and in the 'Niger Flora' to *Legnotideæ*, in which this plant constitutes a new and very distinct species*.

Strychnos, n. 5500 of Wallich's Catalogue, is a very bad specimen, in fruit only, with alternate pinnately-veined leaves, and therefore no *Strychnos*. It affords no materials to determine what it may really be.

S. oblongifolia, Hochst., mentioned in the 'Prodromus' as

* *Anisophyllum grande*, sp. n., foliis amplis quintuplinerviis oblongo-ellipticis glabris, pedunculis crassis ramosis floribusque tomentellis.—Rami adulti glabri. Folia 8–10 poll. longa, 3–4 poll. lata, acuminata, basi obtusa, siccitate flavicantia, petiolo crasso 3 lin. longo. Inflorescentia supra-axillaris; pedunculi sæpe plures suprapositi inæquales, longiores 3–4-pollicares, parum ramosi, tomento minuto rufescentes. Flores sessiles. Unicum examinavi ovario jam paullulum aucto ovoideo 2 lin. longo. Calycis laciniæ 4, brevissimæ, latæ, obtusæ. Petala jam delapsa non vidi. Stamina perpauca superfuerunt parva, antherâ biloculari, filamentis brevi. Styli 4, divaricati, subulati, basi incrassati et pubescentes, disco crassiusculo insidentes. Ovarium inferum, quadriloculare, ovulis in quoque loculo solitariis pendulis.

a doubtful species, has been since referred by its author to *Carissa*.

S. Unguacha, A. Rich., from Abyssinia, extending, if I mistake not, across to Senegambia, an unpublished species gathered by Forbes at Delagoa Bay, and *S. Lokna*, A. Rich., unknown to me, but from his description intermediate between the two, are African arborescent species, corresponding in habit, inflorescence and flowers with the well-known East Indian *S. potatorum*.

S. scandens of Schumacher and Thonning, from West tropical Africa, can, from the descriptions given, scarcely belong to the genus. The leaves, if I understand them rightly, are penninerved, the stamens inserted near the base of the corolla, the lobes of the corolla elongated and slightly contorted, and the fruit a "bacca capsularis;" all which would rather indicate some Apocyneous plant allied to *Vahea*. Vogel's collection from the Niger does indeed comprise a scandent cirrhiferous *Strychnos*, but it is evidently not Thonning's plant. It is in fruit only, and without the flower cannot be distinguished from several of the Indian ones.

The St. Ignatius's bean, a Philippine Island seed, whose medical properties have been so highly extolled by Loureiro and other older writers on Indian botany, as well as by Blanco among modern ones, has been described and figured by Gaertner and others, showing all the characters of a *Strychnos*. The plant which furnishes them is unknown to all modern botanists. The younger Linnæus alone professes to have been acquainted with it, and has characterized it as a distinct genus, under the name of *Ignatia*. He does not tell us where he procured the specimens from, but says generally, "Hab. in Indiâ." The species does not, however, appear to have been ever cultivated in India, where the seed alone is imported. Roxburgh does not mention it: Loureiro introduces it into his flora as an imported seed, taking the characters of the flower from Linnæus. Even Blanco in the Philippine Islands could never procure more than a dried specimen, an "arbolito" of a man's height, in leaf only, without flowers, although he says it is common in the Bisayas provinces of the islands. He vainly endeavoured to cause the seeds to germinate; they all rotted in the ground, although, hearing from an old woman that they would grow if steeped in vinegar, he tried that and other means of exciting them. Turning to Sir James Smith's herbarium, where the younger Linnæus's plants are generally preserved, I find in the cover of *Ignatia* two good specimens of *Posoqueria longiflora*, one from Guiana, from

the Banksian herbarium, the other without any reference to its origin, which agree in most respects with the published description of *Ignatia*; and in a small capsule marked "Flos Ignatiæ, an amaræ? ex Herb. Linn. fil. inter plantas Aubletii," is a detached flower of the same plant. From these data we are forced to conclude, that Linnæus the younger's character of *Ignatia* is taken from the flowers and foliage of a Guiana *Posoqueria*, and the seed only of the true Philippine Island plant, and the genus must therefore be suppressed as fictitious. The St. Ignatius's bean is most probably the seed of a true *Strychnos*, the identification of which must be reserved for future travellers. There is, indeed, one species, described below under the name of *S. multiflora*, which must be abundant in the Philippines, as it occurs under four different numbers of Cuming's collection, and whose foliage answers to Blanco's description; but we have it in flower only, and we have no means of ascertaining whether it be or not the one that produces the bean.

I may here allude to another plant, which, on account of its opposite ribbed leaves, occurs in some herbaria under *Strychnos*. This is a tall, large-leaved climber, having a wide range, from the foot of the Sikkim Himalaya, Khasiya, and Chittagong to Penang and the Moluccas, and has been published by Wallich and DeCandolle in *Jasmineæ* under the name of *Chondrospermum smilacifolium*, and by Blume in *Oleineæ* under that of *Myxopyrum nervosum*. With the habit and flower and exact ovules of the one, and the albuminous seeds of the other, it suggests the propriety of reuniting the *Jasmineæ* and *Oleineæ* as tribes of one family, as established by the elder Jussieu.

The American *Strychni* show the same variations as the Asiatic ones in the length and number of parts of the flower; and, as I have already observed, there remains no character whatever to distinguish *Rouhamon*, for the fruit in all is baccate and indehiscent, although smaller and drier in some species than in others. The division into erect and scandent species is fully as difficult as in the case of the Indian ones, as the dried specimens seldom afford any evidence one way or the other. From collectors' notes it appears that *S. pseudochina* and *tripplinervia* are the only two, among the long-flowered ones, which are real trees. *S. Gardneri*, described as such in the 'Prodromus,' is, according to Gardner's label, a tall climber, and some of his specimens have cirrhi. It is a species closely allied to three or four others from various parts of tropical America, which our specimens scarcely afford materials

for distinguishing properly; and I am by no means confident that I have ascribed correct limits to them. So among the small-flowered ones, some species with cirrhi are nevertheless distinctly described by their collectors as erect twiggy shrubs, and the production of straight spines, as well as of these hooked cirrhi, appears to vary according to situation. I feel persuaded that, however different Blanchet's specimens of *S. parvifolia*, A. DC., may at first sight look from Sello's of *S. brasiliensis*, Mart., they are but forms of one species, which Spruce also found in abundance on the Amazon; the pubescence, the breadth of the leaves, the greater or less prominence of the nerves, vary exceedingly even on the same tree, and specimens with or without thorns and cirrhi differ in no other respect. The stature is generally described as a shrub, or small twiggy tree, of about 15 feet.

The most important of the American species, such as *S. pseudo-china*, St. Hil., *S. toxifera*, Schomb., *S. Rouhamon*, &c., may now be considered as pretty well known; but there are others, said to be much used, of which we have only very vague information and imperfect specimens; such are *S. cogens*, Schomb., and *S. curare*, H. B. K. Much as Schomburgk and Spruce have contributed to the enlargement of this genus, there are still several of their species of which we have not yet seen the flowers; and of the western ones I have only found a flowerless specimen of *S. Darienensis*, Seem., in the Hookerian herbarium, and none at all of *S. Panamensis*, Seem., or of *S. brachiata*, R. et Pav. Very much therefore remains to be done before a good classification of the genus can be substituted for the artificial arrangement I now propose.

20. BREHMIA, Harv.

I have already alluded to the close connexion of this genus (or rather species, for there is but one) with *Strychnos*, with which it will probably one day be reunited. It is a Madagascar shrub, widely spread also over South-east Africa. A specimen of Heudelot's, from Senegambia, is more luxuriant, has no spines, larger leaves, and more flowers; but these flowers are in every respect so precisely similar to those of *B. spinosa*, that I have no hesitation in considering the whole as one species, thus stretching, in common with so many other plants, entirely across the African continent.

21. LABORDEA, Gaud.

This genus is only known from Gaudichaud's figure and imperfect description in the Botany of Freycinet's Voyage. It is evidently

a very distinct plant. The æstivation of the corolla is not described, but it would appear from the figure to be valvate. The fruit is unknown. Gaudichaud doubts whether it be capsular, as was then supposed to be generally the case in *Loganiaceæ*, and it is clear from the figure that the ovary and placenta are thick and fleshy. It would therefore rank artificially next to *Strychnos*, with the stipular dilatations of *Fagraea*, a peculiar calyx, and three cells to the ovary, the only instance except *Desfontainea* as yet known in the Order.

Since this paper was drawn up, during a hurried visit to Paris, I saw the original specimen in the herbarium of the Jardin des Plantes. It had much the look of a *Gærtnera*, but the inflorescence was so young, that it was impossible to derive from it any further information as to the structure of the flowers.

22. NICODEMIA, Ten.

As already mentioned, *Nicodemias* are *Buddleias* with an indehiscent baccate fruit. The plant was long known as a *Buddleia*, and the fruit was probably originally observed by DeCandolle, who, in the 4th vol. of the 'Prodromus,' excludes Sieber's specimens from *Rubiaceæ*, where that collector had placed them, and refers them with doubt to *Solanaceæ*. Tenore was the first who fully identified the fruit and flowers, and established the genus; but as he published it in a country having but little scientific intercourse with the rest of Europe, his *Nicodemia* had been long overlooked; and when preparing *Buddleia* for the 'Prodromus,' I had nothing to lead me to exclude the *B. diversifolia*. I have since, however, received excellent specimens from Tenore, besides seeing the plant in fruit myself in the Botanical Garden at Naples, and have now the opportunity of doing full justice to the Professor's investigations. In describing a second Madagascar species, I myself saw reason to believe that the ovary was fleshy, but had no specimens at all far advanced enough to decide the point.

Tribe IV. GÆRTNEREÆ.

The *Gærtnerææ*, or *Coffeaceæ* with a free ovary, consist of three genera, more intimately connected with the corresponding *Rubiaceæ* than almost any other *Loganiaceæ*, although they represent but very few of the modifications observable in the extensive tribe of *Coffeaceæ*. We have only the valvate corolla of *Psychotria*, not the contorted æstivation of *Ixora*; we have no instance of more

than two cells to the ovary; and of the three most important modes of insertion of the ovule, pendulous in *Canthiæ*, erect in *Psychotriæ*, and laterally peltate in *Ixoreæ*, we have in *Gærtneræ* only the two last.

The connexion with the allied free *Monopetalæ* is very slight. *Pagamea* and *Gærtnera* are Rubiaceous even in their stipules. *Gardnera* may indeed show some approach to *Apocynæ* in its anthers and less prominent stipules, but not in any other particular.

23. GARDNERIA, Wall.

The ovary in this genus is at the time of flowering so small and fleshy, and the cavities so very minute, that it has always been found very difficult to ascertain its structure. It has generally been supposed to have two cells, with one ovule in each; but this is doubted by DeCandolle. Zuccarini describes one pendulous ovule in each cell, and the berry is certainly usually two-seeded. But four-seeded berries are occasionally to be met with in one species, and Wight represents more than one ovule in each cell of the other. I have therefore been led to examine very carefully the ovaria of a considerable number of specimens; and although at first I had some difficulty in tracing them in the *G. ovata*, I subsequently found them in several flowers, but always solitary and exceedingly minute. In the *G. angustifolia* they appeared more distinct, and always two in each cell, collaterally attached by their centre. I found the same structure also in one of Siebold's Japanese specimens of that species.

On searching among *Rubiaceæ* for the nearest parallel to *Gardneria*, I was struck with the very close resemblance in habit and foliage of a Singapore plant, determined by Gardner to be a species of *Cælospermum*. It is in fruit only, but evidently belongs either to that genus or to *Gonochthodes*, of neither of which have we any authentic Javanese specimens, but which are probably not really generically distinct. The seeds of *Cælospermum* are shaped like those of *Gardneria*; but they are enclosed in the crustaceous endocarp, so that the fruit, instead of being a berry, is a drupe with as many pyrenes as seeds. The number of these is four, as in many fruits of *Gardneria angustifolia*, and the genus is consequently placed among those with a four-celled ovary. The ovary, however, is not described by Blume; and, from the fact of the style being bifid only, one would be led to conjecture that it was two-celled only, with two collateral ovules in each cell, showing a still further analogy to *Gardneria angustifolia*.

I have mentioned but two *Gardnerias*, although four are described; but this has been done chiefly on phytogeographical grounds. On a careful comparison of a considerable number of specimens, I can find no difference between the Nilgherry *G. Wallichiana* and the original *G. ovata* from Khasiya; and a specimen communicated to me by the Leyden Museum of the *G. nutans*, Sieb. et Zucc., from Japan, agrees in every respect with the *G. angustifolia*, which is so abundant in Sikhim, Nepal, and Khasiya.

24. PAGAMEA, *Aubl.*

The ovary and fruit of this genus have been hitherto but little known. The seeds of Aublet's species, the only one as yet published, had not been described at the time I determined Schomburgk's *Loganiaceæ*; and, misled by fruits apparently nearly ripe, but filled with a fleshy pulp which had become granulated by drying, I totally misunderstood their structure. I have consequently misled DeCandolle also, who, in the 'Prodromus,' copied the character I had given, in contradiction to the older but more correct one of Jussieu. Mr. Spruce's labours have now supplied us not only with ripe seeds of the old *P. guianensis*, but also with fine specimens, in various states, of three other very distinct new species, from whence I am now enabled to complete the history of the genus.

The flowers, like those of many *Rubiaceæ*, have a tendency to become polygamous, by the abortion of the female organs in some flowers, and occasionally of the anthers in others. The calyx, corolla and anthers are correctly described in the 'Prodromus,' except that in one species the chaff-like hairs which line the lobes of the corolla are exceedingly short. The ovary, in many specimens of *P. guianensis*, and occasionally also in the other species, is short and fleshy, with two very small cells containing each a minute abortive ovule, and the style is then very short, usually divided to the base. Where the ovary is perfect, which I have seldom had occasion to observe in the common *P. guianensis*, it is much less fleshy, completely divided into two cells with one ovule in each, erect from the base, precisely as in *Psychotria*. The style is then elongated, divided much below the middle in *P. guianensis*, but less so in the others. The fruit is a greenish or black berry, or rather drupe, containing two crustaceous, almost bony pyrenes, with a flattish inner face and convex back. Each contains a single erect seed with a thin testa adhering to a cartilaginous albumen, very much ruminated, as in *Grumilea*. The embryo is small,

nearly cylindrical and erect, near the base of the albumen, with a straight radicle about the length of the cotyledons. Such at least is the structure of the seeds in *P. guianensis* and *coriacea*, where I have seen them perfectly ripe.

The stipules of *Pagamea* are long, vaginate and deciduous, as in *Gærtnera*, from which it differs as *Psychotria* does from *Chasalia*, in the shortness of the tube of the corolla. The number of parts of the flower is also usually (though not always) four in *Pagamea*, five in *Gærtnera*; the inflorescence is axillary, not terminal, as might be inferred from the expressions in the 'Prodrômus.' I have at least always observed two opposite axillary peduncles, which in the early stage appear to terminate the branches; but the bud between them soon grows out, leaving the peduncles one on each side at the base of the young shoot, instead of a single terminal peduncle in the dichotomy of two young shoots.

The whole genus has but a limited range in East tropical America. The old *P. Guianensis* is the widest spread, extending over Guiana and North Brazil; *P. capitata* is confined to Guiana and Surinam; the three others have only been found by Spruce on the Upper Rio Negro.

25. GÆRTNERA, Lam.

If *Pagamea* is the Loganiaceous counterpart of *Psychotria*, *Gærtnera* is, without doubt, that of *Chasalia*, from which genus it is absolutely undistinguishable except by the ordinal character of the free ovary and fruit, not always very easy to ascertain at the time of flowering, when the fleshy epigynous disk of *Chasalia* or *Psychotria* is often as large or larger than the ovary itself. The consequence has been, that many *Gærtneras* have been first described as *Chasalias*. The generic characters, originally drawn up from some of the Mauritius species, have since been slightly modified by Endlicher, and lastly by Blume, so as to include the Cingalese ones published by Arnott under the name of *Sykesia*. I have nothing to add to the detailed character in Blume's 'Museum Botanicum,' p. 173, nor even to remark upon, except that the phrase "cotyledonibus e basi tumidâ subulatis" does not refer at least to the *G. thyrsiflora*, where the cotyledons are short and thick. The seeds have, however, only been examined in a very few species. These are now rather numerous; for besides the fourteen Mauritius species enumerated in the 'Prodrômus,' one has been found in West tropical Africa, five in Ceylon, of which

one appears to extend over the Moluccas, and two in Singapore. It is possible that some others may exist in herbaria, confounded with *Psychotrias* and *Chasalias*. In some cases indeed, there is really considerable ambiguity; for although the fruit be always entirely superior, the ovary is sometimes semi-adherent. In the plant distributed by Wallich as *Paderia ternata*, n. 6248, the ovary is really adherent, but separates so readily from the calyx, especially between the ribs, that, if not dissected with great care, it appears free. I had thus, in a note to the 'Niger Flora,' referred it to *Gærtnera*, although it be in fact a true *Rubiacea*, very near to *Psychotria*, if not a genuine species of that genus.

A singular anomaly is mentioned by DeCandolle in regard to the *G. calycina*, that two of the stamens are opposite to the lobes of the corolla, whilst the three others are normally alternate. I have only been able to examine unopened buds, in which I cannot perceive any such irregularity; but it may become developed as the corolla expands, in which case it cannot have any organic importance. The large coloured calyx, however, gives to the plant a peculiar aspect, which may justify the maintenance of the section *Ætheonema*, as proposed by DeCandolle.

Although I perfectly agree with Endlicher, Blume, and Wight, in the propriety of uniting *Sykesia* with *Gærtnera*, yet the comparatively short tube of the corolla, the hairs at its mouth, and the somewhat higher insertion of the stamens, may justify the maintenance of two of its species as a section analogous almost as much to *Psychotria* as to *Chasalia*, and showing a strong approach, as to flowers, to *Pagamea*.

In one of the new species described below, *G. rosea*, Thwaites, two of the stamens appear to be frequently abortive with short filaments; but I have had too few flowers to examine to ascertain whether this anomaly is constant or only accidental.

There are two doubtful genera usually placed at the end of *Loganiaceæ*: *Codonanthus*, G. Don, which has now been ascertained to be a Convolvulaceous plant not generically distinct from *Prevostia*; and *Anabata*, Willd., so imperfectly described, that it may be equally well attributed to half-a-dozen of the most distinct monopetalous orders.

The genus *Chætosus*, which I had at first referred to *Loganiaceæ*, is correctly placed by Alph. DeCandolle in *Apocynææ*.

Dr. Lindley, in the 'Vegetable Kingdom,' attaches *Legnotideæ* to the end of *Loganiaceæ*, as their nearest probable allies; but this

depends upon a view of affinities in which I cannot partake; for to my mind their close proximity to *Rhizophorææ*, with a tendency towards *Lythariææ* and *Cunoniæææ*, as indicated by Brown, does not admit of much doubt.

GENERUM LOGANIACEARUM SYNOPSIS.

Tribus I. ANTONIÆ. Ovula in loculis plurima. Semina alâ membranaceâ cincta.

* *Æstivatio corollæ valvata.*

1. *Antonia*. Bracteæ plurimæ imbricatæ calycem obtegentes. Corollæ tubus brevis.—America tropica.

2. *Usteria*. Bracteæ 2, parvæ. Corollæ tubus elongatus. Stamen perfectum unicum.—Africa tropica.

3. *Norrisia*. Bracteæ 2, parvæ. Corollæ tubus elongatus. Stamina tot quot lobî corollæ.—Asia tropica.

** *Æstivatio corollæ imbricata.*

4. *Gelsemium*.—America borealis, China et Sumatra.

Tribus II. EULOGANIÆ. Ovula in loculis plurima. Fructus capsularis. Semina nuda, rariùs subalata.

* *Æstivatio corollæ valvata.*

5. *Spigelia*. Stylus supernè articulatus. Capsula compressa, circumscissè dehiscens.—America.

6. *Mitreola*. Capsula compressa apice biloba, lobis intus dehiscentibus. Flores pentameri.—America et India orientalis.

7. *Mitrasacme*. Capsula compressa apice biloba, lobis intus dehiscentibus. Flores tetrameri.—Australia et India orientalis.

** *Æstivatio corollæ imbricata.*

8. *Polypremum*. Capsula loculicidè dehiscens. Herba dichotoma.—America.

9. *Logania*. Capsula septicidè dehiscens. Flores sæpius pentameri.—Australia.

10. *Gomphostigma*. Capsula septicidè dehiscens. Flores tetrameri. Corolla subtrotata.—Africa australis.

11. *Nuxia*. Capsula septicidè dehiscens. Flores tetrameri. Corolla tubo brevi supra basin transversè rupto. Stamina exserta.—Africa australis et calidior.

12. *Chilianthus*. Capsula septicidè dehiscens. Flores tetrameri. Corollæ tubus brevis non ruptus. Stamina exserta.—Africa australis.

13. *Buddleia*. Capsula septicidè dehiscens. Flores plerique tetrameri. Antheræ tubo corollæ inclusæ, v. ad faucem sessiles.—America, Asia, Africa.

*** *Æstivatio corollæ contorta.*

14. *Geniostoma*.—Mascarenhasia et Polynesia.

Tribus III. FAGRÆÆ. Ovula in loculis plurima. Fructus baccatus indehiscens.

* *Æstivatio corollæ contorta.*

15. *Desfontainea*. Corolla 5-loba. Ovarium 5-3-loculare.—America australis.

16. *Fagraea*. Corolla 5-loba rarius 6-7-loba. Ovarium biloculare.—India orientalis et Polynesia.

17. *Potalia*. Corolla 10-loba. Placentæ 2 bilobæ.—America tropica.

18. *Anthocleista*. Corolla 10-16-loba. Placentæ 4 bilobæ.—Africa tropica.

** *Æstivatio corollæ valvata.*

19. *Strychnos*. Stamina supra medium tubi corollæ inserta. Ovarium biloculare.—America, Africa, et Asia calidiores.

20. *Brehmia*. Stamina ad basin corollæ brevis inserta. Ovarium septo evanido subuniloculare.—Africa et Mascarenhasia.

21. ? *Labordea*. Ovarium triloculare.—Ins. Sandwich.

*** *Æstivatio corollæ imbricata.*

22. *Nicodemia*.—Mascarenhasia.

Tribus IV. GÆRTNERÆÆ. Ovula in loculis solitaria, rarius 2 collateralia.

23. *Gardneria*. Ovula lateraliter peltatim affixa. Caulis scandens.—Asia calidior.

24. *Pagamea*. Ovula e basi erecta. Corolla vulgò tetramera tubo brevissimo.—America tropica.

25. *Gærtnera*. Ovula e basi erecta. Corolla vulgò pentamera tubo distincto nunc elongato.—Asia calidior et Mascarenhasia.

Species Prodromo Candolleano addendæ vel emendandæ:—

I. ANTONIA, *Pohl.* DC. Prod. vol. ix. p. 20.

Species unica:—

A. ovata, Pohl, Pl. Bras. Ic. t. 109.—*A. pilosa*, Hook. Ic. Pl. t. 64; Endl. Iconogr. t. 56.—*A. pubescens*, Bong. Mem. Acad. Petrop. Ser. 6. vol. iii. t. 1. *Hab.* In Guiana Anglica (*Schomb.* coll. 1. n. 85 a; coll. 2. n. 520; *Rich. Schomb.* n. 822). In Brasiliæ variis locis (*Pohl, Mart. herb.* n. 540, *Gardn.* n. 2667, 2943, 4349bis, 5023 & 5024).

II. USTERIA, *Willd.* DC. Prod. vol. ix. p. 22.

Species unica:—

U. guineensis, Willd. Hook. Fl. Nig. t. 45, et Ic. Pl. t. 795. *Hab.* In Africa tropica occidentali.

III. NORRISIA, *Gardn.* in Kew Journ. Bot. vol. i. p. 327.

Species unica:—

N. malaccensis, Gardn. l. c.—*Antonia Griffithii*, Wight, Illustr. vol. ii. t. 156b. *Hab.* In Malacca (*Griffith*).

IV. GELSEMIUM, *Juss.* A. DC. Prod. vol. ix. p. 23.

Species sunt:—

1. *G. NITIDUM*, *Mich.*, foliis ex ovato-lanceolatis, inflorescentiis brevibus vix ramosis squamato-bracteatis, capsulis compressiusculis acuminatis. *Hab.* In Virginia, Carolina, Georgia, Florida, Louisiana; Mexico (*Harris, Jurgensen*, n. 835), prov. Chiapas (*Linden*, n. 1658).
2. *G. ELEGANS*, foliis ovatis acuminatis, cymis trichotomis multifloris nonnisi ad ramificationes bracteatis, capsulis turgidis muticis.—*Medicia elegans*, Gardn. in Kew Journ. Bot. vol. i. p. 325.—*Leptopteris sumatrana*, Blume, Mus. Bot. vol. i. p. 240. fig. 34 (ex ic. et descr.). *Hab.* In insula Hong Kong (*Champion*) et in Sumatra (*Blume*).

V. SPIGELLA, *Linn.* A. DC. Prod. vol. ix. p. 3.

Species Prodromo addendæ sunt:—

- S. COULTERIANA*, perennis, humilis, decumbens, glabra, foliis obovatis ovatisve obtusissimis, corollæ tubo ampliato limbo obliquo.—Caules e basi proeumbente ramosa erecti, 2-3-pollicares. Folia 2-4-na, semipollicaria vel vix longiora. Calycis laciniæ capsula longiores. Corolla circa 8 lin. longa tubo ferè a basi ampliato.
- Hab.* In Mexico ad Zimapan, *Coulter*, n. 962.
- S. longiflora* et *S. pauciflora*, Mart. et Gal. Bull. Acad. Brux.; Walp. Rep. vol. vi. p. 496, a me non visæ subdubiæ.

Species delendæ sunt:—

- S. Schomburgkiana*, Benth. = *S. Humboldtiana*, Ch. et Schl.
S. gracilis, DC. = *S. spartioides*, Ch. et Schl.
S. multispicata, Steud. = *S. anthelmia*, Linn.
S. nervosa, Steud. = *S. anthelmia*, Linn.

VI. MITREOLA, *Linn.* A. DC. Prod. vol. ix. p. 8.

Species sunt:—

1. *M. SESSILIFOLIA*, *Torr. et Gr.*, annua, glabra, foliis sessilibus, pedicellis brevissimis, capsulæ subovoideæ lobis brevibus erectis v. basi leviter divergentibus.

Hab. In Americæ borealis civitatibus australioribus.

2. *M. PETIOLATA*, *Torr. et Gr.*, annua, glabra, foliis petiolatis, pedicellis brevissimis, capsulæ subovoideæ lobis brevibus erectis v. basi leviter divergentibus.

Hab. In Americæ borealis civitatibus australioribus, in insulis nonnullis Indiæ occidentalis, in Mexico (*Beechey*), Panama (*Seemann*), et in prov. Goyaz Brasiliæ (*Gardn.* n. 3897).—*M. paniculata*, A. DC. Prod. vol. ix. p. 9, quoad specimen Brasiliense.—*Hook.* Ic. t. 828.

3. *M. OLDENLANDIOIDES*, *Wall.*, annua, glabriuscula, foliis petiolatis, pedicellis brevissimis, capsulæ subtriangularis lobis ipsa vix brevioribus demum basi v. undique latè divergentibus.—*Hook.* Ic. Pl. t. 827.—*M. paniculata*, *Wall.* Cat. n. 4349; Cat. Burm. n. 1826.—*Wight*, Ic. t. 1600 (exclusis floribus figuræ majoris).—*M. inconspicua*, *Zoll. et Mor. Verz.* Pl. Jav. p. 55.

Hab. In India orientali; Bombay (*Dalzell*), Concan (*Law*), Sukanaghur (*Hamilton*), Burma (*Wallich*), Java (*Zollinger*).

4. *M. PEDICELLATA*, perennis, repens, foliis petiolatis subhirtellis, pedicellis flore longioribus, capsulæ latæ lobis brevibus demum latissimè divergentibus.—Caulis basi repens, ad nodos radicans, ramis floriferis adscendentibus, nunc 3–4-pollicaribus, nunc $\frac{1}{2}$ –1-pedalibus simplicibus. Stipulæ brevissimæ petiolos connectentes, ad petiolos utrinque 1–2-aristatæ. Folia ovato-acuminata v. oblongo-lanceolata, 2–4 poll. longa, basi in petiolum angustata, ad margines et subtus ad venas sæpissimè ciliato-hirta. Cymæ paucæ, longè pedunculatæ. Pedicelli graciles, 1–2 lin. longæ. Flores et fructus parvi. Sepala ovata, margine membranacea. Stylus basi fissus, mox deciduus, apice breviter bifidus. Capsula quam in *M. oldenlandioides* minor, lobis primum erectis, mox divaricatis, demum sæpè recurvis. Semina ferè globosa.

Hab. In Sikhim (*Hooker fil.*).

VII. MITRASACME, *Labill.* A. DC. Prod. vol. ix. p. 9.

Sectio I. PLECOCALYX, *Don.* Species unica:—

1. *M. AMBIGUA*, *Br.*; DC. l. c. p. 12.—Annua, *M. nudicauli* habitu affinis, imprimis calycis forma et corolla tenui distincta.

Sectio II. DICHELOCALYX, *Don.* Species 3, omnes Australasiæ:—

2. *M. PARADOXA*, *Br.*, erecta, ramosa, foliata, calyce latè bifido, stylis supernè connatis.—*M. divergens*, *Hook. fil.* in *Lond. Journ. Bot.* vol. vi. p. 276.

Hab. Swan River (*Drummond*), King George's Sound (*Bauer, Wakefield*), Victoria (*Ferd. Müller*), Tasmania (*Gunn*).

3. *M. NUDA*, *N. ab E.*, foliis radicalibus, scapo erecto filiformi aphylo apice umbellifero, calyce latè bifido, stylis supernè connatis.

Hab. Swan River (*Preiss*).

4. *M. DISTYLIS*, *Ferd. Müll.*, pusilla, decumbens, foliata, calyce truncato subbifido, stylis liberis v. vix apice connatis.—Planta semipollicaris v. subpollicaris habitu *Montiæ* v. *Microcarpææ* similis. Folia oblonga v. linearia, 1–3 lin. longa. Pedicelli sæpius solitarii, filiformes, semipollicares. Flores quam in *M. paradoxa* multo minores, calyce breviori, lobis rotundatis obtusissimis, corolla calyce brevior, ut in *M. paradoxa* stipitata, lobis brevibus latis. Stamina *M. paradoxæ*. Styli breves, stigmatibus distinctis coronati, et vix levissimè coherentes. Capsula inclusa.

Hab. In montibus Grampians prov. Victoriæ (*Ferd. Müller*) et ad George Town in Tasmania (*Gunn*, n. 2019).

Sectio III. MITRAGYNE, *Endl.* cum *Hologyne*, *Don.*

Species 17 Australasiacæ, 3 Indicæ:—

* *Annucæ.*

5. *M. phascoides*, Br., DC. l. c. p. 11.—Planta minima vix 3-linearis.
6. *M. laricifolia*, Br., DC. l. c. p. 10.—Planta bipollicaris, corolla minima tenui.
7. *M. ramosa*, Br., DC. l. c.—*M. laricifoliæ* similis, imprimis corolla brevi diversa.
8. *M. multicaulis*, Br., DC. l. c.—A me non visa.
9. *M. paludosa*, Br., DC. l. c. p. 11.—*M. alsinoidi* affinis, sed ramosissima, angustifolia, et corollæ forma diversa.
10. *M. pygmaea*, Br., DC. l. c.—Speciminibus minoribus *M. nudicaulis* similima.
11. *M. NUDICAULIS*, *Reinv.*, DC. l. c. p. 12, caule basi pilosulo, foliis subradicalibus patentibus, scapo glabro foliis paucis minimis erectis, umbella pauciflora, calycis lobis corollæ tubi dimidium subæquantibus, stylo basi per anthesin indiviso (mox bifido).—*M. chinensis*, Griseb. in Pl. Meyen. p. 51 (ex descr.).

Hab. Khasiya (*Griffith, Hook. fil. et Thomson*), Assam (*Mrs. Mack*), China prope Canton.

12. *M. INDICA*, *Wight*, Icon. t. 1601, glabra, caule foliato pedicellis axillariibus v. summis subumbellatis, calycis lobis corollæ tubo vix brevioribus, stylo basi per anthesin bifido (v. rarius indiviso?).—*M. crystallina*, Griff. Notulæ, pars iv. p. 87; Ic. t. 383. f. 2.—*M. pusilla*, Dalz. in Kew Journ. Bot. vol. ii. p. 136.

Hab. In Indiæ orientalis peninsula (*Dalzell, Law, Wight*).

13. *M. CAPILLARIS*, *Wall.*, DC. l. c. p. 11, caule basi pilosulo foliato, foliis lanceolatis, pedunculis umbelliferis subnudis glabris, calycis lobis corollæ tubi dimidium subæquantibus, stylo basi per anthesin indiviso (mox bifido).—*M. trinervis*, Spanoghe in Linnæa, vol. xv. p. 335.—*M. Malaccensis*, *Wight*, Ic. t. 1601.—*Limnophila campanuloides*, Benth. in Wall. Cat. n. 3908.—Variat corolla longiore v. brevior, calycis laciniis longioribus brevioribusve, latioribus angustioribusve, &c.

Hab. In terra Canara (*Hohenacker*, n. 590), Nepalia (*Wallich*), Tavoy (*Go-*

mez), Malacca (*Griffith*), Moulmeyn (*Lobb*, n. 348; specimina sæpe pedalia v. ultra), Hong Kong (*Hinds*).

14. *M. alsinoides*, Br., DC. l. c. p. 11.—*M. capillari* valdè affinis. Variat caule basi foliisque glabris v. pubescentibus.
15. *M. prolifera*, Br., DC. l. c. p. 10.—Variat foliis ovatis. A præcedentibus differt imprimis corollæ tubo subgloboso calycem paullo superante, limbo tubum subæquante patente.
16. *M. LÆVIS*, glaberrima, caule foliato subramoso, foliis oblongo-lanceolatis rigidulis uninerviis subtus glaucis, umbella terminali, calycis semi-4-fidi lobis latis rigidis corollæ tubi dimidium æquantibus, stylo basi per anthesin indiviso.—Caules graciles 6–10-pollicares. Folia 3–4 lin. longa, crassiuscula, floralia minora. Pedunculi et pedicelli elongati. Flores magnitudine *M. capillaris*, siccitate virescentes, et corollæ limbus patens videtur ut in *M. prolifera*. Capsula parva, subglobosa, apice vix ante maturitatem bifida.
- Hab.* Ad Port Essington, Australiæ tropicæ orientalis (*Armstrong*).
17. *M. stellata*, Br., DC. l. c. p. 11.—Caules semipedales ad pedales in parte inferiore tantum foliati. Flores in umbellas simplices v. compositas conferti, parvi.—Formam latifoliam legit ad Port Essington cl. *Armstrong*.
18. *M. elata*, Br., DC. l. c. p. 11.—Caules 1–1½-pedales. Folia latitudine varia. Corollæ tubus 4–6 lin. longus.
19. *M. connata*, Br., DC. l. c. p. 11.—Statura et corolla *M. elatæ*. Folia angusta, vix aliter nisi stylis per anthesin a basi connatis differre videtur.

** *Perennes, a basi ramosissimæ.*

20. *M. polymorpha*, Br., DC. l. c. p. 10.—Species prope Port Jackson vulgaris magnoperè variat hirsutia, et cum ea jungendæ videntur *M. canescens*, Br.—DC. l. c.—*M. hirsuta*, Presl; Walp. Ann. vol. vi. p. 496.—Necnon verosimiliter *M. squarrosa*, Br., *M. cinerascens*, Br. et *M. Sieberi*, DC., a me non visæ.
21. *M. DIFFUSA*, ramosissima, diffusa, pilosa, foliis linearibus sublanceolatisve ciliatis, pedicellis hirtis axillaribus v. summis subumbellatis, calycis laciniis lanceolatis ciliatis corollam superantibus.—Habitus *M. pilosæ*, sed folia 4–6 lin. longa, semilineam v. raro ferè lineam lata, pedicelli folio æquales v. sublongiores, et calycis laciniæ angustiores acutæ. Corolla parva, subcampanulata semi-4-fida. Styli basi soluti apice coherentes.
- Hab.* Ad Stradbroke River, Australiæ orientalis (*Fraser* in herb. *Hooker*).
22. *M. pilosa*, Labill.—DC. l. c. p. 11.
23. *M. serpyllifolia*, Br., DC. l. c.—A *M. pilosa* differt imprimis glabritie. Specimina juniora tantum vidi. Ab illis tamen haud differre videtur *M. perpusilla*, Hook. fil. in Lond. Journ. Bot. vol. vi. p. 275. Calycis laciniæ in hac angustiores quam in *M. pilosa*. Planta Browniana circa Portum Jackson lecta fuit, Hookeriana in Tasmania.
24. *M. MONTANA*, *Hook. fil. MSS.*, humilis, ramosissima, diffusa, glabra,

foliis obovatis subcarnosis, floribus sessilibus terminalibus solitariis, stylis distinctis, capsula latè triangulari compressa supra concava.—Caulis perennes $\frac{1}{2}$ –2-pollicares, cæspitoso-ramosissimi. Folia in petiolum brevissimum angustata, raro margine pilis paucis brevibus ciliata. Calyces profunde fissi, lobis duobus paullo latioribus, capsulam æquantibus. Corolla (quam nonnisi emarcidam vidi) calyci æqualis, lobis brevibus. Antheræ subsessiles ad apicem tubi insertæ. Styli breves, paullo post anthesin jam longè distantes, apice leviter introflexi. Capsula apice 2 lin. lata, truncata et obscure sinuato-biloba, valdè compressa, ad angulos stylorum vestigiis acuta, supra marginibus valdè inflexis concava, ad angulos internos cavitatis dehiscens. Placentæ axiles, 4–6-spermæ.

