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JOURNAL

OF

THE PROCEEDINGS

OF

THE LINNEAN SOCIETY.

ZOOLOGY.



VOL. III.

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PROCEEDINGS

OF THE

LINNEAN SOCIETY OF LONDON.

November 5th, 1857.

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

The Secretary announced that during the recess an additional pair of Cabinets for the Society's Collection of Fruits and Seeds had been presented by Thomas Corbyn Janson, Esq., F.L.S.; and the special thanks of the Society were directed to be presented to Mr. Janson for this useful and acceptable present.

Dr. Berthold Seemann, F.L.S., read a detailed report of his visit to Montreal, as the representative of the Linnean Society at the Meeting of the American Association for the Advancement of Science in that city, of which the following is an abstract:—

Availing himself of the free passage placed at the disposal of the Linnean Society by the liberality of the British and North American Royal Mail Steam Packet Company, Dr. Seemann embarked at Liverpool on the 25th of July, on board the 'Persia,' and arrived at New York on the 5th of August. Thence he continued his journey by railway, *via* Albany and Burlington, to Montreal, which he reached a few days previous to the commencement of the meeting, and was most hospitably received, and treated with much consideration by the Local Committee, including Sir William Logan, F.R.S. (the Chairman), the Lord Bishop of Montreal, Professor Dawson, and other distinguished men. On the 11th, Dr. Seemann was introduced by Lieut.-Colonel Munro,

F.L.S., at his *conversazione*, to Professor Caswell, of New Providence, the Acting President, and to Professor Lovering, of Cambridge, Massachusetts, the Secretary of the Meeting; and on the following day presented to them the official letter of the President of the Linnean Society, of which he was the bearer. Both gentlemen expressed themselves highly gratified with the attention shown by the Linnean Society in sending a delegate to the meeting, and showed him marked attention during its continuance. He was also introduced in his official capacity to Sir W. Eyre, K.C.B., Acting Governor-General of Canada, who complimented the Linnean Society on the encouragement given by it to the first meeting of the American Association held on British ground. The meetings were held in the New Court House at Montreal, commencing on the 12th of August and lasting for a week. Professor Caswell opened the session with a powerful speech, in the course of which he announced the presence of delegates from the Geological and Linnean Societies of London, and introduced Professor Ramsay and Dr. Seemann to the meeting. In his reply, Dr. Seemann took occasion to express the high esteem and respect of the Linnean Society for the American Association, and the deep interest with which the Society regarded its labours, and to offer in the name and on the behalf of the Linnean Society the most sincere wishes for the unabated continuance of that success which had hitherto attended it. The number of members attending the meeting amounted to upwards of five hundred, the greater part of whom had come from the United States, although Canada and the other British provinces of North America were, in proportion to their extent and population, equally well represented. It was generally considered to be one of the most successful meetings that had been held in any part of the American continent. Geologists were in great force; Physicists and Ethnologists were also numerous; but there was a comparatively small attendance of Botanists and Zoologists. Dr. Seemann attended daily, and at one of the meetings read a Paper "On the so-called Parthenogenesis in Animals and Plants," in which he presented a summary of the present state of that interesting question. Two other Fellows of the Linnean Society were also present at the meeting, viz. the Rev. William Hincks, Professor of Natural History in the University of Toronto, and Lieut.-Colonel Munro, in command of the 39th Regiment, stationed at Montreal, both of whom showed Dr. Seemann great attention. Of our Foreign Members, there were present, Professor Dana, of

New Haven (elected President of the Natural History Section), and Dr. Torrey of New York. Of the scientific bodies of Europe which had been invited to send delegates to this meeting, the Geological and Linnean Societies of London were the only ones that responded to the call, and their representatives were also the only Members who had come from Europe for the occasion. The cordial reception which they met with, and the universal desire expressed by the Americans for a more frequent intercourse with their European brethren in science, took, on the occasion of the last General Meeting, a substantive form in the following Resolution, moved by Professor Bache of Washington, and carried by unanimous consent:—"That the American Association recognizes with peculiar satisfaction the presence of eminent scientific men from the Old World who have honoured this meeting with their attendance, and it hopes that now, since the ice has been broken, these meetings of fraternity among men of science from different continents will be more frequent." On the 20th of August, after the termination of the meeting, Dr. Seemann left Montreal for the Falls of Niagara, the managers of the railroads and steam-boats on the route kindly placing a free pass at his disposal. Thence he proceeded, by way of Buffalo and Indianapolis, to St. Louis, Missouri, where the Academy of Natural Sciences elected him a Corresponding Member. On the 1st of September he quitted St. Louis for New York to pay a visit to Dr. Torrey, and from thence proceeded to Boston, where he was kindly received by Professor Asa Gray. On the 9th he went on board the steamer 'America,' and after touching at Halifax, reached Liverpool on the 22nd of the same month, after an absence from England of fifty-nine days.

The thanks of the Society were voted to Dr. Seemann for the readiness with which he had undertaken, and the ability with which he had executed his mission.

Read, first, a "Note on the Occurrence of *Phyllosoma commune* on the coast of Cornwall;" by Jonathan Couch, Esq., F.L.S. (See "Zoological Proceedings," vol. ii. p. 146.)

Read, secondly, the commencement of a Memoir "On the Agamic Reproduction of Aphides;" by T. H. Huxley, Esq., F.R.S. Communicated by Professor Busk, Zool. Sec. L.S. (See "Transactions," vol. xxii. p. 191.)

November 19th, 1857.

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

Charles Knight, Esq.; George G. Macpherson, Esq.; and Wilfred Dakin Speer, Esq., were elected Fellows.

Read the following letter from Lady Smith, the widow of the Founder of the Society:—

“Lowestoft, 12th November, 1857.

“GENTLEMEN,—I hope you will do me the honour to accept the accompanying nineteen volumes, comprising the whole of Sir J. E. Smith’s scientific correspondence from the time of his becoming possessed of the Collections of Linnæus till his death in 1828. There are some among your number who, I believe, will peruse these letters with a pleasure nearly equal to that I have enjoyed in arranging them for the present object. They bear ample testimony to the correctness of an observation Sir James made long ago—‘That the pursuit of Natural History is an unerring clue to an intercourse with the best minds.’ A spirit of affection and respect flows through the whole correspondence, so that those who may take no interest in the pursuits that occasioned this intercourse, will nevertheless be attracted by the warmth of friendship, the confidence and personal attachment and esteem that pervade the whole.

“I have two conditions to propose concerning these volumes. The first is, that they shall not be taken from the Society’s rooms for perusal.

“The second, that if in the course of events the Society of which you are members should cease to exist, or merge into any other Society, I wish these volumes to escape being dispersed, and desire they may be placed in the British Museum with the library of Sir Joseph Banks, and there preserved.

“Trusting that such a disposition of them may long be averted by your continuance as a Society, in which I feel the deepest interest, I remain, Gentlemen, with great respect,

“Your faithful Servant,

(Signed) “PLEASANCE SMITH.”

“*To the President and Fellows of the Linnean Society.*”

On the motion of Dr. Boott, seconded by C. Cardale Babington,

Esq., it was resolved that the cordial and affectionate thanks of the Society be given to Lady Smith for her invaluable present.

Read, first, a "Notice of Four Varieties of British Plants;" by John Hogg, Esq., M.A., F.R.S., F.L.S. (See "Botanical Proceedings," vol. ii. p. 133.)

Read, secondly, a "Notice of a Monstrosity of *Scabiosa succisa*, L., and of some other Vegetable Monstrosities;" by Professor Bentley, F.L.S.

Read, thirdly, a "Note on a diseased bunch of Grapes;" by M. T. Masters, Esq. Communicated by the Secretary.

Read, fourthly, "A short Exposition of the Structure of the Ovule and Seed-coats of *Magnolia*;" by Asa Gray, M.D., F.M.L.S. (See "Botanical Proceedings," vol. ii. p. 106.)

Read, fifthly, "Notes of a Botanical Ramble in the North of Spain;" by Joseph Woods, Esq., F.L.S. (See "Botanical Proceedings," vol. ii. p. 111.)

December 3rd, 1857.

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

Thomas Allis, Esq., and Henry Letheby, Esq., M.B., were elected Fellows.

Professor Owen, F.R.S., F.L.S., exhibited specimens of the pods of *Gleditsia triacanthos*, L., which had ripened fully and abundantly in his garden in Richmond Park, during the present year.

Read, first, "Observations on *Entozoa*, with descriptions of several new species;" by Thomas S. Cobbold, Esq., M.D., F.L.S. (See "Transactions," vol. xxii. p. 155.)

Read, secondly, a Paper "On the genus of *Annelida*, named 'Palolo' by the Samodas;" by J. D. McDonald, Esq. Communicated by George Busk, Esq., F.R.S., Zool. Sec. L.S. (See "Transactions," vol. xxii. p. .)

December 17th, 1857.

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

Edward William Cooke, Esq., A.R.A., and Francis Day, Esq., were elected Fellows.

Read, first, a Memoir "On the Zoology of New Guinea;" by Philip Lutley Sclater, Esq., M.A., F.L.S. (See "Zoological Proceedings," vol. ii. p. 149.)

Read, secondly, a "Botanical Report on the North-Australian Expedition, under the command of A. C. Gregory, Esq.;" by Dr. Ferdinand Müller, Botanist to the Expedition. Communicated by the Colonial Office. (See "Botanical Proceedings," vol. ii. p. 137.)

Read, thirdly, "Notes on Dr. Asa-Gray's Observations on the Ovules and Seed-coats of *Magnolia*;" by John Miers, Esq., F.R.S., F.L.S.

January 21st, 1858.

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

Walter Lowry Buller, Esq.; William Charles Hood, Esq., M.D.; William Lauder Lindsay, Esq., M.D.; John Lubbock, Esq.; Buxton Shillitoe, Esq.; and Francis Cornelius Webb, Esq., M.D., were elected Fellows.

Among the presents were specimens of the fruits of *Physianthus albens* and *Stephanotis floribunda*, ripened in Cornwall, the former in the open air and the latter in a greenhouse, presented by Mrs. Fox, of Grove Hill, near Falmouth; of the fruit of *Kœlreuteria paniculata*, ripened (for the first time) during the past autumn, in Chelsea Garden, presented by Thomas Moore, Esq., F.L.S.; and a specimen of the fruit of *Ailantus glandulosa*, ripened, last autumn, at Stoke Newington, near London, presented by Richard Kippist, Esq., Librarian L.S.

Read, first, an Extract of a Letter from Dr. Baikie to Sir John

Richardson, M.D., C.B., F.R.S. and F.L.S., dated 29th October, 1857, at Rabba on the Quorra, giving some account of the proceedings of the Expedition under his charge up to that date. (See "Zoological Proceedings," vol. iii. p. 76.)

Read, secondly, a Note "On the importance of a Microscopic Study of the Integuments in Crustacea;" by T. Spence Bate, Esq., F.L.S. (See "Zoological Proceedings," vol. iii. p. 1.)

Read, thirdly, the conclusion of Professor Huxley's Memoir "On the Agamic Reproduction of *Aphides*;" commenced at the meeting of November 5th, 1857.

February 4th, 1858.

Francis Boott, Esq., M.D., Vice-President, in the Chair.

Peter Squire, Esq., was elected a Fellow.

Read, first, a Memoir "On the Shell-bearing Molluscos Animals with reference to Structure and Form;" by Robert Garner, Esq., F.L.S.

Read, secondly, an Extract of a Letter addressed to Professor Bentley, F.L.S., by Mr. Barter, the Naturalist accompanying the Expedition up the Quorra, dated Rabba, September 29th, 1857.