Hab. Ad montes Wellington et Black Buff, Tasmania (*Gunn*).

VIII. POLYPREMUM, *Linn.* DC. Prod. vol. iv. p. 435,
et vol. ix. p. 12.

Species unica:—

P. procumbens, Linn., DC. l. c.—*P. Schlechtendahl*i, Walp. in Pl. Meyen et ejusd. Repert. vol. vi. p. 56.

Hab. In civitatibus australioribus Americæ borealis, in Mexico et Columbia (et Chile?).

IX. LOGANIA, *R. Br.* DC. Prod. vol. ix. p. 25.

Species Prodromo addendæ v. emendandæ:—

L. angustifolia, Sieb. in DC. Prod. l. c. et *L. linifolia*, Schlecht.; Walp. Ann. vol. i. p. 512, inter *L. floribundam* et *L. revolutam* intermediæ, cum hac pro varietatibus *L. floribundæ* habendæ videntur, hæc enim species, circa Port Jackson vulgaris magnoperè variat et latitudine foliorum et inflorescentia copiosa vel parca.

L. cordifolia, Hook., Walp. Ann. vol. iii. p. 74, et foliis et inflorescentia ab omnibus mihi notis longè distat.

L. hispidula, Nees in Pl. Preiss. vol. i. p. 368 valdè affinis videtur *L. serpyllifolia*, Br., cujus varietates plures legit Drummond in Australia austro-occidentali.

L. depressa, Hook. fil. e Nova Zealania habitu *L. fasciculatæ*, Br., approximata, foliorum forma aliisque notis longè diversa. Speciem *L. fasciculatæ* affiniorem (nec forte diversam?) communicavit F. Müller ex Australia austro-orientalis montibus sub nomine *L. alpina*. Flores tamen in specimine desunt.

L. hyssopoides, Nees, Pl. Preiss. vol. i. p. 368, et *L. centaurium*, Nees, l. c. vol. ii. p. 240 vix a *L. campanulata*, Br., differunt.

L. bracteolata, Nees, l. c. vol. i. p. 367, mihi ignota, ex descriptione sua distinctissima est. Quoadfolia, habitus et inflorescentiam cum sequente convenit, corolla pentamera et capsulæ loculis pleiospermis (si ritè observata) longè differt.

L. MICRANTHA, sp. n., fruticulosa, ramosissima, glabra, foliis (parvis) lineari-

bus, floribus minimis solitariis corymbulosive tetrameris, ovarii loculis uniovulatis.—Fruticulus ferè in omnibus notis cum descriptione *L. bracteolata* conveniens præter numerum partium floris et ovarii structuram. Tota glabra est v. rarius pubes minima in partibus novellis sub lente observatur. Folia 3–4 lin. longa, obtusa, coriacea, margine revoluta. Pedunculi in axillis supremis 1–3-flori, v. ad apices ramorum in corymbum 6–12-florum dispositi. Flores minimi, nutantes. Bracteolæ 2 angustæ ad basin pedicelli, 2 latiores, interdum ovatæ, sub calyce. Calycis lacinia ovatæ, interdum minutissimè ciliatæ. Corollæ faux nuda. Ovarium biloculare, ovulis solitariis prope basin affixis. Stylus brevissimè conicus apice stigmatoso subbilobo. Capsula globosa, coriacea, septicidè dehiscens, carpellis loculicidè bifidis. Semina hemisphærica, facie interna placentæ crassiusculæ oblongæ demum liberæ peltatim affixa. Testa minutè impresso-punctata. Albumen cartilagineum. Embryo brevis, rectus.

Hab. In Australia austro-occidentali (*Drummond*, coll. 5. n. 252).

L. capensis, Eckl. ; DC. Prod. vol. ix. p. 26, ex Africa australi, a nemine inter exploratores hodiernos visa, delenda videtur.

L. paniculata, Kunth et Bouché, Walp. Ann. vol. i. p. 513, in horto Berolinensi descripta, planta videtur a genere aliena. Flores dioici dicuntur, styli distincti, &c.

X. GOMPHOSTIGMA, Turcz. Benth. in DC. Prod. vol. x. p. 433.

Species unica :—

G. scoparioides, Turcz. l. c., ex Africa australi.

XI. NUXIA, Lam. A. DC. Prod. vol. x. p. 434.

Speciebus in Prodrómo descriptis addendæ sunt *N. pubescens*, *N. tomentosa* et *N. emarginata*, omnes a Sondero in Linnæa, vol. 23, e plantis Zeyherianis austro-Africanis illustratæ; quarum duæ priores verosimiliter unius speciei formæ.

XII. CHILIANTHUS, Burch. A. DC. Prod. vol. x. p. 435.

Species 4 jam in Prodrómo recensitæ.

XIII. BUDDLEIA, Linn. Benth. in DC. Prod. vol. x. p. 436.

Species Prodrómo addendæ v. corrigendæ :—

B. Colvillei, Hook. fil. Ill. Pl. Himal. t. 18, species pulcherrima Himalayana nulli hucusque cognitæ proxima.

B. coriacea, et *B. aromatica*, Remy in Ann. Sci. Nat. Par. 3 Ser. vol. viii. pp. 226, 227, e Bolivia, mihi ignotæ.

B. pseudoverticillata, Mart. et Gal. = *B. sessiliflora*.

B. obtusifolia, Mart. et Gal. = *B. microphylla*.

B. elliptica, Mart. et Gal., e Mexico, mihi ignota est.

Buddleia species decem e seminibus Mexicanis in horto Berolinensi natæ et a Kunth et Bouché divulgatæ, omnes denuo inquirendæ verosimiliter pleræque varietates specierum jam in Prodrómo descriptarum.

B. diversifolia, Vahl, Benth. in DC. Prod. vol. x. p. 445 et *B. rondeletiaeflora*, Benth. l. c. ad genus *Nicodemiam* referendæ sunt.

XIV. GENIOSTOMA, *Forst.* DC. Prod. vol. ix. p. 26.

Species Mauritianæ sunt:—

1. *G. pedunculatum*, Boj., DC. Prod. vol. ix. p. 28.—*G. parviflorum*, Boj., DC. l. c. p. 27.—Connectivum vix loculos antheræ excedens, appendice brevissima ciliolata.
2. *G. cordifolium*, Boj., DC. l. c.—Connectivum ultra loculos antheræ productum, appendice ovato-triangulari ciliolata.
3. *G. ovatum*, Boj., DC. l. c.—*G. lanceolatum*, Boj.?, DC. l. c.?—Folia forma quam maximè variabilia. Corollæ laciniæ ovatæ vix lineam longæ. Connectivum ultra loculos non aut vix productum. Capsula ovoidea 4–5 lin. longa, vix duplum diametri sui æquans.
4. *G. angustifolium*, Boj., DC. l. c.—A me non visum.
5. *G. OBOVATUM*, *Boj. MSS.*, glabrum, foliis obovatis oblongisve obtusis v. vix acutis, cymis abbreviatis, calycis lobis ovatis acutiusculis, corollæ lobis lanceolatis intus basi villosis, capsulis oblongis latitudine sua 3–4-plo longioribus.—Affinis *G. ovato*, sed folia crassiora, corollæ multo majores, laciniis $1\frac{1}{2}$ lin. longis; antheræ appendice longa lineari ciliata terminatæ et capsulæ 7–8 lin. longæ.

Hab. In sylvestribus ins. Mauritiæ ad Colville Bridge in Grand Bassin (*Bojer*).

Species Polynesicæ:—

6. *G. FAGRÆOIDES*, glaberrima, foliis amplis ellipticis utrinque acutis, calycis laciniis acutis, placentis distinctis, seminibus stipitatis.—Folia 4–6-pollinaria, fere *Fagrææ*. Stipulæ intrapetiolares, breviter vaginantes, truncatæ. Flores non vidi. Capsulæ 7–8 lin. longæ, crassæ, valvulis crasso-coriaceis recurvis. Placentæ 2 lineares, vix carnosæ. Semina generis, sed funiculi filiformes semine ipso vix breviores.

Hab. In ins. Bonin (*Beechey*).

7. *G. CRASSIFOLIUM*, foliis obovatis ovatisve obtusissimis subcarnosis pubescentibus glabrativis, calycis lobis ovatis acutiusculis, corollæ laciniis intus basi barbatis.—Frutex 12–16-pedalis. Folia 2–3-pollinaria, crassa, semper obtusissima, basi rotundata v. breviter angustata, petiolo apice dilatato, subtus uti ramuli puberula v. in var. β . glabra. Cymulæ a basi v. ad medium trichotomæ, petiolo paullo longiores. Flores quam in *G. rupestri* paullo majores, tubo calyce brevior, limbo patente, lobis ovatis obtusis basi medio pilosis margine vix ciliolatis. Stamina ad faucem inserta, filamentis brevibus, antheris ovatis corollam subæquantibus, connectivo loculos non superante, apice nudo v. ciliis paucis penicillato. Ovarium puberulum. Stigma ovoideum v. globosum, minutè puberulum. Capsula (in var. β) 3 lin. longa.

Frequens in insula Isle of Pines dicta juxta Novam Caledoniam in locis sylvaticis ad pedem montis (*Milne*).

- β. *glaberrimum*, foliis paullo majoribus.—In ins. Angau et Ovalau (ins. Feejee) (*Milne*), et ins. Sandwich teste herb. Hooker., sed hic fortè latet error quidam.
8. *G. rupestre*, Forst., DC. Prod. vol. ix. p. 26.—*G. hæmospermum*, Steud., DC. l. c. p. 27.—Blume, Mus. Bot. vol. i. p. 238.—In ins. Java (*Lobb, &c.*), Feejee (*Amer. Explor. Exped.*), Tanna e Novis Hebridibus (*G. Forster*).
9. *G. reticulatum*, Blume, l. c. p. 239.—Java.—A me non visum.
10. *G. montanum*, Zoll. et Mor. Verz. Pl. Jav. p. 58.—Mihi ignotum. An *G. rupestris* var.?—Java.
11. *G. ligustrifolium*, A. Cunn.; Hook. Ic. t. 430; DC. Prod. vol. ix. p. 27.—In Nova Zeelandia.
12. *G. micranthum*, DC. l. c.—Mihi ignotum.—In ins. Marianis.
13. *G. CUMINGIANUM*, foliis elliptico-lanceolatis acuminatis basi acutis, cymis brevibus, calycis lobis ovatis obtusis, corollæ lobis basi intus villosis.—Folia et inflorescentia *G. ligustrifolii* sed ab omnibus diversum calycis lobis apice minimè acuminatis. Cymulæ plurifloræ in speciminibus Cumingianis, 1-3-floræ in Lobbianis. Corollæ lacinie intus basi tantum pilosæ, nec ferè in tota superficie ut in *G. ligustrifolio*. Antheræ glabræ. Stylus brevis, stigmatè glabro.
- Hab.* In ins. Philippinis (*Cuming*, n. 864; *Lobb*, n. 450).
14. *G. lasiostemon*, Blume, Mus. Bot. p. 239, e Java, mihi ignotum.

XV. DESFONTAINIA, *Ruiz et Pavon*. Dun. in DC. Prod. vol. xiii. pars 1. p. 675.

Ovarium 5- rarius 4-3-loculare, septis in parte superiore ovarii vix in medio cohærentibus. Ovula in quoque loculo plurima (circa 10) ex angulo interno pendula. Bacca completè v. ferè completè 5-3-locularis.

Species unica :—

D. spinosa, R. et P. in Andibus Americæ australis crescens a Nova Granada usque ad fretum Magellanicum. Formæ sub nomine *D. splendidis*, H. B. K., *D. Hookeri*, Dun., et *D. acutangulæ*, Dun., editæ, inter se intermediis numerosis junctæ, vix pro varietatibus distinguendæ sunt.

XVI. FAGRÆA, *Thunb.* Blume, Mus. Bot. p. 163.

Species sunt :—

§ 1. *Corymbosæ*, cymis paucifloris ad apices ramorum subcorymbosæ. Flores majusculi v. maximi.

* Longifloræ, tubo corollæ longè exserto supra medium v. apice tantum ampliato.

F. carnosa, Jack.—Moulmeyn (*Lobb*).

F. tubulosa, Bl. e Sumatra, ex auctore *F. carnosæ* affinis mihi ignota.

F. zeylanica, Thunb. In ins. Ceylon (Hb. Sm. e herb. Linn. fil., Gardner, &c.).

F. BERTERIANA, *A. Gray, MS.*, foliis obovato-oblongis obtusissimis v. breviter acuminatis longiusculè petiolatis coriaceis crassis obsolete venosis, petiolorum basi stipulacea brevi rotundata, corymbo terminali brevi trifido v. trichotomo, corollæ tubo elongato supra medium ampliato calyce triplo longiore.—Arbor 30-pedalis affinis *F. zeylanicæ*, corollæ tubi parte tenui longè exserta, brevior tamen est, corolla tota 2½–3-pollicaris nec 4–5-pollicaris. Antheræ angustiores videntur.—*Carissa grandis*, Berter., et eo teste *Pua* incolarum.

Hab. In ins. Societatis (*Bertero, Bidwill, Hinds, Barclay*), ins. Nukahiva e Marquesas (*Barclay*), in Archipelago Louisiade dicto (*Macgillivray*).

F. lanceolata, Blume.—In Java (*Lobb, Junghuhn*). Species ab auctore optimè illustrata inter longifloras et latifloras ferè media.

F. Wallichiana.—*F. lanceolata*, Wall. Cat. n. 1599.—*Cyrtophyllum? lanceolatum*, A. DC. Prod. vol. ix. p. 31.—In ins. Penang (*Wallich*).—Cymæ subsessiles, laxè 3–5-floræ. Corollæ tubus tenuis longè exsertus. Flores multo minores quam in præcedentibus, duplo tamen longiores quam in *F. fragrans*.

** Latifloræ, corollæ infundibuliformis tubo a basi v. jam infra medium usque ad faucem dilatato.

F. auricularia, Jack.—Malacca (*Griffith*), Java (*Lobb, Zollinger, &c.*).

F. truncata, Blume, e Celebes, mihi ignota, huic affinis dicitur.

F. plumeriæfolia, A. DC.—In ins. Philippinis (*Cuming*).

F. obovata, Wall., Bot. Mag. t. 4205.—In montibus Khasia (*Wallich, Hook. fil. et Thomson*).

F. coromandeliana, Wight, Ic. t. 1316.—Specimen unicum vidi e Peninsula in herb. Stocks. Vix a præcedente differre videtur petiolis abbreviatis.

F. crassifolia, Blume (ex descr. et ic.).—In Malacca (*Griffith*), Rangoon (*MacLelland*).—*F. obovata* valdè affinis, differt paullulum floribus 1–3nis subsessilibus et fortè corollæ tubo breviorè latiore.

F. globosa, Wall., e Chappedong et Tavoy, cujus flores ignoti sunt, est verosimiliter eadem ac *F. crassifolia*.

F. littoralis, Blume, a me non visa, paullulum differt ex icone, fructu ovi-formi.

F. obovata-javana, Blume, ex icone et descr. quasi intermedia videtur inter *F. obovatam* et *F. malabaricam*.

F. malabarica, Blume, Wight, Ic. t. 1317 (*F. obovata*, Griff. Notul. Pars iv. p. 35, Ic. t. 382), præcedentibus valdè affinis. Folia *F. obovata*, inflorescentia laxior, calyx brevior, corollæ paullo minores.—In peninsula indica (*Stocks*), specimina etiam vidi in horto Calcuttensi culta. Adsunt etiam specimina Ceylonensia a Champion et Thwaites lecta inflorescentia calyce

corollaque *F. malabaricæ* donata, foliis ut in *F. coromandeliana* brevè petiolatis. Forte 6 præcedentes omnes *F. obovatæ* varietates sunt.

F. KHASIANA, foliis longiusculè petiolatis oblongo-ellipticis acuminatis basi angustatis crassis subeveniis, cymis laxè trichotomis paucifloris, calycis laciniis margine membranaceis, corollæ tubo ferè a basi dilatato, ovario supernè uniloculari, bacca ovoideo-oblonga.—A præcedentibus floribus minoribus et baccis parvis primo intuitu distinguitur. Folia iis *F. obovatæ* angustiora, longius acuminata, 3–7 poll. longa, $1\frac{1}{2}$ – $2\frac{1}{2}$ poll. lata, crassa, siccatione punctato-rugosa, costa subtus prominente, venis raro conspicuis. Corymbi subsessiles, laxi, bis terve trifidi, pedicellis ultimis 2–3 lin. longis. Flores quoad formam iis *F. malabaricæ* subsimiles sed vix sesquipollicares. Calyces 4–5 lin. longi, lobis orbiculatis margine latè attenuatis ferè scariosis. Corollæ tubi pars tenuis vix calyce longior. Ovarium disco crasso insidens, basi biloculare, superne uniloculare placentis ibidem parietalibus basi confluentibus. Bacca ferè matura 9 lin. longa, angustè ovoidea, ferè acuta. Semina pulpa carnosa semi-immersa, numerosa, testa maculata, albumine carnoso v. ferè cartilagineo. Embryo (in semine nondum maturo?) minimus.

Hab. In montibus Khasia (*Griffith, Simons, D^o. Mack, Hook. fl. et Thomson*).

Speciem ut videtur novam ab Asa Gray edituram, præcedenti affinem, foliis latis, calyce minore, corollæ tubo longiore, legit *American Exploring Expedition* in ins. Feejee. Inflorescentia *F. lanceolata*, Wall., sed flores longè diversi.

F. minor, Blume, e Moluccis foliis basi non angustatis a plerisque hujus sectionis differt. Specimen vidi e Borneo (*Lowe*) cum icone Blumeana satis conveniens.

Supersunt species decem a Blumeo enumeratæ mihi omnino incognitæ.

§ 2. *Racemosæ*, cymis paucifloris brevibus secus pedunculum terminalem oppositis, in racemum plus minus elongatum dispositis.

F. racemosa, Jack, teste ipso Jackio, eadem est ac *F. volubilis*, Wall. Mihi forma videtur inter hanc et *F. morindæfoliam*, Blume, media et varietates tres in speciem unicam jungit, nomine antiquiore *F. racemosa*, Jack, salutandam.

Hab. In Moluccis; frequens in Malacca, ins. Philippinis, &c.

F. CRASSIPES, foliis amplis ellipticis breviter acuminatis basi obtusis, petiolorum basi stipulacea brevissimè connata truncata, cymis plurifloris in racemum brevem subcorymbosum longè pedunculatum coarctatis, corolla crassa infundibulari laciniis subrotundis tubo lato triplo brevioribus.—Folia 10-pollicaria ferè *F. racemosæ* sed magis coriacea, venis arcuatis subtus prominentibus, petiolo brevi crasso torto. Pedunculus 6–10-pollicaris, crassus, medio interdum bracteis 2 subfoliaceis instructus. Cymarum paria 2–3, inferiores pedunculatæ, superiores coarctatæ, singulæ sub-5-floræ. Pedicelli pollicares, crassi. Calyx *F. racemosæ* v. paullo major. Corolla crassa, sesquipollicaris v. paullo longior, tubo basi lato, fauce ampliata minus tamen quam in *F. racemosa*, limbi lobis subæqualibus. Stamina lobis corollinis

paullo breviora. Ovarium completè biloculare, placentis in medio dissepimento bifidis. Bacca junior ferè globosa. Affinis ex descr. *F. coarctata*, Blume, cujus tamen corolla cum illa *F. morindæfolia* (*F. racemosa*) comparatur.

Hab. In ins. Labuan (*Motley*).

F. LIGUSTRINA, Blume, var. ? *brachystachya*.—Pedunculus $1\frac{1}{2}$ –2-pollicaris. Racemi rhachis 1– $1\frac{1}{2}$ -pollicaris. Cymæ sessiles, oppositæ, trifloræ. Pedicelli breves. Corolla pollicaris, tubo tenui supra medium campanulato, dilatato. Ovarium supernè uniloculare, placentis ibidem parietalibus basi confluentibus.

Hab. In Singapore (*Lobb*).

Species Blumeana vera, cum aliis sex ejusdem auctoris hujus sectionis mihi ignotæ sunt.

§ 3. *Parvifloræ*, corymbis supradecompositis multifloris.

F. fragrans, Roxb.—*F. peregrina*, Blume ? In Martabania et Penang (*Wallich*), Tavoy (*Gomez*), Mergui et Malacca (*Griffith*).

F. speciosa, Blume.—*F. elliptica*, Roxb. ?—In Java (*Lobb*, n. 76).

F. Kimangu et *F. picrophlœa*, Blume, mihi ignotæ sunt.

F. tetragona, Spanoghe, Linnæa, vol. xv. p. 326, ex descr. e genere removenda erit.

F. Malayana, Mart., est forte *Tabernæmontana corymbosa* ?

XVII. POTALIA, *Aubl.* DC. Prod. vol. ix. p. 36.

Species unica :—

P. amara, *Aubl.*—*P. resinifera*, Mart.—In Cayenna (*Martin*). Ad Rio Negro superiorem (*Spruce*).

XVIII. ANTHOCLEISTA, *Afzel.* DC. Prod. vol. ix. p. 96.

Species unica :—

A. nobilis, Don.—*A. macrophylla*, Don.—*A. Vogelii*, Planch. in Hook. Ic. t. 793, 794, et Fl. Nig. t. 43, 44.—In Africa tropica occidentali (*G. Don*, *Vogel*, &c.).

XIX. STRYCHNOS, *L.* A. DC. Prod. vol. ix. p. 12.

I. Species Asiaticæ v. Africanæ.

* SCANDENTES, a *brevifloris* ad *longifloras ordinatæ*.

1. *S. MINOR*, Blume, A. DC. Prod. vol. ix. p. 14, scandens, glabra v. minutè puberula, cirrhis simplicibus, foliis ovatis breviter acuminatis, cymis brevibus axillaribus terminalibusque, floribus plerisque tetrameris, corollæ tubo laciniis brevioris.—Folia 3–5-nervia, nunc glaberrima, nunc uti petioli ramuli juniores et inflorescentia plus minus pubescentia, pilis minutis strigosis.

Cirrho oppositifolii (folio subtendente abortiente squamæformi). Cymæ petiolo paullo longiores. Calyx profundè 5-fidus, lobis ovatis ciliatis nunc obtusissimè rotundatis, nunc acutiusculis. Corolla vix $1\frac{1}{2}$ lin. longa, laciniis supra barbatis. Antherarum loculi basi ciliis paucis barbati. Ovarium biloculare, ovulis in quoque loculo 8-10. Bacca mono- vel oligo-sperma.

Hab. In ins. Ceylon, ubi varietates sequentes observantur :—

a. *nitida*, foliis ovatis subbipollicaribus basi angustatis, petiolo 2-3 lin. longo, cymis laxioribus terminalibus axillaribus.—In ins. Ceylon (*Walker, Thwaites*, n. 2516). Huc etiam pertinere videtur Icon Rheedii, vol. vii. t. 5.

β. *ovata*, foliis paullo minoribus, basi rotundatis opacis, cymis plerisque axillaribus densis paucifloris.—In ins. Ceylon (*Kelaart*).

γ. *angustior*, foliis angustius ovatis magis acuminatis, petiolo 1-2 lin. longo, cymis plerisque axillaribus.—In ins. Ceylon (*Walker, Thwaites*, n. 187).

δ. *parvifolia*, foliis vix pollicaribus, ovatis v. rarius obovatis, cymis paucifloris plerisque terminalibus.—In ins. Ceylon (*Gardner*, n. 580).

2. *S. COLUBRINA*, *Linn.* ?, *A. DC. Prod.* vol. ix. p. 14 ?, glabra, scandens, cirrhis plerisque bifurcatis, foliis ovatis ellipticisve obtusis v. vix acuminatis, cymis laxis axillaribus terminalibusque, floribus plerisque pentameris, corollæ tubo laciniis brevior.—*Modira Caniram*, *Rheede, Hort. Malab.* vol. viii. t. 24.—*S. bicirrhosa*, *Lesch.*, *A. DC. Prod.* vol. ix. p. 16.—Folia nunc iis *S. minoris* similia, nunc sæpius majora et proportione longiora. Cirrhi ut in *S. minore* oppositifolii, folio subtendente ad squamam reducto, sed sæpius bifidi sunt et sub bifurcatione bibracteolati; rarius occurrunt hinc inde simplices. Flores magnitudine *S. minoris*, sed semper pentameros nec tetrameros vidi. Fructus multo major quam in *S. minore*.

Hab. In Peninsula Indiæ Orientalis, in montibus Nilgherry (*Leschenault*), circa Madras (*Wight, Wall. Cat.* 1589 A, B, & C, et 4455 B*), in Terra Canara (*Law*). Specimina in herbariis nostris ad speciem ritè elucidandam haud sufficiunt.

3. *S. MALACCENSIS*, scandens, minute puberula, cirrhis simplicibus v. in ramulis aphyllis geminis, cymis interruptè paniculatis, pedicellis brevissimis, floribus pentameris, corollæ tubo laciniis brevior.—*S. colubrina*, *Wall. in Roxb. Fl. Ind.* vol. ii. p. 264 ?—Folia in speciminibus suppetentibus latè ovata, 3-pollicaria, quintuplinervia, costis petiolis ramulis inflorescentiaque puberulis; folia adulta coriacea glabrata. Pedunculi axillares, folio sublongiores, ad apicem cyma densa coronati, additis cymis 2 v. 4 secus pedunculum per paria dissitis. Flores parvi *S. colubrinæ*. Laciniæ corollæ prope basin densè barbati. Antheræ basi barbatae.

Hab. In Malacca (*Griffith*). Species ulterius cum *S. colubrina* comparanda.

4. *S. AXILLARIS*, *Colebr.*, *A. DC. Prod.* vol. ix. p. 13, scandens, cirrhis simplicibus, foliis ovatis acuminatis, cymis densis axillaribus, floribus pentameris, corollæ tubo laciniis brevior.—Ramuli novelli pubescentes demum glabrati. Folia $1\frac{1}{2}$ - $2\frac{1}{2}$ -pollicaria, acumine longo angusto. Cirrhi sæpius axillares folio subtendente perfecto, inferiores interdum more *S. minoris*

* 1589 D. est *Celtis Wightii*, 4455 A. est *Strychnos nux-vomica*.

oppositifolii, nonnulli etiam in ramulos foliiferos abeunt. Flores fere *S. minoris*, sed semper pentameros vidi.

Hab. In montibus Khasia (*Wall. Cat. n. 1587, Griffith, Hook. fil. et Thomson*).

5. *S. PANICULATA*, *Champ.*, Benth. in *Kew Journ. Bot. vol. v. p. 57*, glabra, subscondens, ecirrhosa?, foliis ovatis, paniculis thyrsoides plerisque terminalibus folio longioribus, pedicellis calyce multo longioribus, floribus tetrameris, corollæ tubo laciniis multo brevioribus.—Antheræ filamentis suo æquilongæ basi parè ciliatæ.

Hab. In ins. Hong Kong (*Champion*).

6. *S. MULTIFLORA*, glabra, subscondens?, ecirrhosa?, foliis amplis ovatis ellipticisve, paniculis folio sublongioribus laxè floribundis, pedicellis calyce sublongioribus, floribus pentameris, corollæ tubo laciniis æquante.—Ramuli læves. Folia 4–8 poll. longa, 2–4 poll. lata, breviter et obtusè acuminata, quintuplinervia, petiolo 3–4-lineari. Inflorescentia ferè *S. paniculata* sed pedicelli proportione breviores. Flores majores, semper pentameri. Corollæ tubus $1\frac{1}{2}$ lin., laciniæ $1\frac{1}{2}$ ad $1\frac{1}{2}$ lin. longæ, basi barbatae. Antheræ imberbes. Ovarium villosum. Stylus elongatus. Bacca globosa oligosperma, maturam non vidi. Affinis *S. laurinae*. Folia latiora. Corollæ majores laciniis longioribus.

Hab. In ins. Philippinis (*Cuming, n. 641, 695, 1059 & 1482*).

7. *S. LAURINA*, *Wall.*, A. DC. *Prod. vol. ix. p. 13*, glabra, subscondens, cirrhis bifidis, foliis ovali-ellipticis oblongisve subacuminatis 3–5-plinerviis, paniculis axillaribus folio brevioribus, terminalibus amplis multifloris, floribus pentameris, corollæ tubo laciniis paullo longiore.—Folia 4–6-pollicaria. Paniculæ puberulæ. Pedicelli ultimi abbreviati. Corollæ tubus $1\frac{1}{2}$ lin. longus, supernè latior, laciniæ vix lineam longæ, densè barbatae. Ovarium villosum. Bacca parva videtur, sed in specimine immatura.

Hab. Tavoy (*Gomez*), Mergui (*Griffith*).

8. *S. ANGUSTIFLORA*, glabra, scandens, cirrhis simplicibus apice incrassatis, foliis ovato-acuminatis orbiculatisve, cymis terminalibus pedunculatis laxis folio brevioribus pubescentibus, floribus pentameris, corollæ tubo laciniis elongatis sublongiore.—Folia parva, raro 2 pollices excedentia, latitudine quam maximè varia. Cymæ iis *S. Nux-vomicae* minores. Calyx minimus. Corolla 4 lin. longa; laciniæ basi intus villosæ, angustiores et longiores quam in omnibus mihi notis speciebus. Ovarium et stamina glaberrima. Bacca globosa.

Hab. In ins. Hong Kong (*Hinds, Champion, planta a me olim dubitanter ad S. colubrinam relata*).

9. *S. WALLICHIANA*, *Steud.*, DC. *Prod. vol. ix. p. 13*, glabra, foliis ovato-v. oblongo-ellipticis longè acuminatis triplinerviis, cymis densis multifloris folio brevioribus, corollæ pentameræ tubo tenui laciniis intus basi villosis 4–5-plo longiore.—Folia pleraque sub-5-pollicaria basi in petiolum brevem angustata, acumine abrupto semi-pollicari; in speciminibus nonnullis occurrunt latiora brevius acuminata ferè *S. ovalifoliae*. Pedunculi axillares v. terminales, apice trichotomi, cymis ultimis subcapitatis. Corollæ tubus 4–5 lin. longus, laciniæ vix lineam. Antheræ subexsertæ, glabræ v. basi

pilis paucis ciliatæ. Ovarium glabrum; dissepimentum crassiusculum; placentæ peltatæ ovulis plurimis semi-immersis.

Hab. In montibus Khasia (*H. Bruce, Simons*).

10. *S. Tiewte*, Blume, Rumphia, vol. i. t. 24, species Moluccana scandens, longiflora, fauce nuda, mihi ignota.

11. *S. OVALIFOLIA*, *Wall.*, DC. l. c. vol. ix. p. 13, scandens, cirrhosa, glaberrima, foliis ovatis ellipticisve obtusè acuminatis triplinerviis, paniculis axillaribus pedunculatis laxis folio subbrevioribus, floribus pentameris, corollæ imberbis? tubo laciniis pluries longiore.—*S. Wallichiana* affinis, folia plerumque latiora, magis coriacea, venis transversis minus conspicuis. Inflorescentia laxior. Pedicelli calyce longiores. Flores in speciminibus meis nimis juveniles non ritè examinare potui, sed corolla intus glabra videtur. Tubus certe ut in *S. Wallichiana* elongatus.

Hab. In ins. Penang (*Wallich*).—*S. acuminata*, *Wall.*, DC. l. c. p. 14, e Amherst et Chappedong videtur eadem species, sed flores et fructus desunt.

12. *S.* species, scandens, cirrhifera ex Africa tropica occidentali, floribus ignotis non definienda.

** ARBORESCENTES, a longifloris ad brevifloras ordinatæ.

13. *S. NUX-VOMICA*, *Linn.*, DC. l. c. p. 15, arborescens, foliis petiolatis ovatis 3-5-plinerviis glabris, corymbis terminalibus, corollæ imberbis tubo laciniis 3-4-plo longiore.—*S. ligustrina*, Blume, Rumphia, vol. i. p. 68. t. 25, ex ic. et descr.

Hab. Species ad oras Indiæ orientalis in ins. Ceylon et in Moluccis vulgaris.

14. ? *S. lucida*, *Br.*, DC. l. c. p. 16, ex Australia tropica, mihi ignota.

15. *S. POTATORUM*, *Linn. fl.*, DC. l. c. p. 15, arborescens, foliis brevissimè petiolatis ovatis oblongisve sub-5-plinerviis glabris, cymis ad ramos annotinos brevibus, floribus pentameris, calycis laciniis acuminatis, corollæ tubo laciniis paullo longiore, fauce villosissima.—Iconibus citatis adde *Wight Illustr.* vol. ii. t. 156. Corollæ tubus $1\frac{1}{2}$ lin. longus.

Hab. In India orientali frequens, in Peninsula (*Wight*), Behar (*Hook. fil.*), Prome (*Wallich*).

16. *S. UNGUACHA*, *A. Rich.*, Walp. Rep. vol. iii. p. 72, arborescens, foliis petiolatis ovatis oblongisve glabris, cymis ad ramos annotinos brevissimis densis, floribus plerisque tetrameris, calycis laciniis suborbiculatis, corollæ tubo laciniis incrassatis sublongiore, fauce breviter villosa.

Hab. In Abyssinia (*Schimp.* Ser. 3. n. 1817) et forte eadem species floribus 4-5-meris, in Senegambia (*Heudelot*, n. 801).

17. *S. Lokua*, *A. Rich.*, Walp. l. c., ex Abyssinia, a me non visa. Ex caractere differre videtur a præcedente pube, a sequente foliorum forma. Flores ignoti sunt.

18. *S. DYSOPHYLLA*, arborescens, foliis petiolatis obovatis orbiculatisve utrinque velutino-pubescentibus, cymis ad ramos annotinos brevissimis densis, floribus tetrameris, calycis laciniis suborbiculatis, corollæ tubo laciniis in-

crassatis sublongiore, fauce breviter villosa.—An *S. Unguachæ* var. insignis, foliis utrinque densè molliterque pubescentibus?

Hab. In Africa austro-orientali subtropica ad sinum Delagoa (*Forbes*).

II. Species Americanæ.

* *Longifloræ arborescentes.*

19. *S. pseudochina*, A. de St. Hil. ; A. DC. Prod. vol. ix. p. 14.—Frequens in campis altis prov. Minas Geraes et Goyaz (*Gardner*, n. 4273 & 5007, *Pohl*, *Claussen*, *Martius*, &c.).

20. *S. triplinervia*, Mart. ; A. DC. l. c.—*S. Gomeziana*, Casar. Stirp. Nov. p. 14 ; Walp. Rep. vol. vi. p. 497. Prope Rio Janeiro (*Gardner*, *Tweedie*, *Gomez*, &c.).

** *Longifloræ scandentes vulgo cirrhiferæ.*

21. *S. RONDELETIOIDES*, *Spruce*, scandens, glabra, foliis ovatis oblongisve breviter acuminatis coriaceis, cymis paniculatis terminalibus, pedicellis brevibus, corollæ pulveraceo-tomentellæ tubo laciniis duplo longiore.—Frutex altè scandens, cirrhis simplicibus incrassato-dilatatis. Folia superiora circa 3 poll. longa, 1½ poll. lata, basi rotundata ; inferiora sæpè semipedalia, circa 2 poll. lata, basi angustata ; omnia demum coriacea, 3-5-plinervia, supra nitida, subtus pallida, petiolo 3-4-lineari. Paniculæ foliis superioribus vix longiores, ramis oppositis, floribus ad apices ramulorum confertim cymosis suaveolentibus. Calyces sessiles v. breviter pedicellati, parvi, laciniis latè triangularibus acutis apice sæpè recurvis. Corollæ ochroleucæ tubo 3 lin. longo, laciniis 1½ lin. lanceolatis obtusiusculis intus basi lanatis. Stamina infra apicem tubi inserta, glabra ; antheræ oblongæ, apiculatæ. Ovarium glabrum, dissepimento tenui. Ovula pauca. Stylus exsertus, stigmatè capitato.

Hab. Frequens in "gapo" ad Rio Uaupès ubi Uirari-rána vocatur (*Spruce*, n. 2419).

22. *S. TOXIFERA*, *Schomb.*, DC. Prod. vol. ix. p. 16, scandens, pilis longis rufis patentibus hirsutissima, foliis ovatis v. oblongo-ellipticis acuminatis membranaceis, cymis paucifloris subcapitatis terminalibus, corollæ hirsutissimæ tubo laciniis 3-4-plo longiore.

Hab. In Guiana anglica (*Rob. Schomb.* coll. 1. n. 155, coll. 2. n. 770 ; *Rich. Schomb.* n. 1465). Confer *Schomb.* in Ann. Nat. Hist. vol. vii. p. 411, t. 12 & 13 ; *Hook.* Ic. t. 364 ; *Walp.* Ann. Bot. vol. i. p. 512.

23. *S. TOMENTOSA*, scandens, foliis ovatis oblongisve supra adpressè hirtellis subtus ramulisque rufo-tomentosis, cymis terminalibus confertim paucifloris, corollæ hirsutissimæ tubo laciniis subtriplo longiore.—Rami juniores tomentosi, demum glabrati. Folia breviter petiolata, in speciminibus suppetentibus 1-2 poll. longa, obtusa v. acuta, basi rotundata, 5- v. ferè 7-nervia, pilis paginæ superioris brevibus appressis, tomento inferioris denso molli. Inflorescentia fere *S. toxiferæ* sed laxior. Calycis laciniæ dimidio breviores, ovato-acuminatæ. Corolla ferè *S. toxiferæ*, sed in speci-

minibus paucæ nondum apertæ. Antheræ ut in illa ovato-oblongæ obtusæ vix apiculatæ. Ovarium glabrum, dissepimento tenuissimo.