Read, thirdly, a Paper "On the Question whether Linnæus, in a spirit of ill-will, altered the spelling of the name of the genus *Buffonia*?" by Mons. A. L. A. Fée, Professor of Botany of the Faculty of Medicine at Strasburg. Communicated by Thomas Moore, Esq., F.L.S. (See "Botanical Proceedings," vol. ii. p. 183.)

Read, lastly, a "Note on M. Fée's communication;" by John Joseph Bennett, Esq., F.R.S., Sec. L.S. (See "Botanical Proceedings," vol. ii. p. 188.)

February 18th, 1858.

William Baird, Esq., Member of Council, in the Chair.

Alexander Fry, Esq., was elected a Fellow.

Read, first, a Memoir "On the Muscles of the Larvæ of several species of *Tipulidæ*;" by John Lubbock, Esq., F.L.S. (See "Transactions," vol. xxii. p. 173.)

Read, secondly, a "Note on the genus *Hemigymnia*, Griffith;" by Thomas Thomson, Esq., M.D., F.R.S., F.L.S. (See "Botanical Proceedings," vol. ii. p. 126.)

Read, thirdly, a Paper "On the probable Metamorphoses of *Pedicularia* and other genera of *Gasteropoda*;" by J. D. M'Donald, Esq., R.N. Communicated by George Busk, Esq., F.R.S., Zool. Sec. L.S. (See "Transactions," vol. xxii. p. .)

Read, fourthly, a "Monograph of the *Eucalypti* of Tropical Australia;" by Ferdinand Müller, Ph.D. Communicated by Dr. Hooker, V.P.R.S., F.L.S. (See "Botanical Proceedings," vol. iii. p. 81.)

Read, fifthly, a Paper "On the Anatomy of *Eurybia Gaudichaudi*, as bearing on the position of the *Pteropoda*;" by J. D. M'Donald, Esq., R.N. Communicated by the Zoological Secretary. (See "Transactions," vol. xxii. p. .)

March 4th, 1858.

J. D. Hooker, Esq., Member of Council, in the Chair.

Mr. Allan Black was elected an Associate.

Mr. Ward, F.R.S., presented specimens of White or Fat Turf from the Island of Valentia in the west of Ireland; and a letter was read addressed to Mr. Ward by Dr. Lecky, giving some account of the substance.

Read, first, a Note "On *Pseudocentrum*, a new genus of *Orchidaceæ* from Peru;" by Professor Lindley, F.R.S., F.L.S. (See "Botanical Proceedings," vol. iii. p. 63.)

Read, secondly, a second part of Professor Lindley's "Contributions to the Orchidology of India." (See "Botanical Proceedings," vol. iii. p. 1.)

Read, thirdly, a Memoir "On the Tribe *Legnotideæ*;" by George Bentham, Esq., F.L.S. (See "Botanical Proceedings," vol. iii. p. 65.)

Read, fourthly, a "Synopsis of the Fructification of the compound *Sphæriæ* of the Hookerian Herbarium;" by Frederick Currey, Esq., F.L.S. (See "Transactions," vol. xxii. p. .)

March 18th, 1858.

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

John Cockle, Esq., M.D., and William Hitchman, Esq., M.D., were elected Fellows.

Among the presents was a cast of a Bust of the late Dr. Pereira, F.R.S., F.L.S., presented by Mrs. Pereira, to whom the cordial thanks of the Society were voted for her very acceptable present.

Read, first, "Contributions to the Anatomy and Natural History of the *Cetacea*;" by Robert Knox, M.D., F.R.S.E. Communicated by the Secretary. (See "Zoological Proceedings," vol. iii. p. 63.)

Read, secondly, "A Note on the genus *Abuta*;" by N. Grisebach, Professor of Botany in the University of Göttingen. Communicated by Dr. Hooker, F.L.S. (See "Botanical Proceedings," vol. iii. p. 108.)

April 1st, 1858.

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

Robert W. Hall, Esq., was elected a Fellow.

Mr. Bentham, F.L.S., exhibited specimens of *Asteranthos*, Desf., collected by Mr. Spruce on the Rio Negro in Northern Brazil, and read some observations on its history and affinities. (See "Botanical Proceedings," vol. iii. p. 80.)

Read, "Contributions to Organographic Botany;" by Christopher Dresser, Esq. Communicated by the Secretary.

April 15th, 1858.

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

William Frederick Saunders, Esq., was elected a Fellow.

Read, first, a "Catalogue of Hymenopterous Insects, collected at Celebes by Mr. A. R. Wallace;" by Frederick Smith, Esq. Communicated by W. W. Saunders, Esq., V.P.L.S. (See "Zoological Proceedings," vol. iii. p. 4.)

Read, secondly, a Paper "On some tuberiform Vegetable Productions from China;" by the Rev. M. J. Berkeley, M.A., F.L.S. (See "Botanical Proceedings," vol. iii. p. 102.)

Read, thirdly, "Notes on Arctic Plants;" by George Dickie, M.D., A.L.S., Prof. Nat. Hist. Queen's Coll. Belfast. (See "Botanical Proceedings," vol. iii. p. 109.)

May 6th, 1858.

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

Eardley G. Culling Eardley, Esq., was elected a Fellow; and Professor Albert Kœlliker, and Professor Karl Theodor Ernest von Siebold, were elected Foreign Members.

S. James A. Salter, Esq., F.L.S., exhibited a living specimen of a species of Rat, frequently observed of late on board of vessels in British ports, and made some observations on the characters by which it is distinguished from the original British Rat (*Mus Rattus*, L.).

Read, first, "Contributiones ad Acaciarum Australiæ cognitionem;" by Dr. Ferdinand Müller. Communicated by George Bentham, Esq., F.L.S. (See "Botanical Proceedings," vol. iii. p. .)

Read, secondly, a Note "On a new species of *Bellevalia* from Mount Ida;" by Maxwell T. Masters, Esq. Communicated by the Secretary. (See "Botanical Proceedings," vol. iii. p. 113.)

Read, thirdly, an "Enumeration of the Mosses of India;" by William Mitten, A.L.S. (See "Botanical Proceedings," Supplement for 1858.)

May 24th, 1858.

Anniversary Meeting.

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

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

GENTLEMEN,

WHEN I first ventured to break through the previous custom of the Society, by offering an address to the Fellows at the Anniversary, I felt that I must not depend upon always finding, in the annual retrospect of our own doings, sufficient subject for the occupation and amusement of the time allotted to that object.

On one or two former occasions I had indeed many circumstances of interest to communicate to you, relative to our removal to the place of what I trust may prove our permanent abode, and I last year took the advantage which that event offered me, of adverting to the foundation, development and results of our Society. As long as our circumstances were changing and our final destiny was in abeyance or suspense, there were subjects constantly presenting themselves sufficiently interesting to occupy a due portion of the time which intervenes between the initiatory routine of the day's business, and the final ceremony of the opening of the ballot glasses. But the very settlement of our difficulties, and the solution of our doubts, whilst filling us with the happy sense of the fruition of our hopes and wishes, deprive me of such themes for my address, and throw me again upon the consideration of some of those means of increasing the prosperity and thus extending the usefulness of our Society, which are indicated by daily experience, and the ever-changing and progressing march of natural knowledge.

When I last addressed you on a similar occasion to the present, we had just entered upon the occupation of our new abode. We could not then consider ourselves settled, scarcely even secure; but a twelvemonth's occupancy has now removed all doubt of the absolute enjoyment of the advantages which we then only believed in, and might almost tempt us to yield to a feeling of quiet and satisfied security, and to adopt the sentiment of the Poet,

“*Invenimus portum; spes et fortuna, valete!*”

But if any such feeling of finality in our labours could ever enter the mind or pervade the feelings of the Society, surely nothing could be more entirely misplaced, nothing more calculated to interfere with the fulfilment of our great mission, and to paralyse those efforts without which we must fail in carrying out the objects of our corporate existence. It is, indeed, in our present improved condition, with an increased income, enlarged communication with the scientific world, and a closer association with other scientific bodies, employed like ourselves zealously and constantly in the advancement of knowledge,—with responsibilities increased in proportion to our means and the requirements of scientific progress,—that we ought to recognize an irresistible claim upon our energies, and fresh inducements to enter, with all our powers, and with all the zeal which so noble an object demands, upon the fulfilment of the duties which are imposed upon us, and which we have solemnly accepted as our own.

That it is unnecessary, however, to employ any argument to remind the Society of those duties, or to stimulate it to their fulfilment, is proved by the state of activity and vigour by which it is at present characterized. The number and importance of the communications which have occupied our ordinary meetings, where we have no longer the necessity of listening to, or (*proh pudor!*) of nodding over the fortunately interminable commentary on the *Hortus Malabaricus*, which served for so many years as a *pièce de résistance*, not to say a stop-gap, to prevent the formal *exposé* of our occasional literary bankruptcy,—these circumstances, with the usually satisfactory attendance at our meetings, show a degree of active vitality which is at once a cause of thankful satisfaction and of hopeful anticipation.

With reference to the latter portion of our functions, there is, however, one point which calls for observation, and has been a source of great regret. I alluded to it at the last Anniversary, and made some observations upon the subject, to which I am sorry to have again to recur. I mean the comparative paucity of zoological communications when contrasted with the number and extent of those devoted to the sister science.

The high character of many of those zoological papers which we have received, does not render it less a matter for serious consideration, whether some plan might not be adopted to effect an improvement in so important an element of our functions. That the principal cause of the deficiency is to be sought in the same direction as that to which I pointed on the former occasion, can-

not be doubted. I mean the existence and working of minor societies; one pursuing a single isolated branch of zoology; another adopting an exclusive means of investigation, and thereby contracting its sphere of information on any particular branch; and a third taking up the whole extent of the Animal Kingdom, and thus antagonizing directly and throughout its entire scope, that important portion of our own field of action; for there is scarcely a meeting of any one of these departmental Societies, as I may term them, at which there are not communications read, which would deserve a place in our own Transactions or Journal.

This subject has long engaged my most anxious attention, and I cannot but hope that some plan might be wrought out, which would enable this Society to afford the great advantage of its acknowledged prestige, and the extensive circulation of its publications, to many of the more important of the communications to which I refer. I do not profess satisfactorily to have matured any such plan; but I have thought much on the subject, and have conferred with those whom I thought likely to afford me available counsel; and I will now take the liberty of laying before you some thoughts respecting it, which, though crude, may induce those whom I address to give it their consideration, and thus probably lead to some practicable and available expedient.

At the same time it must be acknowledged that there are great difficulties in the way of such an adjustment. The whole subject of the relation between minor or branch societies and the parent or central one, and the question of the utility to Science of such dismemberment are involved in it. This is a matter to be approached with diffident and cautious, but I trust not without hopeful consideration.

On the motives which usually lead to the establishment of such societies it is not necessary to dwell at any length, and in some instances I fear that any such investigation would appear an invidious one. It is more important to endeavour to discover the means by which such diversion of the stream of knowledge into smaller collateral channels, shall be rendered innocuous or useful, and temptation to further subdivision diminished.

It is an argument commonly urged by the advocates of such dissociation as we are now considering, that it comes within the same category as the great general question of the advantages resulting from the subdivision of labour; but it appears to me that the analogy is altogether unreal, or at most very partial in

its application. Were a Society, engaged in the promotion of any great department of science, made to consist of various sections, to each of which should appertain the cultivation of one individual branch, and each contributing its gains to the general treasury of the whole body, the analogy would be true and comprehensible. But far different from this is the case before us.

In the present instance the contributions of the different sections are wholly diverse in their direction and aim; and the individual bodies, so far from deriving strength and efficiency from their separate action, are weakened like the segregated sticks of the bundle in the fable, by the absence of mutual support and cooperation.