Hab. In Guiana anglica, in montibus Roraima (*Rob. Schomb.* coll. 2. n. 723; *Rich. Schomb.* n. 1075).

24. *S. brachiata*, Ruiz & Pav., A. DC. Prod. vol. ix. p. 15, e Peruvia, a me non visa.

25. *S. SMILACINA*, glabra, foliis (amplis) ellipticis oblongisve coriaceis, cymis axillaribus brevissimis paucifloris v. secus ramulos axillares aphyllis folio breviores oppositis, calycis laciniis orbiculatis obtusis, corollæ pentameræ punctato-tomentellæ tubo laciniis plus duplo longiore.—Folia semipedalia v. longiora. Flores nunc in axillis 3–5 fasciculati breviter pedicellati, nunc sæpius in cymulas breves oppositas dispositi, paniculam axillarem racemiformem constituentes. Corollæ tubus 3 lin. longus, laciniæ vix linea longiores, obtusæ, intus basi parçè piloso-lanatæ.

Hab. In Guiana anglica (*Rob. Schomb.* coll. 2. n. 775, *Rich. Schomb.* n. 1516), Cayenne (*Martin*).

26. *S. GARDNERI*, A. DC. Prod. vol. ix. p. 14. Frutex scandens hinc inde cirrhifer, nec arbor. Flores pentameri, corollæ tubo punctato-tomentello laciniis duplo longiore.

Hab. In prov. Goyaz Brasiliæ, in sylvis prope Arrayas (*Gardner*, n. 3890), et ut videtur eadem in Guiana anglica ad flumen Corentyne superius (*Rob. Schomb.* specimen unicum).

27. *S. PEDUNCULATA*; *Rouhamon pedunculatum*, A. DC. Prod. vol. ix. p. 561. Frutex scandens, præcedenti similis, sed flores tetrameri, corollæ tubo laciniis vix dimidio longiore.

Hab. In montibus Roraima Guianæ anglicæ (*Rob. Schomb.* coll. 1. n. 482 & 792).

28. *S. DARIENENSIS*, Seem. Bot. Herald, p. 166.—Præcedentibus affinis et præsertim sequenti simillima. Folia tamen basi angustata nec ut in sequente rotundata. Flores non vidi. Secundum Seemann glabri sunt. An *S. cogentis* varietas?

Hab. In maritimis ins. Coyba et oræ Darienensis Americæ centralis (*Seemann*).

29. *S. COGENS*, *Schomb.*, DC. Prod. vol. ix. p. 16.—In specimine Schomburgkiano ramuli steriles pubescentes sunt, folia sæpius glabra; in Spruceanis ad eandem ut videtur speciem pertinentibus rami fructiferi glabri, paniculæ axillares, oblongæ, 1–2-pollicares, a basi ramosæ. Calycis laciniæ 5, parvæ, lanceolatæ, acutæ. Baccæ globosæ, flavescentes, seminibus 1–2 orbiculatis. Corollæ desunt.

Hab. In Guiana anglica (*Rob. Schomb.* coll. 1. n. 156). In “gapò” ad Rio Uaupès (*Spruce*, n. 2634) et specimen defloratum e Cayenna (*Martin*) huc etiam pertinere videtur.

30. *S. LANCEOLATA*, *Spruce*, scandens, ramulis hirtellis, foliis oblongo-lanceolatis acutis, cymis abbreviatis axillaribus, corollæ tubo laciniis densissimè lanatis vix longiore.—Cirrhi supernè demum valdè incrassati. Folia brevissimè petiolata, circa 2 poll. longa, 6–9 lin. lata, in specimine fructifero 3 poll. longa, 1 poll. lata, 3–5-plinervia, subtus ad axillas costarum barbata,

costis minutè puberulis, cæterum glabra. Cymæ laxæ, subsessiles, glabræ, pedicellis 1-2 lin. longis. Flores ochroleuci, suaveolentes, pentameri. Calyces glabri, laciniis breviter lanceolatis acutis. Corolla ferè *S. Rouhamon* sed tubus $1\frac{1}{2}$ lin. longus; laciniæ lanceolatæ vix breviores, lana interiore nivea densissima. Stamina ad faucem inserta; filamenta complanata, ad medium laciniarum attingentia; antheræ parvæ, ovatæ. Ovarium glabrum, carnosulum, dissepimento crassiusculo. Bacca flavescens, hinc planiuscula illinc convexa (loculo uno abortiente?). Semina 1-2.

Hab. In "gapò" ad ostium fluminis Uaupès et ad cataractas San Gabriel ad Rio Negro (*Spruce*, n. 2084 & 2375).

*** *Brevifloræ (corollæ tubo laciniis breviorè) cymis axillaribus.*

31. *S. ROUHAMON*, fruticosa, subcirrhifera, foliis ellipticis obovatis oblongisve basi angustatis subtus ad venas ramulisque tomentellis, cymis axillaribus brevibus, floribus 4-5-meris, corollæ tubo laciniis intus densissimè lanatis breviorè.—*Rouhamon guianense*, Aubl., DC. Prod. vol. ix. p. 17.—*R. divaricatum*, DC. l. c.

Hab. In Guiana anglica et gallica.

32. *S. SUBCORDATA*, *Spruce*, scandens, cirrhifera, ramulis hirtis, foliis subsessilibus ovato-lanceolatis basi plerisque cordatis subtus ad venas pubescentibus, cymis brevissimis axillaribus laxè 3-5-floris, floribus plerisque tetrameris, corollæ tubo brevi.—Frutex scandens. Folia majora bipollicaria, pollicem lata, acutiuscula, inferiora breviora et latiora, ramealia multo angustiora, ferè omnia basi cordata, consistentia papyracea v. demum coriacea. Calycis laciniæ parvæ, hirtellæ. Corollam nonnisi emarcidam vidi. Bacca cerasiformis, viridis, 1-2-sperma.

Hab. In sylvis ad Barra do Rio Negro (*Spruce*, n. 1237).

33. *S. BREVI-FOLIA*, *Spruce*, scandens, cirrhosa, ramulis pubescentibus, foliis subsessilibus cordato-ovatis subtus vel utrinque hirtellis, floribus axillaribus 1-3-nis subsessilibus plerisque tetrameris, corollæ tubo brevissimo.—Affinis *S. subcordata*. Folia vix unquam pollicem longa. Flores minores pedicellis subnullis. Calyces tamen majores et ferè glabri. Baccam non vidi. Flores ex *Spruce* ochroleuci suaveolentes.

Hab. In "Capoeiras" ad ostium flum. Uaupès (*Spruce*, n. 2087.)

34.? *S. Mitscherlichii*, Schomb.; Walp. Ann. vol. i. p. 512.—In Guiana anglica (*Rich. Schomb.*). Species a me non visa.

35.? *S. HIRSUTA*, *Spruce*, arborescens, pilis longis rufis patentibus hirsuta, foliis amplis oblongo-ellipticis acuminatis, floribus axillaribus sessilibus glomeratis pentameris, calycis laciniis lanceolatis hirsutis.—Arbor gracilis 20-pedalis (ex *Spruce*). Ramuli, costæ paginæ inferioris foliorum, calyces et bracteæ rufo-hispidi. Folia semipedalia, ferè sessilia, basi rotundata, apice longè et angustè cuspidata, 5-nervia, papyracea, supra glaberrima. Flores in axillis (uti de *S. Mitscherlichii* prædicatur) densè aggregati, bracteis lanceolatis acutis calyces superantibus. Calyx $1\frac{1}{2}$ lin. longus. Corollam non vidi. Ovarium apice pilosum, biloculare, ovulis paucis. Bacca glabra, oblonga, apice obliqua, semipollicaris, abortu monosperma.

Hab. In sylvis umbròsis Managuiry ad Rio Negro (*Spruce*).

36. *S. PARVIFLORA*, *Spruce*, foliis amplis oblongo-ellipticis glabris, cymis axillaribus paniculatis multifloris, floribus minimis pentameris, corollæ canescentis tubo brevissimo laciniis crassis medio lanatis.—Species inflorescentia distinctissima, flores parvi sequentium. Frutex est altè scandens. Ramuli tomento minutissimo flavicantes, demum glabri. Folia breviter petiolata, usque ad 8–10 poll. longa, 3–4 poll. lata, apice acuminata, basi cuneato-rotundata, demum crasso-coriacea, costis subtus elevatis. Paniculæ vel axillares vel ad basin innovationum oppositæ foliis floralibus abortientibus, pedunculatæ, trichotomæ, floribundæ, cymis ultimis densis. Flores in cymulis sessiles, suaveolentes, virentes, siccitate canescentes, vix lineam longi. Calyx minutus, laciniis latis obtusis ciliolatis. Corollæ tubus omnium brevissimus, staminibus versus basin affixis; laciniæ crassæ, intus breviter lanatæ. Ovarium glabrum, stylo brevi.

Hab. In “gapò” ad Rio Uaupès (*Spruce*, n. 2482).

**** *Brevifloræ (corollæ tubo brevissimo) cymis terminalibus.*

37. *S. MARGINATA*, suffruticosa, glaberrima, foliis ovatis orbiculatisve obtusissimis margine incrassatis, cymis terminalibus corymbosis, floribus 4–5-meris, corollæ extus glabræ tubo brevissimo.—Suffrutex 1–2-pedalis. Folia rigida 5-plinervia, venosa, basi apiceque obtusissima v. retusa, petiolo vix lineam longo. Cymæ nunc paucifloræ subsimplices, nunc multifloræ in paniculam seu corymbum basi trifidum dispositæ. Pedicelli brevissimi. Calyces parvi, lobis acutis. Corolla $1\frac{1}{2}$ lin. longa, alba, laciniis intus villosolanatis.

Hab. In collibus arenosis Missionum Duro prov. Goyaz (*Gardner*, n. 3322, caule bipedali foliis 1– $1\frac{1}{2}$ -pollicaribus) et ad Chapada da Mangabeira ejusdem provinciæ (*Gardner*, n. 3323, caule pedali foliis semipollicaribus sed inflorescentia vix evoluta).

38. *S. BRASILIENSIS*, *Mart.*, subarborescens, ramulis puberulis rarius glabratis, foliis ovatis submembranaceis v. tenuiter coriaceis margine tenui, cymis corymbosis terminalibus paucifloris, floribus pentameris, corollæ tubo brevissimo, laciniis medio barbatis.—Arbor parva (sub-15-pedalis) interdum spinis cirrhise axillaribus hinc inde armata. Folia 1– $1\frac{1}{2}$ v. rarius 2 poll. longa, acuta v. obtusa basi rotundata v. angustata. Flores vix $1\frac{1}{2}$ lin. longi. Baccæ cerasiformes aurantiacæ v. flavescens, 1–2-sperma. —Varietates tres vidi: *a*, *normalis*, glabriuscula sæpè floribunda axillis sæpè spiniferis; *S. brasiliensis* et *S. breviflora*, DC. Prod. vol. ix. p. 15. Prope Rio Janeiro præsertim in monte Corcovado (*Sello*, *Lhotsky*, *Gomez*, &c.).—*β*, *minor*, puberula, foliis minoribus, floribus paullo majoribus, inflorescentia densiore, ramulis hinc inde apice spinescentibus axillis nonnunquam cirrhiferis. In Serra Acurua prov. Bahia (*Blanchet*, n. 2792), ad Rio Tapajoz prope Santarem (*Spruce*, n. 704).—*γ*, *rigida*, ramulis evidentius tomentosis, foliis subtus plus minus hirtellis. In campis apertis montosis prope San Antonio (*Gardner*, n. 2085).

39. *S. rubiginosa*, DC. Prod. vol. ix. p. 16. Frutex v. arbor 6–20-pedalis. Flores vix linea longiores, pentameri. Ad Rio San Francisco (*Blanchet*, n. 2918), in districtu Paranaçoa, prov. Piauhy (*Gardner*, n. 2660 & 2661).

40. *S. CASTELNÆI*, Wedd. in Castelnau Expéd. Amér. Sud, vol. v. p. 22, scandens, ecirrhosa, ramulis ferrugineo-villosis foliis elliptico-oblongis membranaceis nervis subtus ferrugineo-pilosis, cymis corymbosis terminalibus multifloris ferrugineo-tomentosis, corollæ tubo brevi laciniis apice barbularis.—Caules altè scandentes demum glabrati. Folia palmaria, acuminata, nitidula glabraque v. puberula, nervis supra pubescentibus imprimis subtusque ferrugineo-pilosis; floralia pollicaria, bractæformia, basi incrassata et reticulata. Cymæ vix bipollicares in ramulis annuis terminales. Calyces bracteis nonnullis linearibus involucrati, lobis obtusis. Corolla inconspicua, breviter infundibuliformis, ad faucem nuda. Antheræ basi barbularis. (Descr. ex Weddel. l. c. et vidi specim. in herb. Mus. Par.)

Hab. Ad ripas fluminis Amazon inter flumina Ucayala et Tabatinga (de Castelnau).

Species non satis notæ sunt:—

S. Ignatia, Juss. Semina a Gærtnero aliisque depicta ad *Strychnum* quendam (an *S. multifloram*?) ex ins. Philippinis pertinent. Flores a Linnæo filio sub nomine *Ignatiæ amaræ* descripti, *Posoqueriam longifloram* e Guiana referunt.

S. farinosa, Blume.—DC. Prod. vol. ix. p. 16, e Madagascaria.

S. innocua, Delile.—DC. l. c. e Nubia.

S. Curare, H. B. K.—Rouhamon? *Curare*, A. DC. Prod. vol. ix. p. 17.

S. Panamensis, Seem. Bot. Herald, p. 166.

Species excludendæ:—

S. grandis, Wall. = *Anisophyllum grande*.

S. 5500 Wall. Cat. Planta dubia, certè non hujus ordinis.

S. oblongifolia, Hochst. = *Carissa oblongifolia*.

S. scandens, Schum. & Thonn. = *Apocynæa*?

XX. BREHMIA, Harv., A. DC. Prod. vol. ix. p. 19.

Species unica:—

B. spinosa, Harv.; A. DC. l. c.—In Madagascaria, Africa austro-orientali et tropica usque ad Senegambiam (Heudelot).

XXI. LABORDEA, Gaud., A. DC. Prod. vol. ix. p. 21.

Species unica:—

L. fagroidea, Gaud.; DC. l. c.—In ins. Sandwichensibus. A me non examinata.

XXII. NICODEMIA, Ten. Cat. Hort. Napol. p. 88.

Species sunt:—

1. *N. diversifolia*, Ten. l. c.; Walp. Ann. vol. i. p. 531.—*Buddleia diversifolia*, Lam.; Benth. in DC. Prod. vol. x. p. 445.—In ins. Mauritio et Madagascar.

2. *N. rondeletiaeflora*.—*Buddleia rondeletiaeflora*, Benth. l. c. p. 445.—In ins. Johanna Comores.

XXIII. GARDNERIA, *Wall.*, DC. Prod. vol. ix. p. 19.

Species sunt:—

1. *G. OVATA*, *Wall.*, DC. l. c. p. 20, pedunculis trifidis trichotomisve, corollæ lobis obtusis, antheris connatis, ovarii loculis uniovulatis.—*Wall. Pl. As. Rar.* vol. iii. t. 231.—*G. Wallichiana*, *Wight* in *Wall. Pl. As. Rar.* vol. iii. t. 281; *Wight*, *Ic. t.* 1313.

Hab. In montibus Khasia (*M. R. Smith, Griffith, Hook. fil. & Thoms.*); in montibus Peninsulæ Indiæ Orientalis (*Wight, Gardner, Schmidt, Hohenacker*, n. 1445, sub nom. *Ardisiaceæ tetrameræ*).

2. *G. ANGUSTIFOLIA*, *Wall.*, DC. l. c., pedunculis unifloris recurvis rarissimè bifloris, corollæ lobis acuminatis, antheris liberis, ovarii loculis collateraliter biovulatis.—*G. nutans*, *Sieb. & Zucc. Fam. nat. Fl. Jap. pars 2. p.* 41.

Hab. In jugo Himalaico, in Napalia (*Wall.*), in Kemaon (*Madden, Strachey & Winterbottom*), in montibus Sikkim (*Hook. fil.*) et Khasia (*Hook. fil. & Thoms.*), et in Japonia (*Siebold*).

XXIV. PAGAMEA, *Aubl.*, DC. Prod. vol. ix. p. 19.

Flores sæpè polygamo-dioici. Ovarium perfectum, biloculare; ovula in loculis solitaria, e basi erecta. Bacca seu drupa nigra v. virescens, dipyrena, pyrenis crustaceis v. ferè osseis, intus planis, dorso convexis. Semen erectum, testa tenui, albumine cartilagineo sulcato-runcinato. Embryo parvus, subteres, prope basin albuminis erectus, radícula recta, cotyledonibus æquilonga.

Species sunt:—

1. *P. CAPITATA*, foliis ovato-lanceolatis acuminatis margine revolutis subtus inflorescentiaque hirtellis, florum glomerulis ad apicem pedunculi capitatis bracteatis.—Partes juniores pilis brevibus mollibus hirtæ et ut videtur viscidulæ. Stipulæ quam in cæteris Pagameis breviores et diutius persistentes; vaginæ vix 2 lin. longæ, dentes breves. Folia forma ferè *P. guianensis*, sed magis acuminata, rigidiora, 2–2½ poll. longa, supra nitidula, margine in sicco semper revoluta, venis primariis secus costam utrinque 4–6 prominulis subplicata. Pedunculi compressi, foliis breviores, capitulo denso depresso, bracteis linearibus foliaceis sæpius 2–4 flores superantibus. Flores tetrameri. Corollæ lobi intus ferè glabri. Stylus bifidus.

Hab. In Guiana anglica (*Rob. Schomb. coll. 2. n.* 578; *Rich. Schomb. n.* 870) et in Surinama (*Hostmann*, n. 801).

2. *P. PPLICATA*, *Spruce*, foliis (amplis) ovali-ellipticis subtus molliter pubescentibus, venis primariis valdè prominentibus, florum glomerulis interruptè spicatis.—Arbor 30-pedalis. Stipulæ elongatæ. Folia 6–8 poll. longa, 3–4 poll. lata, petiolo triquetro sæpè ultra pollicem longo, supra glabra, subtus canescentia, inter costas insigniter plicata, præsertim in vivo teste *Spruceo*. Pedunculi 2–4-pollicares, valdè compressi, uti calyces leviter puberuli. Inflorescentia *P. guianensis*, sed flores et fructus majores; corollas tamen non vidi.

Hab. In campo quodam arenoso parvo prope San Gabriel do Cachoeiras ad Rio Negro Brasiliæ septentrionalis detexit *R. Spruce*.

Var. β . *glabrescens*, foliis subtus parè villosis. Corollæ tubus brevis, laciniæ intus breviter paleaceo-villosæ. In Brasiliæ prov. Pernambuco ad Rio Preto legit *G. Gardner*, n. 2891.

3. *P. GUIANENSIS*, *Aubl.*, DC. Prod. vol. ix. p. 19, glabra, foliis ovato-lanceolatis oblongisve planis, florum glomerulis interruptè spicatis, corollæ lobis intus paleaceo-villosissimis.—Frutex v. arbor parva 6–15-pedalis. Folia $1\frac{1}{2}$ –2 rarius 3 poll. longa. Flores albi. Baccæ demum nigricantes.

Hab. Frequens in Guiana anglica et gallica, in Surinama et in Brasilia boreali usque ad Bahiam.

4. *P. SESSILIFLORA*, *Spruce*, glabra, foliis oblongo-lanceolatis planis, florum glomerulis inter folia suprema arctè sessilibus, corollæ lobis intus villosis.—Arbor parva, ramosissima, 6–15-pedalis. Folia quam in *P. guianensi* minora, apice basi que angustata. Stipulæ latæ, membranacæ, caducissimæ. Flores magnitudine *P. guianensis*. Calycis margo 4–5-dentatus. Corolla pallidè vires, villis quam in *P. guianensi* brevioribus. Baccæ ovoideo-globosæ, non didymæ. Semina profundè sulcato-rugosa.

Hab. In sylvis humilioribus prope San Carlos do Rio Negro (*Spruce*).

5. *P. THYRSIFLORA*, *Spruce*, glabra, foliis ovato-lanceolatis oblongisve planis, florum glomerulis pedunculatis thyrsoideo-paniculatis, corollæ lobis intus brevissimè paleaceo-hirtis.—Arbor 6–15-pedalis, densè ramosa, in omnibus *P. guianensi* similis, nisi inflorescentia laxa, interdum ferè corymbosa, glomerulis inferioribus longiusculè pedunculatis et floribus (albis) minoribus corollæ lobis intus paleis brevissimis candidis nec pilis longis paleaceis obtectis. Stylus semibifidus. Baccæ quam in *P. guianensi* minores, ovoideo-globosæ nec didymæ. Semina hemisphærica, intus profundè bisulcata, dorso leviter corrugata.

Hab. In sylvis humidis prope San Carlos do Rio Negro (*Spruce*).

6. *P. MACROPHYLLA*, *Spruce*, glabra, foliis amplis ovali-vel oblongo-ellipticis breviter acuminatis, panicula ramosa petiolum vix superante, corollæ lobis intus densè villosis.—Arbor 15–20-pedalis, ramulis crassiusculis. Folia 6–8 poll. longa, 3–4 poll. lata, basi in petiolum sesquipollicarem angustata, subcoriacea, plana, glabra at opaca, subtus punctis lepidotis minutis creberrimis pallida; costa venisque primariis utrinsecus 8–9 subtus prominentibus. Stipulæ $1\frac{1}{2}$ –2-pollicares, acuminatæ, connatæ, superiores circa inflorescentias juniores medio inflatæ, membranacæ, mox rumpentes et subcalyptratim deciduæ, basibus latis irregulariter truncatis persistentibus. Paniculæ in axillis supremis oppositæ, petiolo paullo longiores v. subbreviares, trichotomæ, densifloræ, rhachide compressa. Flores ad apices ramulorum brevium conferti, sessiles. Calyx cupuliformis, truncatus, tubo basi breviter carnosus, ovario pulvinato. Ovula in floribus a me examinatis minuta ut videtur abortiva. Corolla virescens, 4-fida, lobis intus densissimè paleaceo-pilosis.

Hab. Frequens in sylvis *Caa-tingas* dictis prope Panurè ad Rio Uaupès (*Spruce*).

7. *P. CORIACEA*, *Spruce*, glabra, foliis (amplis) ovali- v. oblongo-ellipticis coriaceis, paniculis folia subæquantibus, florum glomerulis secus ramos paniculæ interruptè spicatis.—Arbor gracilis 20–50-pedalis. Ramuli virides,

medulla ex Spruceo hexagona. Folia longè petiolata, subsemipedalia, in vivo crassa et viridia, venis vix prominulis. Stipularum vaginæ pollicares v. longiores, dentibus brevibus. Inflorescentiæ albidæ, subcarnosæ, folia breviter superantes, pedunculo compresso supra medium ramoso, glomerulis secus ramos sessilibus. Flores *P. guianensis*, albi, pili tamen loborum corollæ multo breviores. Stylus vix ad medium bifidus. Fructus *P. guianensis*, v. paullo major, apice emarginatus v. subdidymus.

Hab. In campis ad Rio Negro prope cataractas San Gabriel et ad Uananaca, necnon ad ripas fluminis Orenoco prope Esmeralda frequens (*Spruce*).

8. *P. HIRSUTA*, *Spruce*, undique pilis longis hirsuta, foliis amplis oblongo-ellipticis, florum glomerulis secus pedunculum paucis, summis sessilibus infimis breviter pedunculatis.—Folia petiolata, magnitudine *P. coriaceæ* et *P. plicatæ*, sed utrinque uti ramuli stipulæ et inflorescentiæ pilis longis subrufis patentibus hirsuta. Stipulæ sesquipollicares, connatæ, rufo-villosæ, caducissimæ. Pedunculi oppositi, folio breviores, ancipites. Capitula in parte superiore 3–5, summo terminali, pari superiore sessili, inferiore utrinque pedunculato. Calyx breviter hispidus, limbo brevi cupulato integro. Corollæ tubus duplo longior, lacinie angustæ, acutæ, extus hispidæ, intus pilis brevibus paleaceis vestitæ. Fructus *P. coriaceæ*, subdidymus.

Hab. In sylvis humilioribus ad flumen Guaiaina seu Rio Negro superius, et prope San Carlos do Rio Negro (*Spruce*).

XXV. GÆRTNERA, *Lam.*, DC. Prod. vol. ix. p. 32; Blume, Mus. Bot. p. 173.

Sect. I. ÆTHEONEMA, DC.—Calyx amplus coloratus limbo campanulato.

Species unica:—

1. *G. calycina*, Boj. in DC. Prod. vol. ix. p. 35.

Sect. II. EUGÆRTNERA, DC.—Calyx parvus, limbo patente v. subcampanulato. Corollæ tubus elongatus intus nudus v. intra stamina leviter villosus.

2–14. Species 13 Mascarenses in 'Prodromo' enumeratæ cum sequentibus duabus Ceylonensibus.

15. *G. ROSEA*, *Thwaites*, foliis ovatis lanceolatisve acutè acuminatis, stipulis biaristatis, floribus ternis sessilibus, calyce truncato 5-dentato, corollæ tubo elongato intus leviter villosus, filamentis anthera longioribus medio tubo insertis.—Frutex dichotomè ramosus. Folia sub-bipollicaria. Vaginæ stipulares breves, aristis brevioribus longioribusve. Corollæ rosæ, 8–9 lin. longæ. Bacca subdrupacea, basi contracta.

Hab. In ins. Ceylon (*Walker, Thwaites*).

16. *G. WALKERI*, *Wight*, Illustr. vol. ii. t. 156, foliis oblongis lanceolatisve acutè acuminatis, panicula pauciflora, pedicellis elongatis, corollæ tubo elongato intus villosulo, filamentis anthera sublongioribus medio tubo insertis.

Hab. In ins. Ceylon (*Walker, Gardner*, n. 581).—Ejusdem var. *angustifolia*, foliis angustè lanceolatis linearibusve, pedicellis 1–3-nis, dentibus calycinis angustioribus. In ins. Ceylon (*Walker, Thwaites*, n. 363, 440 & 457).

Sect. III. SYKESIA.—Calyx *Eugærtneræ*. Corollæ tubus lobis brevior v. vix longior, ad faucem intus villosus.

17. *G. PANICULATA*, *Benth.* in *Hook. Fl. Nigr.* p. 459, foliis (amplis) breviter petiolatis obovali-ellipticis oblongisve breviter acuminatis, vaginis stipulaceis apice aristato-dentiferis, panicula laxa trichotoma, corollæ lobis tubo subbrevioribus, antheris vix exsertis filamentis longioribus.—Species *G. Kænigii* arctè affinis. Flores numerosiores, minores, graciliores, calyx minus patens, et stipulæ aristatæ.

Hab. In Africa tropica occidentali ad Grand Bassa (*Vogel*).

18. *G. KÆNIGII*, *Wight, Ic.* t. 1318; *Blume, Mus. Bot.* p. 174, foliis (amplis) breviter petiolatis obovali-ellipticis oblongisve breviter acuminatis, vaginis stipulaceis integris v. obtusè dentatis, panicula laxè trichotoma, corollæ lobis tubo suo longioribus, antheris exsertis filamentis elongatis.—*Sykesia Kænigii*, *Arn., DC. Prod.* vol. ix. p. 35.

Hab. In ins. Ceylon (*Walker, Gardner, n.* 582, &c.).

19. *G. ACUMINATA*, foliis oblongis acutè acuminatis, vaginis stipulaceis apice subaristato-dentiferis, panicula laxè trichotoma, corollæ lobis tubo subæquilongis, antheris vix exsertis filamentis longioribus.—Valde affinis *G. Kænigii* et fortè ejus varietas, folia angustiora longius et acutius acuminata, corollæ minores tubo tenuiore et filamenta multo breviora. Faux corollæ densè villosa.

Hab. In Singapore (*Wall. Cat.* n. 8342), et eadem species? in Borneo (*Lobb*).—An *G. Kænigii, paniculata* et *acuminata* ad unam speciem pertinent ab Africa occidentali usque ad Moluccas diffusam?

20. *G. THYRSIFLOEA*, *Blume, Mus. Bot.* p. 174, foliis oblongis acutè acuminatis, vaginis stipulaceis 2–4-aristatis, panicula laxè thyrsioidea pauciflora, corollæ tubo laciniis brevior, antheris exsertis, filamentis elongatis.—*Sykesia thyrsoiflora*, *Arn., DC. Prod.* vol. ix. p. 35.—Drupa dipyrena, pyrenis chartaceis, facie plana. Semen semiglobosum, prope basin interiorè affixum. Testa venis ramosis leviter impressa. Albumen cartilagineum. Embryo prope basin albuminis rectum, cylindricum; radícula elongata ad hilum spectans; cotyledones breves conicæ.

Hab. In ins. Ceylon (*Walker, et forte Thwaites, n.* 288 sine fl.).

21. *G. OXYPHYLLA*, foliis oblongo-lanceolatis acutè acuminatis basi longè angustatis, vaginis stipulaceis subbriaristatis, panicula laxa pauciflora, corollæ tubo laciniis subæquilongo, filamentis brevibus (?).—*Psychotria oxyphylla*, *Wall. Cat.* n. 8374.—Specimina perpauca quæ vidi a *G. acuminata* differre videntur, foliis minoribus multo angustioribus et inflorescentia depauperata. Panicula trifida ramis subpollicaribus, terminali 5–7-floro, lateralibus trifloris.

Hab. In ins. Singapore (*Wallich*).

Since the publication of the first portion of this paper, I have received a detailed memoir on the same subject by M. Louis

Edouard Bureau, entitled "De la Famille des Loganiacées et des plantes qu'elle fournit à la médecine, Thèse pour le Doctorat en médecine." Paris, 1856, 4to, 150 pp. The medical properties of the drugs derived from the family are treated at great length, but there is also considerable space devoted to the systematic questions which are the subject of my own paper. M. Bureau has not had the same advantages as myself in the examination of so large a proportion of specimens, nor does he appear to have had the opportunity of consulting some of the more modern works excepting through Walpers's extracts, such, for instance, as Blume's "Museum Botanicum Lugduno-Batavum," but he has availed himself to the utmost of the materials he has had access to, and his analysis and descriptions are very careful and exact. He inclines to reject a considerable number of genera, referring them to their nearest allied families; that is, *Mitreola*, *Mitrasacme*, and *Polypremum* to *Rubiaceæ*; *Gelsemium* to *Apocynæ*; *Fagraea*, *Potalia*, and *Anthocleista* to *Gentianæ*; *Nuxia* and its allies to *Scrophularinæ*. For the reasons above given, I cannot concur in this course, unless indeed the whole order be broken up, and the two genera which M. Bureau considers as essentially typical, *Logania* and *Geniostoma*, be also rejected, the one to *Scrophularinæ*, the other to *Apocynæ*.

M. Bureau's careful observations of the details of structure of such genera as he had specimens of to dissect, suggest a few additional notes which I shall place in the order above adopted.

MITREOLA, MITRASACME, and POLYPREMUM.

In dissecting the flowers at a very early stage, M. Bureau finds a very perceptible adherence of the ovary to the tube of the calyx, amounting in *Polypremum* to a fifth or nearly a fourth of the total height of the young ovary, and in *Mitreola* to nearly one-half in a very young state, although gradually disappearing as the ovary grows, and imperceptible when the capsule is ripe. This adherence, which some might be disposed to consider as the broad base of the ovary, always large in proportion to its height at an early stage, is, without doubt, indicative of a close affinity to *Rubiaceæ*, an affinity which must suggest itself to any one who studies the *Loganiaceæ*; but appears to me insufficient to establish identity, as it is no more than what is observable in numerous *Scrophularinæ*—in none more so than in *Calceolaria*, which can yet hardly be excluded from true *Scrophularinæ*.

GENIOSTOMA.

M. Bureau points out the curious expansions of the placenta in

which the seeds are imbedded. Most probably in a fresh state they form a pulp filling the whole cavity of the fruit, assuming in desiccation the regular stellately-lobed form, described and figured by M. Bureau.

LABORDEA.

M. Bureau has been enabled to dissect three flowers of this plant. He confirms the presumed valvular æstivation of the corolla, but finds always two cells only to the ovary, as in the majority of *Loganiaceæ*, and very plausibly suggests that the three-celled one, examined by Gaudichaud, was an accidentally abnormal one. As the fruit is still unknown, there is nothing yet to indicate more exactly its proper place in the order.

GARDNERIA.

M. Bureau has dissected a flower of *G. ovata*, with ovary-cells and ovules very much larger in proportion to the ovary itself than I had succeeded in finding; possibly those I dissected may have been imperfect by abortion, or M. Bureau's flower may have belonged to the *G. angustifolia*, which is often much like *G. ovata* in foliage. I found the ovary of *G. angustifolia* very much like that figured p. 55 of M. Bureau's paper; but what he designates as a cupuliform arillus, was to my eyes a second ovule, collateral in attachment, but superposed by pressure, and often ripening into a second seed; for the fruit of *G. angustifolia* is more frequently tetraspermous than dispermous.

M. Bureau's woodcuts, comprising dissections of all the genera he has examined, are very accurate and well executed.

I take this opportunity of requesting the correction of two clerical or typographical errors in the first portion of this paper:—

Page 57, line 2 from the bottom, *for stipules read petioles.*

— 81, — 25, *for exact read erect.*

On some Collections of Arctic Plants, chiefly made by Dr. Lyall, Dr. Anderson, Herr Miertsching, and Mr. Rac, during the Expeditions in search of Sir John Franklin, under Sir John Richardson, Sir Edward Belcher, and Sir Robert M'Clure. By J. D. HOOKEB, Esq., M.D., F.R.S., F.L.S., &c.

[Read April 1st, 1856.]

ALTHOUGH the collections made during the later Arctic expeditions contain no novelty, they are, I think, worthy of publication;

both as important materials towards our knowledge of the geographical distribution of plants within the Polar Circle, and as records of the eminent services rendered to this branch of science, by the exertions of the officers of those expeditions, which have contributed so materially to the naval glory of the first half of the nineteenth century.

It is not my intention to do more here than place on record an account of the collections made by Dr. Lyall in Sir E. Belcher's expedition, by Dr. Anderson and Herr Miertsching in Sir R. M'Clure's, and by Mr. Rae after his detachment from Sir John Richardson's party on an exploring expedition from Great Bear Lake to the mouth of the Coppermine River, and to the south shores of Victoria Land. I restrict myself thus, because I hope at some future period to have the honour of laying before this Society a full account of the vegetation of the Polar Circle, embracing the discoveries of all our Arctic voyagers, as well as those of the Scandinavian and Russian naturalists in Greenland, North Europe, and Siberia. This, however, is a work demanding much time and study; my main object in attempting it being to trace the extra Polar distribution of the Polar species, to determine, if possible, the effects of climate upon them during various phases of their development, and to indicate some causes which may have contributed to determine their present distribution.

1. Dr. Lyall's plants, collected during Sir E. Belcher's expedition in 1852-4, in Disco and Whale Fish Islands, and Cape York (coast of Greenland); and in Lancaster Sound, Beechey Island, Wellington Channel, and Northumberland Sound, amongst the Polar islands.

Lat. 68° to 77° N.

Long. 50° to 95° W.

2. Dr. Anderson's and Herr Miertsching's collections from Banks' Land and the adjacent west coast of Prince of Wales Land, and Cape Bathurst, on the mainland to the southward of Banks' Land.

Lat. 70° to 74° N.

Long. 115° to 128° W.

3. Mr. Rae's collections, the chief interest of which is that they connect the latter with the vegetation of the mainland to the south-east, and with the southern shores of Prince Albert's Land, portions of which are called Victoria Land and Wollaston Land.

Lat. 66° to 69° N.

Long. 112° to 117° W.

I cannot dismiss this subject, however briefly introduced, without adverting to the advantage I have derived from the study of Sir John Richardson's admirable Essay on the Geographical Distribution of (American) plants in the country north of the 49th parallel of latitude in his "Arctic Searching Expedition" (ii. 264).

I. DR. LYALL'S Collection.

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| <p>1. <i>Thalictrum alpinum</i>, <i>L.</i>
<i>Hab.</i> Disco.</p> <p>2. <i>Ranunculus nivalis</i>, <i>L.</i>
<i>Hab.</i> Disco, Navy Board Inlet, Pond's Bay, Beechey Island, and Northumberland Sound.</p> <p>3. <i>Papaver nudicaule</i>, <i>L.</i>
<i>Hab.</i> Wellington Channel, &c., abundant.</p> <p>4. <i>Arabis alpina</i>, <i>L.</i>
<i>Hab.</i> Disco.</p> <p>5. <i>Draba alpina</i>, <i>Wahl.</i>
—— <i>glacialis</i>, Adams.
—— <i>algida</i>, Adams.
<i>Hab.</i> Beechey Island and Wellington Channel.</p> <p>6. <i>Draba micropetala</i>, <i>Hook.</i>
<i>Hab.</i> Wellington Channel.</p> <p>7. <i>Draba rupestris</i>, <i>R.Br.</i>
<i>Hab.</i> Powell Creek and Beechey Island.</p> <p>8. <i>Cochlearia anglica</i>, <i>DC.</i>
<i>Hab.</i> Pond's Bay, Beechey Island, and Wellington Channel.</p> <p>9. <i>Platypetalum purpurascens</i>, <i>R.Br.</i>
<i>Hab.</i> Lancaster Sound.</p> <p>10. <i>Silene acaulis</i>, <i>L.</i>
<i>Hab.</i> Disco.</p> <p>11. <i>Lychnis apetala</i>, <i>L.</i>
<i>Hab.</i> Wellington Channel.</p> <p>12. <i>Larbræa uliginosa</i>, <i>Hook.</i>
<i>Hab.</i> Disco.</p> <p>13. <i>Stellaria glauca</i>, <i>L.</i>
<i>Hab.</i> Disco.</p> <p>14. <i>Stellaria longipes</i>, <i>Goldie.</i>
<i>Hab.</i> Wellington Channel.</p> | <p>15. <i>Arenaria rubra</i>, <i>L.</i>
<i>Hab.</i> Disco.</p> <p>16. <i>Arenaria rubella</i>, <i>Hook.</i>
<i>Hab.</i> Beechey Island.</p> <p>17. <i>Arenaria Rossii</i>, <i>R.Br.</i>
<i>Hab.</i> Beechey Island and Northumberland Sound.</p> <p>18. <i>Honckeneya peploides</i>, <i>Ehrh.</i>
<i>Hab.</i> Whale Fish Island.</p> <p>19. <i>Cerastium alpinum</i>, <i>L.</i>
<i>Hab.</i> Whale Fish Island, Disco, and Wellington Channel.</p> <p>20. <i>Oxytropis campestris</i>, <i>L.</i>
<i>Hab.</i> Pond's Bay.</p> <p>21. <i>Alchemilla vulgaris</i>, <i>L.</i>
<i>Hab.</i> Disco.</p> <p>22. <i>Dryas integrifolia</i>, <i>Vahl.</i>
<i>Hab.</i> Beechey Island, Northumberland Sound, and Powell Creek.</p> <p>23. <i>Dryas octopetala</i>, <i>L.</i>
<i>Hab.</i> Wellington Channel.</p> <p>24. <i>Potentilla crocea</i>, <i>Salisb.</i>
<i>Hab.</i> Disco.</p> <p>25. <i>Potentilla pulchella</i>, <i>R.Br.</i>
<i>Hab.</i> Powell Creek, Beechey Island, and Northumberland Sound.</p> <p>26. <i>Potentilla nivea</i>, <i>L.</i>
<i>Hab.</i> Disco.</p> <p>27. <i>Potentilla pulchella</i>, <i>R.Br.?</i>
<i>Hab.</i> Disco.</p> <p>28. <i>Epilobium latifolium</i>, <i>L.</i>
<i>Hab.</i> Disco.</p> <p>29. <i>Saxifraga Hirculus</i>, <i>L.</i>
<i>Hab.</i> Beechey Island, Wellington Channel, and Northumberland Sound.</p> |
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30. *Saxifraga flagellaris*, *Willd.*
Hab. Beechey Island, Wellington Channel, and Northumberland Sound.
31. *Saxifraga tricuspidata*, *Retz.*
Hab. Pond's Bay and Disco.
32. *Saxifraga nivalis*, *L.*
Hab. Beechey Island and Wellington Channel.
33. *Saxifraga cæspitosa*, *L.*
Hab. Whale Fish Island, Powell Creek, Beechey Island, Wellington Channel, and Northumberland Sound.
34. *Saxifraga hirta*, *Haw.*
Hab. Disco.
35. *Saxifraga cernua*, *L.*
Hab. Beechey Island, Wellington Channel, and Northumberland Sound.
36. *Saxifraga rivularis*, *L.*
Hab. Disco.
- Saxifraga rivularis*, *var. hyperborea.*
Hab. Wellington Channel and Powell Creek.
37. *Saxifraga Aizoon*, *Jacq.*
Hab. Disco.
38. *Saxifraga oppositifolia*, *L.*
Hab. Abundant as far North as Northumberland Sound.
39. *Chrysosplenium alternifolium*, *L.*
Hab. Wellington Channel.
40. *Angelica officinalis*, *L.*
Hab. Disco.
41. *Taraxacum dens-leonis*, *Desf.*
Hab. Disco. Wild and introduced forms.
42. *Gnaphalium sylvaticum*, *L.*
Hab. Disco.
43. *Gnaphalium supinum*, *L.*
Hab. Disco.
44. *Antennaria alpina*, *Gertn.*
Hab. Disco.
45. *Erigeron uniflorum*, *L.*
Hab. Disco.
46. *Campanula linifolia*, *A. DC.*
Hab. Disco.
47. *Vaccinium uliginosum*, *L.*
Hab. Disco and Pond's Bay.
48. *Azalea procumbens*, *L.*
Hab. Whale Fish Island.
49. *Pyrola rotundifolia*, *L.*
Hab. Disco and Whale Fish Island.
50. *Cassiopea tetragona*, *Don.*
Hab. Whale Fish Island, Navy Board Inlet, Pond's Bay, Beechey Island, and Northumberland Sound.
51. *Ledum palustre*, *L.*
Hab. Whale Fish Island.
52. *Phyllodoce taxifolia*, *Don.*
Hab. Disco.
53. *Pedicularis hirsuta*, *L.*
Hab. Disco, Pond's Bay, Beechey Island, and Wellington Channel.
54. *Veronica alpina*, *L.*
Hab. Disco.
55. *Bartsia alpina*, *L.*
Hab. Disco.
56. *Empetrum nigrum*, *L.*
Hab. Whale Fish Island and Disco.
57. *Polygonum viviparum*, *L.*
Hab. Disco, Powell Creek, Beechey Island, and Wellington Channel.
58. *Oxyria reniformis*, *L.*
Hab. Disco, Powell Creek, Beechey Island, and Northumberland Sound.
59. *Betula nana*, *L.*
Hab. Disco.
60. *Salix arctica*, *R. Br.*
Hab. Disco, Navy Board Inlet, Powell Creek, Beechey Island, and Wellington Channel.
61. *Salix polaris*, *Wahl.*
Hab. Powell Creek.
62. *Peristylus albidus*, *Lindl.*
Hab. Disco.
63. *Platanthera hyperborea*, *Lindl.*
Hab. Disco.

64. *Juncus biglumis*, *L.*
Hab. Powell Creek and Wellington Channel.
65. *Luzula parviflora*, *Desv.*
Hab. Disco.
66. *Luzula spicata*, *Desv.*
Hab. Wellington Channel?*
67. *Luzula hyperborea*, *R.Br.*
Hab. Disco, Powell Creek, Beechey Island, and Wellington Channel.
68. *Luzula campestris*, *Desv.*
Hab. Whale Fish Island.
69. *Elymus arenarius*, *L.*
Hab. Disco.
70. *Festuca rubra*, *L.*
Hab. Disco and Beechey Island.
71. *Festuca brevifolia*, *R.Br.*
Hab. Whale Fish Island, Beechey Island, and Wellington Channel.
72. *Poa pratensis*, *L.*
Hab. Disco.
73. *Poa angustata*, *R.Br.*
Hab. Powell Creek, Beechey Island, and Wellington Channel.
74. *Poa cæsia*, *Sm.*
Hab. Beechey Island.
- Poa cæsia*, *var. vivipara.*
Hab. Beechey Island.
75. *Poa laxa*, *Hænke.*
Hab. Lancaster Sound.
76. *Glyceria arctica*, *Hook.*
Hab. Wellington Channel.
77. *Pleuropogon Sabinii*, *R.Br.*
Hab. Powell Creek.
78. *Phippsia algida*, *R.Br.*
Hab. Cape York.
79. *Dupontia Fischeri*, *R.Br.*
Hab. Beechey Island.
80. *Hierochloa alpina*, *Ræm. & Sch.*
Hab. Beechey Island.
81. *Colpodium latifolium*, *R.Br.*
Hab. Wellington Channel.
82. *Phleum alpinum*, *L.*
Hab. Disco.
83. *Alopecurus alpinus*, *Sm.*
Hab. Cape York, Pond's Bay, Powell Creek, Beechey Island, and Wellington Channel.
84. *Trisetum subspicatum*, *Beauv.*
Hab. Disco.
85. *Eriophorum capitatum*, *Host.*
Hab. Whale Fish Island and Powell Creek.
86. *Eriophorum polystachyum*, *L.*
Hab. Disco, Powell Creek, and Wellington Channel.
87. † *Carex festiva*, *Dewey.*
Hab. Disco Island.
88. *Carex hyperborea*, *Drejer.*
Hab. Disco Island, Powell Creek, and Coast of Greenland.
89. *Carex rariflora*, *Smith.*
Hab. Whale Fish Island.
90. *Equisetum arvense*, *L.*
Hab. Whale Fish Island and Disco.
91. *Equisetum variegatum*, *L.*
Hab. Disco.
92. *Polystichum Lonchitis*, *Prest.*
Hab. Disco.
93. *Cystopteris fragilis*, *Bernh.*
Hab. Disco.
94. *Lycopodium annotinum*, *L.*
Hab. Disco.
95. *Lycopodium Selago*, *L.*
Hab. Whale Fish Island and Disco.

* More probably from Disco.

† The *Cárices* were named by Dr. Boott.

Musci.

(Determined by W. MITTEN, Esq., A.L.S.)

1. *Distichium capillaceum*, *B. & S.*
Hab. Beechey Island, between
Beechey Island and Northumber-
land Sound, and Navy Board Inlet.
2. *Leptotrichum flexicaule*, *Hmpe.*
Hab. Wellington Channel.
3. *Dicranum elongatum*, *Schleich.*
Hab. Pond's Bay.
4. *Dicranum strumiferum*, *Ehrh.*
Hab. Arctic Greenland: fertile.
5. *Splachnum Wormskioldii*, *Hsch.*
Hab. Cape York: fertile.
6. *Conostomum boreale*, *Sw.*
Hab. Powell Creek, Lancaster Sound.
7. *Bartramia fontana*, *Schw.*
Hab. Disco Island: fertile.
8. *Bartramia ithyphylla*, *Brid.*
Hab. Disco Island: fertile.
9. *Pottia Heimii*, *Fürnr.*
Hab. Beechey Island: fertile.
10. *Desmatodon obliquus*, *Bruch.*
Hab. Beechey Island: fertile.
11. *Trichostomum rigidulum*, *Sm.*
Hab. Beechey Island, Navy Board
Inlet.
12. *Tortula ruralis*, *Hedw.*
Hab. Beechey Island, and between
there and Northumberland Sound.
13. *Tortula leucostoma*, *R. Br.*
Hab. Beechey Island: fertile.
14. *Encalypta rhabdocarpa*, *Schw.*
Hab. Wellington Channel, Beechey
Island: fertile.
15. *Zygodon Lapponicus*, *B. & S.*
Hab. Arctic Greenland: fertile.
16. *Grimmia apocarpa*, *Hedw.*
Hab. Arctic Greenland, Powell
Creek, Lancaster Sound.
17. *Racomitrium lanuginosum*, *Brid.*
Hab. Whale Fish Island.
18. *Mielichhoferia nitida*, *Hsch.*
Var. *gymnostoma*; cætera ut in
formâ *γ.* *elongata.*
Hab. Wellington Channel and
Beechey Island: fertile.
19. *Bryum nutans*, *Schreb.*
Hab. Whale Fish Island, Cape York,
Wellington Channel, Beechey
Island, and Pond's Bay: fertile.
20. *Bryum albicans*, *Wahl.*
Hab. Disco Island.
21. *Bryum crudum*, *Schreb.*
Hab. Disco Island, Beechey Island.
22. *Bryum cernuum*, *B. & S.*
Hab. Whale Fish Island, Wellin-
gton Channel, Powell Creek, Lan-
caster Sound: fertile.
23. *Bryum bimum*, *Schreb.*
Hab. Beechey Island.
24. *Bryum calophyllum*, *R. Br.*
Hab. Beechey Island: fertile.
25. *Bryum pallens*, *Sw.*
Hab. Between Beechey Island and
Northumberland Sound.
26. *Bryum pseudo-triquetrum*, *Hedw.*
Hab. Navy Board Inlet.
27. *Bryum Ludwigii*, *Spreng.*
Hab. Whale Fish Island.
28. *Mnium affine*, *Bland.*
Hab. Whale Fish Island, Beechey
Island, Wellington Channel.
29. *Mnium hymenophylloides*, *Hüb.*
Hab. Navy Board Inlet.
30. *Cinclidium stygium*, *Sw.*
Hab. Wellington Channel.
31. *Aulacomnion palustre*, *Schw.*
Hab. Whale Fish Island.
32. *Aulacomnion turgidum*, *Schw.*
Hab. Whale Fish Island, Powell
Creek, between Beechey Island
and Northumberland Sound.
33. *Timmia Megapolitana*, *Hedw.*
Hab. Wellington Channel.
34. *Timmia austriaca*, *Hedw.*
Hab. Between Beechey Island and
Northumberland Sound.
35. *Polytrichum juniperinum*, *Hedw.*
Hab. Cape York, Whale Fish Island.

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| <p>36. <i>Polytrichum formosum</i>, <i>Hedw.</i>
<i>Hab.</i> Disco Island.</p> <p>37. <i>Hypnum julaceum</i>, <i>Vill.</i>
<i>Hab.</i> Wellington Channel, Pond's Bay, Navy Board Inlet.</p> <p>38. <i>Hypnum chryseum</i>, <i>Schw.</i>
<i>Hab.</i> Wellington Channel, Beechey Island, Pond's Bay.</p> <p>39. <i>Hypnum pulchellum</i>, <i>Dicks.</i>
<i>Hab.</i> Between Beechey Island and Northumberland Sound.</p> <p>40. <i>Hypnum splendens</i>, <i>Hedw.</i>
<i>Hab.</i> Disco Island.</p> <p>41. <i>Hypnum rutabulum</i>, <i>L.</i>
<i>Hab.</i> Disco Island.</p> <p>42. <i>Hypnum salebrosum</i>, <i>Hoffm.</i>
<i>Hab.</i> Beechey Island, Navy Board Inlet.</p> <p>43. <i>Hypnum cirrhosum</i>, <i>Schw.</i>
<i>Hab.</i> Beechey Island.</p> | <p>44. <i>Hypnum Sprucei</i>, <i>Bruch.</i>
<i>Hab.</i> Navy Board Inlet.</p> <p>45. <i>Hypnum filicinum</i>, <i>L.</i>
<i>Hab.</i> Beechey Island.</p> <p>46. <i>Hypnum stellatum</i>, <i>Schreb.</i>
<i>Hab.</i> Wellington Channel, Pond's Bay.</p> <p><i>Hypnum stellatum</i>, <i>var. foliis basi profundè excavatis.</i>
<i>Hab.</i> Navy Board Inlet.</p> <p>Differing in appearance from usual states of the species, but, so far as yet observed, without tangible specific character.</p> <p>47. <i>Hypnum uncinatum</i>, <i>Hedw.</i>
<i>Hab.</i> Wellington Channel, Disco Island, Beechey Island, Navy Board Inlet, Arctic Greenland.</p> <p>48. <i>Hypnum cordifolium</i>, <i>Hedw.</i>
<i>Hab.</i> Whale Fish Island.</p> |
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Hepaticæ.

(Determined by W. MITTEN, Esq., A.L.S.)

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| <p>1. <i>Jungermannia concinnata</i>, <i>Lightf.</i>
<i>Hab.</i> Whale Fish Island.</p> <p>2. <i>Jungermannia barbata</i>, <i>Schreb.</i>
<i>Hab.</i> Disco Island, Pond's Bay.</p> <p>3. <i>Jungermannia trichophylla</i>, <i>L.</i>
<i>Hab.</i> Pond's Bay, Navy Board Inlet.</p> <p>4. <i>Plagiochila asplenioides</i>, <i>M. & N.</i>
<i>Hab.</i> Pond's Bay.</p> <p>5. <i>Ptilidium ciliare</i>, <i>Nees ab E.</i>
<i>Hab.</i> Whale Fish Island. Between Beechey Island and Northumberland Sound.</p> | <p>6. <i>Frullania Tamarisci</i>, <i>Nees ab E.</i>
<i>Hab.</i> Navy Board Inlet.</p> <p>7. <i>Sarcomitrium pingue</i>, (<i>L.</i>) <i>Mitten.</i>
<i>Hab.</i> Beechey Island.</p> <p>8. <i>Marchantia polymorpha</i>, <i>L.</i>
<i>Hab.</i> Whale Fish Island, Disco Island.</p> <p>9. <i>Preissia commutata</i>, <i>Nees ab E.</i>
<i>Hab.</i> Wellington Channel.</p> |
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II. DR. ANDERSON'S and HERR MIERTSCHING'S Collections.

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| <p>1. <i>Anemone Richardsons</i>, <i>Hook.</i>
<i>Hab.</i> Minto Inlet.</p> <p>2. <i>Ranunculus nivalis</i>, <i>L.</i>
<i>Hab.</i> Banks' Land.</p> <p>3. <i>Ranunculus affinis</i>, <i>R. Br.</i>
<i>Hab.</i> Bay of Mercy, Minto Inlet, and Cambridge Gulf.</p> | <p>4. <i>Caltha arctica</i>, <i>L.</i>
<i>Hab.</i> Cambridge Gulf and Minto Inlet.</p> <p>5. <i>Papaver nudicaule</i>, <i>L.</i>
<i>Hab.</i> Banks' Land, &c., abundant.</p> <p>6. <i>Cardamine digitata</i>, <i>Richards.</i>
<i>Hab.</i> Banks' Land.</p> |
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7. *Hesperis Hookeri*, *Led.*
Hab. Minto Inlet.
8. *Parrya arctica*, *R.Br.*
Hab. Cambridge Gulf and Minto Inlet.
9. *Vesicaria arctica*, *Richards.*
Hab. Minto Inlet.
10. *Draba alpina*, *Wahl.* (*D. glacialis*, Adams, and *algida*, Adams.)
Hab. Banks' Land, &c.
11. *Draba hirta*, *L.*
Hab. Banks' Land, Albert Sound, Minto Inlet, and Cambridge Gulf.
12. *Draba incana*, *L.*
Hab. Banks' Land.
13. *Draba rupestris*, *R.Br.*
Hab. Bay of Mercy, Banks' Land.
14. *Cochlearia anglica*, *DC.*
Hab. Banks' Land, &c.
15. *Platypetalum purpurascens*,
R.Br.
Hab. Minto Inlet.
16. *Eutrema Edwardsii*, *R.Br.*
Hab. Minto Inlet and Cambridge Gulf.
17. *Silene acaulis*, *L.*
Hab. Banks' Land and P. Albert's Sound.
18. *Lychnis apetala*, *L.*
Hab. Baring Land, Cambridge Bay, and Minto Inlet.
19. *Stellaria longipes*, *Goldie.*
Hab. Banks' Land, &c.
20. *Honckeneya peploides*, *Ehrh.*
Hab. Banks' Land, Minto Inlet, and Cambridge Gulf.
21. *Cerastium alpinum*, *L.*
Hab. Banks' Land, Minto Inlet, and Cambridge Gulf.
22. *Linum perenne*, *L.*
Hab. Minto Inlet.
23. *Lupinus perennis*, *L.*
Hab. Banks' Land.
24. *Hedysarum M'Kenzii*, *Richards.*
Hab. Banks' Land, Minto Inlet, and Cambridge Bay.
25. *Hedysarum boreale*, *Richards.*
Hab. Minto Inlet.
26. *Phaca astragalina*, *DC.*
Hab. Minto Inlet and Cambridge Gulf.
27. *Phaca aboriginorum*, *Richards.*
Hab. Banks' Land, Minto Inlet, and Cambridge Gulf.
28. *Oxytropis campestris*, *L.*
Hab. Banks' Land, Minto Inlet, and Cambridge Bay.
29. *Oxytropis Uralensis*, *var. arctica.*
Hab. Banks' Land, Cambridge Gulf, and Minto Inlet.
30. *Oxytropis nigrescens*, *Fisch.*
Hab. Minto Inlet and Cambridge Gulf.
31. *Dryas integrifolia*, *Vahl.*
Hab. Banks' Land.
32. *Potentilla nivea*, *L.*
Hab. Banks' Land, Minto Inlet, and Cambridge Gulf.
33. *Potentilla nana*, *Lehm.*
Hab. Banks' Land.
34. *Epilobium latifolium*, *L.*
Hab. Minto Inlet and Cambridge Gulf.
35. *Epilobium alpinum*, *L.*
Hab. Minto Inlet.
36. *Hippuris vulgaris*, *L.*
Hab. Cambridge Bay.
37. *Saxifraga Hirculus*, *L.*
Hab. Minto Inlet and Cambridge Bay.
38. *Saxifraga aizoides*, *L.*
Hab. Minto Inlet.
39. *Saxifraga flagellaris*, *Willd.*
Hab. Banks' Land.
40. *Saxifraga tricuspida*, *Retz.*
Hab. Banks' Land and Minto Inlet.

41. *Saxifraga hieraciifolia*, *Kit.*
Hab. Cambridge Bay.
42. *Saxifraga nivalis*, *L.*
Hab. Banks' Land and Cambridge Gulf.
43. *Saxifraga cæspitosa*, *L.*
Hab. Banks' Land.
44. *Saxifraga cernua*, *L.*
Hab. Banks' Land, Minto Inlet, Cambridge Gulf, Point Drew, and Point Pitt.
45. *Saxifraga oppositifolia*, *L.*
Hab. Abundant throughout Banks' Land, &c.
46. *Chrysosplenium alternifolium*, *L.*
Hab. Cambridge Gulf.
47. *Taraxacum dens-leonis*, *Desf.*
Hab. Banks' Land, Minto Inlet, and Cambridge Bay.
48. *Senecio frigidus*, *Less.*
Hab. Banks' Land, Minto Inlet, and Point Bathurst.
49. *Senecio palustris*, *var. congestus.*
Hab. Banks' Land, Cambridge Gulf, and Minto Inlet.
50. *Senecio aureus*, *L.?*
Hab. Point Drew, Jones' Island, and Cape Bathurst.
51. *Arnica angustifolia*, *Vahl.*
Hab. Banks' Land and Minto Inlet.
52. *Artemisia vulgaris*, *L., var. Tilesii.*
Hab. Point Drew and Cape Bathurst.
53. *Artemisia borealis*, *Pall.*
Hab. Minto Inlet.
54. *Leucanthemum integrifolium*, *DC.*
Hab. Minto Inlet and Cambridge Gulf.
55. *Leucanthemum arcticum*, *DC.*
Hab. Point Maitland.
56. *Erigeron* ———?
Hab. Banks' Land.
57. *Erigeron uniflorum*, *L.*
Hab. Banks' Land and Minto Inlet.
58. *Nardosmia corymbosa*, *Hook.*
Hab. Banks' Land, Point Drew, and Minto Inlet.
59. *Campanula linifolia*, *A.DC.*
Hab. Minto Inlet.
60. *Vaccinium uliginosum*, *L.*
Hab. Minto Inlet.
61. *Cassiopea tetragona*, *Don.*
Hab. Banks' Land and Minto Inlet.
62. *Arbutus alpina*, *L.*
Hab. Banks' Land, Minto Inlet, Point Drew, Cape Bathurst, and Jones' Island.
63. *Polemonium cæruleum*, *L., var. β.*
Hab. Banks' Land.
64. *Primula Hornemanniana*, *Lehm.*
Hab. Banks' Land.
65. *Androsace septentrionalis*, *L.*
Hab. Minto Inlet and Cambridge Bay.
66. *Androsace Chamæjasme*, *Wulf.*
Hab. Banks' Land, Cape Bathurst, &c.
67. *Phlox Richardsonii*, *Hook.*
Hab. Banks' Land.
68. *Castilleja pallida*, *Spr.*
Hab. Banks' Land, Minto Inlet, and Cambridge Bay.
69. *Pedicularis capitata*, *Adams.*
Hab. Minto Inlet and Cambridge Bay.
70. *Pedicularis Sudetica*, *Willd.*
Hab. Minto Inlet, Cambridge Bay, Points Drew, Pitt, Armstrong and Maitland.
71. *Pedicularis hirsuta*, *L.*
Hab. Banks' Land, Minto Inlet, and Cambridge Bay.
72. *Armeria arctica*, *Wallr.*
Hab. Minto Inlet and Cambridge Bay.

73. *Polygonum viviparum*, *L.*
Hab. Banks' Land, Cambridge Gulf, and Minto Inlet.
74. *Oxyria reniformis*, *Hook.*
Hab. Banks' Land, &c.
75. *Salix myrsinites*, *L.*
Hab. Prince Albert's Sound.
76. *Salix Richardsonii*, *Hook.*
Hab. Minto Inlet.
77. *Salix myrtilloides*, *L.*
Hab. Banks' Land.
78. *Salix desertorum*?, *Richards.*
Hab. Minto Inlet.
79. *Salix speciosa*, *Hook.*
Hab. Banks' Land.
80. *Salix polaris*, *Wahl.*
Hab. Cape Bathurst.
81. *Salix reticulata*, *L.*
Hab. Cambridge Bay and Minto Inlet.
82. *Triticum repens*, *L.*, *var.* *purpureum.*
Hab. Banks' Land, Points Warren and Pitt.
83. *Elymus arenarius*, *L.*
Hab. Banks' Land, Minto Inlet, and Point Warren.
84. *Festuca brevifolia*, *R.Br.*
Hab. Banks' Land, Point Drew, Cape Bathurst, and Jones' Island.
85. *Poa laxa*, *Hænke.*
Hab. Point Drew.
86. *Catabrosa aquatica*, *Beauv.*?
Hab. Banks' Land.
87. *Glyceria arctica*, *Hook.*
Hab. Minto Inlet.
88. *Deschampsia cæspitosa*, *Beauv.*
Hab. Minto Inlet.
89. *Dupontia Fischeri*, *R.Br.*
Hab. Points Maitland and Warren.
90. *Hierochloa pauciflora*, *R.Br.*
Hab. Minto Inlet.
91. *Calamagrostis stricta*, *Beauv.*
Hab. Point Maitland.
92. *Calamagrostis purpurascens*, *R.Br.*
Hab. Minto Inlet.
93. *Colpodium latifolium*, *R.Br.*
Hab. Minto Inlet.
94. *Alopecurus alpinus*, *Sm.*
Hab. Banks' Land, Cambridge Bay, and Minto Inlet.
95. *Eriophorum capitatum*, *Host.*
Hab. Banks' Land, Minto Inlet, Point Drew, and Cambridge Bay.
96. *Eriophorum vaginatum*, *L.*
Hab. Minto Inlet.
97. *Eriophorum polystachyum*, *L.*
Hab. Banks' Land, Prince Albert's Sound, and Minto Inlet.
98. *Carex** *scirpoidea*, *Mich.*
Hab. Minto Inlet.
99. *Carex incurva*, *Lightf.*
Hab. Minto Inlet.
100. *Carex rigida*, *Good.*
Hab. Banks' Land.
101. *Carex stans*, *Drejer.*
Hab. Minto Inlet.
102. *Carex compacta*, *R.Br.*
Hab. Minto Inlet.
103. *Carex vaginata*, *Tausch.*
Hab. Minto Inlet.
104. *Carex fuliginosa*, *Sternb. & Hoppe.*
Hab. Minto Inlet and Cambridge Bay.
105. *Carex ustulata*, *Wahl.*
Hab. Cambridge Bay.
106. *Elyna spicata*, *Schrad.*
Hab. Minto Inlet.
107. *Equisetum arvense*, *L.*
Hab. Banks' Land and Minto Inlet.
108. *Cystopteris fragilis*, *Bernh.*
Hab. Minto Inlet.

* I owe the names of the *Carexes* to the kindness of Dr. Boott.

III. MR. RAE'S Collections.

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| <p>1. <i>Anemone Richardsonii</i>, <i>Hook.</i>
 2. <i>Anemone parviflora</i>, <i>Mich.</i>
 3. <i>Ranunculus Purshii</i> β, <i>Rich.</i>
 4. <i>Ranunculus hyperboreus</i>, <i>Rottb.</i>
 5. <i>Caltha arctica</i>, <i>L.</i>
 6. <i>Draba incana</i>, <i>L.</i>
 7. <i>Erysimum cheiranthoides</i>, <i>L.</i>
 8. <i>Oxytropis deflexa</i>, <i>Dec.</i>
 9. <i>Oxytropis campestris</i>, <i>Dec.</i>
 10. <i>Oxytropis Uralensis</i>, <i>DC.</i>
 11. <i>Oxytropis nigrescens</i>, <i>Fisch.</i>
 12. <i>Phaca astragalina</i>, <i>DC.</i>
 13. <i>Phaca aboriginorum</i>, <i>Richards.</i>
 14. <i>Lupinus perennis</i>, <i>L.</i>
 15. <i>Hedysarum M'Kenzii</i>, <i>Richards.</i>
 16. <i>Hedysarum boreale</i>, <i>Nutt.</i>
 17. <i>Sieversia Rossii</i>, <i>R.Br.</i>
 18. <i>Dryas integrifolia</i>, <i>Vahl.</i>
 19. <i>Dryas octopetala</i>, <i>L.</i>
 20. <i>Potentilla biflora</i>, <i>Willd.</i>
 21. <i>Potentilla fruticosa</i>, <i>L.</i>
 22. <i>Epilobium latifolium</i>, <i>L.</i>
 23. <i>Saxifraga Hirculus</i>, <i>L.</i>
 24. <i>Saxifraga tricuspidata</i>, <i>Roth.</i>
 25. <i>Saxifraga nivalis</i>, <i>L.</i>
 26. <i>Saxifraga cæspitosa</i>, <i>L.</i>
 27. <i>Saxifraga cernua</i>, <i>L.</i>
 28. <i>Saxifraga rivularis</i>, <i>L.</i>
 29. <i>Saxifraga oppositifolia</i>, <i>L.</i>
 30. <i>Taraxacum dens-leonis</i>, <i>Desf.</i>
 31. <i>Senecio palustris</i>, <i>var. congestus</i>,
 <i>DC.</i>
 32. <i>Arnica angustifolia</i>, <i>Vahl.</i>
 33. <i>Antennaria alpina</i>, <i>Gærtn.</i>
 34. <i>Pyrethrum inodorum</i>, <i>var. pu-</i>
 <i>milum</i>, <i>Smith.</i>
 35. <i>Leucanthemum integrifolium</i>,
 <i>DC.</i>
 36. <i>Achillea Millefolium</i>, <i>L.</i>
 37. <i>Erigeron compositum</i>, <i>Pursh.</i>
 38. <i>Erigeron uniflorum</i>, <i>L.</i>
 39. <i>Aster pygmaeus</i>, <i>Torr. & Gray.</i>
 40. <i>Campanula linifolia</i>, <i>Lam.</i></p> | <p>41. <i>Gentiana propinqua</i>, <i>Richards.</i>
 42. <i>Vaccinium uliginosum</i>, <i>L.</i>
 43. <i>Cassiopea tetragona</i>, <i>G.Don.</i>
 44. <i>Ledum palustre</i>, <i>L.</i>
 45. <i>Rhododendron lapponicum</i>,
 <i>Wahl.</i>
 46. <i>Arbutus alpina</i>, <i>L.</i>
 47. <i>Primula Hornemanniana</i>, <i>Lehm.</i>
 48. <i>Androsace septentrionalis</i>, <i>L.</i>
 49. <i>Androsace Chamæjasme</i>, <i>Wulf.</i>
 50. <i>Phlox Richardsonii</i>, <i>Hook.</i>
 51. <i>Castilleja pallida</i>, <i>Spr.</i>
 52. <i>Pedicularis capitata</i>, <i>Adams.</i>
 53. <i>Pedicularis Sudetica</i>, <i>Willd.</i>
 54. <i>Pedicularis hirsuta</i>, <i>L.</i>
 55. <i>Pinguicula vulgaris</i>, <i>L.</i>
 56. <i>Mertensia maritima</i>, <i>Roth.</i>
 57. <i>Plantago lanceolata</i>, <i>L.</i>
 58. <i>Empetrum nigrum</i>, <i>L.</i>
 59. <i>Armeria arctica</i>, <i>Wallr.</i>
 60. <i>Polygonum viviparum</i>, <i>L.</i>
 61. <i>Oxyria reniformis</i>, <i>Hook.</i>
 62. <i>Salix glauca</i>, <i>L.</i>
 63. <i>Salix Richardsonii</i>, <i>Hook.</i>
 64. <i>Salix arctica</i>, <i>Pall.</i>
 65. <i>Salix reticulata</i>, <i>L.</i>
 66. <i>Triticum repens</i>, <i>L.</i>, <i>var. pur-</i>
 <i>pureum.</i>
 67. <i>Festuca brevifolia</i>, <i>R.Br.</i>
 68. <i>Poa cassia</i>, <i>Smith?</i>
 69. <i>Poa laxa</i>, <i>Hænke.</i>
 70. <i>Dupontia Fischeri</i>, <i>R.Br.</i>
 71. <i>Hierochloe alpina</i>, <i>R. & S.</i>
 72. <i>Calamagrostis Canadensis</i>,
 <i>Beauv.</i>
 73. <i>Colpodium latifolium</i>, <i>R.Br.</i>
 74. <i>Alopecurus alpinus</i>, <i>Sm.</i>
 75. <i>Trisetum subspicatum</i>, <i>Beauv.</i>
 76. <i>Eriophorum capitatum</i>, <i>Host.</i>
 77. <i>Eriophorum polystachyum</i>, <i>L.</i>
 78. <i>Carex</i> * <i>stans</i>, <i>Drejer.</i>
 79. <i>Lycopodium Selago</i>, <i>L.</i></p> |
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* Named by Dr. Boott.

On the Botany of Raoul Island, one of the Kermadec group in the South Pacific Ocean. By J. D. HOOKER, Esq., M.D. F.R.S., F.L.S. &c.

[Read April 1st, 1856.]

THE materials from which the following sketch is drawn up consist of a small collection of plants made upon Raoul Island, by Mr. M'Gillivray, late Naturalist to H.M.S. *Herald*, under the command of Captain Denham, R.N., who forwarded the collection in question to Sir W. Hooker; and whose zealous exertions in furthering the scientific objects of the expedition under his command demand the grateful acknowledgement of all classes of naturalists.

Very little being known of the Kermadec group, I applied to Captain Washington, R.N., the present able and assiduous Hydrographer to the Admiralty, who promptly forwarded me the following information.

The name of Kermadec Islands was first given, in the chart accompanying Admiral Rossel's account of D'Entrecasteaux's voyage in search of La Peyrouse, to a group situated about 450 miles N.E. of New Zealand, between that group and the Fijis. They consist of four principal islands, Macauley and Curtis Islands, discovered before D'Entrecasteaux's visit, by Lieutenant Watts in the *Penrhyn* in 1788, and Raoul and Esperance Islands, by D'Entrecasteaux on March 15th, 1793.

Raoul, or Sunday Island, is described both by D'Entrecasteaux (vol. i. 295) and D'Urville (Voy. de l'Astrolabe, iii. 7) as triangular, and not more than four leagues in circumference, forming a high, rugged, steep mountain covered with wood. Commodore Wilkes, who afterwards visited it, adds that it appears to be volcanic, and that its rocks rise like basaltic columns.

Captain Denham in H.M.S. *Herald* finished the survey of this island on July 24th, 1854, and reports that "it is in lat. $29^{\circ} 15' 30''$ S., long. $177^{\circ} 54' 52''$ W., and that its maximum altitude is 1627 feet." Its only inhabitants consist of a family from New York, to whose humane disposition he is indebted, under the trying circumstances of having to inter his son close to their settlement. Poultry, vegetables and water can be procured there during the summer.

Some further information regarding Raoul Island is given by Mr. Milne (Botanical Collector to the Expedition) in Hooker's 'Journal of Botany' (vii. 151), where the luxuriance of the Cryptogamic vegetation is particularly alluded to, and the pre-

sence of a Palm and some *Orchidææ*, of which, however, no specimens have hitherto been transmitted.

Macauley and Curtis Islands are very much smaller, and L'Esperance is a mere rock.

The most interesting circumstance connected with the vegetation of Raoul Island is the identity of most of the flowering plants, and all but one of the ferns, that have been collected upon it, with those of New Zealand. The great extent of intervening ocean (450 miles), and the small size of the islands, would appear to render it extremely difficult to account for this similarity of vegetation by transport; added to which, the prevailing winds blow from the north-west, and the oceanic currents set in the same direction.

It is also worthy of remark, that of the nine species that are not natives of New Zealand, four are new, and three of these are nearly allied to New Zealand plants; whilst of those five that are not new, three are widely diffused throughout the tropical and subtropical Pacific islands, and would appear not to be capable of enduring the cold of New Zealand; these are the *Metrosideros polymorpha*, *Piper latifolium*, and *Omalanthus nutans*.

The absence of any Ferns (with a single exception) but such as are natives of New Zealand, is, however, a far more striking fact, both because the list is a large one for so small an island (twenty-two species), and because, if their presence is to be accounted for wholly by trans-oceanic transport of these species, the question at once occurs, why has there been no addition of some of the many Fiji or New Caledonian Island ferns, that are common tropical Pacific species, the Fiji Islands being only 700 miles north of the Kermadecs, and New Caledonia 750. The only fern which is not a native of New Zealand, is the Norfolk Island *Asplenium difforme*.

Still more remarkable is the total absence in the collection of any of the plants peculiar to Norfolk Island, for Raoul Island is in the same latitude as Norfolk Island, is exactly the same distance from New Zealand, and the winds and currents set from Norfolk to Raoul Island: in short, though the northern extreme of New Zealand, Norfolk Island and Raoul Island form an equilateral triangle, with the exception of *Asplenium difforme*, there is not a single fern of Norfolk Island found in Raoul Island that is not also found in New Zealand; whilst of the twenty flowering plants of Raoul Island, no less than six are absolutely peculiar to New Zealand and Raoul Island, and with the excep-

tion of the tropical, widely diffused Pacific species, there are no phænogamic plants or ferns confined to Norfolk Island and Raoul Island. It is further remarkable that of the Raoul Island ferns, *Cyathea medullaris* and *Pteris falcata* have not been found in Norfolk Island.

There is no doubt that a complete flora of Raoul Island would modify these results; but there can also be no doubt that it would confirm these indications of its affinities being most strong with that of New Zealand, and feeble to a very unaccountable degree with the floras of those other groups with which it might be expected to possess a very strong relationship.