That a sincere anxiety and singleness of endeavour for the acquisition and spread of scientific knowledge is the worthy motive which induces many a zealous naturalist to join in and promote the subdivision in question, cannot for a moment be doubted. The overwhelming mass of daily additions to our knowledge of mere isolated facts, the constant influx of newly discovered species, having no obvious bearing on any question of moment, the geographical distribution of individual forms, the periodicity of the various phases of animal functions and habits, and a thousand other circumstances which, although unimportant in their individual and unassociated entities, are yet worth preserving *as* truths, or as having some future possible bearing upon more important generalization, appear to require some means by which their record may be established and their publicity secured; and this necessity has doubtless its bearing upon the utility of associations having for their object the fixing and utilizing of such otherwise evanescent units of knowledge. But it becomes again a question whether their preservation might not be equally provided for, without the expense both of time and money which is contingent upon the working of so many distinct bodies.

This observation leads me to consider for a moment another, and I have reason to believe a very general reason for the exclusive association of good and zealous men with some of the minor societies. I mean the small comparative expense to which they are subjected. This certainly appears, on the face of it, a very plausible reason for abstaining from a union with the larger and more expensive institutions. The difference between three guineas and one guinea annually is so considerable, that I doubt not there are many sincere and devoted naturalists to whom it would just present the alternative between the propriety and prudence

of expending the one or the other in the enjoyment of their favourite pursuit.

For myself, I have always been the advocate for reducing the annual subscription in Scientific Societies to the lowest sum consistent with the efficient carrying out of their objects; and I have not only entertained myself, but proposed for the consideration of my colleagues, the question whether some reduction might not be adopted in our own annual contribution or entrance fee. My full conviction, however, is that under existing circumstances such reduction is utterly impracticable; but how far this desirable end would be furthered by the members of the minor societies joining us, and thus at once increasing our income and strengthening our efficiency, is, I submit, worthy their consideration. Besides this, if we even adhere to the argument of the *quid pro quo*, it must be recollected that the Transactions and other publications of those Societies are not presented to the members without payment, whereas ours, often of considerable pecuniary as well as intrinsic value, are given to every contributing Member without additional expense. Surely these advantages, which appeal to the mere financial motive, in addition to the free use of all the noble libraries now collected within these walls, are more than an equivalent for the additional annual expense. You will at once perceive that these remarks are only partially applicable. There are some Institutions with pursuits collateral with our own, which have not even the pecuniary plea for separation.

I am too well aware, however, of the importance of the contributions to Natural Science emanating from the various societies to which I have referred, to look with indifference or lack of respect upon their labours. I know full well that many of the most important works of the first naturalists of our age and country have come before the public under the auspices of these associations; that the Transactions of the Zoological Society are half-filled with the contributions of the most eminent naturalists of this country; that those of the Microscopical and Entomological Societies contain papers of great value on recondite physiological subjects, or learned generalizations on some of the most interesting branches of Natural History. But it must be remembered that the separate working of each of these bodies is attended with great expense, independent of that which is required by the mere publication of each individual paper in connexion with others, and that this expense would be greatly lessened in each case,

were the power by which the separate bodies are moved, concentrated into one great machine.

In Botanical Science this distribution of the means of recording discovery has not been thought necessary; and it would certainly appear somewhat strange if we were to hear of the formation of a Ranunculaceous Society, as distinguished from a Liliaceous, or even a Cryptogamic as independent of, and antagonistic to, a Phanerogamic Society. Yet, viewed with relation to the true principles of classification, there appears to be no more incongruity in these absurd examples, than in the separation of the Entomologists from other cultivators of Natural History, and still more, the subdivision of the former into Coleopterists and Lepidopterists, and the latter into as many branchlets as there are groups in the great order of scaled-winged insects.

In the vegetable kingdom, the Linnean Society is the main recipient of contributions to that important branch of natural science in this country; and I rejoice as heartily as the most exclusive votary at the shrine of Flora, at the vigorous strides which that charming science is making, and at the high character of the papers in that department of Natural History which appear in our own publications. I feel it to be matter of honest congratulation, that the Society has been so long, and still continues to be, the medium of thus contributing to the diffusion of botanical knowledge throughout the world. It is not because I have been led more particularly into the study of animal existences, that I can have any wish to see Zoology occupy an undue or predominant situation in our proceedings here. It would ill become me, in the position in which you have done me the honour to place me, to exhibit or to feel any partiality for either. Not Dido herself could have uttered with more sincerity than I do, "*Tros Tyriusve mihi nullo discrimine agetur.*" It has, I hope, been the guiding principle of my conduct, certainly of my intentions, since I have occupied this chair; but I cannot but consider it most desirable and important that a Society like ours, professedly devoted equally to the two branches, and with all the machinery necessary for the equal promotion of both, should not have its means curtailed, and its usefulness impaired in relation either to one or the other. The relative number of contributions to our Society during the past year in the two departments, exclusive of statements of isolated facts, or passing and ephemeral subjects, gives force to my present appeal, and shows the reality of my complaint.

In the remarks which I have considered it my duty to make

upon this difficult and somewhat distasteful subject, I hope it is unnecessary for me to declare that I have not been actuated by any feeling inconsistent with a full appreciation of, and sincere respect for, those scientific bodies on whose relation to ourselves I have animadverted, and of admiration of the results of their labours. Still less is it possible that I could entertain any feeling of personal or corporate rivalry. Many of the most distinguished members of those very Institutions are our fellow-members here, our personal friends and joint labourers in the same field. Nay, many are at this moment within the hearing of the unpalatable truths which I have felt called upon to utter. But I have considered it right to speak plainly my thoughts upon a matter which has long caused me great anxiety, and to which, perhaps from long pondering upon it, I may have been led to attribute what others may deem a more than deserved importance.

And now it may be reasonably demanded, after all that has been said on the disadvantages of such divisions as I have been deprecating, supposing all that has been asked to be granted, what means are proposed to meet the difficulty and to obviate the asserted evil? This is, indeed, a much more perplexing and complicated question; and I am free to confess that I, for one, am not prepared with any immediate practicable remedy. There are, however, some suggestions which have occurred to my mind in reflecting upon the subject, which, with great diffidence and a deep sense of all the vagueness and obscurity that hangs about them, I will venture to offer.

In the first place, even acknowledging on the one hand all the evils of the system which I have assumed, these Societies do exist, and have existed long enough to be firmly established. They are working and working with good effect. There are honest, truthful, talented, enlightened men engaged in that working. They constitute a great and important fact;—and must be dealt with, if at all, as associate and fellow Institutions with our own. What I am anxious to see is, not their present antagonism, but their union with us, as far as practicable, in such a relation as shall be mutually advantageous. Not as at present, the child taking food from the parent's mouth,—not the sucker depriving the tree from which it springs of its nourishment and growth and strength.

One of the most obvious means suggesting itself for carrying out this object, is that the Societies in question should, in such manner as they may see best, communicate to the Linnean Society such papers as appear particularly calculated for publication

in our Transactions or Proceedings. There are three Societies especially, from which papers might, on this plan, be communicated,—the Zoological, the Entomological and the Microscopical. With regard to the first of these, it would be impossible for us, without considerable pecuniary assistance, to publish the luxuriously beautiful illustrations which, from the pencil of the first animal draughtsman of this or perhaps any former period, have, for some years, rendered the octavo publication of that Society the most beautiful and elegant periodical work on the Natural History of Animals that has ever appeared. Nor does it seem necessary or desirable, even were it possible, that the description and figuring of every new species should devolve upon the Linnean Society. There are many very valuable papers requiring few and inexpensive or perhaps not any illustrations, which, from their more abstract scientific character, would form suitable and important matter for our publications; and these may either be read at the meetings of both the Societies, or sent directly to us from the Publication Committee of the other Society; or it may be so far understood that papers of this description are not considered as their legitimate object, as that authors would send their papers immediately to us.

The proposal of this change in the publishing province of that important Institution, cannot be considered as in any degree disrespectful to its scientific members. It is in fact perfectly consistent with a step in the same direction which the authorities of the Society have themselves adopted. By the recent discontinuance of the quarto Transactions, they have virtually implied the future refusal of such papers as require quarto illustrations; and the change which I have now suggested is only another step in advance of their own progress. They have repudiated a certain class of papers upon no principle whatever having relation to either the matter or design or character of such papers; but only with reference to the size of the plates required for their illustration; and there can be no sacrifice of principle involved in the further change suggested, but only an extension *upon* principle of a course already arbitrarily commenced. And it must not be forgotten that the whole scientific element of that great Society (the abolition of which element, be it remembered, is not within the terms of my proposition) is but an adjunct to its original constitution and aim, organized too by an almost suicidal act of the Zoological body of this Society, who converted a very promising auxiliary of their own raising into a powerful and successful

rival. But I will not trouble you by a recapitulation of the observations which I made on this fact last year; I recur to it principally to show that the two characters in which the Zoological Society appeals to the public are essentially different, and that there is no more congruity in such an association, than there would be if the Horticultural Society were now to attempt to combine with that useful practical character which has rendered it so deservedly popular, a more purely scientific element, and, usurping the functions of our own botanical department, receive and publish such papers as now find their place in our own Transactions.

With respect to other Societies having the same relation to ours as regards their objects, a similar course, *mutatis mutandis*, might be adopted; but it is unnecessary that I should further take up your time by suggesting details, the discussion of which, whatever might be the result of the consideration of the general principle, would at present be wholly premature.

The great importance of the object of these observations prevents me from wholly passing over two other ideas which have occurred to my mind, and, in various modifications, to the minds of others, but which at present appear so impracticable, and to require for their fulfilment so large a change in the present working of the Society, that I cannot for a moment entertain them as worthy of serious discussion. In the first place, it has been questioned whether the desirable result of bringing those congenial Societies, which are now separated from us, within our own sphere, might not be obtained by offering to those of their existing members who have been such for a given number of years, the remission or reduction of the entrance fee, supposing that, on being proposed and balloted for, they should be elected as Fellows of this Society. The other proposal has been, to form a new body of Associates, for the admission of such persons as, cultivating any branch of Natural History, are willing to join our Society, paying a smaller annual contribution, and having limited advantages. I do not enter into any detailed plan as connected with either of these proposals, because I do not believe that it would be possible or desirable to carry them out; but I thought it my duty to lay before you whatever had occurred to myself or others, as a means for obviating the difficulty in which the present state of things has placed us.

I must repeat, that I consider the serious imperative mission of this Society, as the centre of Natural History Science in this country, to consist in taking every available means, honestly and

earnestly and with a high and unselfish aim, to further the advance of those branches of science to which it is devoted. If circumstances are found to exist which interfere with the fulfilment of this object, it becomes our duty to endeavour by all the fair and honourable means in our power to obviate them. I have approached the subject on which I have so long detained you with great diffidence and reluctance. I am well aware that I may have laid myself open to misapprehension, but I felt it imperative upon me, placed where I am by your confidence and good opinion, to give you unreservedly my feelings and thoughts upon a matter in which I believe the welfare of the Society, and consequently the progress of Natural History, are in a greater or less degree involved; and I have only now to say, "liberavi animam meam," and to leave the subject in your hands. And now, Gentlemen, I apply myself with great pleasure to matters of a more agreeable character.

It is with great satisfaction that I call your attention to what I have always considered a very important and useful portion of our Museum department, and one peculiarly appropriate to the original object of this Society as distinctly expressed in our charter, which defines that object to be "the cultivation of the Science of Natural History in all its branches, and *more especially* of the Natural History of Great Britain and Ireland." I allude to the British Herbarium. The existence of several typical and well-known collections of our native plants which have at various times come into our possession, appeared, now that we have ample room for their arrangement and use, to afford a most desirable opportunity of forming as complete an assemblage as possible of our national Flora, of which those collections should form the nucleus. Your Council have therefore named a Committee, consisting of three of the most competent British botanists in the Society, for the accomplishment of this object; and I am sure you will agree with me, when I mention the names of Dr. Alexander, Mr. Charles Cardale Babington, and Mr. Bentham, that a better selection could not have been made. These gentlemen have conferred a great benefit on the Society by kindly accepting the task, and they have now entered upon their labours. The basis of the proposed herbarium is being selected from the collections of Mr. Winch and of Dr. Withering, and the deficiencies will be filled up by contributions offered by various Fellows of the Society. The Committee have the advantage of the assistance of Mr. Daniel Oliver, one of our Fellows, who has under-

taken the task of selecting, laying out and arranging the specimens, and Mr. Babington that of checking the names attached to them. The Committee report their full confidence that, by this means, a very complete British Herbarium will be formed, in which all marked varieties will be included; and there can be no doubt that it will be found a most useful standard collection for reference. I cannot but believe that this new feature in our arrangements will be viewed with the greatest satisfaction by the numerous cultivators of British Botany, who will thus have, at length, a complete and well-arranged herbarium of our native plants constantly accessible for consultation and comparison.

It is not my intention to occupy your time by entering upon any analysis of the papers, many of them of great interest, which have occupied the Society at its meetings during the past year. A glance at our two publications will sufficiently attest the zeal and talent which have characterized them, and I believe I may without hesitation assert that they have not been surpassed by those of any former year. That the forthcoming part of the Transactions will consequently maintain the character, both at home and abroad, which has for so long a period attached to that our principal publication, I cannot doubt. The Journal of Proceedings also continues to give the greatest satisfaction in every quarter from whence I have had an opportunity of obtaining an opinion, and its efficiency and importance are now fully established. It has enabled us to publish very many papers of high interest, which but for such a vehicle could scarcely have been published at all, or at least only after a long interval. I may here aptly quote the words of one of our most distinguished Fellows, who thus expressed himself in a letter which I not long since received from him:—

“The number of excellent papers,” he says, “which we have had this session, constitute quite an epoch in the history of Natural Science. I know of no Society at home or abroad that can boast of such an array of valuable papers as we can already show for this one half-session.”

The general satisfaction of the Fellows of the Society with its present condition and with the manner in which its affairs are conducted, is evinced by the cheering and I believe unprecedented fact, that the whole past year has not witnessed a single instance of withdrawal from its ranks. I cannot but attribute this circumstance in great measure to the manner in which their interest is kept alive by the appearance at intervals of our Journal of Pro-

ceedings, especially as regards our country Fellows, whose connexion with the Society is mainly kept up by this means.

The present state of our Finances, with so considerable a balance in our hands, for which I refer you with great pleasure to the Auditors' Report, will I trust enable your Council to turn their attention to the gradual increase of the Library, which is very deficient in some departments of Natural History literature. The proximity and common use of the Library of the Royal Society, which contains a considerable number of the more expensive works on local Natural History, such as several of the beautifully illustrated French Voyages and others, will assist in enabling us to direct our means towards the acquisition of less expensive but equally useful works, and to the completion of some important serial publications. At the same time it must be remembered that this can only be done at present to a very limited extent, as the illustrations of some of the most valuable of the papers which have been lately read will necessarily be very expensive.

Amongst those who have been recently removed from us by death, is our old and respected friend Richard Horsman Solly, who for more than thirty years was one of the most constant attendants at our meetings, and a liberal contributor to any pecuniary exigency whenever an appeal was made to him; and he has shown a lasting interest in the welfare of the Society to which he was so long and so warmly attached, by a legacy of £100.

I cannot conclude this brief allusion to the most prominent circumstances or events of the past year, without calling particular attention to the accession to our library of the whole of the scientific correspondence of our founder, presented to us, since the last anniversary, by his honoured widow. This important gift is not more acceptable on account of its intrinsic value, great as that is, than as a graceful evidence of attachment and respect from one, who, during the life of her revered husband, was ever associated with him in the deep interest he took in Natural Science and in the welfare of our Society in particular; and who now, at a very advanced age, and as full of energy as of years, has shown, by this munificent act, that she still recurs with fond recollection to the favourite object of her husband's scientific life, and retains, even now, a vivid interest in our pursuits, and a warm and earnest wish for our prosperity.

There are some other additions to our rooms by gift which I cannot pass over without remark. The widow of one of our highly valued members, the late Dr. Pereira, has kindly presented

us with a faithful bust of her excellent husband. A portrait of our esteemed friend and Fellow, Mr. Ward, painted by Mr. Knight the Royal Academician, and acknowledged to be an admirable likeness as well as an interesting and beautiful picture, has been presented by a number of gentlemen, not confined to Fellows of this Society, by whose subscription, this pleasing testimony to Mr. Ward's scientific and social claims to our esteem and gratitude has been produced. And lastly, we have received within the last few days an interesting bust of the great LINNÆUS, a copy of the original in the Hall of the Academy of Sciences of Stockholm; this valuable addition to our memorials of the distinguished men who have been more or less closely associated with the objects of the Society, was presented to us by Professor Anderson.

We have now had twelve months' experience of our close local association with the Royal Society, and have been able to test the result of our meeting on the same evening with them. With regard to the first, I think I may safely say that our proximity has been the source of great advantage to us, and I am sure that it has tended to the increase of kindly feeling and good fellowship between the two bodies. On more than one occasion this has been evident, when a union of action was necessary to carry out some important object; and it is my pleasant duty to say that nothing can exceed the kind consideration and ready cooperation which have characterized the conduct of the authorities of that respected body. Our evening association with them after the business of the two Societies has been concluded, has also had the effect of bringing us into close and friendly relation, and has never materially interfered with our scientific arrangements.

I have now, I believe, Gentlemen, glanced at the principal circumstances which demand allusion from me. Upon the whole, our retrospect affords us ground for great thankfulness and congratulation. Our position is in almost every respect greatly improved. Our finances are not only now in a prosperous state, but our means will be still further increased, by the cessation of rent for the house in Soho Square at the approaching autumnal quarter. Our numbers are gradually being augmented by the addition of active and zealous and intelligent naturalists. Our publications are increasing in importance, and are everywhere more and more appreciated and valued.

That this state of progress may continue, nothing now is needful but a perseverance in the same course of energy and vigour, combined with good feeling and kindly brotherhood, which, I thank God, has long been characteristic of our Society.

OBITUARY NOTICES.

The Secretary then read the following notices of deceased *Fellows* and *Foreign Members* :—

For the brief notice which I am about to offer to the Society, of *Henry James Brooke, Esq.*, I am chiefly indebted to an article in the last Anniversary 'Proceedings' of the Royal Society, of which what follows is little more than an abstract. He was born on the 25th of May, 1771, in the city of Exeter, where his relatives were engaged in the manufacture of broadcloth, but was himself destined for the bar, for which profession he had nearly completed his studies when an advantageous opening led him to engage in the Spanish wool-trade. He spent nearly two years in Spain, and subsequently formed an establishment in London, where he took up his abode in 1802, devoting his leisure to the study of mineralogy, geology, and botany, but especially of the two former sciences, to which he became devotedly attached. He became a Fellow of the Geological Society in 1815, of the Linnean in 1818, and of the Royal in 1819. When the trade in Spanish wool was in a great measure superseded by that with Germany, Mr. Brooke turned his attention to other objects of commercial pursuit more congenial to his tastes, and entered warmly into the formation of companies for working the mines of South America; but these speculations having for the most part failed, he became secretary to the London Life Assurance Association, of which he had been one of the founders. In 1828 he maintained the principles on which the business of that association was carried on, in "Observations on a pamphlet by Mr. Morgan, entitled a View of the Rise and Progress of the Equitable Society." A slight concussion of the brain, the result of being thrown down by collision with a horse, and followed by symptoms of undue cerebral excitement, compelled him for some years to limit his customary mental efforts; and during this period he occupied himself in the collection of shells and of engravings. Of the former he made a large collection, which he afterwards presented to the University of Cambridge. While engaged in its formation, he published, in the fifth volume of the 'Zoological Journal,' a paper on "Conchology, regarded as a distinct branch of Science," in which he maintains that "the proper study of shells may not inaptly be considered as analogous to that of the skeletons of the higher classes of animals, and may be regarded as the comparative anatomy of the molluscous

inhabitants; and if it were so pursued, those who study shells alone might, without the fear of being regarded as triflers, confess themselves to be conchologists, and might thus assert their title to a place in the ranks of science." Mr. Brooke's reputation as a man of science was, however, chiefly derived from the eminence which he attained as a mineralogist, and especially as a crystallographer, in which department he stood almost unrivalled in this country. His "Familiar Introduction to Crystallography, including Explanations of the Principle and Use of the Goniometer," was published in 1823, and was followed, at a considerable interval, by a treatise on the same subject in the 'Encyclopædia Metropolitana.' In the latter of these works he greatly simplified the system which he had proposed in the former, and reduced the number of primary crystalline forms to six. With much labour and perseverance, he applied the reflective goniometer to the crystals of artificial salts, and published, in the 'Annals of Philosophy' for 1823, the determination of the forms of no fewer than fifty-five different laboratory crystals. He published also numerous mineralogical notices, including the description of thirteen new mineral species, in the pages of the 'Philosophical Magazine' and 'Annals,' and in the 'Edinburgh Philosophical Journal,' and was the author of the treatise on mineralogy in the 'Encyclopædia Metropolitana.' His latest labours were directed to the general relations and geometrical similarity of all crystals belonging to the same system, a paper on which subject, read before the Royal Society, was in the press at the time of his decease, and affords a striking proof how little his advanced age had diminished the strength and energy of his reasoning powers. He died, at his residence at Clapham, on the 26th of June, 1857, soon after completing the 86th year of his age, from natural decay, accelerated by the depression of his system produced by a severe cold; and his splendid collection of minerals has since been presented to the University of Cambridge, as the best means of rendering it subservient to the advancement of mineralogical science.

William Maddocks Bush, Esq., M.D., died at Weston-super-Mare on the 17th of December, 1857, aged 44 years. Dr. Bush completed an excellent general education at Eton in 1830, when he commenced his course of medical studies at St. George's Hospital, and subsequently prosecuted them at the London University. Having become a Member of the Royal College of Surgeons of England, and a Licentiate of the Society of Apothecaries, he was appointed one of the House Surgeons of the Marylebone Infirmary,

where he acquired extensive medical knowledge and experience. After this he visited the Medical Schools of Paris and Germany, in one of the universities of which latter he graduated as an M.D. During all these professional labours his mind was not inattentive to other kinds of knowledge. He was an ardent lover of nature under all her forms; but perhaps his greatest leaning to either branch of Natural History was to Botany, of which he had acquired considerable knowledge. He was elected a Fellow of the Linnean Society in 1843, and about the same time the Royal College of Physicians in London admitted him a Licentiate, *ex urbe*, of their body. The time having now arrived for selecting a department of his profession in which to bring his acquirements to a practical use, he selected that of Psychology, with the treatment of the insane mind. In this, both in the Metropolis and in the provinces, he was eminently successful, and was much consulted by his professional brethren. In connexion with this subject he was the author of an excellent pamphlet on "The General Paralysis of the Insane," a subject at that time but little attended to; and more lately he wrote a valuable monograph on "Moral Delinquency in Children," or an exposition of the early tendency to insanity in childhood, partly the result of hereditary predisposition, and partly the consequence of imperfect and misdirected education. When the photographic art became more generally known, Dr. Bush very early observed how advantageously a good manipulator might apply the processes to record objects in Natural History. He became an ardent practitioner of the art, and had gained great efficiency in it, producing beautiful specimens from various natural sources, especially from the vegetable kingdom; but, unfortunately, in his manipulations his skin absorbed some of the poisonous matters used in the preparation of his paper, and this becoming diffused through his body led to inflammation of the veins in his extremities; from thence the inflammation spread gradually to the great blood-vessels of the trunk, and led to his premature decease. His rectitude of heart and life, his amiable and conciliatory manners, and his devoted love of nature endeared him to a numerous circle of friends; while this Society has to record the loss of a member who promised greatly to advance the objects of the Society itself, and who happily blended the characters of the gentleman and the man of science.