Of the twenty flowering plants, three are noticed by the collector as being possibly introduced by man, viz. *Sicyos angulatus*, *Gnaphalium luteo-album*, and *Oplismenus æmulus*, all of which were found to affect cultivated ground. These are, however, so widely distributed in the South Pacific Islands, New Zealand, and Australia, that it is quite as probable as not that they are truly wild in the Kermadec group, and only grow in more abundance upon prepared soil. All have, however, appendages that would favour their transport, as the glochidiate setæ of the fruit of the *Sicyos*, the awn of the glume of *Oplismenus*, and the pappus of *Gnaphalium*.

With regard to the remaining seventeen flowering plants, I recognize special adaptations for transport in the following two only:—*Bidens leucantha**, in the barbed setæ of the fruit, and *Lagenophora petiolata*, in the viscid fruit. Of the rest none seem in any way adapted for transport, unless the minute and numerous seeds of the *Lobelia*, *Acianthus*, and *Metrosideros* be so regarded.

DICOTYLEDONES.

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| 1. <i>Coriaria ruscifolia</i> , <i>L.</i> | 10. <i>Scævola gracilis</i> , <i>n. sp.</i> |
| 2. <i>Metrosideros polymorpha</i> , <i>Gaud.</i> | 11. <i>Lobelia anceps</i> , <i>Thunb.</i> |
| 3. <i>Sicyos angulatus</i> , <i>L.</i> | 12. <i>Veronica parviflora</i> , <i>Vahl.</i> |
| 4. <i>Coprosma petiolata</i> , <i>n. sp.</i> | 13. <i>Myoporum lætum</i> , <i>Forst.</i> |
| 5. <i>Coprosma acutifolia</i> , <i>n. sp.</i> | 14. <i>Omalanthus nutans</i> , <i>Guill.</i> |
| 6. <i>Panax arboreum</i> , <i>Forst.</i> | 15. <i>Piper latifolium</i> , <i>Forst.</i> |
| 7. <i>Lagenophora petiolata</i> , <i>H. f.</i> | 16. <i>Peperomia Urvilleana</i> , <i>A. Rich.</i> |
| 8. <i>Bidens leucantha</i> , <i>Willd.</i> | 17. <i>Ascarina lanceolata</i> , <i>n. sp.</i> |
| 9. <i>Gnaphalium luteo-album</i> , <i>L.</i> | |

* This, though not included in the New Zealand flora, has been latterly introduced into the neighbourhood of Auckland, &c.

MONOCOTYLEDONES.

18. *Acianthus Sinclairii*, *H. f.*
 19. *Isolepis nodosa*, *R. Br.*
 20. *Oplismenus æmulus*, *R. Br.*

FILICES & LYCOPODIACEÆ.

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| 21. <i>Cyathea medullaris</i> , <i>Sw.</i> | 32. <i>Asplenium difforme</i> , <i>R. Br.</i> |
| 22. <i>Hymenophyllum demissum</i> , <i>Sw.</i> | 33. <i>Asplenium polyodon</i> , <i>Forst.</i> |
| 23. <i>Adiantum hispidulum</i> , <i>Sw.</i> | 34. <i>Asplenium obtusatum</i> , <i>Forst.</i> |
| 24. <i>Pteris falcata</i> , <i>R. Br.</i> | 35. <i>Asplenium lucidum</i> , <i>Forst.</i> |
| 25. <i>Pteris aquilina</i> , <i>L.</i> , <i>var. esculenta</i> . | 36. <i>Nephrodium decompositum</i> ,
<i>R. Br.</i> |
| 26. <i>Pteris comans</i> , <i>Forst.</i> | 37. <i>Polystichum aristatum</i> , <i>Presl.</i> |
| 27. <i>Pteris tremula</i> , <i>R. Br.</i> | 38. <i>Hypolepis tenuifolia</i> , <i>Bernh.</i> |
| 28. <i>Lomaria procera</i> , <i>Spr.</i> | 39. <i>Phymatodes Billardieri</i> , <i>Presl.</i> |
| 29. <i>Lomaria lanceolata</i> , <i>Spr.</i> | 40. <i>Niphobolus rupestris</i> , <i>Spr.</i> |
| 30. <i>Doodia caudata</i> , <i>R. Br.</i> | 41. <i>Psilotum triquetrum</i> , <i>Sw.</i> |
| 31. <i>Asplenium flaccidum</i> , <i>Forst.</i> | 42. <i>Lycopodium Billardieri</i> , <i>Spring.</i> |

Descriptions of the New Species.

COPROSMA PETIOLATA, *H. fl.*; ramis cylindricis cortice pallido, ramulis petiolisque puberulis, foliis gracilè petiolatis elliptico-oblongis obovatisve obtusis subcoriaceis, stipulis transversè elongatis abruptè longè acuminatis, costis puberulis, floribus capitatis, pedunculis infra v. supra medium bracteolatis, fl. ♂ subsessilibus congestis, calyce brevissimo, corollâ latè campanulatâ profundè 4-fidâ, fl. ♀ 3-5 sessilibus, calycis limbo truncato, corollâ brevi cylindricâ breviter 4-fidâ, stylis crassis erectis.

C. Bauerianæ Ins. Norfolkicæ et Nov. Zelandiæ similis, sed folia gracilius petiolata minus carnosa, et marginibus non aut vix recurvis.—Arbor parva, cortice lævi pallido. Folia 1-2 unc. longa, petiolo costâ venisque subtùs puberulis. Pedunculi puberuli, stricti v. curvi, petiolis æquilongi v. iis longiores, interdùm bifoliati. Flores ♂ plurimi, basi involucello brevi suffulti, $\frac{1}{4}$ unc. longi, alabastra subglobosa. Antheræ breviter oblongæ. Fl. ♀ pauciores, involucello longiore diphylo suffulti.

COPROSMA ACUTIFOLIA, *H. fl.*; arborescens, ramis cortice lævi pallido tectis, foliis petiolatis membranaceis ovatis elliptico-ovatis ovato-lanceolatisve acuminatis, fl. ♂ ad apices pedunculorum solitariis binis ternisve subsessilibus; pedunculis simplicibus v. dichotomis, calyce minimo 4-lobo, corollâ infundibuliformi ad medium 4-fidâ, staminibus longè exsertis.

C. lucidæ, *Forst.*, affinis, differt præcipuè foliis membranaceis.—Arbor parva, ramosa, cortice lævi pallido, ramulis gracilibus ultimis cylindricis. Folia $2\frac{1}{2}$ - $2\frac{1}{2}$ unc. longa, in petiolum $\frac{1}{2}$ unc. longam angustata, penninervia, et reticulatim venosa. Pedunculi petiolis æquilongi v. iis longiores, dum divisi ad axillas stipulis connatis membranaceis instructi. Flores brevissimè pedicellati $\frac{1}{2}$ unc. longi, ♂ tantum visi.

SCÆVOLA GRACILIS, *H. fl.*; procumbens, ramis herbaceis foliisque utrinque pubescenti-pilosis axillis villosis, foliis lanceolatis cuneato-lanceolatisve acutis irregulariter serrato-dentatis in petiolum elongatum angustatis, floribus in ramulis brevissimis axillaribus subsessilibus, foliis 4 lineari-lanceolatis floribus æquilongis bracteatis, calycis tubo brevi basi bracteolato, limbi lobis 5 inæqualibus, 3 subulatis, 2 intermediis brevibus, corollæ lobis angustis.

Calycis villosi tubus basi multibracteatus, sericeus, $\frac{1}{4}$ unc. longus, lobis valdè inæqualibus, 3 subulatis tubo corollæ $\frac{1}{4}$ brevioribus, 2 intermediis brevibus obtusis lobulatis. Corollæ flavidæ tubus lentè curvus, laciniæ tubo longiores, lineares, ligulatæ, acuminato-uncinatæ, supernè paulò dilatatæ, marginibus membranaceis undulatis, tubo intùs villosus supernè pilis capitatis opacis et secus basin limbi instructo. Stamina subæqualia, tubo corollæ breviora; filamenta filiformia, glaberrima; antheris linearibus muticis. Stylus pilosus. Stigma hemisphæricum, marginibus cupulæ ciliatis.

ASIMINA LANCEOLATA, *H. fl.*; arbuscula, foliis coriaceis petiolatis lanceolatis acuminatis grossè serratis subtùs glaucis, paniculis folio brevioribus.

A. lucidæ, *H. fl.*, Novæ-Zelandiæ affinis, sed foliis lanceolatis longioribus et angustioribus, serraturis grossioribus apicibus curvis acutis. Folia 2-3 unc. longa, acuminata, basi in petiolum sensim angustata. Flores subimbricati.

Note on *Obolaria virginica*, L. By ASA GRAY, M.D., F.M.L.S. &c.—Extracted from a Letter to George Bentham, Esq., F.L.S. &c.

[Read April 15th, 1856.]

SEVERAL years ago, in a memoir* in which *Obolaria virginica* is figured and described, I endeavoured to show that this genus should be referred to the order *Gentianeæ*, notwithstanding a peculiarity in its placentation. I wish now to say, that it should be referred there *on account* of its placentation. Had I properly noted at the time what Grisebach states (in his *Gen. et Sp. Gentianearum*), respecting the ovules sometimes occupying several series somewhat remote from the sutures, or had I been led to inspect the ovary of almost any of our common Gentians, the case would have been clear at once. It is only recently that my former pupil, Mr. Henry J. Clark, has called my attention to the fact, hitherto unknown, I believe, that the ovules in most of our Gentians of the United States occupy the whole, or nearly the whole parietes of the ovary; sometimes in nearly definite rows, as in *G. quinqueflora*, but more commonly indefinitely crowded over

* Chloris Bor. Amer. in Mem. Amer. Acad. 1846.

every part except the very sutures, as in *G. Andrewsii*, *G. crinita*, &c. Examining some other genera, we found this to occur also in *Bartonia*, Muhl. (*Centaurella*, Michx.); equally so in both species, *B. tenella* and *B. verna*. In the former species, in which, as in *Obolaria*, four re-entering angles render the cell cruciform, the resemblance to *Obolaria* is striking and complete, as you will see from the enclosed sketch of a transverse section of the ovary of *B. tenella*. The only anomaly of *Obolaria* as a true *Gentianeæ* which remains, is the imbricative (instead of convolutive) æstivation of its corolla;—of which no parallel instance is known, so far as I am aware. It may however be expected to occur; for useful and reliable as the æstivation of the corolla often is, as an ordinal mark, it is seldom altogether constant.

I think I once mentioned to you an exception of this sort, or rather a variation, which occurs in a family in the arrangement of which you have employed æstivation of the corolla to great advantage, viz. the *Scrophulariaceæ*, in characterizing the *suborders* (as I would suggest they ought not to be called) *Antirrhinideæ* and *Rhinanthideæ*. The same accurate observer, Mr. Clark, long ago showed me that this character occasionally failed in *Mimulus*, especially in *M. ringens* and *M. moschatus*, which almost as frequently present the æstivation of the *Rhinanthideæ* (*i. e.* have some part of the lower lip exterior) as that of the *Antirrhinideæ*, to which the genus belongs. Last summer I noticed a second exception of the kind in a *Pentstemon* (*P. heterandrum*, Torr. & Gray, in Beckwith's Report of a Pacific Railroad Survey), which besides the anomaly of having the fifth stamen sometimes antheriferous and sometimes sterile, had also, in about half of the flowers examined, the lateral lobes of the corolla external in the bud, and covering the two posterior lobes as well as the anterior one.

On the Action of Sea-water on the Germination of Seeds. By
CHARLES DARWIN, Esq., Vice-Pres. R.S., F.L.S. &c.

[Read May 6th, 1856.]

DURING the spring of last year it occurred to me that it would be worth while, in relation to the distribution of plants, to test how long seeds could endure immersion in sea-water, and yet retain their vitality. As far as I knew, this had not been tried by bota-

nists, who would have been far more capable of doing it efficiently than myself; and I now find that M. Alph. DeCandolle, in his admirable work, "Géographie Botanique," regrets that such experiments have not been tried; I think, that had he known even the few facts here to be recorded, some of his opinions on the means of distribution of particular families would have been slightly modified. The Rev. M. J. Berkeley has likewise tested fifty-three different kinds of seeds, and has published a report in the "Gardener's Chronicle*," to which periodical I have also sent two brief notices on the same subject†. I intend here to give, with Mr. Berkeley's kind permission, an account of our joint experiments. I may premise, that not knowing, at first, whether the seeds would endure even a week's immersion, I selected a few by simple chance, taking, however, the seeds of different families; subsequently I have been aided by suggestions from Dr. Hooker.

I must briefly describe how my experiments were tried: the seeds were placed in small bottles, each holding two or three ounces of salt water, carefully made according to Schweitzer's analysis: as both *algæ* and marine animals have, as is well known, long survived in water thus made, there can be no doubt that the experiment was thus fairly tried. Mr. Berkeley sent his seeds to Ramsgate, tied up in little bags and placed in the sea-water, daily renewed; and they were thus immersed for three weeks, and when partially dried, but still damp, were sent off, but by accident were not unpacked for four days subsequently, so that their total immersion "was equivalent to one of more than a month." Some of my bottles were put out of doors in the shade, and were exposed to an average weekly temperature of from 35° to 57°; the other bottles were kept in my cellar, and were exposed to much less variation of temperature, viz. to a daily mean average of from 46° to 56°. Further, to test the effect of temperature, I immersed eighteen different sorts of seeds in salt water, in a tank, which, from containing much snow, was for six weeks at the temperature of 32°, slowly rising for the next six weeks to 44°; but the seeds thus tested did not seem to withstand the injurious effect of the salt water better than those exposed to a higher but variable temperature. I may remark, that amongst the eighteen kinds of seeds immersed in the cold salt water, there were seeds of a somewhat tender constitution, as capsicum and vegetable marrow, but the exposure to the cold in no degree injured their germination. In the case of some of the seeds which I first tried,

* Sept. 1st, 1855.

† May 26th and Nov. 24th, 1855.

and which were put out of doors, I did not change the salt water for fifty-six days, and it became putrid and smelt offensively to a quite surprising degree, especially the water with the cabbage, radish, cress and onion seed, which also gave out strongly the odour of each kind; so that I thought the putridity would infallibly have been communicated to the seeds; but judging from the seeds of some of the same plants (but not actually from the same lot of seed) placed in salt water often renewed, and likewise kept in the cellar under a less variable temperature, neither the putridity of the water nor the changing temperature had any marked effect on their vitality. Cress seed (*Lepidium sativum*) and that of *Phalaris Canariensis*, after twenty-two days' immersion, were thoroughly dried for a week and then planted; they germinated pretty well, but the seeds themselves of this particular lot were not very good. At first I tried the seeds after each successive week's immersion, and they germinated at the same period as did seeds of the same kind which had not been salted; celery and rhubarb seed, however, were somewhat accelerated in their germination. Some kinds of seeds, as of *Trifolium incarnatum*, *Sinapis nigra*, peas, kidney and common beans, swelled much in the salt water, and they generally were killed by a short immersion; but the swollen seeds of *Lupinus polyphyllus* germinated better than those which did not swell. I was surprised to observe that most of the seeds of *Convolvulus tricolor* germinated after seven days under the salt water and lived for some time in it; as did likewise the fresh seed of *Tussilago farfara* after 9 days; after 25 days I took out some of the young plants of the *Tussilago* and planted them, and one of them grew: some of the seeds of the garden orache (*Atriplex*) also germinated under water after 56 days' immersion, but I failed in raising the seedlings; the other seeds of the same lot of the orache germinated excellently after 100 days' immersion.

The total number of seeds tried by Mr. Berkeley and myself amount only to 87, for unfortunately we happened to select some of the same kinds; in one respect, however, this has been fortunate, for we have thus tested each other's results, and they accord perfectly as far as they go; the seed of the tomato, however, germinated better after a month's immersion with Mr. Berkeley than after only 22 days with me; but my seed appeared to be old. And this leads me to remark, that I suspect that fresh seed withstands the salt water better than old, but yet good seed; this was the case with *Trifolium incarnatum*, *Phlox Drummondii*,

and I believe with *Sinapis nigra*. Of the genus *Godetia*, Mr. Berkeley found one species was killed by, and another survived, a month's immersion: but a far more curious case is presented by the varieties of the cabbage; for I found that good seed of the "Mammoth white broccoli" germinated after 11 days' immersion, but was killed by 22 days; seed of the "early cauliflower" survived 22 days, but was killed by 36 days; "Cattell's cabbage" germinated excellently after 36 days, but was killed by 50 days; and lastly, fresh seed of the wild cabbage from Tenby germinated excellently after 50 days, very well after 110 days, and two seeds out of some hundreds germinated after 133 days' immersion.

Of the 87 kinds of seeds tried, 23 or more than one quarter did not endure 28 days' immersion: capsicum has endured the trial best, for 30 out of 56 seeds germinated well after 137 days' immersion: of celery seed after the same period of 137 days, only 6 out of several hundreds germinated. The worst germinators have been dwarf kidney beans and *Hibiscus manihot*, both killed by 11 days' immersion; common peas were killed by 14 days'; *Tussilago farfara* germinated under water after 9 days, but the young plants kept alive for some time: the next worse germinators have been *Phlox Drummondii*, *Trifolium incarnatum*, *Linum usitatissimum*, and *Sinapis nigra*, very few of which survived 15 days' immersion.

From such scanty materials it is, perhaps, rash to draw any sort of deduction in regard to the power of resistance to salt water in the different divisions of the vegetable kingdom; but a few remarks may be permitted. Three out of the 17 Endogens and 20 out of the 70 Exogens were killed by a month or 28 days' immersion: this fact, together with the marked power of endurance in the *Atriplex*, *Beta*, *Spinacea*, and *Rheum*, lowly organized exogens, accords with, and is perhaps connected with, the fact, insisted on so much by M. A. DeCandolle, of the wider range of the Endogens and of the lowly organized Exogens, than of the higher Exogens*. The four *Solanaceæ* and two *Umbelliferae* endured the salt water very well, and each included the longest survivor of all the species tried. Ten *Compositæ* were tried, and only one was killed by a month's immersion, that is excepting the *Tussilago* which germinated under water. Eight *Cruciferae* were tried, and all withstood the influence well, excepting *Sinapis nigra*, which

* Godron in his "Florula Juvenalis," p. 16, states that the seeds of some plants, as of *Atriplex* and certain *Gramineæ*, germinate perfectly in salt-marshes, where they have been immersed during all the winter under salt water.

was killed by 25 days' immersion; three of the *Cruciferae* survived 85 days: this power of endurance in the seeds of this family is, perhaps, surprising, considering the oil in their seeds. Nine *Leguminosae* were tried; these all resisted the salt water badly, with the exception of the hard thin seeds of *Mimosa sensitiva*, which germinated pretty well after 50 days; three species of Lupine seemed just able occasionally to withstand about 36 days' immersion; the seeds of the other *Leguminosae* having all been killed by much shorter periods. I suspect that it is the water, and not the salt, which kills the *Leguminosae*; at least I found that a lot of fresh "Thurston Reliance" peas were all killed by 13 days' immersion in pure water*; and I have been assured that a much shorter immersion will kill kidney beans. Lastly, seven species of the allied families of *Hydrophyllaceae* and *Polemoniaceae* (six having been selected by Mr. Berkeley) were killed by a month's immersion, and so great a proportion can hardly be accidental.

From the great difference in the powers of resistance to the sea-water in the different families just specified, and even in the varieties of the same species; and from the *Leguminosae* being apparently in this respect the tenderest, whereas they are generally believed to keep longer than any other seeds in a dry state, I think we may learn a lesson of caution, not to infer with too much certainty which seeds will endure longest when naturally buried in damp earth, from knowing what kinds will keep best in an artificial state.

I had intended trying many more seeds, as I at one time thought that these experiments would have thrown more light on the dispersal of plants than I now think they do. I soon became aware that most seeds, in accordance with the common experience of gardeners, sink in water; at least I have found this to be the case, after a few days, with the 51 kinds of seeds which I have myself tried; so that such seeds could not possibly be transported by sea-currents beyond a very short distance. Some few seeds, however, do float, as I have tried with some of those cast by the Gulf Stream on the coast of Norway. From knowing that timber is often cast on the shores of oceanic islands far from the mainland, and from having met with accounts of floating vege-

* Loiseleur-Deslongchamps says (Consid. sur les Céréales, Part ii. p. 234) that in wheat put into water the embryo comes out in the course of two days; as Mr. Berkeley's wheat survived after 30 days' immersion in sea-water, one may suspect that in this case, the seed would survive longer under sea-water than under fresh water.

table rubbish off estuaries, I assumed that plants, with ripe seeds, washed into the sea by rivers, landslips, &c., might be drifted by sea-currents during a period of some weeks. The closing of the capsules, pods, and heads of the *Compositæ*, &c., when wetted, and their re-opening when cast on shore and dried, the seeds being thus allowed to be driven inland by the first stormy winds, seemed to favour such means of transport. But in putting 34 plants of different orders, with ripe fruit, into salt water, one alone, the *Euonymus*, floated for a month, being buoyed up by its fruit; the others all sunk in 21 days, some in 5, and several in 7, 9, and 11 days. But I am not sure that I have made the trial fairly, for I kept the floating plants in too warm and dark a place, which might have favoured their decay. Finally I may remark, that the seeds of very few species are, as far as we yet know, all killed by 10 days' immersion,—that some plants will float for this period,—that the average rate of the ten currents in the Atlantic Ocean, given in Johnston's "Physical Atlas," is 33 miles per diem (the main Equatorial current running at the rate of 60 miles, and the Cape Stream at 80 miles per diem); and therefore I conclude, under the existing extremely scanty materials for forming any opinion, that some plants might under favourable conditions be transported over arms of the sea 300 or even more miles in breadth; and if cast on the shore of an island not well stocked with species, might become naturalized.

In the following list, to save repetition, I have marked the plants tried by Mr. Berkeley, and which germinated after a month's immersion, with †; when they did not germinate, this is expressly stated. The "cold water" refers to the seeds placed in salt water in the tank with snow.

I have arranged the families in accordance with Lindley's "Vegetable Kingdom."

ENDOGENS.

(GRAMINEÆ.)

Avena (common oats): after 85 days' immersion germinated excellently; after 100 days some germinated; after 120 days some half-germinated.

Hordeum (common barley): germinated well after 28 days, but none after 42 days; in the cold water well after 30 days(†).

† *Triticum* (wheat).

Phalaris Canariensis: after 70 days nearly all germinated; in

another lot after 85, most of the seeds germinated, but the seedlings died off; after 100 and likewise after 120 days' immersion, in each case, a single seedling came up.

Holcus saccharatus: after 36 days germinated fairly; after 50 days all died.

†*Zea Mays*: none germinated after a month's immersion.

†*Arum maculatum*.

†*Anomatheca cruenta*.

†*Babiana plicata*.

†*Trichonema pudicum*.

†*Sisyrinchium iridifolium*.

Canna Indica: after 50 days several germinated, but not very strongly.

†*Colchicum autumnale*: did not germinate.

Allium cepa: after 56 days' immersion, 3 out of 15 germinated; after 82 days in the cold water, most of the seeds grew well; after 100 days, 2 or 3 grew out of about 25 planted (†).

†*Bulbine annua*.

†*Asphodelus luteus*.

†*Uropetalum serotinum*: did not germinate.

EXOGENS.

Ricinus communis (var. *major* and *minor*): both germinated after 36 days.

Cucurbita Melopepo (vegetable marrow): germinated after 100 days; of 4 seeds immersed in the cold water for 82 days, 2 germinated.

†*Cucumis Melo* (melon).

Cistus (mixed shrubby garden varieties): germinated well after 36 days, and some germinated after 70 days.

(CRUCIFERÆ.)

Lepidium sativum: after 85 days' immersion only one out of many germinated; after 56 days $\frac{6}{57}$ grew: in the cold water, after 65 days, $\frac{4}{56}$ grew. (†var., golden cress.) These seeds gave out an astonishing quantity of slime in the salt water.

Brassica oleracea, var. "Mammoth white Broccoli:" germinated after 11 days' immersion, but after 22 days all died.

—————, var. "Early Cauliflower:" after 22 days, 5 out of 100 germinated; after 36 days all dead.

Brassica oleracea, var. "Cattell's Cabbage:" germinated excellently after 36 days; all dead after 50 days.

—————, var. growing wild on the Castle Rocks of Tenby; fresh seeds, after 50 days germinated excellently; after 110 days germinated very well; after 133 days only two out of some hundreds germinated (†).

†*Brassica Rapa* (var. yellow turnip).

Raphanus sativus: after 85 days, $\frac{2}{30}$ germinated; the cold water seemed to be injurious to these seeds, for after only 30 or 50 days all the seeds were dead (var. black radish) (†).

Erysimum Perowskianum: after 36 days germinated well; after 50 only one seed; after 70 days all dead (†).

Matthiola annua: germinated after 28 days; all dead after 54 days.

Sinapis nigra: seeds much swollen; germinated after 11 days; all dead after 22 days: fresh seed germinated pretty well after 15 days, but were all killed by 25 days' immersion.

Crambe maritima: after 37 days germinated well.

Tropæolum majus: after 37 days nearly all germinated, but after 50 days none did.

†*Limnanthes Douglasii*.

Hibiscus Manihot: all were killed by 11 days' immersion (†).

†*Malope grandiflora*.

Papaver somniferum: germinated well after 28 days; was killed by 54 days.

Argemone Mexicana: came up excellently after 50 days, and pretty well after 70 days.

†*Chryseis crocea* (germinated very imperfectly after the month).

Linum usitatissimum: after 7 and after 14 days only two or three seeds, out of very many, germinated; after 28 only one seed came up; after 42 days not one germinated. These seeds gave out much slime.

†*Silene compacta*.

Rheum Rhaponticum: germinated well after 82 days.

Atriplex (garden orache): some of the seed germinated under water after 56 days' immersion; the remaining seed germinated excellently after 100 days.

Beta vulgaris: excellently after 100 days (†).

Spinacea oleracea: excellently after 70 days; a few after 120 days; all killed by 137 days (†).

(LEGUMINOSÆ.)

Vicia Faba (var. "Johnston's Wonder"): two out of six lived

after 11 days' immersion; one half-germinated after 14 days; after 22 days all dead: many of these beans swelled greatly. I tried sixty after 28 days and found all dead. None survived 30 days in the cold water.

Pisum sativum: after 11 days some germinated; none survived 14 days; none survived 30 days in the cold water. Another lot of *fresh* seed ("Thurston's Reliance") all died after 12 days; none survived 30 days in the cold water. I found 13 days' immersion in pure water killed these latter fresh peas. (†None germinated.)

Phaseolus vulgaris (var. "early frame dwarf"): all died after 11 days' immersion; after 28 days' immersion, 80 were planted, but all dead. I tried another lot of *fresh* seed, but none of them resisted even 10 days' immersion; nor did they resist 30 days in the cold water: many of these seeds swelled much (†).

Trifolium incarnatum: all died after 11 days' immersion, and after 30 in the cold water. *Fresh* seed germinated excellently after 5 days' immersion, well after 12 days, and one single seed out of some hundreds germinated after 20 days. These seeds swelled much.

Ulex europæus: after 11 days germinated well; after 14 days two germinated; after 28 days all dead.

Lupinus polyphyllus: after 22 days, out of seven swollen seeds three germinated; seven others did not swell and were all dead; after 36 days' immersion one began to germinate and then died.

Lupinus luteus (pale var.): after 22 days $\frac{4}{5}$ lived; after 36 days' immersion $\frac{3}{8}$ germinated; after 50 days all dead.

†*Lupinus pubescens* germinated after a month, but Mr. Berkeley says the greater number were rotten.

Mimosa sensitiva: germinated excellently after 36 days' immersion, and pretty well after 50 days.

Geum coccineum (var. *splendens*): after 36 days germinated well, and after 70 days one single seed germinated.

Saxifraga incurvifolia: did not germinate after 30 days' immersion.

———— *aizoides*, nor did this species, but the seed was not very good.

(SOLANACEÆ.)

Capsicum annuum: after 137 days' immersion, 30, out of 56 planted, germinated well (†).

Solanum tuberosum: germinated excellently after 70 days, well after 100; all dead after 120 days.

——— *lycopersicum* (common tomato): one seed germinated after 22 days' immersion, the rest were killed by 36 and 50 days' immersion. († But Mr. Berkeley found that they germinated after a month.)

†——— *melongena*.

Convolvulus tricolor: after having been 7 days in the salt water, many of the seeds germinated, and the embryos came out of the husks: of those which did not germinate under water, one germinated after 36 days' immersion.

(POLEMONIACEÆ and HYDROPHYLLACEÆ.)

Gilia tricolor († was killed by a month's immersion).

Phlox Drummondii: of old seed none germinated after 11 days; but of fresh seed, 3 out of many germinated after 15 days, and none after 25 days' immersion.

Eutoca viscida.

Nemophila insignis.

——— *atomaria*.

——— *maculata*.

——— *discoidalis*.

} † None of these were found by Mr. Berkeley to germinate after a month's immersion.

Borago officinalis: a few came up after 14 days' immersion, one after 28 days, and none after 42 days.

† *Nolana grandiflora*.

Satureja (common savory): after 42 days, 3 seeds out of many germinated.

Campanula Pentagonia († did not germinate after a month's immersion).

† *Fedia graciliflora*.

† *Fedia* (corn salad).

(COMPOSITÆ.)

Lactuca sativa (common lettuce): after 56 days' immersion $\frac{7}{10}$ of the seed came up; after 85 days only one out of several germinated. Cold water had no marked effect, but after 65 days they germinated rather better than the others (†).

† *Cichorium Endivia*.

Galinsoga trilobata: germinated after 22 days.

Aster Chinensis (mixed German varieties): germinated after 28 days; all dead after 54 days' immersion.

Ageratum Mexicanum: after 100 days, one seed out of many germinated; at much shorter periods these seeds did not germinate well.

Leontodon Taraxacum: germinated excellently after 61 days' immersion; the seeds were fresh.

Tussilago Farfara: fresh seeds being placed in the salt water, after 9 days, many of them germinated under water. After 25 days, I took out some of the young plants and planted them: one grew. The germination of these seeds is the more remarkable, as this is not a sea-side plant.

† *Monolopia Californica*.

† *Cenia turbinata*.

† *Cosmos luteus*: did not germinate after a month's immersion.

Clarkia pulchella: germinated well after 28 days; was killed by 54 days' immersion.

† *Godetia rubicunda*.

† ——— *Lindleyana* was killed by a month's immersion.

Apium graveolens (var. "Cattell's white"): after 137 days only 6 seeds out of some hundreds germinated; after 85 days the seeds germinated excellently; they did not appear to germinate quite so well after 82 days in the cold water (†).

Daucus carota: a very few germinated after 85 days; after only 56 days $\frac{3}{10}$ grew (†).

On the Vitality of Seeds after prolonged Submersion in the Sea.

By JAMES SALTER, Esq., M.D., F.L.S. &c.

[Read May 6th, 1856.]

I SHOULD not have thought the observations which are the subject of this little communication of sufficient importance to occupy the attention of the Linnean Society, had it not come to my knowledge that one of our most distinguished British naturalists is at present engaged in investigating experimentally the question of the vitality of seeds after prolonged submersion in sea-water, especially in reference to the influence which that circumstance would have in explaining some of the problems of geographical vegetable distribution.

The facts which I am about to detail, and which came accidentally under my notice some years since, bear directly upon this subject, and while, as it seems to me, they establish the doctrine

that certain seeds *do* retain their vitality after submersion in the sea, probably for a considerable period, they suggest also, as far as these instances themselves are concerned, an explanation of the mode in which the seeds may have passed from one locality to another. The facts to which I refer are briefly these:—

In the year 1843, the authorities of Poole in Dorsetshire determined to deepen the channels of Poole Harbour to facilitate navigation. For this purpose a large number of ballast-lighter-barges were employed to scrape the mud from the bottom of the channels and convey it to the shore, where it was deposited in large quantities. During the winter sufficient mud was thus obtained to cover an area of some hundred square yards several feet in thickness, and this was accumulated to such an extent, that a quay was made of the hardened mud on the edge of the shore.

The quay however was never used, nor its surface disturbed.

Early in the following spring I was surprised to see that the surface of this harbour-mud exhibited abundant vegetation, of a character totally distinct from that of the neighbouring shore; and as the season advanced, and the species were recognized, the flora of this mud quay was not only found totally distinct from the littoral vegetation which surrounded it, but it contained plants which did not grow within many miles of the spot, and one which was probably foreign to the county. Immediately surrounding the mud quay was the ordinary vegetation of our southern harbour shores, *Statice*, *Salicornia*, *Atriplex*, *Carices*, &c., whilst on this exposed mud itself not one of them was to be seen; but instead of these there sprung up a large crop of oats and barley, some plants of *Lysimachia vulgaris*, one plant of *Centaurea calcitrapa*, and multitudes of *Epilobium hirsutum*; and besides these there were other plants which I did not recognize, or whose names I have forgotten.

To my mind it appeared conclusive, that the seeds which produced this crop of vegetation must have been in the mud at the time it was deposited on the shore by the lighters.

Taking the plants I have named as constituting part of the vegetation of this new-made land,—they none of them grew in its neighbourhood. The cereals, which constituted the most numerous of the plants, were not cultivated within a mile of the spot. This mud quay was made at the extremity of the peninsula upon which the town of Poole is built, and the nearest field upon which cereals are cultivated is on the other side of the town, and at least a mile from the shore.

Lysimachia vulgaris does not grow within four or six miles of the spot; *Epilobium hirsutum* two or three miles; and *Centaurea calcitrapa* is scarcely known in the county, and certainly not within ten miles of Poole.

Now remembering that none of these plants grew either on the shore around the spot, nor even within miles distant; remembering too that they were the sole occupants of this new-made land, and that the ordinary shore plants, growing in abundance only a few feet from its edges, were not to be seen on it, and further, that this abnormal vegetation showed itself the very next spring, even only a few weeks after it was completed, it must, I think, be conceded, that the seeds were in the mud at the time it was spread upon the shore; and that idea is still further sustained because a very possible explanation suggests itself, which would sufficiently account for the presence of the seeds of the plants named, in the situation from which the mud was obtained. The mud was collected in the main channel about midway between the head and the mouth of the harbour. At the head of the harbour two rivers pour their waters into it, the river Frome and the river Piddle. These rivers take their origin in the western parts of the county of Dorset, and in their course pass through districts having every variety of soil and capable of furnishing vegetation of great diversity; on their banks, moreover, two of the species I have mentioned (*Lysimachia* and *Epilobium*) grow in profusion.

Is it too much to suppose that the seeds from which these plants sprung had fallen into the rivers in various parts of their course, had gone with their waters into the harbour, and ultimately reached the position from which the mud and they had been collected? That explanation appears to me to be very probably correct; but whether it be received or not, the more important point,—that a variety of seeds had been for a period, probably considerable, at the bottom of Poole Harbour, soaking in water as salt as that of the ocean, had retained their vitality till brought under the influence of air and rain and warmth, and had then produced healthy vegetation—that is a point which I think cannot be disputed.

Note on the Development of Fungi upon Patna Opium. By the
Rev. M. J. BERKELEY, M.A., F.L.S. &c.

[Read June 3rd, 1856.]

CORDA has figured in his fifth Fasciculus a species of *Periconia*, which was observed by Jänner on Opium from which the *Morphine* had been extracted. This, as far as I know, is the only recorded instance of vegetation on that substance, though there would be no reason for surprise, when moulds are developed so largely in mineral poisons, if they should not be incapable of growth in vegetable poisons. The stems and capsules of *Papaver somniferum* nourish more than one parasite; but it is probable, that in the condition in which they are when the fungi make their appearance, they contain very little opium.

Specimens of the shell of opium cakes, consisting of the petals of *Papaver somniferum*, agglutinated with an impure opium paste known under the name of Lewah, have just been transmitted to me by Dr. Thomson, to whom they had been communicated by Dr. Mackinnon from Patna, in consequence of an affection to which the opium cakes have been subject for the last year or more. One specimen consists of shell from a very perfect cake, the other from a cake in an advanced state of decay. On examination of the lewah between the layers of petals, with sesquichloride of iron, there was little or no red tint in either. Both so far seemed to be in the same condition. On examination with the microscope, the shell from the perfect cake exhibited a large quantity of pollen-grains attached to the surface, and abundant mycelium of *Penicillium*, with necklaces of spores of various sizes, but without any symptoms of consequent decay. The shell from the unsound cake was much decomposed. It was infested with *Acari*, whose eggs and dung were scattered about, mixed with a few pollen-grains. There were abundant traces of the same *Penicillium*, but not in so perfect a condition. There seemed also to be a mixture of the spores of *Aspergillus*, with copious sporangia of *Eurotium Herbariorum*, which is now recognized as a form of the fruit of that genus; besides which, there were little heaps of white matter, consisting of minute bodies endowed with Brownian motion, and numberless infant spores of some mould in various conditions, resembling the Yeast fungus, and possibly an early stage of the *Penicillium* or *Aspergillus*. In the former case mould was present, but not in such abundance as to do mischief; in the latter mould predominated, and was, I believe, the cause of the dete-

rioration of the opium. Without more ample materials, it would be imprudent to conclude that the little mould in the first instance had robbed the lewah of its meconic acid, though it had done no damage to the mass of opium within, nor have I any specimen of the damaged opium itself for comparison.

Supposing however, which is very probable, that the injury to the opium has really arisen from the mould, the question is, how may it be remedied, and so remedied as not to impair the sample? It is obvious that dipping the cakes into any solution would be liable to objection, as probably leading to mischief. If, however, the cakes, as soon as any mould appears, were submitted to sulphurous acid (the vapour of common sulphur), I am inclined to think that the remedy would be complete, and that the cakes would not be injured in appearance. If the affection should become of any serious importance, the practice would be well worth trial, and I should be very sanguine of its success.