Lieut. James Holman, R.N., F.R.S., universally known as "the blind traveller," was born at Exeter, in the county of Devon, October 15th, 1786. Although not distinguished as a naturalist,

the career of this gentleman offers so remarkable an instance of energy and perseverance in carrying out what appears to have been an irresistible impulse for visiting foreign and distant lands under circumstances which might be supposed to present almost insuperable obstacles, that I need scarcely apologize for dwelling upon it at some length. He was first sent to a day school in Theatre Lane, Exeter, kept by an old woman, at which he remained until he was between eight and nine years of age, when he was transferred to a private school near Alphington Cross, kept by the well-known Dr. Halloran; and afterwards to another school, where, as he says, he was crammed with geography, astronomy, algebra, geometry, navigation, &c., in order to fit him for the position of first-class volunteer obtained for him by Lord Bridport through the kindness of General Simco. He accordingly joined, in December 1798, being then twelve years old, the Royal George, 100, Captain C. M. Pole, bearing Lord Bridport's flag, in the English Channel; was present at the attempt at Basque Roads, and, after two unsuccessful applications to Lord Bridport to be allowed to join cruising frigates, was placed on board the Cambrian, 40, Captain Legge, in which he served from 1799 to 1805 on the Home and North American stations. He then joined in succession the Leander and Cleopatra, of which latter frigate he was appointed lieutenant, April 27, 1807. He was next employed in the Guerrière frigate, on the North American station, from October 1808 to November 1810, when, in consequence of severe rheumatism brought on by the hard service on that station, he invalided, and was placed on half-pay, returning to England in January 1811, in H.M. Brig Fantôme. In July of that year he was visiting his friends at and near Bath, when he was attacked with severe ophthalmia, which in a short time entirely deprived him of sight. In 1812, having become permanently blind, he was made a Naval Knight of Windsor. During the next seven years he devoted his time so much to the study of literature (entering at the University of Edinburgh, where he obtained a diploma), that his health suffered severely, and he was compelled to seek restoration in the air of his native county. Not finding the benefit he expected, this, together with the permission which he had obtained to absent himself from Windsor, induced him, in the year 1819, to visit the South of France alone, and without any knowledge of the continental languages. He then made the grand tour, passing through the south of France into Italy, traversing the greater part of both the southern and northern states of that peninsula, cross-

ing into Savoy by Mount Cenis, proceeding thence by Chambery to Geneva, and through Switzerland to Basle, descending the Rhine to the sea, and from Amsterdam passing by the Hague, Rotterdam, and Antwerp to Brussels, returning to England, by Ostend, in September 1821. An account of these travels was published by him in 1822, under the title of "A Narrative of a Journey undertaken in the years 1819, 1820, and 1821, through France, Italy, Savoy," &c. &c. In July 1822, he embarked alone from the London Docks for St. Petersburg, and had proceeded through Russia into Siberia, traversing it as far as Irkoutsk (2000 miles beyond Tobolsk), intending to embark at Kamtschatka for Sitka on the north-west coast of America, and thence to proceed to the Sandwich Islands, &c., when his progress was checked by a mandate from the Emperor of Russia, under which he was conveyed as a state prisoner to the confines of Cracow, and there dismissed. The motive for this proceeding was said to be a belief that he was an English spy and that his blindness was only feigned. He then proceeded through Austria, Bohemia, Saxony, Prussia, and Hanover to Hamburgh, and arrived at Hull in June 1824. Of these travels also a narrative was published in 1825. In July 1827 he proceeded with Captain Owen of H.M.S. *Eden* to South Africa, visiting by the way Madeira, Teneriffe, St. Jago, Sierra Leone, Cape Coast, Accra, Fernando Po, Bonny, Calabar, &c., Prince's Island and Ascension; after leaving which island, falling in with a Dutch galliot on its way to Rio de Janeiro, he transferred himself and baggage to that vessel. From Rio he visited the gold mines, and after journeying through the Brazils, quitted S. America for the Cape of Good Hope in H.M. Brig *Falcon*, Captain Pole, and after traversing the Cape Colony and part of Caffreland, left Simon's Bay for Mauritius, Madagascar, the Comoro Islands, Zanzibar, and the Seychelles, returning thence to the Mauritius. He then proceeded to Colombo, and having travelled through Kandy and made the ascent of Adam's Peak, embarked at Trincomalee for Pondicherry and Madras, and thence for Bangalore, returning by Chittoor and Arcot to Madras, from which he sailed for Masulipatam and Calcutta. In August 1830, he left that city for China, visiting Penang, Malacca, Singapore, and Canton, whence he sailed for Hobart Town. He next traversed Van Diemen's Land, proceeded to Sydney, and after travelling in the interior of Australia, left for England, visiting on his way home New Zealand, Bahia and Flores, and arriving in August 1832. The narrative of these travels was published in four volumes in 1834 and 1835, under the

title of "A Voyage round the World." In August 1836, he proceeded to the north of Ireland, where he remained during the next three months. He paid a short visit to the Channel Islands, St. Malo, and Dinant in the summer of 1839. In the latter part of 1840 he embarked at Blackwall for Falmouth and Oporto, landed there, and visited the following places in succession, viz. the Alto-Douro, Lanego, Oporto, Lisbon (visiting St. Ubes, the salt-pans of Rio Lado, Cintra, Colares, and the English lines), Cadiz, Seville, Port St. Mary, and Xeres, Gibraltar, Ceuta, Malaga, Granada, Almeria, Carthagená, Alicante, Valencia, Barcelona, and Tarragona. From Barcelona he proceeded to Majorca, Minorca, Algiers, Bona, Tunis, and Carthage; thence to Malta, the Ionian Islands, Patras, Athens, the island of Syra, Smyrna, Rhodes, Beyrout, and Alexandria; from thence to Cairo, Suez, Moses' Wells, &c. Then from Cairo he crossed the Desert, to Jerusalem by way of El Arish, then to the Jordan, Dead Sea, and Bethlehem; then from Jerusalem to Nazareth, the Sea of Galilee, Mount Carmel, Acre, Tyre, Sidon, and Beyrout. From Beyrout he went to Tripoli, the island of Rhodes, Latakia, Sudea (on the Orontes); thence to Antioch, Aleppo, and Hamman, by the Desert, to Damascus, and across the Lebanon and Anti-Lebanon back to Beyrout. This he left for Alexandria, Malta, and Naples, from the latter place making his way through Apulia, Calabria and Sicily to Reggio, and thence back to Naples. He then proceeded through the Abruzzi to Pescara on the Adriatic, Loretto, Rimini, Ravenna, Ferrara, Padua, Venice, Udine, Goritz, and Trieste; thence to Fiume, Zara, Libenico, Nur, Seigu, Spalatio, by sea to Ragusa and Boca di Cataro, making a tour in Montenegro, and returning to Boca di Cataro and Ragusa, then voyaging to Stagno, crossing the Isthmus, thence through the Gulf of Narenta, up the little Narenta river, returning to Fort Opus and Metcavitch, and descending the main stream of the Narenta to the sea, along the coast to Spalatio, from thence going to Seigu, and entering Bosnia by Billibuch, passing to Zavena, Travnich, Kisslovoda and Sana, to the frontiers of Servia, thence to Belgrade, down the Danube to Giurgevo, Bucharest, and Ibrail, across the Sereth to Galatz, thence to Jassy and through the Bukovina, Transylvania, and Hungary to Vienna. Then through Austria, Bavaria, and the Tyrol to Italy, visiting Verona, Lodi, Milan, Pavia, Genoa, and Nice; thence to Toulon, Marseilles, Avignon, Nismes, Montpellier, Cette, Perpignan, St. Louis, and the Pyrenees, Arriège, Bagnères de Bigorre, Cauterets, Pau, and Bayonne. Thence into Spain by Vittoria to Valladolid, visiting from thence

Leon, thence to Madrid, Talavera, Badajoz, and into Portugal, visiting Elvas, Lisbon, Bucellas, Figuera, Cintra, Oporto, and Vigo, returning to Oporto by sea, thence by Corunna, Bilbao, and San Sebastian to Bayonne. Leaving Bayonne for Bordeaux, Saintes, Cognac, Charente, Rochfort, Rochelle, Bourbon-Vendée, Nantes, L'Orient, Brest, Morlaix, Dinant, Avranches, Granville, Cherbourg, Caen, Hâvre, Rouen, Chateauroux, Limoges, Agen, Auch, Pau, Cauterets, Bagnères de Bigorre, Toulouse, Lyons, Vichy, Moulins, Macon, and Chalons-sur-Saone to Dijon, Chalons-sur-Maine, Rheims, St. Quentin, Valenciennes, Lille, and Dunkirk to Calais and Boulogne, returning to England in October 1846. In the spring of 1852 he again embarked from Hull for Norway and Sweden; after travelling through which countries for a few months, he returned to England. This was the last journey he made, otherwise than by paying occasional visits to Boulogne and Bath. During the last few years most of his time was spent between Windsor and London, while at the former place secluding himself completely from all society, occupying himself wholly in writing the account of his later travels and an autobiography, and thereby so materially injuring his health that after a short illness of four or five days he died, July 28th, 1857, in the 71st year of his age. He became a Fellow of the Linnean Society in 1826, and of the Royal Society in the following year. As many among us can bear testimony, he was a most cheerful and agreeable companion, full of information and anecdote on a great variety of subjects; and these qualities are so conspicuously displayed in the published Narratives of his Travels, that it is earnestly to be hoped that those of later date may also ere long be given to the world.

John Macmillan, Esq., M.D., entered the Royal Navy and became full Surgeon in 1807. He was for some time on the South Sea station, and after his return to England became, in 1820, a Fellow of the Linnean Society. He subsequently retired to Culross in the county of Perth, where he died on the 1st of the present month, after a long illness, at the age of 81.

Sir George Magrath, M.D., C.B., K.H., &c., entered the Navy at an early age as an Assistant Surgeon, and was present in that capacity on board the *Theseus* at the evacuation of Fort Matilda, Guadaloupe, in the year 1794. As Surgeon of the *Russell* he took part in the action off Camperdown in 1797, and was appointed Superintendent of the Hospital for Dutch prisoners subsequently established at Yarmouth. In 1801 he was again surgeon of the

Russell at the attack on Copenhagen, and was afterwards Flag Medical Officer to Lord Nelson in the Mediterranean, and had charge of the hospital at Gibraltar during the fever which raged in 1804 and 1805. He was elected Fellow of the Colleges of Physicians of London and Edinburgh, and became Physician Extraordinary to the Duke of Clarence when appointed Lord High Admiral. In 1841 he was promoted to the rank of Inspector of Hospitals, and continued during the remainder of his life to reside at Plymouth, where he died on the 12th of last June, at the age of 82. His remains were interred in the burying-ground of St. Andrew's church, and were attended to the grave by a large concourse of people, including many of the neighbouring gentry. He became a Fellow of the Linnean Society in 1816, of the Royal Society in 1819, and was likewise a Member of the Royal Irish Academy, and a Fellow of the Geological Society. Besides the distinctions already mentioned, he had a medal with two clasps for Camperdown and Copenhagen, and was a Knight Commander of the Portuguese Order of the Cross of Christ.

John Forbes Royle, Esq., M.D., F.R.S., F.G.S., Officer of the Legion of Honour, was the only son of Capt. William Henry Royle, an officer in the service of the Hon. East India Company, and was born at Cawnpore. Having lost his father while yet a child, he received his early education, first under the care of Dr. Sangster, and afterwards at the High School of Edinburgh. He was originally destined for the profession of arms; but while waiting for an appointment at Addiscombe, he became a pupil of Dr. Anthony Todd Thomson, under whose able tuition he acquired so strong a taste for Natural History, and especially for Botany and its useful applications, that he was induced to decline the military appointment, and to accept in its place, as soon as he had obtained his diploma, an Assistant-Surgeoncy in the Company's service. In 1819 he proceeded to Calcutta on the medical staff of the Bengal army. He was first posted to the artillery at Dumdum, and for two or three years afterwards he was moved from station to station in Bengal or the North-western provinces, discharging subordinate medical duties, as the ordinary routine and exigencies of the service demanded. While thus employed, he availed himself of every opportunity that change of locality afforded to acquire a knowledge of the natural productions of the country. Among these, the study of Indian plants occupied the first place, and drew him into correspondence with Dr. Wallich, at that time Superintendent of the Hon. Company's Botanical Garden at Cal-

cutta. A vacancy having occurred in the charge of the Botanical Garden at Saharunpore, Dr. Royle was, fortunately for science, selected as the best-qualified candidate, and appointed Superintendent in 1823. No station in India is more happily situated for the cultivation of the natural sciences. Eastward of Delhi, elevated 1000 feet above the level of the sea, near the extreme northern limit of that part of the great plain of India which is included in the valley of the Ganges, within a few miles of the Sewalik Hills, and within easy range of the great chain of the Himalayah, the position commands alike the tropical flora and fauna of the plains of India, the temperate of the snowy range, and every transitional stage between the two. Dr. Royle possessed the acquirements, through education and self-culture, the energy of character, and the ardent love of science, to avail himself to the full measure of these advantages. The public garden, supported by a native endowment, and laid out after the simple native geometrical plan, with abundance of fruit-trees and common flowering plants, was entirely remodelled by the new superintendent, after the most approved style of English landscape gardening. A large addition was made to the number of species grown, indigenous and exotic; a scientific arrangement was introduced; a conservatory sprung up; an ample stream of running water was introduced, which fell into an artificial lake; in short, every refined alteration was adopted by which a tame oriental garden could be converted into a beautifully-planned and useful scientific institution. The whole was the creation of Dr. Royle. His other duties, including the medical charge of the station of Saharunpoor, with two hospitals, deprived him of the opportunities of travelling, necessary for the thorough investigation of the natural history of so rich a field; but, to compensate as much as possible for this drawback, he deputed parties of plant-collectors in successive years to the various mountain provinces in the neighbourhood, across the snowy range into the Thibetan boundary of Kunawur; and as far westward as the valley of Cashmeer. By these means he soon amassed a rich and valuable herbarium. But his natural bent was most strongly exhibited in the investigation of the properties of plants, and their application to the wants of man. For a considerable time he supplied the hospitals of Bengal with indigenous drugs, as substitutes for the expensive articles imported from Europe. He devoted himself with great success to the identification of the articles now occurring in the bazaars of the East with the medicines familiar to the

Greeks, as described by Dioscorides and Theophrastus. He investigated the agricultural resources of the plains of India, with a view to the improved culture and introduction of various grains, and of plants yielding fibres and other useful products; and he endeavoured to direct attention to the capabilities of the valleys and slopes of the Himalaya for the growth of tea, which has been so successfully carried out by his successors. Dr. Royle's principal work, "The Illustrations of the Botany, &c. of the Himalaya Mountains," is a storehouse of valuable facts and information, bearing on all these and other allied subjects, and has been largely drawn from by every writer of authority who has since devoted his labours to the properties and uses of plants. The favourable situation of Saharunpoor provided other tempting fields of natural investigation, which his ardent zeal would not permit him to neglect. Single-handed he undertook the severe task (for a tropical climate) of horary observations of the thermometer dry- and wet-bulb, and of the barometer, on a single day in each month throughout the year, besides the regular ordinary observations twice a day, and by these means attained excellent data for determining the meteorological conditions of the climate, and fixing one of the standard stations by which the range of mean temperature over the continent of India has been ascertained. He made collections of the mammalia, birds, reptiles, and insects of the northern plains and mountains of India, in themselves so valuable and extensive that they furnished materials for two important and distinct memoirs, by eminent British naturalists, upon the fauna of India, contained in his great work before referred to. During his various journeys through the Himalayan mountains, he carefully collected specimens of all the rocks he met with, marked the direction and measured the inclination of the strata, ascertained the elevations of the successive ridges, and the depressions of the intervening valleys, by barometrical measurement, and recorded the whole of the observations with such care, that, gleaned materials from other sources, and aided by Sir Henry De la Beche, he was enabled to produce a very creditable approximative geological section across the chain of the Himalayas, from the plains of Hindostan on to the snowy range, which was also brought out in his 'Illustrations.' All these varied and extensive researches were condensed within the comparatively short period of eight years. Patient of labour, and self-exacting to the full measure of his physical powers, he never remitted his exertions, nor yielded to the enervating effects of a tropical climate. Gifted by nature

with a strong frame and a constitution that never failed him, and which sickness never touched, he toiled on, from first to last, the earnest and ardent investigator of every natural object that came within his reach. One incident, connected with Dr. Royle's service in India, redounds so highly to his scientific credit that it appears deserving of an honoured record. The first Burmese and other wars had brought the finances of India to an unusually disastrous state; and the home authorities devolved upon the Governor-General, Lord William Bentinck, the ungrateful task of retrieving the untoward position by unpopular measures. Retrenchment the most ruthless was applied to every department of the public service that would admit of the process. The medical branch suffered most, and was struck down at one blow from affluent ease to comparative indigence. Dr. Royle, in his medical relations, suffered equally with the rest of his brethren; but the Botanical Garden at Saharunpore was for the time spared, as an outlying exception. At last the Governor-General visited the station with the announced intention of abolishing the Botanical Garden. It was remote and unfrequented, and therefore doomed. Dr. Royle, dissatisfied with the turn which the service had taken, was on the eve of vacating his appointment, on promotion to a higher grade, and returning to Europe to resign the service. Yet so good a show did he make of sterling, honest, and useful work, and of practical results effected by the Botanic Garden, that the Governor-General, finding at the same time that it was supported by a native endowment, was compelled to abandon the threatened decree for the abolition of the institution, and the Saharunpore Garden was saved. For this service Dr. Royle is entitled to the enduring gratitude of all Indian naturalists. In 1831 he returned to Europe with a large and valuable collection of materials. With characteristic energy he threw himself at once upon the investigation of what he had amassed, and between that period and 1840 he devoted himself chiefly to the publication of his great work, the "Illustrations of the Botany and other branches of the Natural History of the Himalaya Mountains," which is distinguished alike by a very large amount of original information, and by the most comprehensive, exact, and useful research. He became a member of all the leading scientific societies of the Metropolis. His election as a Fellow of the Linnean Society dates from 1833; and in the same year he read a Paper "On the *Lycium* of Dioscorides," which is printed in the 17th volume of our 'Transactions.' About the same time he received from the University of Munich the diploma of a

Doctor of Medicine ; and in 1837 he became a Fellow of the Royal Society, of which he was afterwards for a time a Vice-President. He also became a Fellow of the Geological Society, in which for several years he filled the office of one of its Secretaries ; latterly, for several years, he was Secretary of the Horticultural Society, in the business and well-being of which he always took the most lively and active interest ; and for several of the later years of his life he was Secretary of the British Association for the Advancement of Science. The signal success with which he had studied the materia medica of the East led to his being appointed to fill the chair of that branch combined with Therapeutics, in King's College, when vacated by the late Dr. Paris ; and the introductory lecture to his first course in that institution formed the basis of an essay "On the Antiquity of Hindoo Medicine," published in 1837. About the same time he was united in marriage to a lady of highly cultivated intellect, daughter of the late Edward Solly, Esq., who became the earnest and competent partner of all his subsequent labours : never was a man of science more fortunate in his domestic ties. In 1840 he published an "Essay on the Productive Resources of India," a work of high importance in an economical point of view, and the basis of all that has since been written on the subject. In 1844, being Dean of the Faculty of Medicine at King's College, he was requested to publish his introductory lecture "On Medical Education ;" and in 1847 he published, in a thick 12mo volume, for the use of his pupils, "A Manual of Materia Medica and Therapeutics," which became widely popular, on account of the unusual pains taken in the elaboration of the botanical and commercial history of the various substances. A second edition was published in 1853, and a third in 1856, both in 8vo, the last "revised and enlarged by F. W. Headland." In the changes which took place in the Royal Society about the year 1847, he took an active part, and was one of the founders of the Philosophical Club, established in that year. Besides the societies connected with the cultivation of natural science, he took an active share in the business of the Royal Asiatic Society, and with habitual energy soon struck out a new branch of inquiry in it. The 'Transactions' of that learned body had hitherto been directed chiefly to the languages, history, mythology, archæology, and numismatics of the East. At the instance of Dr. Royle, a committee was organized for the investigation of the productive resources of India, and a series of valuable communications upon interesting commercial objects, either

new or but imperfectly known, emanating from Dr. Royle, was the result. The commercial interest of the manufacturing districts was naturally awakened to these raw products; and the India-house became exposed to inquiries upon the subject, to which no department of that great establishment was at the time competent to give a reply. The natural and inevitable result soon followed: an office, that of "Correspondence relating to the Vegetable Productions of India," was created for Dr. Royle, who had now resigned his medical appointment; and Leadenhall Street henceforth became the centre of his labours and public usefulness. From this time forward he devoted his whole attention to the development of the productive resources of the country of his birth. Having the entire charge of the correspondence in relation to this most important subject, he was naturally one of the first to be consulted with regard to the Indian Department of the Great Exhibition of 1851, on which he furnished a valuable memoir, which was published in the Appendix No. 3 to the Preliminary Report of the Commissioners. In the management of this Exhibition he was appointed one of the Local Commissioners for the City of London, and had the entire charge of the Indian department. The results of his labours on this occasion are too well known to render it necessary to dwell on the skill, energy, and taste which presided over its organization and arrangement. When the Great Exhibition of Paris took place in 1855, he was again selected to superintend the Oriental department, which was, by his exertions, placed on a scale of truly oriental magnificence. For his eminent services on this occasion he received from the Emperor the large honorary medal, together with the decoration of an Officer of the Legion of Honour. Once again his talents were called into requisition in a similar manner, in the organization of the Indian Collection at the Exhibition of Art-Treasures in Manchester in 1857. In the meantime, although so busily occupied in these exhibitions and in the ordinary duties of his office, he had published in 1851 an elaborate work "On the Culture and Commerce of Cotton in India and elsewhere," and had contributed a series of Articles to the 'Penny Cyclopædia,' and to Dr. Kitto's 'Cyclopædia of Biblical Literature,' and numerous Notices in different Journals, besides Lectures at the Society of Arts and elsewhere, among which were two on the Results of the Great Exhibition, "On the Arts and Manufactures of India," "On Indian Fibres, &c." This latter, when the war with Russia threatened to cut off our supply of the principal fibrous materials

for the navy, was expanded into an important work, entitled "The Fibrous Plants of India, fitted for Clothing, Cordage, and Paper: with an account of the Cultivation and Preparation of Flax, Hemp, and their Substitutes," Lond. 8vo, 1855. The immense collections of Indian products, raw and manufactured, many of the latter of great interest either as fabrics or as exquisite models of design, which had been brought together with a view to these several exhibitions, afforded Dr. Royle an opportunity of pressing upon the authorities of the India House the importance of forming a museum in Leadenhall Street, where they might be collectively exposed for the benefit and instruction of the public. The plan was adopted; and to carry it out became the great object of the last year of his laborious and valuable life. He survived to see the rooms filled, and most of the specimens laid out. The day before his death, after an interval of confinement for some weeks, he was again at his post, to urge on the final arrangements of the museum; but mortal disease was then upon him, and on the following morning he was carried off by a sudden stroke. He died at his residence, Heathfield Lodge, Acton, on the 2nd of January in the present year, and in the fifty-ninth year of his age, leaving a widow, two sons, and a daughter to bemoan his loss, and a deep-seated sentiment of respect and regret among a wide circle of friends.