M. J. BERKELEY.

King's Cliffe, April 26, 1856.

Supplemental Observations, in a Letter to J. D. Hooker, Esq.,
M.D., F.R.S., F.L.S. &c.

King's Cliffe, April 28, 1856.

MY DEAR FRIEND,—I have made another chemical examination of the two specimens of Opium shell this morning, the result of which is as follows:—

Neither in the bad nor good the lewah in solution with water and alcohol gave any red tint with litmus paper. There is, therefore, no free meconic acid.

1. Sesquioxide of iron in a spirituous solution of the lewah gave no red tint in either. It should seem then, again, that there is no meconic acid. As, however, the solution was slightly discoloured with gallate of iron, the matter is not decisive. Meconate of iron may not have been formed, in consequence of the formation of gallate of iron.

2. Strong nitric acid gave a *slight* red tinge to a spirituous solution in both cases: there is, therefore, a small quantity of morphia in both.

We made a comparative trial with opium powder in the first instance (No. 1), and at once obtained a *strong* red tint even with an aqueous solution. Our examination, therefore, is to a certain degree worth attention.

We also made a comparative trial with opium powder, and obtained a decided red with a spirituous solution on the addition of strong nitric acid (No. 2). Our manipulation then, in this case, is not at fault.

Of course, no more weight is to be attached to such a rough chemical examination than it deserves, but it is at least suggestive.

Mould destroys the virtue of many drugs, and why not of opium? We ought to have had a portion of the opium from the cakes to which the two specimens of shell belonged.

M. J. BERKELEY.

The lewah would naturally be deficient in meconic acid and morphia compared with good opium; but not probably so deficient as in the shell after moulds have grown upon it.

Note on the Recent Discoveries in relation to the Microgonidia of Freshwater *Algæ*. By the Rev. M. J. BERKELEY, F.L.S. &c.

[Read April 1st, 1856.]

AMONGST other points in the physiology of *Algæ*, on which so much light has been thrown by the beautiful observations of Pringsheim, the functions of the little organs which Braun has discovered in very different groups of freshwater *Algæ*, and to which he has given the name of *microgonidia*, have not been neglected. These bodies, which scarcely exceed $\frac{1}{500}$ th of an inch in length, and are often not half that size, are clavate above and strongly attenuated below. They are either unicellular or divided by one or two septa, and occur in little groups or separately on or in the neighbourhood of the large spores. They soon attain their full development, and open by means of a little lid at their apex, through which their contents are rapidly evacuated. Pringsheim has observed in *Ædogonium* (*Vesiculifera*, Hass.) and *Bulbochate*, that when the contents of the swollen joints in which the spores originate have been concentrated, a round lateral aperture in the former, and one or more circular fissures in the latter are formed, by means of which they are exposed to the entrance of minute bodies from without. As the microgonidia burst at the same time with the formation of these apertures, Pringsheim conjectures with great probability that they perform the same functions as the horn-like

processes in *Vaucheria*. He has not, however, witnessed the production of spermatozoids from them. After the rupture of the spore-cells has taken place, the concentrated mass soon acquires an external membrane, exactly after the fashion of the spores in *Vaucheria*, and is in a condition to be separated at the proper time from the parent plant, to germinate, or to undergo farther changes instead of immediate germination. One of these bodies is figured by Thuret under *Ædogonium*, but he does not call any particular attention to them, nor does he seem to have observed them *in situ*.

After reading the paper of Pringsheim, I referred to a file of letters received some ten years since from Mr. Thwaites, and under the date of April 1846 I found a correct figure of the microgonidia in a species of *Ædogonium*, agreeing exactly with the account of Pringsheim, as does a mounted specimen received at the same time which is still in excellent condition. Mr. Thwaites remarks that these bodies appear to be of the same nature with the horns in *Vaucheria*, and that they are probably antheridia; but he was led aside from following the clue before him by theoretical views which in the end proved of far less importance. It is curious that he had not observed them also in *Bulbochæte*, for mounted specimens received from him about the same time exhibit them in great abundance. Mr. Broome, who was at that time the constant companion of Mr. Thwaites in his scientific pursuits, has at my request examined his own mounted specimens of *Bulbochæte*. He finds that *microgonidia* are equally abundant in them as in my own specimens, and has moreover transmitted sketches, which are now laid before the Society. There is no doubt that Pringsheim will follow up the question which he has so successfully begun; but as the season is just at hand for observing these bodies in perfection, I have thought that an especial notice of their observation some years since in England might be interesting to such Members as may not have met with Pringsheim's memoir.

The same author has, moreover, made some important discoveries as to the development of the spore in *Bulbochæte* after separation from the mother-cell. The spore, after remaining some weeks without much alteration, at length escapes, and in a few hours elongates, attaining twice its original length. The endochrome by successive division gives rise to four distinct bodies which acquire a nearly globular form and are furnished at one extremity with two sets of ciliary processes, by means of which they move about, and thus appear in the condition of zoospores. It is

probable that some similar change may take place in *Ædogonium*. The observation of the spores, therefore, in this genus, after their formation or separation from their parent-cells, presents another interesting subject of investigation.

The species of *Bulbochæte* on which the microgonidia are figured by Mr. Broome, appear to be *B. setigera* and *B. crassa*. The two species at any rate are different, for while the spores of *B. setigera* measure $\cdot 003$ in diameter, or $\frac{1}{333}'''$, in the other species they measure only $\cdot 0015$, or $\frac{1}{666}'''$. On the threads of the former a little parasitic species is also figured, which I believe to be undescribed, and has been named by Messrs. Broome and Thwaites *B. parasitica*. Microgonidia have not been observed in this species; but the specimens are so entangled with the threads on which they grow, that it is not possible to obtain a very clear view. The sketches, it should be observed, are mere hasty sketches for the sake of illustration, and were made without the slightest notion of being laid before the Society.

On a New Species of *Peziza*, being the full Development of *Sclerotium roseum*, Kneiff. By FREDERICK CURREY, Esq., F.L.S.

[Read June 17th, 1856.]

THE genus *Sclerotium* is one which, for a long time, has occupied a doubtful position in the family of the *Fungi*. After having been bandied about from one family to another, the opinion has for some time been gaining ground, that the *Sclerotia* are not autonomous productions, but are merely the mycelia of other *Fungi*, which being arrested in their growth whilst retaining their vitality, await only a favourable season for attaining their full development. There are numerous instances in which, by the observation of them in their natural condition or by cultivation, the *Sclerotia* have been ascertained to produce *Fungi* of various kinds and belonging to widely different families, but there is still a vast number in which no such subsequent development has been traced, and which in the mean time are necessarily retained in the genus *Sclerotium*. Under these circumstances, any new case in which the full development is observed must be a matter of interest to mycologists, and I have therefore thought it worth while to bring before the notice of the Society the following instance. The *Sclerotium* to which I allude is *Sclerotium roseum*, Kneiff., which is found in the interior of the stems of Bull-rushes and common

rushes, the pith of which it partially displaces. The fungus is oblong and almost cylindrical in shape, usually somewhat rounded at both ends, and varying in length from $\frac{1}{8}$ th to $\frac{1}{2}$ an inch and upwards. Its surface is marked with longitudinal furrows, and I have observed that the fibres of the interior of the rush fit closely into these furrows. Like many other *Sclerotia*, its outer surface is formed of a layer of dark-coloured cells, making the body appear black to the naked eye, but which cells, when seen under a sufficient magnifying power, assume a brown hue. The internal cellular tissue is almost white, but with a decided tendency to rose-colour, a circumstance which has given rise to the specific name "*roseum*." It is worthy of remark that if a thin transverse section be placed under the microscope, it is seen to consist of a mass of densely packed thread-like cells which constitute the substance of the *Sclerotium*, and intermixed with these cells there is to be seen a quantity of the well-known stellate cells forming the pith of the rush. This fact shows that the *Sclerotium* has not altogether displaced the pith, but has grown round it, cutting off, and as it were incorporating with itself, a portion of such pith.

It was on the 23rd of April in the present year (1856), that in searching for Algæ in a pool on Paul's Cray Common, near Chislehurst, in Kent, I met with several specimens of a very elegant *Peziza* growing upon the last year's stems of some species of Rush, probably *Juncus conglomeratus*. Upon a closer examination I observed that the *Peziza* was not attached to the surface of the rush, but had emerged from the interior, causing a longitudinal fissure in its passage from within outwards; and upon splitting open the rush, a black tubercular body was visible which proved to be *Sclerotium roseum*, to which the stalk of the *Peziza* was attached, and from which in fact it grew. The cup was of a bright brown colour, varying somewhat in shape; in most of the specimens it was hemispherical, but in some cases infundibuliform; in one the edge of the cup was erect, extending beyond the equator of the hemisphere, and calling to mind the peculiar shape of *Peziza Persoonii* as figured in the 'Mycologia Europæa;' in other specimens the edge of the cup was recurved and sinuous. The number of *Pezizæ* growing from each *Sclerotium* varied from two to thirteen, and the greater the number the less was the size of each individual. The diameter of the largest cup was rather more than one-half, and of the smallest about $\frac{1}{8}$ th of an inch. The stalk was well developed, being generally about the length of the diameter of the cup, of a darker colour than the cup, and

tapering somewhat from above downwards. In one specimen the base of the stalk at its point of junction with the *Sclerotium* was thickly covered with hairs.

The *Peziza* described has not been hitherto observed, but there is another well-known species which also grows from a Sclerotoid base to which it bears a considerable resemblance, viz. *Peziza tuberosa*, Bull. The cup of the latter generally grows to a larger size, and its stalk is usually much longer, but the two plants are so alike in shape and colour, that there might be some difficulty in distinguishing small detached specimens of *Peziza tuberosa* from large specimens of the new *Peziza*;—I say *detached* specimens, because the habits of growth of the two Fungi are so dissimilar that they could never be confounded in their natural habitats. *Peziza tuberosa* grows on the ground, its cup just appearing above the surface, and its stalk with the tuberous extremity being buried sometimes to the depth of upwards of 2 inches in the earth. The other, having its nidus in the interior of rushes on the edge of a pool, grew almost, I may say quite, in the water. Another important mark of distinction is to be found in the spores, those of *Peziza tuberosa* being elliptical, whilst those of the rush-*Peziza* are narrow, and more or less arcuate. In conclusion I may mention that there is another *Sclerotium* (*Sclerotium sulcatum*, Desm.), which grows in the interior of the stems of *Carices*, just as *Sclerotium roseum* does in the interior of rushes. It has lately been observed by M. Durieu de Maisonneuve, that *Sclerotium sulcatum* under favourable circumstances becomes (like *Sclerotium roseum*) developed into a *Peziza*. I have not seen this latter *Peziza*, and am indebted to M. Tulasne for a notice of the fact.

My friend Mr. Berkeley, to whom I sent specimens, has marked my plant in his herbarium "*Peziza Curreyana*," and has requested me to adopt that name.

Description of the Kobo-tree, a new genus of *Leguminosæ*, collected by Dr. W. F. DANIELL, F.L.S., in Sierra Leone. By JOHN JOSEPH BENNETT, Esq., F.R.S., Sec. L.S.

[Read November 4th, 1856.]

GUIBOURZIA, *Benn.*

CHAR. GEN. *Calyx* bibracteatus, 4-sepalus; sepalis deciduis. *Corolla* nulla. *Stamina* 10, libera, æqualia. *Ovarium* compressum, pauci- (2-4-) ovulatum; stylo filiformi; stigmatibus ob-

tuso. *Legumen* —.—Arbor Africæ Occidentalis, *Hymenææ facie*. Folia bifoliolata, foliolis 3-5-nerviis. Paniculæ terminales; floribus in ramulis ultimis approximatis, sessilibus, inconspicuis.

This new genus belongs to the Suborder *Cæsalpineæ*, and is evidently very nearly related on the one hand to *Copaifera* and *Cynometra*, and on the other to *Hymenæa*, *Trachylobium* and *Peltogyne*. It differs from the three latter genera in the total absence of petals, in the complete suppression of the tube of the calyx, and in its closely approximated sessile flowers. In these particulars it approaches *Copaifera*, from which it is technically scarcely to be distinguished by any other character than the remarkable one of its two large persistent lateral bractæ, and by its bifoliolate leaves; which last-named peculiarity is, however, found in one or two species of *Copaifera*. It thus forms a connecting link between *Hymenæa* and its subdivisions on the one hand, and *Copaifera* and *Cynometra* on the other. As one of the trees producing a valuable kind of Copal, it cannot be more appropriately dedicated than to the learned Pharmacologist to whom we are indebted for so many elaborate investigations into the origin and history of substances used in Medicine and the Arts.

GUIBOURTTIA COPALLIFERA, Benn.

Habitat in Africâ Tropicâ Occidentali, apud "Goderich" et "Lumley."

Descr. Arbor, comâ ut videtur densâ; ramulis ultimis molliter pilosiusculis, densè foliatis. Folia petiolo vix semiunciali crassiusculo insidentia, bifoliolata; foliolis sessilibus, falcato-semiobovatis, latere interiori plûs minùs concavo, acumine brevi obtuso plerumque terminatis, glaberrimis, coriaceis, plerumque opacis sed aliquandò evidenter pellucido-punctatis, a basi 3- vel rariùs 5-nerviis, nervis venisque crebris subtùs prominentibus reticulatis. Inflorescentia terminalis, e spicis numerosis in paniculam brevem densam dispositis. Spicæ, vel paniculæ ramuli, 1-2-pollicares; rachibus crassiusculis, velutino-tomentosis. Flores sessiles, approximati; juniores bracteâ subtendente concavâ, ovatâ, acutâ, velutino-tomentosâ, margine ciliatâ, alabastro longiore, citò caducâ, stipati et oclusi. Calyx bibracteatus, bracteis lateralibus coriaceis, subrotundis vel truncatis, nervo carinatis, glabriusculis, alabastro ovali quadruplò brevioribus, persistentibus. Sepala 4, 2 posteriora nempe in unicum coalita; æstivatione imbricata, anticum scilicet omninò exterius, alterumque e lateralibus omninò (carinâ exceptâ) interius; coriacea, subæquilonga, latitudine inæqualia, subovalia, obtusa, glabra, pellucido-punctata, decidua. Petala nulla. Stamina 10, omninò libera, æqualia, disco inconspicuo in calycis fundo breviter piloso inserta; filamentis in æstivatione medio inflexis, flore aperto sepalis duplò longioribus, exsertis. Antheræ omnes fertiles, subæquales, lineari-oblongæ, versatiles. Ovarium e basi attenuatâ inæqui-

lateraliter ovoideum, compressum, 2-4-ovulatum; stylo ejusdem ferè longitudinis, in alabastro spiraliter involuto; stigmatè obtuso. Legumen ignotum.

Extract of a Letter from THOMAS C. ARCHER, Esq., dated "Liverpool Royal Institution, 20th Nov., 1856," to THOMAS BELL, Esq., Pres. L.S.

[Read December 2nd, 1856.]

IN one of the newspaper reports of a recent meeting of the Linnean Society, I read with much interest some remarks by Dr. W. F. Daniell on the Kobo-tree of Sierra Leone (*Guibourtia*, Bennett). To the observations of Dr. Daniell, I can add one or two which may be acceptable to your botanical Members.

The gum-resin which Dr. Daniell speaks of as being collected from *Guibourtia copallifera* is probably one of three kinds which are very largely imported into Liverpool under the names of African Copal, African Yellow-gum, and African Red-gum, specimens of which I shall have much pleasure in forwarding to you if they would be acceptable. They differ very much in appearance, and I believe in value. The first is in rounded tears of variable size, but usually large, often very transparent, but rather dull on their surfaces; the colour a pale straw-yellow. The other two are in masses which are fragmentary in appearance, the yellow one usually less so than the red; the latter is often rendered yellowish in colour by adherent dust. The yellow sort is often semi-opaline from a milkiness which exists in some of the masses. I have seen one piece (evidently only a portion of a gigantic *tear*) which weighed nearly three pounds. The usual size of the fragments is that of a hen's egg. The colour of the red kind is rather redder than the oriental topaz, and may be called a reddish-yellow. The *quantity* of these gums received in this port is enormous, when we reflect upon the labour required for the collection of such products: more than 150 tons were imported in 1855; the whole of which I believe is consumed in the manufacture of varnishes, under the general name of Copal.

Trusting these remarks may not be out of place,

I remain, dear Sir,

Yours faithfully,

THOS. C. ARCHER.

On the Palm of Timbuctoo. By BERTHOLD SEEMANN, Esq., Ph.D.,
F.L.S. &c.

[Read November 18th, 1856.]

UNTIL lately, all our knowledge of Timbuctoo was very unsatisfactory. A mysterious haze was closely associated with the very name of that place, opening a field for the exercise of the imaginative faculties, the more unbounded as the veracity of those who had visited and described Timbuctoo was very much doubted; the doubts arising chiefly from the descriptions given, which in order to find general credence were either too vague, or when more positive, too much opposed to well-ascertained facts. Thus, for instance, it was stated that the Cocoa-nut Palm grew there; but as that tree, though found, according to J. D. Hooker, as far inland as Patna in Bengal, and, according to Humboldt and Bonpland, in New Granada, nearly a hundred leagues up the River Magdalena, is essentially a littoral plant, which refuses to grow in many countries any distance from the sea, the correctness of the statement was called in question, and the Palm of Timbuctoo remained until this day a botanical enigma.

In September 1853, Dr. Henry Barth succeeded in reaching Timbuctoo, and during a stay of several months obtained an intimate knowledge of the place and its productions. On his return to Europe, I asked that enterprising explorer whether the Palm alluded to was actually the Cocoa-nut tree. He replied in the negative, and at the same time informed me that it was the same which our mutual friend Edward Vogel had met with on the Lake of Tuburi, and described in his letter to Petermann, dated Kuka, July 13, 1854 (Bonplandia, vol. iii. p. 13). In that letter, Dr. Vogel mentions that he takes the Palm described by him to be the same as that discovered in Sennâr by Russegger's Expedition. Now, in submitting, during my stay at Vienna, all my evidence, including a letter received from Dr. H. Barth, to my friend M. Theodore Kotschy, the botanist of Russegger's Expedition, he agreed with me that Vogel was right in his conclusion, and that the whole of Barth's description corresponded with what he knew of the Palm. Having thus ascertained that the information I had collected referred to one and the same plant, the next step was to find out the genus to which it could belong. It must be borne in mind that I had no specimens at my disposal; Vogel, it is true, had sent a few fruits, but the box containing them has not come to hand*,—and the chief thing I had to guide

* Since this paper was read the box has arrived at Kew, and the fruits prove to be those of *Bonassus*? *Æthiopum*, Mart.

me was the description given in Vogel's letter, in which it is stated that the fruit is from 8-9 inches long and from 6-7 in diameter, weighs about four or five pounds, has an oval shape, and a fibrous husk enclosing three seeds; that the trunk is, unlike that of the Doom-palm, undivided, and the leaves fan-shaped, characters which agreed with no other genus than *Borassus*; and on turning to Martius' great work, I find the palm described as *Borassus ? Æthiopum*, Mart.

It was necessary to show the way and the means by which I have arrived at the identification of the Palm of Timbuctoo with *Borassus ? Æthiopum*, Mart., in order to gain the assent of botanists to it, and I will now proceed to condense and connect all the information I have collected, that we may see the sum total of what is known about this palm. Like *Adansonia digitata*, *Hypæne Thebaica*, *Kigelia pinnata*, and many other plants, the *Borassus ? Æthiopum* is spread from the eastern to the western shores of Africa, and has, by some, been thought to extend as far as the Cape de Verd Islands; but Dr. Bolle, from personal observation, assures me that the *Borassus* occurring on that group in isolated specimens is the old *B. flabelliformis*, Linn., as correctly stated by J. A. Schmidt in his Contributions to that flora (Beiträge zur Flora der Cap-Verdischen Inseln, Heidelberg, 1852), and that it was introduced by the Portuguese from the East Indies. *B. ? Æthiopum* has been found in Nubia, on the Senegal, and in the territories of the Fidaëes; Ed. Vogel observed it on the Lake of Tuburi; and Barth adds: "It is diffused over the whole of Central Africa, and forms, especially on the banks of the shallow water-courses, so numerous in that country, extensive forests; at any distance from such waters it is only found in isolated specimens, and sometimes it is met with in company of the Date- and the Doom-palm. It is the most characteristic tree, not only in the Musgoo-country (*i. e.* the fertile, slightly elevated plains between the Shary and the eastern tributaries of the so-called Niger), but also in all the southern tributary provinces of Bagirmi; in Wadai, especially on the Bat-ha, as well as in Darfur and Kordofan, it is abundant. On the central Niger it is scarce; in Haussa very much isolated; but on the Upper Niger, above Timbuctoo, it is again plentiful, and has there been mistaken for the Coconut Palm. In the language of the Haussa-people it is termed 'Gigiña,'—in Kanuri, that of the Bornuëse, 'Kamelútoo,' in that of Fulbe, 'Dugbi,' in that of the people of Logon, 'Margum,' and in the Musgoo-language, 'Uray.'" In Nubia it is known by the

name of 'Dolaib,' 'Delaib,' or 'Deleb,' on the Senegal by that of 'Runn,' and amongst the Fidaëes by that of 'Vige-Tjo.'

The trunk is about 2 feet in diameter, and according to Ed. Vogel 40, according to Thonning from 60–70, and according to Barth from 60–80 feet high. It is undivided, unarmed, and shares with *Iriartea ventricosa* and several other palms the peculiarity of having above its middle height a very perceptible swelling. Kotschy informs me that this swelling does not remain fixed in the particular part in which it makes its first appearance, but that, as the plant grows higher, it shifts its position, draws in, and appears in another place. Judging, however, from what I know of *Iriartea*, I do not see how it is possible for this hard woody swelling to become contracted; perhaps it may be that the part below the ventricose extension increases so much in thickness that the swelling itself becomes obsolete, and that a new swelling appears.

The foliage, forming a magnificent crown at the end of the trunk, is, according to Ed. Vogel, of a more lively green than that of the Ginger-bread-tree or Doom-palm, and is composed of fan-shaped leaves, measuring 5 to 12 feet in diameter. They are used for thatch, for making baskets, mats, hats, and other articles for which the leaves of most palms are usually employed. The palm is polycarpæous,—the inflorescence appearing between the leaves, bearing large bundles of almost round fruits, about as large as a common-sized melon, of a dark-yellow colour, and about four or five pounds in weight. The fruit has three seeds, surrounded by a fibrous husk which contains a pulp, of an acid sweet (according to Ed. Vogel, rather bitter) flavour, and an agreeable odour resembling that of the pine- or the Mamey-apple, on account of which (the fruit being either raw or boiled) the natives eat or rather suck it. The seeds are planted in the ground. In about a fortnight seedlings have sprung up, which are eaten, either roasted or raw. Barth states that he never saw them eaten in any other state than raw, in the parts he visited. "I am inclined to believe," says the last-named traveller, "that a well-known flour, called 'fidogma,' in the southern provinces of Bornoo, is derived from their root." The albumen of the seed, when still soft, is likewise eaten.

It is curious to find this palm applied to the same uses in Africa, as its congener the Palmyra (*B. flabelliformis*, L.) is in Asia, especially the sucking of the husk of the fruit, the eating of the young seedlings, and the extracting from the latter (as most probably is the case) a kind of flour. Now there may not be anything peculiar in the way in which the fruit is eaten, as that would

readily suggest itself to anybody wishing to partake of it; but there *is* something peculiar in eating the seedlings, to say nothing of the extraction of flour from them. Here the question involuntarily arises: "Is the idea of eating them of native growth, or has it been derived from the East Indies?" I am not inclined to give the negroes much credit for inventive genius, but I think in this instance we must assign it to them. For if the applications of this palm had been adopted from the Palmyra, it is not likely that the most useful one of them, the extracting of toddy for making wine, vinegar, yeast, spirits and sugar, would have been overlooked. But neither of the *B. ? Æthiopum* nor of any other African palm do I find it recorded that they serve for that purpose; all we hear is, that the date-tree in Northern Africa, after the heart of its leaves has been cut out, accumulates a thick, sweetish, and refreshing sap ("Lagbi"), of a slightly purgative tendency; and that the ancient inhabitants of the Canary Islands, the Guanches, knew how to prepare from it a beverage, which replaced the grape wine, and also vinegar, honey, and sugar; but that branch of industry has long since become extinct, and even the method by which the sap was obtained has not been handed down to us: as we are informed, however, by Viera, that each tree yielded about a small caskful, it is not impossible that it may have been procured as it is still in Northern Africa, and that whenever sap was required, at least one tree had to be sacrificed. The extraction of toddy seems to be peculiarly Asiatic: in America it is unknown, for the so-called "palm-wine" of that country is not obtained by means of the spadix from a *living tree*, as is the case with genuine toddy, but by a hole cut under the crown of a tree *previously felled*. Thus we find that all the three continents, chiefly inhabited by these princes of the vegetable kingdom, practise one principal method of extracting the saccharine matter in which many of the palms abound. Both the Africans and the Americans kill the tree, the sap of which they procure, the former by destroying its terminal bud, the latter by felling its trunk: only the Asiatics preserve it by merely cutting its spadix, and allowing the sap to ooze out through the wounded parts. The wanton destruction of the trees by the one party, and the careful husbanding of them by the other, is the reason why Africa and America have never furnished, and as long as the present process of destruction is continued, will never furnish any palm-sugar, a product of which Asia sends to Europe alone several thousand tons annually.

Note on the Use of the Rhizoma of *Pteris aquilina* as an Article of Food. By the Rev. M. J. BERKELEY, M.A., F.L.S. &c.

[Read December 16th, 1856.]

THE rhizoma of *Pteris aquilina*, which abounds in starch and mucilage, is sometimes used in Europe and Siberia to make a coarse kind of bread. This circumstance is mentioned by Houttuyn in his edition of the 'Systema Plantarum' of Linnæus, adverting at the same time to the report of Forster, that the New Zealanders derive a large portion of their food from roasted fern-roots pounded between stones, the woody matter being rejected as useless. He expressly says, however, that the fern so used is not *Pteris aquilina*, but *Acrostichum falcatum*, Linn. Houttuyn has, however, made some mistake in this, as *Gleichenia Hermannii*, and not *Gleichenia furcata*, a West Indian species, is the plant mentioned by Forster under the name of *Polypodium dichotomum*, which, after all, is a very doubtful native of New Zealand. It is now, however, well known, not only that several species of Fern in New Zealand afford an esculent rhizoma, but that amongst them is a species of *Pteris* so like *P. aquilina*, that it is considered merely a variety of that species under the name of *esculenta*. Having lately had occasion to examine the rhizoma of our common Bracken, it became a matter of interest to ascertain what sort of food might be afforded by it. I accordingly roasted some of the rhizomata, and found them eatable, but extremely disagreeable from their slimy consistence and peculiar flavour, in both of which respects they precisely resemble ill-ripened Brinjals. It struck me, however, that they might afford a better food, if the slimy matter could be removed. I accordingly scraped some of the rhizomata, which had first been washed and peeled, avoiding, however, the two columns of hard coloured tissue with which they are threaded, and then placed the pulp thus obtained in water. After four-and-twenty hours, the water had become extremely slimy and of a yellow-brown. This was carefully decanted, and the pulp washed again with water, which was now quite colourless. This also was decanted, and the pulp, when sufficiently dry, was kneaded into a cake, and baked upon the hearth. The result was a coarse but palatable food, perfectly free from any disagreeable flavour,—much better indeed to my taste, and probably not less nutritious, than Cassava bread.

In laying this note before the Society, I do not make the slightest pretension to novelty. The only interest which it may be supposed to possess, is the confirmation of the views, so far as

the nutritive qualities of the two ferns in question go, which consider the New Zealand Bracken as belonging to the same species with our own.

Bread is said to be made of the roots of *Pteris aquilina* in Normandy and Siberia. Wahlenberg, however, states that, as far as he has seen, the plant is confined to one locality in Lapland. It is mentioned by Pallas in his 'Iter Sibiricum.'

On some Entomogenous *Sphæriæ*.

By the Rev. M. J. BERKELEY, M.A., F.L.S.

[Read Nov. 4th, 1856.]

No country in the world seems to abound more in *Fungi* than the United States. I have something approaching to 5000 species in my Herbarium from two or three of the Southern States alone, and it is quite certain, from the new forms which are constantly occurring, that the number is far from being exhausted. Many of the species are identical with European forms, but there is a considerable number which have at present occurred nowhere else. Amongst the most curious and interesting of these are the entomogenous species of which I now lay a short description before the Society. None of these are completely isolated from the rest, for *Cordyceps palustris* resembles *C. sobolifera*; *C. stylophora* and *acicularis* are connected through *C. Ravenelii* with *C. sinensis*; and *C. armeniaca* calls to mind the apricot-coloured *C. myrmecophila*. Besides these species I have received *C. militaris* from South Carolina, where *C. entomorrhiza* also occurs under a very fine form.

The entomogenous species of *Cordyceps*, as at present known, are distributed as follow:—

2. *C. militaris* and *entomorrhiza* are common to Europe and the United States.
 1. *C. myrmecophila* is found in England and Italy.
 1. *C. gracilis* in Scotland and Algiers.
 1. *C. sinensis* in China, where it is used as a drug.
 2. *C. Gunnii* and *Taylori* in Australia.
 2. *C. Sinclairii* and *Robertsii* in New Zealand.
 2. *C. racemosa* and *falcata* at Myriong in the Khazia Mountains of Bengal.
 1. *C. armeniaca* in South Carolina.
 2. *C. sobolifera* and *sphecocephala* in the West Indies.
 1. *C. larvata* in Cayenne.

Eight species therefore belong to temperate climates, descending however occasionally to warmer regions, and seven to tropical or subtropical. Of the first eight, four belong to those temperate parts of the Southern Hemisphere which often exhibit subtropical species of Fungi. The Entomogenous *Sphæriæ*, then, on the whole predominate in warm or equable climates.

One doubtful entomogenous species, *C. bicephala* from Brazil, has been omitted in the foregoing list.

1. *CORDYCEPS ARMENIACA*, *Berk. & Curt.*; armeniaca, stipite flexuoso breviusculo, capitulo e peritheciis asperulo pallidiore. *Curt.* no. 3774. (*Plate I. fig. 1.*)

Apparently on the excrement of birds, but probably on larvæ contained in it. Society Hill, South Carolina.

Apricot-coloured. Stem $\frac{1}{2}$ inch high, flexuous, sometimes twisted, paler than the head, which is subhemispherical and rough with the ostiola. Asci elongated, with a swollen apex; sporidia immature.

This species has some points in common with *C. myrmecophila*, but it is a shorter and far more robust plant, with a differently shaped head.

2. *CORDYCEPS ACICULARIS*, *Ravenel*; fusca, stipite gracili elongato, capitulo cylindrico apice sterili acuminato longiore; peritheciis superficialibus liberis. *Rav.* no. 1276. (*Plate I. fig. 2.*)

On caterpillars buried in the soil in damp shady woods. South Carolina. Summer. *H. W. Ravenel, Esq.*

Stem 3 inches or more high, not half a line thick, brown below and tomentose, smooth above and tawny, grooved when dry. Head $\frac{3}{4}$ inch long, cylindrical, brown, studded with the free perithecia, above barren and acuminate. Asci very long, flexuous; sporidia linear, breaking up into truncate joints $\frac{1}{5000}$ or more rarely $\frac{1}{10000}$ inch long.

This species is closely allied to *C. Ravenelii*, but the habit is very different. I can find no essential difference in the fruit.

3. *CORDYCEPS STYLOPHORA*, *Berk. & Broome*; fulva, stipite gracili, capitulo in stylum producto subæquali; peritheciis immersis. *Rav.* no. 1325. (*Plate I. fig. 3.*)

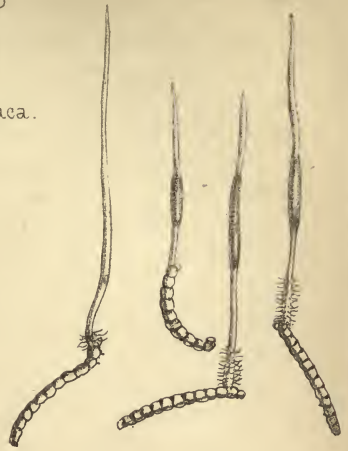
On larvæ buried in rotten logs. South Carolina. Autumn. *H. W. Ravenel, Esq.*

Stem $\frac{1}{2}$ – $\frac{3}{4}$ inch high, $\frac{1}{4}$ line thick, smooth, about as long as the cylindrical head, which is produced into an acuminate sterile process as long or longer than itself; perithecia immersed.

I have not seen the ripe asci of this species, which appears to be quite distinct from either of the foregoing or subsequent species. All three occur on different larvæ, and in different situations.

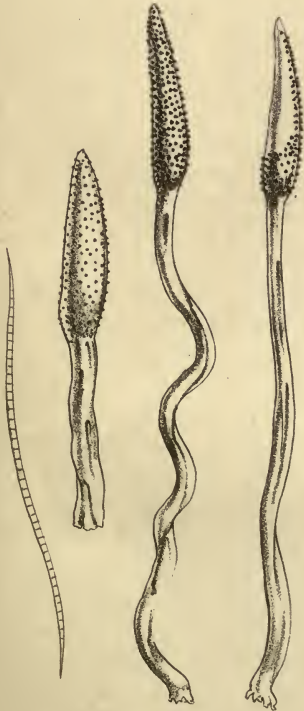


C.Armeniaca.



Cordyceps stylophora.

C. palustris.



Cordyceps Ravenelii .

C. acicularis.

C. entomorrhiza differs from all in the far longer articulations of the sporidia.

4. *CORDYCEPS RAVENELII*, *Berk. & Curtis*; fusca, stipite elongato flexuoso sulcato compresso glabriusculo, capitulo cylindrico attenuato longiore; peritheciis superficialibus. *Curt.* no. 3080, *Rav.* no. 1272. (*Plate I. fig. 4.*)

On larvæ of *Ancylonycha*, Dejean, or *Rhizotrogus*, Latreille, buried one or two inches in the earth. Spring and Summer. South Carolina. *Rev. M. A. Curtis* and *H. W. Ravenel, Esq.*

Brown. Stem 2 inches or more high, flexuous, compressed or grooved, at first minutely tomentose, at length smooth; head $\frac{3}{4}$ inch long, cylindrical, but slightly attenuated at either end. Perithecia free, ovate; asci very long; sporidia very long, filiform, breaking up into joints $\frac{1}{10000}$ of an inch long.

This species has very much the habit of *C. sinensis*.

5. *CORDYCEPS PALUSTRIS*, *Berk. & Broome*; carnosu-suberosa, sordidè carneo-fusca; stipite cylindrico sursum bifido trifidove, capitulis clavatis sub-cylindricis ex ostioliis asperulis; sporidiis filiformibus in articulos minimos globosos solvendis. *Rav.* no. 718. (*Plate I. fig. 5.*)

On moist putrid logs, undoubtedly attached to larvæ. Northampton Swamp, South Carolina. May. *H. W. Ravenel, Esq.*

From 1-2 inches high, about half as much when dry, of a dull brownish-purple or flesh-colour; carnosu-suberosa; stem cylindrical, pulverulent, divided above, about as long as the clavate head, but scarcely so thick. Head rough with the mouths of the globose perithecia. Asci long, flexuous, filled with moniliform strings of globose, extremely minute grains, at length discharged in the form of white flocci. Articulations of the sporidia not exceeding $\frac{1}{20000}$ of an inch in diameter.

The extremely minute articulations or sporidiola, without any other character, separate this curious species, which has moreover a peculiar habit.

Note on a Monstrosity of the Flowers of *Saponaria officinalis*, L.

By MAXWELL T. MASTERS, Esq. Communicated by the Secretary.

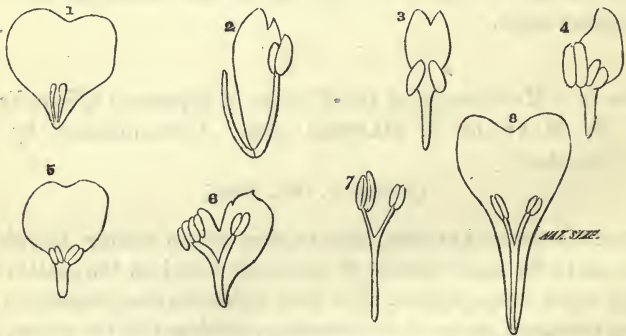
[Read Nov. 18th, 1856.]

MUCH discussion has from time to time arisen among Morphologists, as to the exact nature of the scales found on the petals of so many of the *Caryophylleæ*. The early botanists were content to call them nectaries, scales of the corona, appendages to the petals, &c., without attempting to explain them further. M. Dunal and the supporters of the theory of transverse chorisis, consider them to afford good illustrations of that process. This notion has also the support of Dr. Asa Gray, who institutes a comparison between

the combined intrapetiolar stipules of *Melianthus*, and the two-cleft adnate appendages to the petals in the *Caryophylleæ*. Another view is that taken by a writer in Hooker's Journal of Botany for 1849, where they are considered to be in most cases deformed glands, the writer adducing, among other reasons for so considering them, the fact of "their gradual passage into anthers in some flowers," in accordance with his notion that the formation of anthers is due to the conversion of the glands of the staminal leaf into those organs.

Without wishing to enter into the question of the morphological import of the so-called glands in general, the object of the present communication is to bring forward evidence to show that the scale on the petals of the *Caryophylleæ* is in reality a double organ, consisting of two abortive stamens united together. The double nature of the scale is very manifest. In *Dianthus* there are two plates projecting from the claw of the petal. In most of the species of *Silene* the two plates are quite detached one from the other, and from the petal itself at the point of junction between the claw and the blade; hence in systematic works the appendage is described as bifid, while in some species, as *S. cerastoides*, *Cucubalus bacciferus*, &c. &c., the appendage is quadrifid,—an indication, as it were, of two two-lobed anthers. The double nature of the scales is almost equally obvious in the flowers of the *Sapindaceæ*, particularly in certain species of *Cupania* and *Urvillea*.

In some young flower-buds of a semi-double variety of *Saponaria officinalis* that have recently been examined, the scales were found



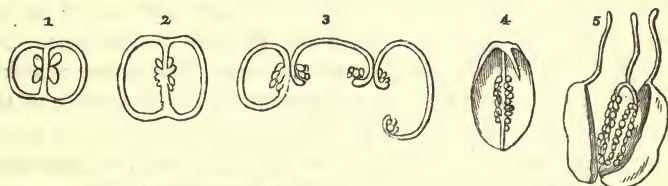
in some instances to be completely divided into two strap-shaped bodies, standing in front of the petal, and quite distinct from it. In one example the scale, single below, was bifurcated above, each subdivision bearing an anther. Several similar scales were found

adherent to the claws of the petals. There were also numerous cases showing an intermediate condition between the ordinary scale and that of two distinct stamens—some of these are drawn in the sketch given below. A careful inspection of some very young flower-buds showed that these scale-like stamens, though formed subsequently to the petals, yet advanced more rapidly in their development than the petals, from which in the first instance they were perfectly distinct.

From these circumstances it seems fair to infer that the scales on the petals of the *Caryophylleæ* are composed of two abortive stamens united together, and in consequence that these bodies do not constitute any real exception to the laws of alternation.

The nature of the scales of the flowers of the species of *Cuscuta* has been explained by Mr. Babington in the *Annals of Nat. Hist.* for 1844 in a similar way, but he does not adduce any positive evidence in support of his opinion.

The flowers of *Saponaria* above alluded to afforded instances of both marginal and free central placentation. In the sketch are represented cross sections of two ovaries (figs. 1, 2), each consisting



of two carpels, and in each there is an evident connexion between the placenta and the walls of the ovary. Other bi-carpellary ovaria, examined at a more advanced period of development, presented a central ovuliferous column, apparently quite unconnected with the walls of the carpels. The most frequent condition of the ovary was that in which there were three carpels, slightly united at their bases, but distinct one from the other for the greater part of their length, open along the ventral suture, and bearing ovules on their margins, as is shown in transverse section in the sketch (fig. 3). Figure 4 shows one of three carpels; the other two bore marginal placentæ, but in this one there was an ovuliferous cord, free from the margins of the carpel, but connected with the style, which is inflexed. Here it seems as if the two placentæ had become detached from the margins of the carpel during growth, while they had remained in union one with the other.

A not unfrequent condition was that in which there were two

lateral carpels with no ovules on their edges (fig. 5), but between them there was an arched body, bearing a style, and studded with four rows of ovules, two on either side, as if the placentæ of both carpels had become detached, with a portion of the style from each, and had united to form the arch:—or, were there four carpels originally, the anterior and posterior reduced each to a narrow strip bearing ovules and united together above, so as to form a single style?

On a Species of *Pilobolus*.

By FREDERICK CURREY, Esq., M.A., F.L.S. &c.

[Read Dec. 16th, 1856.]

A SPECIES of *Pilobolus* has lately occurred in the neighbourhood of Blackheath, differing in some respects from the only common species, *Pilobolus crystallinus*, and closely resembling, if it be not identical with, *Pilobolus roridus* of Bolton, which has hitherto been considered a doubtful form. Like *Pilobolus crystallinus* it is a most delicate and elegant fungus, although not choice in its habitat, flourishing as it does on the surface of cow-dung. My attention was first attracted by a number of little points of a dull yellow colour, giving a scabrous appearance to the surface of the dung, and an examination with a lens disclosed a very few small, ripe specimens of the *Pilobolus*, not differing much at first sight from ordinary specimens of *Pilobolus crystallinus*. By scraping off a thin layer of the cow-dung and keeping it under a small bell-glass in a moist atmosphere, an abundant crop appeared in a few hours, which was followed by others in continuous succession for a fortnight; after which the soil appeared to be exhausted, and in order to procure further specimens a fresh layer of the cow-dung was necessary. I have thus been enabled to follow out the different phases of the plant and to examine its structure with some minuteness. The yellow points above alluded to become elongated into filiform processes, tapering slightly towards the upper extremity, which frequently assumes a clearer and deeper colour (Pl. II. fig. 1). Subsequently the apex of these threads becomes gradually swollen into the form of a flattened sphere, at which period the plants look like small orange-coloured pins (fig. 2). The swollen heads gradually change colour, becoming first of a dull olive-green, and eventually black; or rather (as appears upon a closer examination) a very deep opaque purple. During the

time that the heads are changing colour the upper part of the pedicel becomes swollen into the form of a clear ovoid vesicle, separated by a sharp constriction from the head, but passing gradually at its lower extremity into the line of the stem. This vesicle and the stem were usually continuous and crystalline, looking, in fact, as if made of the clearest glass; but in some instances a granular layer of protoplasm covered the walls of both, and in many specimens there was to be seen a bright orange-coloured band at the point of junction of the stem and vesicle, indicating either the existence of a septum, or a want of affinity between their fluid contents; I rather think the latter. From a time antecedent to the formation of the head, that is, from the period of growth shown in fig. 1, the beauty of these fungi was greatly increased by the vast number of drops of water with which they were always covered. This appearance of dew-drops is invariably seen to occur to some extent in *Pilobolus crystallinus*, but in the present species the drops were far more abundant, being sufficient in many instances entirely to conceal the outline of the stem; they occurred, although in less abundance, on the vesicle, and frequently also on the head, the latter however being often entirely free from them. Up to this point the description applies to the part of the fungus which is, so to speak, above ground; but the part which is imbedded beneath the surface of the dung is no less curious. There is no great difficulty in extracting this portion without injury with the point of a lancet, and then by a careful use of needles, plenty of water, and a delicate camel's-hair brush, the foreign matter may be cleared away, and it is then seen (figs. 3, 4) that the stem-cell becomes globular at its lower extremity, the globe being somewhat obliquely situated with regard to the axis of the stem, and being generally more or less filled with granular orange-coloured endochrome. The globe fits into a cup-shaped cell filled with a similar but denser endochrome, and this latter cell tapers gradually for a considerable length at its lower extremity, and ultimately expands into numerous colourless ramifications resembling the ordinary mycelium of any other fungus. The spores are formed beneath the black covering at the apex of the fungus, which covering seems to have been hitherto considered, at least in *Pilobolus crystallinus*, to be the coat of the sporangium. Such however is not the case in the present species, for this black covering may be drawn off like a finger-stall, leaving the ellipsoidal sporangial cell enclosed in its own proper thick gelatinous membrane still adherent to the apex of the pedicel, and

filled with ripe spores. It is clear therefore that this purple skin only forms as it were a partial veil, and cannot be properly looked upon as a coat of the sporangium. Not unfrequently this skin either partially peels off, of its own accord, or is imperfectly developed, as shown in fig. 7; but it usually hides the sporangium entirely, and is finally cast off with it by the process peculiar to the genus *Pilobolus*, namely the elastic action of the septum which is formed at an early period across the upper end of the vesicle between that and the sporangium. This septum takes an upward growth, becomes gradually more and more everted, and at length by its pressure throws off the sporangium-cell and its purple veil to a distance of several inches. After this has taken place the upper end of the stem-cell exhibits the appearance shown in fig. 8. In the Transactions of the Breslau Academy for 1851 is to be found an elaborate account of *Pilobolus crystallinus* by Dr. Cohn, on reference to which it will be seen that the fungus just described differs from *Pilobolus crystallinus* in the great development in length of the stem, and the vast number of the drops of water spread over its surface. There is another peculiarity, which consists in a number of shining specks scattered over the surface of the veil, having the appearance of small grains of quartz; but these, although very general, are not universal. They are so minute that it is almost impossible to detach them separately, and they do not occur in sufficient numbers on any one plant to be capable of being scraped off in a mass. In one instance they seemed to dissolve in water into a number of exceedingly minute pear-shaped bodies; but the observation was an uncertain one, and beyond it I have not yet been able to ascertain their nature.

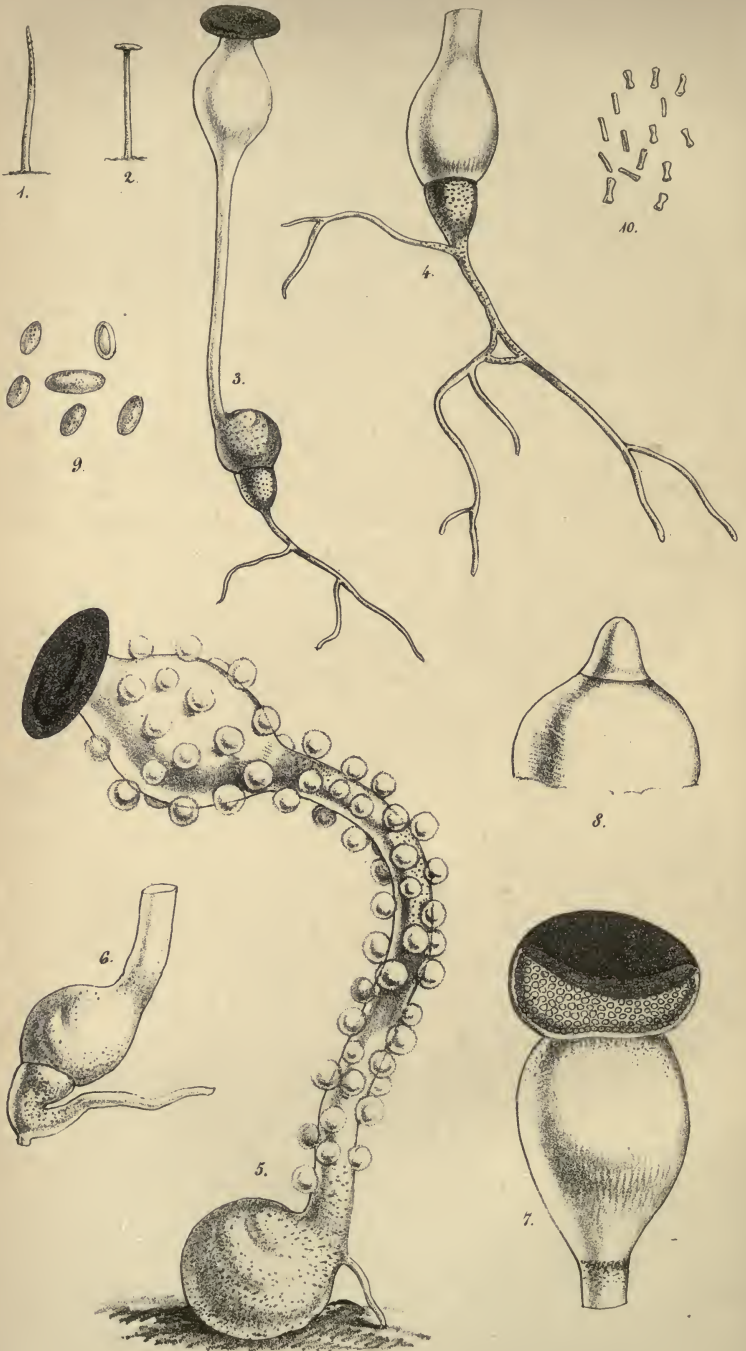
The distinctions above mentioned would not, I think, be alone sufficient to separate this species from *P. crystallinus*, and I should have been disposed to consider the present fungus as only a form of the latter species, had it not been for a difference in the spores. Such a difference, I need hardly say, is one of the safest criterions for the separation of species in Fungi, and one which will probably be more and more valued in proportion as the microscope is called in aid for the detection of such differences. Dr. Cohn describes the spores of *Pilobolus crystallinus* as globular, surrounded by a tough distinct membrane, the latter appearing as a broad dark line, and filled with flesh-coloured, grumous, highly refractive contents, with small nucleoli. Now the spores in my species (fig. 9) are quite unlike those figured by Dr. Cohn;

they are elliptical, of a pale straw-colour, and without any evident external membrane until treated with æther or alcohol, when by the contraction of the contents such membrane becomes visible, not however in the form of a broad dark band, but of a clear and bright line. The contents moreover are very slightly, if at all, granular.

In Bolton's account of *Pilobolus roridus* no particulars are given of the spores—indeed the microscopes of his time would hardly have enabled him to do so with accuracy; in other respects his account agrees sufficiently with the above description to lead me to think that his *Pilobolus roridus* is the same as that which I have described. There are two very curious facts connected with the above *Pilobolus*, which I have had an opportunity of investigating, and which are worthy of notice. They are alluded to by Dr. Cohn as having been noticed by former observers in *Pilobolus crystallinus*, but he refrains from giving any opinion, inasmuch as the appearances in question had not fallen under his own observation. The first is mentioned by Müller, the original discoverer of *Pilobolus crystallinus*, who states that he had seen in many of the vesicles a small white delicate worm, which crawled round and round, and appeared to swim as it were in a little ocean of its own. Müller thereupon came to the conclusion that *Pilobolus crystallinus* was neither animal nor vegetable, but a mixture of the two, in fact a Zoophyte—not in the modern acceptation of that term, but according to its proper meaning. Persoon, on the other hand, alleged that these creatures were nothing but *Anguillulæ*, which came out of the dung and crawled on the outside of the fungus. It would seem that Persoon's opinion is correct, for I have several times observed a species of *Anguillula* encased in the drops of water on the surface of my *Pilobolus*, and twirling round so actively that it is a matter of surprise that it does not cause the drops to collapse. There is no difficulty in extracting the worm from the drop, and it appears to be the common *Anguillula fluvialis*, which no doubt climbs up the stem of the fungus and deposits itself in one of the numerous dew-drops. Similar worms may be seen crawling on the surface of the dung and unconnected with the fungus, leaving no doubt as to their place of origin. The sight of these animals revolving rapidly in their crystal cases is most curious and interesting. It is no matter of surprise that Müller should have been led to suppose that the worm was in the interior of the plant, for it not unfrequently happens that before the real vesicle is formed, a drop of water

becomes attached to the apex of the stem precisely in the spot usually occupied by the vesicle, and it is not always easy for the observer to tell whether he is looking at the vesicle itself or at a substituted drop of water.

The second appearance alluded to above is not so easy of explanation. In the interior of the drops of water which, as has just been mentioned, sometimes occupy the place of the vesicle, I have several times seen a small orange-coloured body revolving with more or less rapidity, but having rather the appearance of being carried round and round by the force of a current than by any voluntary motion. This, or a similar appearance, was noticed by Ehrenberg, and described by him in a paper published in 1823, in Kruze and Schmidt's 'Mykologische Hefte'; he did not however ascertain what the revolving body was, and only endeavoured to explain its rotation by attributing it to some unknown physical agency which kept the drop of water in perpetual revolution. I was very desirous of ascertaining the nature of this moving body, and tried to detach it from the drop of water. This attempt was not successful, but I managed to float a drop entire with its orange-coloured occupant on to a piece of white paper, and then waited for the water to evaporate, hoping thus to leave the object high and dry. However, as the water dried up the body became entirely disintegrated, resolved itself into a mass of granular orange-coloured particles, and left nothing behind but a yellow stain on the surface of the paper. As to what its nature may be, or what may be the cause of its singular rotation, I can offer no conjecture, but I have thought it worth while to mention the above facts with the view of directing further attention to this curious phenomenon. It is interesting to notice the resemblance in point of structure between the genus *Pilobolus* and the fungus which causes the annual epidemic amongst the House Flies; the only essential difference being, that the latter throws off a single cell, whereas in *Pilobolus* the cell which is thrown off is the mother-cell of innumerable multitudes of spores, by which the species is reproduced. It is possible, however, that the contents of the single cell in the *Empusa* may become subdivided into smaller reproductive particles after separation from the parent plant; and this supposition seems the more probable as the single cell is of too large a size to admit of its gaining access to the bodies of the flies, in the interior of which (according to Dr. Cohn's account in a late paper) the first symptoms of this disease are always to be noticed.



Pilobolus roridus.

There is one other fact which may be mentioned before I conclude, viz. the occasional appearance in the interior of the vesicle of small, pale yellow bodies, sometimes cylindrical, sometimes shaped like a dumb-bell (fig. 10). It is probable, I think, that these are young and imperfect spores which have escaped into the vesicle through a small rupture in the septum between that and the sporangium. When the septum is accidentally broken through, the whole mass of spores may be seen to rush into the vesicle, and the fracture, if very slight, might permit the escape of these small bodies, and at the same time not be sufficient to allow of the passage of the fully-formed spores.

Postscript.—I was not aware, until after this paper was finished, that the question of the specific difference between *Pilobolus crystallinus* and *Pilobolus roridus* has been lately discussed by Bail. His observations are to be found in the 'Botanische Zeitung,' 7th Sept. 1855.

DESCRIPTION OF PLATE II.

- Fig. 1.* The *Pilobolus* in an early stage, before the formation of the head, slightly magnified.
- Fig. 2.* The *Pilobolus* when it has assumed the pin-shape, slightly magnified.
- Fig. 3.* A perfect plant magnified about 20 diameters.
- Fig. 4.* The lower portion of a plant in which the swelling at the lower end of the stem-cell is less oblique than in figs. 3 & 5.
- Fig. 5.* A perfect plant magnified 44 diameters, showing the adherent dew-drops.
- Fig. 6.* The root-cell and a portion of the stem-cell of another plant, magnified 44 diameters.
- Fig. 7.* The upper portion of a plant magnified 60 diameters. This specimen shows the peeling off, or imperfect development, of the veil, and the band of orange-coloured matter at the junction of the stem and vesicle, referred to in the text.
- Fig. 8.* A portion of the vesicle of a plant which has cast its sporangium, showing the eversion of the septum.
- Fig. 9.* Spores magnified nearly 400 diameters. The one with a double outline has been treated with alcohol.
- Fig. 10.* Cylindrical and dumb-bell-shaped bodies occasionally seen in the interior of the vesicle.

A Note on *Spiranthes gemmipara*. By Professor LINDLEY,
F.R.S., F.L.S. &c.

[Read January 20th, 1857.]

WITH the permission of the Society, I venture to draw its attention to a point in Irish botany which has not yet been sufficiently examined. In the year 1828 Sir James Smith published in his 'English Flora' (iv. 36) an account of a *Neottia gemmipara* which had been discovered in August 1810, near Cork, by Drummond, and at the same time communicated to him by the Rev. Mr. Hincks. Smith compared it to his *Neottia spiralis*, from which he distinguished it by the leaves being "lanceolate and as tall as the stalk. Spike 3-ranked, twisted. Bracteas smooth."

Subsequently a figure, taken from the dried specimen in Smith's Herbarium, was published in the 'Supplement to English Botany,' t. 2786; and was afterwards copied by the younger Reichenbach, in 1851, into his elaborate 'Orchideæ in Flora Germanica recensitæ.' So early, however, as September 1840, I had examined the specimen in the Smithian Herbarium, and referred it to the genus *Spiranthes* (Gen. et Sp. Orch. p. 464), with the remark that it so much resembled *Spiranthes Romanzoffiana*, a Unalashka plant, that I could scarcely doubt the identity of the two. Nevertheless, Prof. Reichenbach, misled by the only published figure, expressed a doubt whether the plant even belonged to the genus *Spiranthes* (Orch. in Fl. Germ. p. 154). This acute Orchidologist was not aware that, so long before as 1844, it had been made the subject of a special memoir laid by Mr. Babington before this Society, and afterwards published in our Transactions (xix. p. 261. t. 32). Since that time it has, I believe, remained unnoticed by all writers on critical botany. A recent examination of the Neottian Orchids of the Old World, the result of which is now before the Society in another communication, has rendered it necessary to reconsider the relation which the Irish *Spiranthes* bears to other species, and the conclusion at which I have arrived forms the subject of the present note.

Of *Spiranthes gemmipara* I possess two authentic specimens, for which I am indebted to the kindness of Lord Berehaven, the present Earl of Bandon, on whose estate, near Castletown, the species occurs. Both were gathered at the end of August 1843. These correspond so nearly with the description given by Mr. Babington, that a redescription would be superfluous. The only cir-

cumstances to which it seems useful to advert are—1, that the adhesion of the sepals and petals is no greater than occurs in *S. autumnalis*; 2, that the sepaline hairs represented in Mr. Sowerby's figure are scarcely discoverable in the dried specimen; 3, that the face of the column is distinctly pilose below the stigma, as Mr. Sowerby has shown it; 4, that the lip has two distinct, rather large, oblong calli *within* the base, which were overlooked by both Mr. Babington and Mr. Sowerby. Other material points are, that the foot of the column is unusually long, whence the breadth of the base of the sepals and apex of the ovary is much greater than usual, that the base of the lip is nearly twice as broad as the apex above the contraction, and that the coherent sepals and petals curve their points upwards in such a manner as to become secund, while the point of the lip projects beyond them in front.

The first suggestion that is on record as to the relation of this plant is that of Smith, who compares it with *Sp. autumnalis* (his *Neottia spiralis*), from which he separates it. The second is my own, that it may be identical with *Sp. Romanzoffiana*. The third is that of Mr. Babington, who refers it unhesitatingly to the *Sp. cernua* of the United States, an old and well-known species.

Mr. Babington objects to its union with *Sp. Romanzoffiana*, because it differs by "its much shorter bracts, its blunt linear and equally broad sepals, and its longer spatulate lip." But if Reichenbach's figures are examined (and he evidently possessed excellent materials), especially the left-hand figure of his t. 125, and all the analysis, it will be seen that these distinctions are unreal, with the exception of the short bracts. Better differences are to be found in the hairy sepals of *Sp. Romanzoffiana*, and if I mistake not, in the smaller calli placed far within the base of the lip of that species.

From the proposal to identify the plant with *Spiranthes cernua*, I am obliged wholly to dissent. The dispersion of terrestrial Orchids is doubtless far greater than is generally supposed, and, therefore, mere geographical probabilities cannot have much weight; at the same time we must require very strong proof that a plant hitherto unknown, except in the south-east of Ireland, is the same as a common North American species. Not only does it seem to me that such proof is absent, but I hope to show that the evidence lies all the other way. *Sp. cernua* has long naked stems and a thin spike loaded with glandular hairs—*Sp. gemmipara* has short leafy stems and a dense naked spike. *Sp. cernua* has the ovary very narrow and much contracted below the sepals, as is

usual in the genus—in *Sp. gemmipara* it is pear-shaped, and there is scarcely a trace of a contraction, as Mr. Sowerby has very well shown in his figure. In *Sp. cernua* the sepals and petals have very little cohesion, are long and narrow, and the lateral sepals are almost acute—in *Sp. gemmipara*, on the contrary, their cohesion is great, while the sepals are almost ovate and remarkably blunt. Moreover, while in *Sp. cernua* the lip is not much broader at the base than apex, has the basal calli on the very edge, and is covered externally with coarse hairs,—*Sp. gemmipara* has the lip nearly, if not quite, twice as broad at the base as apex, has the calli distinctly intramarginal, and has no hairs externally, as far as I can discover; Mr. Babington, indeed, describes it as glandular externally, a circumstance that escaped the observation of Mr. Sowerby, and which might easily be overlooked by others, the only glands I can make out being minute points just visible under a half-inch simple lens.

I therefore think the identification of *Sp. gemmipara* with *Sp. cernua* is to be regarded as a mistake, and that the former must be admitted as a perfectly distinct species, peculiar, as far as is at present known, to a small district in Ireland. In my view of the affinities of the species, it is much nearer *Sp. æstivalis* than *cernua*, although distinct from the former by its dense 3-rowed spike, leafy stem scarcely longer than the radical leaves, short pyriform ovary, and very broad base to the lip.

Contributions to the Orchidology of India.—No. 1.

By PROFESSOR LINDLEY, F.R.S., F.L.S. &c.

[Read January 20th, 1857.]

THE materials out of which the following observations proceed are principally derived from the highly important collections formed by Drs. J. D. Hooker and Thomas Thomson, who, with rare liberality, have placed everything they possess, bearing on the present subject, at my disposal. But in addition to such resources, many others must be mentioned, especially the Burma and Khasia and Malacca plants sent me by the lamented Griffith, the Indian collections in the Herbarium of the Museum of Natural History, Paris, a fine set dried by Mr. Thomas Lobb while in the service of our great nurserymen the Messrs. Veitch, many Ceylon plants from Mr. Thwaites, the late Col. Champion and others, Cuming's

Philippine Collection, Chinese plants from Fortune, Champion, and Vachell, authentic specimens from Wight and Achille Richard, and a pretty extensive series of Malay plants placed in my hands by my friends Prof. De Vriese and the late venerable Prof. Reinwardt. To these should be added whatever the herbarium contains of Dr. Stock's, whose loss we have so lately had to deplore, the whole of Wallich's materials, and everything that the great Hookerian Museum, or the Gardens of England have been able to supply. In short, there is little that has not been entrusted to me except the Malay plants of Horsfield in this country and those of Blume from Java and other Dutch islands.

To deal with so large a mass of materials in a single communication would fatigue the Society, even if it did not render any communication whatever altogether uncertain. I therefore propose to take up different portions of the subject as time will permit.

To nothing, perhaps, more remarkable does an examination of Indian Orchids lead, than to the unexpected fact that they show certain species to have a most extensive geographical distribution. Hitherto it has been believed that these plants are extremely local, and such is probably the case with epiphytes, but it is quite the reverse with terrestrial species, the range of some of which proves to be as wide as that of the most ubiquitous species belonging to other natural orders.

It has been long known that our *Orchis latifolia* wanders into North-Western India, where it was found by Buchanan Hamilton, Wallich, and Royle; to this must now be added Western Thibet, whence Dr. Thomson has brought it (Hb. 254). But this is no solitary case.

Herminium Monorchis, in no respect whatever distinguishable from its English state, is found in North-Western India, and probably also in Sylhet; while the *Herminium unalaschkense** of Chamisso, from the distant Aleutian Islands, is identical with the *Herm. congestum* found on the Alps of Sikkim.

Gymnadenia cucullata, a plant of Eastern Europe and Siberia, seems to be the same as a plant gathered by Dr. Hooker, in Sikkim, at the elevation of 14,000 feet.

Goodyera repens is common in Sikkim at the height of 11,000–12,000 feet; while *Goodyera procera* extends from Sikkim to Hong Kong, by way of the Nilgherries, Ceylon, and Java.

In like manner *Zeuxine sulcata* is as much an inhabitant of

* This is by no means *Platanthera Schiffmareffiana*, as Prof. Reichenbach supposes.

Hong Kong, the Philippines, and Ceylon, as it is of Indian plains as far as Peshawur.

What I believe to be *Spiranthes autumnalis* occurs in North-Western India, and *Sp. australis* seems to grow everywhere from Siberia, Peshawur, and North-Western India generally, the Sunderbunds, Nilgherries, Ceylon, and Java, to China, New Holland, and New Zealand. What is more, I think that any one who has examined a long suite of specimens will probably be right in regarding this variable plant as nothing more than our own *Sp. aestivalis*.

Similar facts are elicited by a critical examination of the genera *Epipactis* and *Cephalanthera*. *E. veratrifolia*, a remarkable Persian species, was found at Peshawur by Major Vicary; and there can be no doubt that the common Indian species described under the names of *consimilis*, *macrostachya*, *herbacea* and *Dalhousiæ*, are only so many states of the well-known European *E. latifolia*. It is equally certain that my *Cephalanthera acuminata*, found all over Northern India from Mussooree to Bootan, is identical with the European *Cephalanthera ensifolia*.

Epipogium Gmelini was found in Sirmur by Dr. Thomson.

Lastly, what is most startling and unexpected, is the discovery by Dr. Hooker, in Sikkim, of a species of the genus *Tipularia*, hitherto known only in the United States of America. This plant, although different in some respects from the American form, and distinguished by Prof. Reichenbach, Jun., is probably nothing more than a form of the original *Tipularia* itself, which thus appears at once in two points of the globe distant some 12,000 miles from each other.

Facts of this nature are of the more interest, seeing that the ordinary modes of dispersion by birds, by winds, by waves, by man, would seem to be inoperative, or at least insufficient to explain such very remarkable ranges.

In the following enumeration of species, I have not thought it necessary to observe much order, the purpose of a catalogue being equally well served whatever the sequence of the species.

I. PHOLIDOTA, *Lindl. Gen. et Sp. Orch.* p. 36.

- 1. *P. imbricata*, *Lindl. l. c.*

Sikkim Himalaya, at 3000-5000 feet; Khasia Mountains, at 2000-4000 feet,
J. D. H. & T. T. (78)

2. *P. rubra*, *Lindl. l. c.*

Sikkim Himalaya, at 6000 feet, *J. D. H.*; Khasia Mountains, at 4000 feet,
J. D. H. & T. T. (123)

3. *P. recurva*, *Lindl. l. c.*

Sikkim Himalaya, at 5000 feet, *J. D. H.* (158)

Flowers dirty rose-colour.

4. *P. articulata*, *Lindl. l. c.*

Khasia Mountains, at 2000–6000 feet, *J. D. H.* (79), *Lobb.*

“Scarcely odorous. Lowest flowers on spike open first.”—
J. D. H.

5. *P. CALCEATA* (*Rehb. fl. in Bonpl. Oct.* 15, 1856); pseudobulbis e latâ basi angustissimis cæspitosis monophyllis, foliis lanceolatis in petiolum longum angustatis, spicis erectis capillaribus foliis longioribus, bracteis dissitis ovatis subpersistentibus, sepalis oblongis obtusis ecarinatis, labello apice bilobo lobis incurvis.

Khasia Mountains, *J. D. H. & T. T.* (122)

A small-flowered plant with convex, very blunt, wholly keelless sepals.

II. OTOCHILUS, *Lindl. Gen. et Sp. Orch.* p. 35.

6. *O. alba*, *Lindl. l. c.*

Sikkim Himalaya, at 5000 feet, *J. D. H.*; Khasia Mountains, at 4000–6000 feet, *J. D. H. & T. T.* (81)

7. *O. fusca*, *Lindl. l. c.*; *Wallich, Pl. As. Rar.* i. t. 68; *Bot. Mag.* t. 3921.

Otochilus, *Griff. Ic.* t. 289.—*O. latifolius*, *Notulæ*, p. 279; *It. Not.* p. 75.

Sikkim Himalaya, at 2000–6000 feet, *J. D. H. & T. T.*; Khasia Mountains (82), *Griffith*; *Bootan, id.*

This is readily known from the last by its nearly persistent bracts and much narrower leaves.

8. *O. porrecta*, *Lindl. l. c.*

Tetrapeltis fragrans, *Wall. in Lindl. Gen. et Sp.* p. 212.

Otochilus, *Griffith, Ic.* t. 288; *Itin. Notes*, p. 75.—*O. lancifolius*, *Notulæ*, p. 278.

Dipodous genus, *Griff. Ic.* t. 329; *Not.* p. 406.

Khasia Mountains, *J. D. H. & T. T.*, *Lobb, Griffith*; Dilling in the Mishmee Mountains, and towards the summit of Thumathaya, *Griffith.*

I give Griffith's names as I find them in his published works; but it is hardly to be doubted that his editor has transposed them. This species must have been what he meant to call *O. latifolius*. It is also unquestionably the “dipodous genus,” not *Dipodium* from Dilling.

The name *Tetrapeltis* originated with Wallich, who gave it to a remarkable plant of uncertain origin, of which it was supposed that a drawing only existed among his collections. It was said by him to have a stigmatic gland common to a pair of narrow caudicles, which bore four peltate hemispherical pollen-masses,

whence the name. I had however described it three years before as a probable species of *Otochilus*, the pollen-masses of which had not been found. And such it really is, as Griffith determined, without however knowing that it was a described plant. The stigmatic gland described by Wallich, but not represented in his drawing, has no existence, as Griffith's figure and description show, and as I have verified. The species is, however, remarkable for having two straps holding together the pollen-masses in pairs, each strap having a perfectly well-defined outline; of these only rudiments occur in the two other species. They are analogous to the narrower and more obscure threads which occur in *Pholidota articulata*, as I learn from Dr. Hooker's drawings.

III. TIPULARIA, Nutt. Gen. Amer. ii. 195.

9. T. JOSEPHI (*Rehb. f. ined.*); labello acuminato.
Sikkim, 10,000–12,000 feet, *J. D. H.* (351)

When Prof. Reichenbach saw this in my herbarium he gave it the above name, distinguishing it by its "having the lateral lobes of the lip half ovate not acute, and by its shorter column." The latter difference seems constant, the former cannot be relied on. I, however, find that the lip of the Indian species is acuminate, and the flowers smaller and darker coloured. The two plants are, however, so much alike that I cannot avoid doubting their specific distinctness.

IV. EPIPACTIS, *Camerarius*.

10. E. veratrifolia, *Boissier, Diagnoses*, xiii. 11.—(E. consimilis, *Wall. Cat.* 7403, nec *D. Don.*)
Peshawur, Major Vicary, *J. D. H.* (324)

Identical with the plant found by Kotschy in the gorges of Mount Elbruz, near Derbend. The plant intended by Don for *E. consimilis* is *E. latifolia*.

11. E. Royleana, *Lindl. in Royle's Illustr.* 368.
Ravine above Jungnam, Kunawur, *T. Thomson*; a single specimen.

The bracts are short and broad, and the parts of the flower less elongated than in *E. americana*, which is very like this.

12. E. latifolia, *Swartz, Act. Holm.* 1800, p. 232.—(E. consimilis, *Don, Prodr.* p. 28.—E. macrostachya, *Lindl. in Wall. Cat.* 7404.—E. herbacea, *Lindl. in Royle's Illustr.* 368.—E. Dalhousia, *Wight, Ic.* t. 1723.)

N.W. Himalaya, 6000–9000 feet, *T. T.* (323); W. Thibet, 7000–11,000 feet, *T. T.* (322); Sikkim, 11,000 feet (323).

The Himalayan plant is more robust in growth than the Eu-

ropean specimens, but is evidently the same. The plant found by Dr. Thomson in Western Thibet has a thinner raceme, and a smaller lip much compressed with a pair of large calli at the base of the epichil; the ovary, moreover, is perfectly smooth, as in what has been called *Epipactis Phyllanthus*, but I do not think, in so variable a species, such characters have any distinctive value. *E. herbacea* is not distinct from the *E. viridiflora* of European botanists.

13. *E. INTRUSA*; habitu *E. latifoliae* valdè attenuatæ folio unico parvo cuique cauli, floribusque longè distantibus, hypochilio subtus intruso, epichilio ovato apiculato trinervi ecalloso.

Sikkim, at 11,000 feet, *J. D. H.* (323 mixed with *E. latifolia*).

This seems to be something more than an attenuated starved state of *E. latifolia*, (with which it is mixed in Dr. Hooker's collections,) on account of the hypochil being pushed upwards as it were from below, so as to be convex in the inside, and the epichil having no calli and no venules, but only three well-defined veins ending in a little distinct point.

V. CEPHALANTHERA, *L. C. Richard.*

14. *C. ensifolia*, *L. C. Richard.*

C. acuminata, *Lindl. Gen. et Sp. Orch.* p. 412; *Wight, Ic.* t. 1721.

Secunda Devec, near Mussooree; Dadoo-ka-Taola, in Gurhwal; N.W. Himalayas generally to the height of 5000-10,000 feet, *J. D. H. & T. T.* (321); Bootan, near Panga, in oak and fir woods at 7500 feet, *Griffith*; in pine and oak woods under the mountain Vari-Ki-teibi, *Jacquemont* (651).

I am persuaded that the Indian Cephalantheras all belong to one and the same species, that one being the common European *C. ensifolia*. The specimens before me differ in the length and breadth of their leaves and in the denseness of their inflorescence; perhaps, too, in the form of the epichilium, a point hard to determine when dried. The Bootan specimen is the smallest. It has already been found in the country beyond Caucasus according to Reichenbach fil. I have seen no specimen with the long leafy bracts which Dr. Wight's artist has represented; such a state is only to be found occasionally associated with the lowest flower.

VI. LISTERA, *R. Brown.*

15. *L. PINETORUM*; foliis cordato-subrotundis acutis, rachi flexuosâ tomentosâ, bracteis adpressis ovarii longitudine, floribus subsessilibus, labello maximo obovato bilobo, columnâ elongatâ.

Sikkim, 10,000-11,000 feet, near Lachen in pine woods, *J. D. H.* (355)

Flowers pale green, the largest in the genus. Most like *L. con-*

vallarioides, from which it differs in the form of the leaves, the sessile flowers, &c. *L. Escholtziana*, of which *L. Banksiana* is a synonym, differs in its smaller long-stalked flowers and in the form of its leaves.

16. *L. TENUIS*; foliis ovatis acutis, caule capillari, bracteis parvis pedicellis æqualibus, labello cuneato emarginato sepalis multò longiore.

Sikkim, 11,000–12,000 feet, *J. D. H.* (354)

A very slender plant. Lip apparently deep olive colour.

17. *L. MICRANTHA*; foliis subrotundo-ovatis radicalibus, racemo tenui, bracteis pedicellis filiformibus multò brevioribus, labello ovato cucullato trilobo sepalis vix æquali, lobis lateralibus rotundatis intermedio acutissimo.

Sikkim, 10,000 feet, *J. D. H.* (353)

A very remarkable plant, with the lip concave, not convex, and scarcely so long as the sepals; at its base it is furnished with a pair of auricles, while the sides of the acute middle lobe have each a single minute sharp tooth.

VII. NEOTTIA, *Linn.*

18. *N. listeroides*, *Lindl. in Royle's Himal.* p. 368.

N.W. Himalaya, at 8000 feet, *T. Thomson* (356).

The specimens, like those brought home by Dr. Royle, appear in two states, the one very much stouter than the other.

VIII. EPIPOGIUM, *R. Br.* (*Galera*, *Blume, Bijdr.* i. 415. t. 3. *Podanthera*, *R. Wight, Ic.* t. 1759. *Ceratopsis*, *Lindl. Gen. et Sp. Orch.* p. 383.)