It would be unjust not to mention, that in the preparation of this notice I have been largely indebted to the kindness of my friend Dr. Falconer, who succeeded Dr. Royle in the charge of the Botanic Garden at Saharunpore, and was through life one of his warmest and most intimate friends.

Joseph Smith, Esq., F.R.S., well known to many of us as having filled for a considerable period the office of Treasurer of the Royal Society Club, was called to the Bar as a Member of Gray's Inn, within the precincts of which he continued to live during the remainder of his life, and where he died on the 26th of May 1857, at the age of eighty-three. He became a Fellow of the Linnean Society in 1811, and of the Royal Society in 1819, and was a constant attendant at the meetings of the latter, until the infirmities of age precluded his appearance abroad. He was well acquainted with British plants, and wrote a memoir on the Guernsey Lily, which however has not been published.

The Rev. William Smith, Professor of Natural History in Queen's College, Cork, was the fifth son of the late Samuel Smith, Esq., of Balnamere, near Ballymoney, in the county of Antrim,

and was born on the 12th of January 1808. He received his collegiate education in the Royal Belfast Academical Institution, and, devoting himself to the ministry, attached himself first to the Presbytery of Antrim, and afterwards to the Remonstrant Synod of Ulster. At a very early period of life he was chosen minister of the Unitarian congregation of Dundee, whence, after the lapse of a few years, he removed to Bolton in Lancashire, and subsequently to Stockport, where he continued in the exercise of his ministerial functions from 1834 to 1845. Compelled by his health to seek a milder climate, he became successively pastor of the congregations in Torquay, Jersey, Cheltenham, Wareham, and Lewes; and towards the end of 1854 he was appointed, on the recommendation of the late Professor Edward Forbes, to the Chair of Natural History at Cork, which he occupied till his decease. He was for many years a martyr to the gout; but his ailment, although severe, did not preclude the application of his mind to study; and in the pursuit of natural history, to which he had been addicted from his youth, he found both solace from pain and a pleasing occupation. Although well-versed in the knowledge of British plants generally, he determined to restrict his more immediate studies to one particular group; and his fondness for microscopical investigation led him to select the *Diatomaceæ* as the family to which his attention should be especially devoted. Accordingly he published, in 1853 and 1856, two crown 8vo volumes, entitled "A Synopsis of the British Diatomaceæ," illustrated by sixty-nine plates, containing figures of nearly four hundred species of that singular group. The specimens which formed the materials for this work are now deposited in the British Museum, and constitute a striking memorial of his industry in collecting, and patience in determining, objects so minute, but at the same time so curious and interesting. As a professor, he soon became exceedingly popular, and his class was one of the most successful in the college; but his health had long been declining, and he died on the 6th of October last, after having occupied the chair only about three years, in the fiftieth year of his age. He became a Fellow of the Linnean Society in 1847.

Richard Horsman Solly, Esq., was the eldest son of Samuel Solly, Esq., F.R.S., F.S.A., of Serge Hill, near Abbots' Langley, Herts, and was born on the 29th of April, 1778, at the house of his father in Great Ormond Street, which he himself continued to inhabit until the close of his life. Mr. Samuel Solly was originally a very considerable merchant in the Italian and Levant

trade, and inherited from his uncle, Mr. Timothy Holles, the house in Great Ormond Street, together with a handsome legacy and a museum of curiosities, which descended to our late Fellow, and contributed, no doubt, to awaken in him that taste for natural and physical science, and that spirit of inquiry by which he was through life distinguished. His mother was one of the two daughters and co-heiresses of Dr. Horsman, an eminent London physician; and his school-days were passed at Cheam in Surrey, under the tuition of Mr. Gilpin, son of the celebrated author of the work on "Forest Trees." He became a student of Magdalen College, Cambridge, where he took his degree of M.A. in the year 1800, and was subsequently called to the bar as a member of Lincoln's Inn. On the death of his father in 1807, he succeeded to a considerable property, and devoted himself thenceforward to the indulgence of his inclination for the pursuits of science and art, and to the cultivation of friendly relations with those who were most eminent in both. He became in the same year a Fellow of the Royal Society, and was early led, by his intimacy with the late Mr. Thomas Andrew Knight, at whose house at Downton he was a frequent visitor, to take a warm interest in the Horticultural Society, of which he continued through life to be an active supporter. He was also for many years an assiduous promoter of the Society of Arts and of the Royal Institution; and became a Fellow of the Society of Antiquaries, the Geological, the Zoological and numerous other Societies. But the subject which more than any other attracted his attention, was the improvement of the microscope; and his patronage and encouragement were liberally bestowed on those able opticians who contributed so greatly, some twenty or thirty years since, to the perfection of an instrument, the importance of which in scientific investigation is daily becoming more widely acknowledged. To this recognition was subsequently due the formation of the Microscopical Society, of which Mr. Solly, notwithstanding his strong predilection for microscopical studies, became a somewhat reluctant member, inasmuch as he felt that the microscope was simply an instrument of research in various branches of science, each of which was already provided with its own appropriate Society. Of the Linnean Society he became a Fellow in 1826, and was frequently a member of our Council, in which his business habits and the activity of his mind rendered him peculiarly useful, especially in relation to financial questions. To him we are chiefly indebted for the clearness and simplicity of our balance-sheet and especially of that

portion of it which relates to our assets and liabilities ; and as a last proof of his good-will and of the warm interest which he ever took in our affairs, I have to record that he has bequeathed to us by his will a legacy of a hundred pounds, of which his executors have courteously announced the speedy payment. To many of us he has been so long known by his constant attendance at our meetings, both scientific and social, by his liberal hospitality, by the kindness of his disposition, and by that spirit of universal good-will which he both felt and inspired, that his loss will leave a marked vacancy in the ever-narrowing circle of our older friends. He died at his house in Great Ormond Street on the 31st of March in the present year, having nearly completed the 80th year of his age, and was buried on the 7th of April in the New Cemetery at Woking, Surrey.

The Rev. William Stockdale, M.A., second in seniority on the list of our Members, having been elected a Fellow of the Linnean Society in the year 1796, died on the 27th of February in the present year, at Mear's Ashby Hall, near Northampton, in the 91st year of his age. He had been for forty-four years vicar of East Ashby, and for nearly sixty-two years a Fellow of the Linnean Society. For many years past I have received from him, at each recurrence of this Anniversary, a letter expressing his warm sympathy with the Society, and occasionally enclosing a botanical specimen with a query attached to it, evincing his continued interest in its pursuits.

William Wood, Esq., F.R.S., was born in Kendal in the year 1774, and was educated for the medical profession. Having completed his studies at St. Bartholomew's Hospital, in London, under the tuition of Abernethy, he commenced practice as a surgeon at Wingham, in the neighbourhood of Canterbury. Attaching himself early to the study of Natural History, he became in 1798 a Fellow of the Linnean Society ; and published, in 1801, in the sixth volume of our 'Transactions,' a useful Paper entitled "Observations on the Hinges of British Bivalve Shells," carefully illustrated by figures from the pencil of Mr. Henry Boys, also an early Fellow of the Society, and still, I believe, living at Toronto in Canada West, of the University of which city he has long been one of the Professors. About 1801 Mr. Wood removed to London, where he continued to practise his profession until 1815, when he entered into business as a bookseller in the Strand, dealing chiefly in books of Natural History, and publishing some important works in that department of Science. He had pre-

viously, in 1812, become a Fellow of the Royal Society, and had given to the world an English translation of Buffon's "Natural History," and a work entitled "Zoography, or the Beauties of Nature displayed in select Descriptions from the Animal and Vegetable, with additions from the Mineral Kingdom," in three vols. 8vo. 1807-1811. In 1815 he published the first volume of a work, entitled "General Conchology;" but this intended work subsequently gave place to his "Index Testaceologicus, or a Catalogue of Shells, British and Foreign, arranged according to the Linnean System," commenced in 1818, and completed in 1828. Of this work, containing about 3000 coloured figures of shells, "a new and entirely revised edition" was published by Mr. S. Hanley in 1855. The success of this 'Conchological Index' induced Mr. Wood to publish, in 1839, on a similar plan, an "Index Entomologicus, or a complete illustrated Catalogue, consisting of 1944 figures, of the Lepidopterous Insects of Great Britain," of which also a second edition, "with figures of the newly discovered species," was given in 1852 by Mr. Westwood. In the meantime he had also published "Illustrations of the Linnean Genera Insects," in two vols. 12mo, London, 1821; a new edition of Gustavus Brander's "Fossilia Hantoniensia," 4to, London, 1829; and three 4to parts of "A complete Illustration of the British Freshwater Fishes, with some account of their Habits." He quitted business in 1840, and since that time has continued to reside at Ruislip in Middlesex, at which place he died on the 26th of May, 1857, in the 84th year of his age, and in the 60th year of his Fellowship of the Linnean Society. Since his retirement from business he has been but rarely seen among us; but this brief outline of his industrious and useful career will recall to many of our older Fellows the remembrance of an honourable and estimable man, who laboured earnestly for the promotion of natural science. He has left a son, who succeeded him in business, but also retired a few years ago, and who, it is but justice to add, has considerable talent as an artist, and had no small share in the production of some of his father's publications, and especially of the two Indexes above-mentioned.