There is no doubt that all these genera are the same, and that their supposed differences have been suggested by inexact observation, or insufficient comparison. *Ceratopsis*, founded on the *Limodorum roseum* of D. Don, was supposed by me to have cirrhi on the column, such cirrhi being nothing more than the cartilaginous caudicles of its pollen-masses observed in an old and withered flower. *Podanthera* and *Galera* are not different from each other even as species, and are merely *Epipogiums* with an undivided lip bearing two hairy lines along the middle. The following are the only species yet known.

19. *E. GMELINI*, *L. C. Richard*; *Rehb. f. Orch. Germ.* t. 116; *Hooker, Bot. Mag.* t. 4821; labello auriculato ovato intùs pulverulento seriatim papilloso, calcare inflato.

Sirmur, N.W. Himalaya, at 8000 feet, *T. Thomson* (224). Two specimens only seen.

Although this differs in some small particulars from the European and Siberian plant, I cannot think the two specimens found by Dr. Thomson to be anything more than a slight variety. Their general aspect is quite the same as usual, but the lip is more acute, and its auricles are much smaller, or even obsolete. It would seem, however, from the stains still observable in the dried specimens, that the characteristic blotches on the lip of the European state are also present, and the magnitude of the auricles of the latter, like the length of the sepals and petals, is inconstant.

20. *E. ROSEUM* (*Ceratopsis rosea*, *Lindl. Gen. et Sp. Orch.* p. 383); labello indiviso acuto intra apicem pulvinato-glanduloso lineis 2 pubescentibus decurrentibus continuis, calcare clavato integro.

Upper Nepal, *Wallich*, according to *D. Don*.

No specimens of this exist among any of the modern collections that I have examined. That in my herbarium was sent by Wallich to Rudge among the first of his Indian consignments. The flowers are much smaller than in *E. nutans*, there is a large papillose convexity just within the apex of the lip, and the spur is quite unlike that of either of the two other species.

21. *E. NUTANS* (*Galera nutans*, *Blume, l. c.* *Podanthera pallida*, *Wight, l. c.*); labello indiviso acuto apice plano lineis 2 pubescentibus decurrentibus continuis, calcare oblongo emarginato.

Ceylon, *Thwaites, Macrae*; Sikkim, in hot valleys, *J. D. H.* (348), *Cathcart*; Wynaud, *Wight*; Java, *Blume*.

There is no apparent difference among the specimens from these places, all of which I have examined except that from Java. Dr. Wight's artist has indeed represented three hairy lines upon the lip of *Podanthera pallida*, but this is certainly an oversight, as I have ascertained not only from excellent drawings by Dr. Hooker and Mr. Thwaites, but from Wight's own specimens. There seems to be some difference in the colour of the plant, for Dr. Hooker's figure represents it of a uniform pale straw colour, while Cathcart and Macrae's draughtsmen have it whitish, with small red speckles.

IX. SPIRANTHES, *Richard*.

22. *S. autumnalis*, *Rich. Orch. Europ. Annot.* 37.

Sohonghat, May 1845, *T. Thomson*.

A couple of specimens gathered at this place are, I think, unquestionably our European species.

23. *S. australis*, *Lindl. in B. Reg.* 823. (Sp. *australis* et *densa*, *Wight, Ic.* t. 1724.—*Spiranthes*, *Griffith, Notul.* iii. 384. t. 348.—Sp. N. *Zelandiæ*, *Hooker, Fl. N. Zealand.* i. 243.)

Upper Assam, *Griffith*; Sunderbunds, *id.*; Bootan, *id.*; Nilgherries, *Perrottet* (864); Western India, *Jacquemont* (411); Peshawur, *Major Vicary*; Java, *Reinwardt*; Hong Kong, *Champion*; China, Sowchow, *Fortune*; Chusan hills, *id.*; Canara, *Dalzell* in hb. Stocks; N.W. Himalaya, 6000–9000 feet, *T. Thomson* (326); Khasia, 4000–6000 feet, *id.*, *Lobb, Griffith*; Sikkim, 6000–10,000 feet, *J. D. H.* (327).

In the long list of localities here given, there occur all the forms of the species previously described (*Gen. et Sp. Orch.* 465) and others, but they run into each other in so many directions, that any attempt further to define the forms would be unsuccessful. The most distinct of all is the Chinese plant, which I formerly called *pudica*, and which seems to have invariably a smooth rachis and ovary, while all the others are more or less downy. Fortune's Sowchow plant is said to have yellow flowers, which I take to be a mistake, there being nothing whatever in its structure to separate it from the red-flowered *S. pudica*. One of the Java plants in Reinwardt's herbarium has the red flowers, in another they are white, and it appears that in this respect, as well as in the size of the flowers, the specimens vary from hill to hill. Griffith seems, however, only to have seen the white sort.

24. *S. STYLITES*; foliis gramineis vix in caulem ascendentes, caule elato glabro 4-vaginato, spicâ laxâ quaquaversâ ovarisque tomentosis, floribus glabris angustis elongatis, sepalorum marginibus rectiusculis, petalis linearibus univeniis, labello oblongo canaliculato apice crispulo pubescente basi calloso-sagittato, columnâ valde elongatâ rostello subulato.

China, province of Che-Kiang, *Fortune*.

At first I took this for the N. American *Sp. cernua*, some of the states of which it much resembles, and with which it corresponds in the sagittate lip; but its flowers are narrower in proportion to the breadth, and its column is so long that the attenuated point of the rostellum reaches beyond the middle of the lip.

X. *HERPYSMA*, *Lindl. Gen. et Sp. Orch.* p. 506.

25. *H. longicaulis*, *Lindl. l. c.*

E. Nepal, at 3000 feet, *J. D. H.* (340).

Flowers white, tinged with pink (*Cathcart*). The lip is sometimes rounded and nearly equally 3-lobed; sometimes it is oblate with a very small middle lobe.

XI. *ANÆCTOCHILUS*, *Blume, Fl. Jav. præf.* vi.

26. *A. ELATUS*; foliis radicalibus 3–4 subrotundo-ovatis apiculatis subtus purpurascensibus venis concoloribus, scapo gracili erecto pubescente vaginis

tribus acuminatis patentibus, spicâ distantiflorâ, labelli medio auriculati fimbriis laminâ bipartitâ integrâ longioribus, sacco conico acuto.

Ootacamund, in damp woods near Wallaghaut; *M'Ivor*, 59.

This seems to be quite distinct from *A. setaceus* in its long slender stem, loose inflorescence, very long fringes to the lip, which is distinctly auriculate near the middle, and in the want of coloured veins on the leaves.

27. *A. lanceolatus*, *Lindl. Gen. et Sp. Orch.* p. 499.

Khasia Hills, at 4000–5000 feet, *J. D. H. & T. T.* (330); Sikkim, 5000 feet, *J. D. H.* (338); Mishmee Hills, lower ranges, *Griffith*.

The specimens from Khasia have the fringes on the lip much shorter than in those from Sikkim and Assam, but I see nothing else by which to separate them. The sac of the lip is very short and almost hemispherical; the leaves are nearly as long as the flower stem, and rather unequal-sided. Lip white with brown fringes.

28. *A. LUTEUS*; caule folioso, foliis ovatis acutis undulatis scapo 1–2-squamato longioribus, spicâ conicâ, labelli fimbriis setaceis laminæ lobis oblique truncatis multo brevioribus, sacco hemispherico.

Sikkim, 5000 feet (341 in part), *J. D. H.*, *Cathcart*.

Upper sepal and petals rufous, lower herbaceous; lip bright yellow with a crimson line along the centre. Anther crimson. Two conical yellow processes in front of the yellow column. Inodorous. The true structure of this very distinct species is shown in Dr. Hooker's drawings.

29. *A. GRANDIFLORUS*; caule folioso, foliis oblongis acutis unicoloribus scapo longioribus, floribus glabris, sepalis variegatis, labelli fimbriis acuminatis basi latis laminæ lobis ovatis brevioribus, sacco obtuso.

Sikkim, 4000–6000 feet, *J. D. H.* (329); Khasia, 4000 feet, *id.*

A much larger plant than any other, with flowers in long loose spikes. Sepals spreading, green with rose-coloured veins; lip white, with a tinge of pink; anther crimson; column yellow, with a pair of conical processes in front. Inodorous.

30. *A. setaceus*, *Blume, Bijdr.* t. 15; *Bot. Reg.* t. 2010. (*Orchis picta*, *Herb. Reinwardt.*)

Java, *Reinwardt.*

31. *A. brevilabris*, *Lindl. l. c.*

Sikkim, *Cathcart*.

No specimen of this exists in the herbarium, but there is a drawing in Mr. Cathcart's portfolio. The lip is white, with dirty purple notches in the room of fringes, the number of which is much greater than in the Assam plant, from which the species was first described. The leaves have yellow veins, and much

resemble those of *Anætochilus setaceus*. The short lip, with its two broad obovate lobes, are very characteristic. The lateral sepals spread at right angles, and are rosy at the point but green at the bases.

32. A. (Myrmechis) CRISPUS; foliis subrotundo-ovatis acutis crispulis concoloribus scapo brevioribus, spicâ pubente laxâ 5-florâ, labelli mutici lobis terminalibus semiovatis acutis serrulatis, sacco hemisphærico.

Sikkim, *Cathcart*.

Of this no specimens exist in the herbarium. Mr. Cathcart's artist represents it as a plant 6 or 7 inches high, with roundish 3-ribbed leaves setting close to the stem, and shorter than the downy scape, which has two distant acuminate scales. The flowers (five) are distant, white, with no fringes on the unguis of the labellum, whose terminal lobes are half-ovate, somewhat falcate, and serrulate on the outer side. It is so very different from all others that I do not hesitate to describe it from a drawing only.

XII. PHYSURUS, *Rich. Lindl. Gen. et Sp. Orch.* 501.

No species of this genus occurs among Dr. Hooker's collections. The following are new:—

33. P. hirsutus (*Goodyera hirsuta*, *Griffith, Ic. t.* 347; *Notul.* iii. p. 393).
On the Burmese frontier of Assam, *Griffith*.

I have seen no specimens. The leaves are said to be glaucous beneath; the scape or rather the spike tawny; the bracts and all the flowers more or less ferruginous, with a white lamina to the lip.

34. P. VIRIDIFLORUS (*Neottia viridiflora*, *Blume, Bijdr.* 408); caule debili ascendente usque ad spicam folioso, foliis ovalibus acutis inæquilateris, spicâ 6-8-florâ, sepalis crassissimè carinatis, labello lanceolato apice deflexo, appendicibus calcaris filiformibus capitatis.

Java, *Lobb & De Vriese*.

Four specimens occur in Sir W. Hooker's herbarium. It is a weak plant, not unlike *Physurus debilis*; the closed flowers and excessively thick keels of the sepals are remarkable. Petals with the inner edge straight, the outer straight near the point, half-oblong next the base.

35. P. GLANDULOSUS; foliis rosulatis ovato-oblongis membranaceis scapo erecto filiformi tomentoso supra medium vaginato multò brevioribus, spicâ pauciflorâ corymbosâ pilis glandulosis conspicuis tectâ, labello lineari cana-

liculato apice parvo cochleari basi hemisphærico ventricosò juxta columnam subitò in calcar conicum extenso.

Borneo, *Lobb.*

Flowers small, inconspicuous, furnished with hairs having broad depressed glands.

36. *P. Blumei*, *Lindl. l. c.* p. 504.

Ceylon, *Thwaites* (598).

Flowers pale brownish red, with the blade of the lip white.

XIII. RHOMBODA.

Ovarium rectum. *Sepalum dorsale* petalis agglutinatum, anticum; *lateralia* basi valdè gibba. *Labellum* cucullatum, basi ventricosum, 3-lobum, appendicibus 2 rhombeis intra scrotum juxta basin. *Columna* brevis, altè cucullata, resupinata, rostello obtuso, antice lineis 2 parallelis carnosis elevatis apice expansis truncatis aucta.

37. *R. longifolia*.

Sikkim, unique, *J. D. H.* (335).

A great caulescent plant. Leaves 6–8 inches long, standing twice as high as the scape, which has a pair of close-pressed sheaths. Spike 6 inches long, very slightly downy. Bracts acuminate, shorter than the rostrate ovary. Flowers apparently dull brownish red, smooth. Sepals subulate at the points; petals unequally falcate, firmly glued to the upper sepal. The column resembles a resupinate membranous goblet, within which lies the acuminate anther. In front of the column grows a pair of contiguous fleshy ridges which suddenly project into a strong ledge at the base of the stigma.

This genus most nearly resembles *Rhamphidia*, from which however the very peculiar apparatus in front of the column and the internal appendages of the lip distinguish it. The latter are lozenge-shaped, flat, petaloid, and terminate two deep red simple veins originating at the base of the column. They are extremely like what occur in *Dossinia lanceolata*.

XIV. RHAMPHIDIA, *Lindl. Gen. et Sp. Orch.* p. 494. *Goodyera* §.

38. *R. ovalifolia*. (*Goodyera ovalifolia*, *Wight, Ic.* 1730.)

Sikkim, at 3000 feet, *J. D. H.* (337).

Near *R. (Goodyera) elongata*, from which it is distinguished by its lip, 3-lobed at the point, and its truly ovate oblong leaves. *Wight's* figure is much exaggerated and inconsistent with itself.

39. *R. rubens*. (*Cerochilus rubens*, *Gard. Chron.*, *New Plants*, no. 45. *Goodyera* 4, *Griff. Not.* iii. p. 390.)
Naga Hills, Khasia; *Griffith*.

When I published this under the name of *Cerochilus rubens*, I had forgotten my old section of *Goodyera*, which I had not seen for fifteen years. It seems to me to be undoubtedly Griffith's 4th *Goodyera*, which I have from himself, although the flowers are larger, as was to be expected in a cultivated plant.

40. *R. TENUIS*; caule scapoque pubescentibus, scapi vaginis supremis aristatis, spicâ longâ tenui tomentosâ, labello libero obtuso margine subrepando extûs piloso.

Philippines, *Cuming*.

Very like *R. elongata*, but the spike much more slender, the flowers not more than half the size, the lip quite free, sparingly covered with jointed hairs externally, and the calli of the lip simple and incurved, not broken up into narrow membranes.

41. *R. ALSINEFOLIA* (*Neottia alsinefolia*, *Herb. Reinwardt*); debilis, caule multifolio, foliis ovatis, spicâ 2-3-florâ, bracteis membranaceis fimbriatis ovario brevioribus, petalis sepalo antico solutis acuminatis obtusis recurvis, labello apice transverso angusto bilobo.

Java, *Lobb* in *Hb. Hooker*, *Reinwardt*.

Stem weak, many-leaved at the very point, 2-3-flowered. Flowers small, white, with odd sepal in front. Petals quite free, bluntly acuminate, recurved at the point. Lip ventricose, acuminate, ending in a narrow transverse almost reniform point. The separation of the petals and third sepal, in this species, is very remarkable.

42. *R. GRANDIFLORA*; caule densè folioso, foliis ovato-subrotundis acutis, spicâ 2-3-florâ sessili glabrâ, sepalis petalisque obtusis acuminatis, labello libero apice 2-dentato.

Java, *Lobb* (192).

Apparently a trailing plant with stems 6 or 7 inches long, closely covered with roundish ovate acute leaves. The flowers are twice as large as in any other species and perfectly glabrous. The lip is channelled and acuminate from a free ventricose base, with two short tooth-like blunt lobes at the point.

XV. GOODYERA, *R. Brown*.

43. *G. secundiflora*, *Griffith, Not.* iii. 393; *Ic. t.* 347; also *Goodyera* no. 6, *id. Not.* iii. 392.

Khasia, 4000-6000 feet, *J. D. H. & T. T.* (342, 328). Woods in the province of Che-Kiang, *Fortune*; Surureem, in Assam, *Griffith*.

Flowers white, with a green dorsal sepal. Leaves green with

pale variegations. Usually from 4 to 10 inches high; but there is a specimen in the collection (328) nearly 18 inches high with larger flowers. The Chinese plant has also rather larger flowers, but is not taller than the common state.

44. *G. HISPIDA*; foliis rosulatis subsessilibus ovato-lanceolatis acutissimis scapo 4-vaginato longioribus, spicâ spirali, alabastris subglobosis pilis articulatis hispidis, sepalis apice crassis recurvis, labello cymbiformi acuminato canaliculato obtuso.

Khasia, 4000 feet, *J. D. H.* (2110).

A solitary specimen exists in the collection. Much resembles *G. repens*, but the leaves are very much larger. Flowers "white," remarkably hispid with glandular articulated hairs.

45. *G. repens*, *R. Brown, l. c.*

Sikkim, 11,000–12,000 feet, *J. D. H.* (349).

The specimens of this are taller and with larger flowers than some of those of Europe and N. America; the point of the lip is also a little more drawn out; but I find nothing distinct.

46. *G. marginata, l. c.*

N.W. Himalaya, at 8000 feet, *T. T.* (346.)

This little species, like the following, is one of those which have the sac of the lip destitute of hairs.

47. *G. RECURVA*; foliis lanceolatis parum mutatis scapum vestientibus, racemo denso secundo recurvo pubescente, sepalis abruptè acuminatis, labelli laminâ canaliculatâ oblongâ sacco vacuo duplò longiore.

Khasia, 5000–6000 feet, *J. D. H. & T. T.* (345).

A very distinct plant with a dense recurved one-sided raceme, and the scape clothed with leaves but little smaller than the others. The leaves are also narrower than in *G. marginata*, and not at all ovate.

48. *G. procera, Hooker, l. c.* (*Cionisaccus lanceolatus, Kuhl & Hasselt. G. carnea, A. Richard, Ann. Sc. Nat. ser. 2. xv. p. 80.*)

Assam, Naga Hills, *Griffith*; Sikkim, hot valleys, *J. D. H.* (291); Hong Kong, *Champion*; Ceylon, *Macrae, Thwaites*; Java, *Reinwardt*; Nilgherries, *Perrottet*, no. 1107, in the Herb. of M. de Franqueville.

A common plant subject to a little diversity in the sharpness of the sepals and petals, and in the degree of down upon the spike; but these states do not seem to require separate notice. An authentic specimen of *G. carnea*, obligingly sent me through M. Weddell, by M. Graves from the collection of M. de Franqueville, shows that plant to be merely a young state of this common species.

49. *G. rubicunda*, *Lindl. in Bot. Reg. 1839, Misc. 92* (*Ætheria rubicunda*, *Rehb. fl. in Bonplandia*).
Philippines, *Cuming*.

This is certainly a plant of the same genus as *Goodyera procera*, and no *Ætheria*, as Prof. Reichenbach supposes.

XVI. GEORCHIS, *Lindl. Gen. et Sp. Orch. p. 495.*

50. *G. cordata*, *l. c.*

Khasia, at the height of 4000 feet, *J. D. H. & T. T. (344)*, *Griffith*.

51. *G. foliosa*, *l. c.* (*Goodyera*, *Griffith, Ic. t. 346. 1.*)

Khasia, 3000-5000 feet, *J. D. H. & T. T. (339)*; Sikkim, 3000-5000 feet, *J. D. H. (331)*; Burma, *Griffith*.

This seems to be a common species, and subject to some differences in the degree of hairiness of its flowers and in the length of the bracts. The flowers are rose-coloured with a white lip and petals.

52. *G. VITTATA*; foliis ovatis acutis carnosis subtus purpureis supra vittis 3 pallidis, spicâ subspirali, floribus ovarioque glaberrimis, labello elongato canaliculato, petalis sepalo dorsali conformibus.

Sikkim, in hot valleys, *J. D. H. (336)*.

Flowers much larger than in the last, with the pouch of the lip projecting beyond the sepals. Sepals pink; petals and lip white.

53. *G. CALVA*; foliis obliquis, spicâ oblongâ omninô calvâ foliis parum longiore, bracteis linearibus acuminatis herbaceis floribus multò longioribus, petalis obovatis.

Java, *Lobb*.

Much like some states of *G. foliosa*, especially in its unequal-sided leaves; in the length of the bracts it corresponds with the Sikkim state of that plant. But its short spikes, perfectly smooth ovary, and obovate petals induce me to separate it.

XVII. ÆTHERIA, *Endlich. Lindl. Gen. et Sp. Orch. p. 490.*

54. *Æ. fusca*, *Lindl. l. c. p. 491.*

Sikkim, 12,000-15,000 feet, *J. D. H. (347)*.

55. *Æ. MOLLIS*; caule debili folioso, foliis ovatis acutis in vaginam ferè sessilibus, scapo vaginâ subherbaceâ in medio spicâque tenui elongatâ mollibus, sepalo dorsali lateralibus multò majore, petalis oblongis obtusis, labello bilobo callis in ventre sigmoideis.

Khasia, 3000-4000 feet, *J. D. H. & T. T. (343)*; Burma, *Griffith*.

A slender plant a span high with small somewhat spiral soft flowers, white and green. "Lip adnate (glued?) to the margins of column," *J. D. H.*

56. *Æ. anomala* (Goodyera no. 10, *Griff. Notul.* iii. 394).

Forest at Tingree in Assam, among Tea-trees, *Griffith*.

It appears that Mr. Griffith found only two specimens of this remarkable plant, one of which is in my herbarium, from himself. The materials at my command do not permit me to determine with certainty the peculiar structure of its column and stigmatic apparatus, but there is evidently something very unusual in it. Griffith's words, restored to what he probably wrote, may be put thus:—"Saccus (labelli) intus utrinque et basin versus, continet processus cellulosos complanatos 2-3, apicibus crenato-repandis. Columna nana, hinc utrinque dente membranaceo aucta; facies antica centrum versus processum [habet] celluloseum cristiformem basi, mediante labello, c. dentibus lateralibus continuum. Stigma verum anticum inconspicuum, canali inter faciem anticam et faciem processiferam, quæ verosimiliter pars labelli. Stigma supra in rostellii processus 2 subulatos productum; facies postica, in alabastro, integra membranacea, basi in gibberem quasi inflatum." It appeared to me that the stigmatic surface consisted of a deep hollow opening vertically, and forming two faces, one of which is presented to the lip and the other to the anther. Possibly my specimen may be the specimen in which what Griffith regarded as a deformity occurred. It is much to be regretted that no other traveller should have met with this curious plant.

57. *Æ. CORDATA*; foliis cordato-lanceolatis, spicâ tenui pubescente, labello basi subconico apice obtusè bidentato.

Banda, *Reinwardt*.

The long cordate thin leaves are remarkable. In habit the plant resembles *Monochilus flavus*. The calli are thin, long, and falcate.

XVIII. DOSSINIA, *Morren in Ann. Gand*, iv. 171, with a figure.

58. *D. marmorata*, *Morren, l. c.* (*Cheirostylis marmorata*, *Lindl. in Van Houtt. Fl. des Serres*, 1848, t. 70.)

Khasia, at 4000 feet, *J. D. H. & T. T.* (366).

The specimens in the herbarium of Hooker and Thomson prove the inaccuracy of the Garden report, that this plant comes from Java, where no one has found it growing. From the following it differs in its hairy raceme, golden-veined roundish ovate leaves, and long falcate toothed appendage of the column. The figure in the 'Fl. des Serres' gives a good view of the general appearance of the plant, but the details are inaccurate.

59. *D. LANCEOLATA*; foliis lanceolatis acuminatis costâ suprâ albâ, scapi vaginis 4 laxiusculis quarum inferior foliacea, spica et bracteis acuminatis pubescentibus, floribus distantibus ovariisque glabris, sepalis petalisque subæqualibus acutis, petalis semioblongis acutis sep. dors. agglutinatis supra columnam cucullatis, labello longè angustato tridentato intra ventrem 2-lamellato callis 2 carnosis circularibus dentatis, columnæ appendicibus 2 membranaceis liberis bilobis.

Khasia, near Pomrang; one specimen only seen, *J. D. H.*

About a foot high. Stem erect with three or four dark green leaves near the middle, each with a broad white band along the midrib; the petioles rose-coloured. Spike cylindrical, 2 inches long, of about fourteen distant rose-coloured flowers. The dorsal sepal and broad petals firmly glued to it form a wide hood completely overlaying the column and hypochil.

XIX. ZEUXINE, *Lindl. Gen. et Sp. Orch.* p. 485.

60. *Z. sulcata*, *l. c.* (*Z. robusta*, *Wight, Ic.* 1726. *Z. brevifolia*, *id. Ic.* 1725. *Z. emarginata*, *Lindl. l. c.*)

Peshawur, *Major Vicary*; Plains of N.W. India, *T. T.* (352); Plains of Behar, *J. D. H. (id.)*; Ceylon, *id.*; Hong Kong, *Champion*; Assam, *Griffith*; Chittagong, *J. D. H. & T. T.*; Philippines, *Cuming*.

This very common plant is evidently extremely variable, and I think all the names above quoted certainly belong to it; *Z. emarginata* is a very small state. *Z. robusta* and *brevifolia* I cannot at all distinguish.

61. *Z. membranacea*, *l. c.* (486). (*Z. bracteata*, *Wight, Ic.* 1724 bis.) Assam, Bootan, Sunderbunds, *Griffith*.

A much taller plant than the last, with long grassy leaves and a membranous lip.

62. *Z. Tripleura*. (*Tripleura pallida*, *Lindl. l. c.* p. 452.) Hot valleys, Sikkim, *J. D. H.* (352).

Very like the last, but distinguished by its lateral petals being linear and spreading at right angles to the lip, which is oblong, concave, and abruptly terminated in an emarginate point. The proposal of the genus *Tripleura* was a great oversight.

XX. MONOCHILUS, *Wallich, in Lindl. Gen. et Sp. Orch.* p. 486.

63. *M. longilabris*, *Lindl. l. c.* (*M. affinis*, *R. Wight, Ic.* 1728.) Ceylon, *Thwaites, Champion*; The Ghats, *Stocks* (13).

No doubt can exist of the above figure in *Wight's Icones* belonging to this, and not to *M. affinis*, a smaller two-flowered plant

with a tomentose calyx, and shorter broader lip with a few cre-
natures.

64. *M. nervosus*, *l. c.*

Hot valleys in Sikkim, *J. D. H.* (341); Ceylon, *id.* (334).

65. *M. flavus*, *l. c.*

Ceylon, *Thwaites* (3120); Assam and Mergui, *Griffith*.

The lip seems to vary in the length of its lobes; in Mr. Thwaites's excellent sketches, in my possession, they are very short, broad, and rounded; in other cases they are deeply divided.

66. *M. goodyeroides* (*Zeuxine goodyeroides*, *Lindl. Gen. et Sp. Orch.* p. 486).
Mishmee Hills, *Griffith*.

"Sepals brownish flesh-coloured. Petals white." *W. G.*

Petals obovate, rather longer than the dorsal sepal. The habit being that of *Monochilus flavus*, and the dorsal sepal not being saccate, this requires to be removed from *Zeuxine*, in which I first placed it.

67. *M. GALEATUS*; foliis ovatis lineâ mediâ pallidâ, scapo basi univaginato, floribus glabris, petalis oblique obovatis sepalo dorsali adnatis et pauld longioribus, labello breviorè apice rotundato.

Mishmee Hills, *Griffith*.

Very like *M. regius*, but the leaves are broader, the flowers smooth, the lateral sepals longer, the petals rounded and obovate, not linear and acute, and the lip rounded, not 2-lobed. The sepals are almost petaloid, and I have found no calli in the hollow of the hypochil.

XXI. CHEIROSTYLIS, *Blume, Bijdr.* 413. t. 16.

68. *C. flabellata*, *Wight, Ic.* 1727. (*Goodyera flabellata*, *A. Rich. in Ann. des Sc.* ser. 2. xv. p. 79. t. 12. *Zeuxine moniliformis*, *Griffith, Notul.* iii. 397. t. 350.)

Bootan, *Griffith*.

69. *C. PARVIFOLIA*, *Lindl. in Bot. Reg.* 1839. *Misc.* no. 21; spicâ elongatâ, labelli laminâ dentatâ sepalis vix longiore, stigmati processibus acinaciformibus rostello æqualibus.

Ceylon, *Thwaites* (3071).

A slender plant, very like *Ætheria flava*. An excellent drawing and specimens from Mr. Thwaites show that it altogether agrees with *Cheirostylis* in the connate sepals and stigmatic processes, nor is it when young unlike *Ch. flabellata*, but the lip is wholly dissimilar. The specific character originally given was framed from a poor starved specimen; for that now described I am indebted to Mr. Thwaites.

70. *C. pusilla*, *Lindl. l. c.* p. 489.

Sikkim, 7000–8000 feet, *J. D. H.*; Khasia, *Griffith*, 3000–4000 feet, *J. D. H.* & *T. T.* (325).

71. *C. GRIFFITHII* (*Goodyera* no. 9, *Griff. Not.* iii. 393); foliis ovatis acutis, scapi glabriusculi vaginis 2 laxis acuminatis, spicâ 1–3-florâ, labello basi subgibboso columnæ faciei arcuè adnato inde in unguem linearem producto apice dilatato multifido, columnæ falcibus setaceis acutissimis.

Khasia, *Lobb*; in the woods of Mamloo, *Griffith*.

Of this remarkable plant I have three specimens from Griffith, and one gathered by Lobb. They are from 4 to 6 inches high, with a few ovate thin leaves, a pubescent scape with two amplexicaul lanceolate sheaths, and a solitary bract of similar size and form. The flowers are 1–2, or 3 in number, nearly smooth, barely $\frac{1}{2}$ an inch long, with the parts forming an almost cylindrical tube 4–5 lines long.

In the foregoing enumeration I have reserved what I wish to say respecting the new genera which it contains till I could bring into one general view those Neottian Orchids that constitute the group of *PHYSURIDS*.

From the analytical table given in the *Gen. et Sp. Orch.* p. 443, there must be excluded *Plexaure*, *Endl.*, ascertained to be a *Phreatia* by Professor Reichenbach, junior; *Ulantha*, *Hooker*, which is a *Chlorœa*; and *Galera*, which belongs to *Arethuseæ*. The remainder require rearrangement, which I propose to effect as follows.

The genera fall into three groups, of which one has a lip with a distinct spur or pouch at the base; another a mere swelling; while the third has neither the one nor the other, but is nearly flat next the column.

In the first, or *calcarate* group, there is nothing to add or alter. The second, or *ventricose* group, requires both correction and addition.

Macodes has been described as having a twisted column and lip like *Hæmaria*; this was a mistake originating with Blume's artist. An examination of a specimen collected by Junghuhn (no. 282), for which I am indebted to my learned friend Prof. De Vriese, shows that the column and lip are straight as usual, that the two great "tubercles" at the foot of the column are a pair of hooked processes analogous to what occur in *Cheirostylis*, *Anætochilus*, &c., that the rostellum is petaloid, and that the lip, which is dorsal, bears at its base the two fleshy calli characteristic of *Ætheria*, *Cheirostylis*, *Spiranthes*, &c.

From *Cheirostylis* must be separated Morren's *Dossinia*, on account of its ventricose labellum, the double petaloid deflected process of its style, and either a tubercle or a double vertical plate situated at the base of the epichil.

From *Goodyera* three forms require to be distinguished. Firstly, Achille Richard's *Platylepis*, the *Goodyera occulta* of Du Petit Thouars, the lip of which has a pair of calli within the base, and a long column, the stigmatic area of which is bordered by a membrane; for this, of which I have a second species from Tahiti, I propose the name of *Notiophrys**, that of *Platylepis* being now admitted among *Cyperaceæ*. A second genus is the section of *Goodyera*, which I formerly called *Rhamphidia* (Gen. et Sp. Orch. p. 494), and at a later period *Cerochilus*, distinguished from *Goodyera* by its dorsal lip with calli instead of hairs within, and from *Macodes* and *Rhomboda* by the want of appendages on the column. The last-mentioned genus is founded upon a most remarkable plant, native of Sikkim, with a great saccate dorsal lip, a truncate column having quite a funnel-shaped anther-bed, and a pair of large, soft, tooth-like transverse processes in front, resembling in form the mandibles of a coleopterous insect, added to which the customary calli within the base of the lip are so large and thin as almost to deserve the name of petaloid. Of the importance and signification of these processes I hope to offer some explanation on another occasion.

The last group, in which the base of the lip is flat, consists of four certain genera, *Chloidia*, *Zeuxine*, *Monochilus*, and *Cheirostylis*, to which may possibly be added Blume's *Eucosia*, a plant which I have found nowhere, and of which the figure is perhaps as inaccurate as that of *Macodes*.

In order to bring the differences among the genera of Physurids into a more distinct view, the following analytical table has been prepared.

* Sp. 1. *N. occulta* (*Goodyera occulta*, *Thouars*; *Platylepis goodyeroides*, *A. Rich.*; *Ætheria occulta*, *Lindl.*); bracteis ventricosis floribus longioribus, labello indiviso, sepalis pilosis.—Mauritius.

Sp. 2. *N. Commelynae*; bracteis planis acutis ovarii longitudine, labello apice 3-lobo, sepalis glabris.—A foot and a half high. Leaves three, stalked, oblong lanceolate acuminate, shorter than the scape, which has three close-pressed sheaths and is downy under the spike. Spike itself and ovaries downy, 4 inches long.—Found once only in Tahiti by Bidwill (who at first took it for a *Commelyna*), on a rock, in the bed of a stream, in the valley of Fataua, about a mile beyond the native camp.

ages, which, so far as he has been able to ascertain, are undescribed. They occur on the apices of the younger and nascent leaves, and may be readily observed, assisted by a simple lens, by removing the outer fleshy, alternately opposite pairs, until but from two to four or five pairs remain around the *punctum vegetationis*.

The outer leaves provided with the 'gland' present it as a yellow-brown, or brown-black apical process, evidently evanescent and about to fall away. These glands, which are somewhat ovate-conical or oblong in form, are erecto-patent, or deflexed towards the back of the leaves; thus, when seen in profile or from above, they radiate from the axis of the sprout. The external leaf-scales, which, doubtless, in their early condition had been in like manner furnished with these organs, do not exhibit any very perceptible scar at the point of their former attachment. The 'glands' appear to be in their matured and perfect condition on but the very young leaves, the contents of the large cells composing them assuming, more especially towards the base and middle portion, a yellowish-brown colour, and at the same time becoming more opaque, and probably granular, as they remove from the termination of the axis. The perfect 'gland' consists of numerous, comparatively large cells, filled with a clear watery cell-sap, becoming yellowish on the application of tincture of iodine. In some cases perhaps they are almost pedicellate, though generally they may be termed sessile, and resting upon the apex of the leaf. They appear in almost the earliest stage of the nascent leaf, forming, when the succeeding pair becomes visible, an appendage of considerable relative size.

The minute buds in the axils of the cataphyllary leaves of these rosettes are also furnished with these organs.

Mr. Oliver considers the function and purpose of these glands, as in many and parallel cases in structural botany, to be enveloped in obscurity. He suggests that it would be desirable that some observer having at hand fresh specimens of allied *Epilobia* and other *Onagraceæ* producing 'rosettes' towards the cold season, should take the pains to institute a more comparative examination of these structures, which possess, he thinks, considerable interest.

Mr. Oliver's Note was accompanied by illustrative microscopical drawings of the structures indicated.

Description of a New British Species of *Draparnaldia*.

By J. B. HICKS, Esq., M.D., F.L.S.

[Read November 18, 1856.]

I FOUND the following *Draparnaldia* two years since, and again this year, in the bog-streams of the New Forest, Hampshire. I have been unable to find it described in any of the works which I have obtained; I have therefore named it *Draparnaldia cruciata*, from the cruciate arrangement of its parts, and beg leave to submit a description as follows:—

DRAPARNALDIA CRUCIATA, *Hicks*.

*Fron*d 3 to 4 inches long, light green, paler than *Drap. plumosa* or *D. glomerata*, having a flocculent appearance in water; when removed it is highly mucous. *Main filament*—cells fasciated, very slightly inflated, 3–4 times longer than wide, about 330th inch diameter. *Ramuli* proceeding from main filament at right angles, mostly in whorls of four, cruciately; the intervals between the principal ramuli great, about every 50–60 cells of main filament between them; cells as wide as long, especially the younger, not fasciated. *Ultimate tufts* springing in a cruciate manner from the ramuli; their branches springing nearly at right angles gives them an arborescent appearance, bearing cilia of extreme tenuity and length. The tufts also arise from the main filament at about every 5–10–20 cells distant. From the base of the ramuli, and even from the smaller tufts, roots arise very freely, which coil round the filament many times; sometimes the end diverges from it, and becomes a small tuft. These rooted ramuli becoming disengaged float away, and form another plant. The main filament and ramuli are invested with a most perceptible layer of *mucus*, about 6 diameters of the cell. This layer is less seen after the plant has been kept for a day or two in a glass, when it will be found covered with the spores that have been generated. *The spores* are not so large as those of *D. glomerata*, being about $\frac{1}{214}$ th inch long diameter and $\frac{1}{3735}$ th short ditto, with cilia.

This species is found attached to sticks and stones in streamlets issuing from some of the New Forest bogs. In its young state it is of a very pale yellow-green, but when older it is rather greener. It may be easily distinguished from *Drap. glomerata*, *D. plumosa*, and *D. tripartita*, 1st, by the ramuli diverging at right angles; 2ndly, by the cruciate arrangement throughout; 3rdly, by the perceptible mucous sheath, thus drawing it closer to the genus *Chatophora*; 4thly, by the excessive length of the cilia; 5thly, by the extraordinary length and frequency of the radicles; 6thly, by the more equal width of the main cells, as also their greater length; 7thly, by the stiff and formal appearance of the larger tufts, so unlike the thick flexible tufts of the other species. The long interval between the ramuli gives the main filament a much more naked appearance.

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ERRATUM.

At p. 129, l. 16, for ASIMINA read ASCARINA.

23
5 p.m.