Among FOREIGN MEMBERS our losses have been heavy, amounting to no less than five:—

Charles Jules Laurent Lucien Bonaparte was the eldest son of Lucien Bonaparte, brother of the first Napoleon, by his second marriage with Alexandrine de Bleschamps. He was born at Paris

on the 14th of May, 1803, and in 1804 accompanied his father into Italy, and was with him in 1810 on board the vessel in which he made his unsuccessful attempt to proceed to America. Being taken prisoners on their passage by an English cruiser, Lucien and his family were brought to this country, where they passed several years in the neighbourhood of Ludlow, where the young Charles first betrayed that taste for natural history by which he was afterwards so eminently distinguished. After the conclusion of the peace of 1814, Lucien returned to Italy, and acquired by purchase from the Apostolic Chamber the principality of Canino, in the neighbourhood of Viterbo, while his son Charles took the title of Prince of Musignano. Residing at Rome for the next seven years, the young Prince devoted himself with great ardour to the study of natural history, successively taking up plants, insects, and vertebrated animals, and finally attaching himself especially to the class of Birds, which continued through life to be his favourite study. In 1822 he married, at Brussels, his cousin Zenaide, the eldest and only surviving daughter of his uncle, Joseph Bonaparte, who was then residing, under the title of Count de Survilliers, in the United States, whither Charles Lucien also soon after proceeded with his youthful bride, and took up his residence in the neighbourhood of his father-in-law. Here, in 1824, he published the first volume of his continuation of Wilson's 'American Ornithology,' which was followed by two other volumes in 1828, and by a fourth in 1833. This important work, together with the "Genera of North American Birds," published in the 'Annals of the Lyceum of Natural History of New York,' in 1826 and 1827, at once established his reputation as a systematic zoologist, and gave evident proof both of his extensive knowledge of the subject, and of the unwearied industry with which he pursued it. In 1827 he came to England, and was elected, at the early age of 24, a Foreign Member of the Linnean Society. On his return to Rome in the following year, he commenced the formation of a splendid zoological cabinet, and soon after issued the first numbers of a magnificent work entitled "*Iconografia della Fauna Italica per le quattro classi degli Animali Vertebrati*," three vols. 4to, Rome, 1832-42, which forms unquestionably the most complete and elaborate work that is extant on the Vertebrated Fauna of any country in the world. In 1837 he again visited England, and communicated to our Society "A new Systematic Arrangement of Vertebrated Animals," which was published in the eighteenth volume of our 'Transactions,' and contained many valuable

suggestions in regard to the classification of the *Vertebrata*. On the principal element of the primary subdivisions of the class mammalia first promulgated in this paper, Professor Owen has recently remarked in our 'Journal,' "that he considers it as the most important improvement in the classification of mammalia which has been proposed since the establishment of the natural character of the Implacental or Ovo-viviparous division." From this time the Prince became a frequent visitor at the meetings of the British Association for the Advancement of Science; and so strongly was he impressed with the advantages derived from such meetings, that he laboured long and successfully in the foundation of a similar Association in Italy, the first meeting of which took place at Pisa, in 1839, where and at the subsequent meetings, until 1847, he was constantly President of the Zoological Section, to which he made many interesting communications. By the death of his father in 1840, he succeeded to the title of Canino; and in 1844 he was elected a Corresponding Member of the Academy of Sciences of the French Institute. He continued to reside at Rome, occupying himself incessantly with zoological subjects, until the political events of 1847 rekindled in Italy the revolutionary spirit, when he threw himself ardently into the Republican cause, and became President of the Roman Constituent Assembly, which position he retained until the Roman Republic fell before the arms of France. Proscribed in Italy, he retired first to England, but finally took up his residence at Paris, frequently, however, visiting this country, especially with a view to the meetings of the British Association. For some years past he had suffered severely from swellings and ulceration of the legs, which at last terminated in dropsy of the chest, of which he died, after much suffering, at his house in the Rue de Lille, at Paris, on the 30th of July, 1857, in the 55th year of his age. By his wife Zenaide, who died in 1854, he had twelve children, nine of whom survive him. The number of his works and papers comprised in the list of the 'Bibliographia Zoologiæ' of the Ray Society, amounts to forty-nine; but these extend no lower than 1842, and consequently contain none of his later zoological writings. The production of a complete "Systema Avium" was the great object of his ambition; and at this he laboured indefatigably, notwithstanding his sufferings, to the last hour of his life. The portions relating to *Insectores* and *Grallatores* are already published, and the remainder is left in MS. ready for publication. A special work, in continuation of Temminck's splendid Monograph of

Pigeons, of which several numbers have been published, occupied him up to the time of his death. This extreme ardour in the pursuit of science, and the unremitting attention which he devoted to it, increasing even as his physical powers gave way, were his most striking characteristics. Confining himself to Vertebrated zoology, and especially conversant with the class of Birds, which few men have studied more successfully, his labours have contributed largely to our knowledge of the faunas of Europe and of North America in particular, to the improvement of their systematic arrangement, to the establishment of many well-marked genera, and to the distinction and description of a multitude of new or imperfectly-known species. Of his conduct in public life it is not my business to speak; but I only echo the general sentiment in saying that in private he was amiable and estimable, a warm friend, and an agreeable companion.

Martin Heinrich Karl Lichtenstein, Doctor of Medicine and Philosophy, Member of the Royal Academy of Sciences at Berlin, Director of the Zoological Museum, and Professor of Zoology in the University of that city, was born at Hamburg, on the 10th of January, 1780. He devoted himself to the study of medicine, and took his Doctor's Degree at Helmstadt in 1801. In the following year he became tutor to the children of General Janssen, the Dutch Governor of the Cape of Good Hope, and accompanied him, partly in that capacity and partly as his physician, to Southern Africa. Soon after his arrival, he was made Surgeon-Major in the battalion of Hottentot Light Infantry, raised for the Dutch service, and was appointed in 1804 one of the Commissioners for visiting several then unknown parts of the interior, on missions connected with the outbreak of the war with the native races. In this capacity he was enabled to collect a great amount of information relative to the geography and natural history of the regions which he visited, and in particular to gratify that ardent inclination for zoological investigation which had become his ruling passion. After the capture of the Cape by the English, he returned to Holland with his patron, bringing with him large collections and other materials, on which he laboured for several years, and having settled at Berlin in 1810, commenced his academical career in the following year as ordinary Professor of Zoology in the University. The narrative of his African Travels, published under the title of '*Reisen im Südlichen Africa*,' two vols. 8vo, Berlin, 1810-12, added greatly to the reputation which he had already acquired, and was speedily translated into English

and other European languages. In 1815 he was appointed First Director of the Zoological Museum; and in that capacity published, in 1816, an 8vo volume, entitled 'Das Zoologische Museum der Universität zu Berlin;' and in subsequent years a series of Catalogues under the title of "Verzeichniss der Dubletten des Zoologischen Museums, &c.," in which many new species, especially of birds, were from time to time described. His "Darstellung neuer oder wenig bekannter Säugethiere in Abbildungen und Beschreibungen," a splendid folio work, published at Berlin from 1827 to 1829, contains figures and descriptions of many important animals from the collection of the Berlin Museum; and a multitude of other works and essays in the 'Transactions' of the Berlin Academy, in Wiegmann's 'Archiv,' and in other periodicals, attest his continued attention to his favourite pursuit nearly to the close of his long and useful life. Among these, not the least interesting and instructive are his Commentaries on Maregrave and Piso, and on Hernandez, in which he has not only ably illustrated the labours of those early pioneers of American zoology, but has added much valuable information derived from the study of the important collection of which he had the principal charge. In 1826 he received the order of the Red Eagle; in 1835 he was elected a Foreign Member of the Linnean Society; and he died suddenly, at Berlin, in September last, having nearly completed his 78th year.

Johannes Müller, M.D., Professor of Anatomy in the University of Berlin, Member of the Royal Academy of Berlin, Foreign Member of the Royal Society of London, and Correspondent of the French Institute, was born at Coblenz, on the 14th of July 1801, became Professor at Berlin in 1831, Foreign Member of the Linnean Society in 1837, and died at Berlin of an apoplectic stroke on the 28th of April of the present year, in the 57th year of his age. The news of the death of this great physiologist is so recent, that I must entreat the Society to excuse my not having prepared a sketch of his life, which has had too great an influence on the existing state of science to be treated of without due consideration.

Christian Gottfried Nees von Esenbeck, President of the Imperial Academy "Naturæ Curiosorum," was born on the 14th of February 1776, and educated at the Pædagogium of Darmstadt, where he first imbibed a taste for the pursuit of natural history. He studied medicine at the University of Jena, where he took his Doctor's Degree, and afterwards established himself as a practising physician at Frankfort-on-the-Maine. His first botanical publication,

‘Die Algen des süßen Wassers nach ihren Entwicklungsstufen dargestellt,’ Bamberg, 1814, 8vo, was speedily followed by a much more important work in 4to, entitled ‘Das System der Pilze und Schwämme,’ Würzburg, 1816. By these works he became so favourably known, that in 1818 he was appointed Ordinary Professor of Botany, and Director of the Botanic Garden of the University of Erlangen, where he published, as an introduction to his first course of lectures, a ‘Synopsis specierum generis *Asterum* herbacearum, præmissis nonnullis de Asteribus in genere, earum structura et evolutione naturali,’ Erlangæ, 1818, 4to, which he enlarged in 1832 into a much more important book on the same subject, under the title of ‘Genera et Species Asterearum,’ Vratislaviæ, 8vo. In the same year, 1818, he was appointed editor of the ‘Nova Acta Academiae Cesareæ Leopoldino-Carolinæ Naturæ Curiosorum,’ the direction of which he retained, as President of the Academy, until his death. In 1819 he became Ordinary Professor of Natural History in the University of Bonn, where he laboured assiduously, in conjunction with his scarcely less celebrated brother, Theodor Friedrich Ludwig, in the establishment of an excellent botanic garden, and where his lectures were in high repute, until 1831, when he was transferred to the Botanical Chair of the University of Breslau. Professor Nees von Esenbeck was not only one of the most laborious, but also one of the most distinguished systematic botanists of the present century. His principal botanical publications, besides those already mentioned, are his ‘Handbuch der Botanik,’ in two vols. 8vo, Nürnberg, 1820–1; his ‘Agrostologia Brasiliensis,’ forming the second volume of Professor Von Martius’s intended ‘Flora Brasiliensis,’ 8vo, 1829; his ‘Cyperaceæ Brasilienses;’ his ‘Naturgeschichte der Europäischen Lebermoose,’ four vols. 8vo, 1833–38; his ‘Systema Laurinearum,’ 8vo. 1836; the “Acanthaceæ” of DeCandolle’s ‘Prodromus;’ and his “Monograph of the East Indian *Solanææ*,” printed in the seventeenth volume of our ‘Transactions.’ Besides these, he assisted largely in several important works, published by his brother and other writers, and wrote numerous papers in the ‘Nova Acta,’ and elsewhere. It is not, however, as a botanist only that he deserved well of natural history; as an entomologist also he is well known by his extensive series of researches on the family of *Ichneumonidæ* and their allies, of which his ‘Monographie der Ichneumoniden,’ two vols. 8vo, Stuttgart, 1828, and his ‘Hymenopterorum Ichneumonibus Affinium Monographiæ,’ two vols. 8vo, Stuttgart, 1830, contain the

most complete *résumé*. But perhaps the greatest service that he rendered to natural science was in the revival of the German Academy *Naturæ Curiosorum*, after a repose of twenty-seven years, and the skill and industry which, for a period of forty years, he bestowed upon the superintendence of the highly important series of its 'Transactions' from the ninth to the twenty-fourth volumes. He became a Foreign Member of the Linnean Society in 1827, and communicated to us, in addition to the paper previously mentioned, "A Descriptive Catalogue of the *Gramineæ* and *Cyperaceæ* contained in the Indian Herbarium of Dr. Royle," the characters of the new genera contained in which are given in the first volume of our 'Proceedings.' He died at Breslau at the commencement of the present year, in the 82nd year of his age.

Conrad Jacob Temminck, Member of the Royal Academy of Sciences of the Netherlands, and one of the most distinguished ornithologists of the present century, was born at Amsterdam, of a good family, on the 31st of March 1778. His father, Jacob Temminck, was Treasurer of the East India Company; and he was himself destined for a mercantile career, his friends obtaining for him, at the age of 17, an appointment as one of the Vendu-masters to the Company. In this capacity he had many opportunities of making himself acquainted with the numerous objects of natural history brought home by the Company's ships. He had also the advantage of studying a small collection of birds made by his father, whose taste for natural history led him to give such recommendations and other assistance to Levaillant in his voyage to the Cape of Good Hope, as induced the latter to dedicate to him the first volume of his '*Oiseaux d'Afrique*.' Many of the specimens of birds brought home by Levaillant, and still extant in the Museum at Leyden, were prepared by the younger Temminck, who acquired great skill in the preservation of the remains of animals, and especially of fishes, his mode of preparing which became afterwards celebrated under the name of Temminck's method. His intimacy with Levaillant contributed in no small degree to increase his taste for natural history, and is supposed to have given him that facility in the use of the French language, both in speaking and writing, which was so useful to him in after-life; but his chief instructor in natural science was Bernhard Meyer, the *collaborateur* of Wolf in the well-known '*Taschenbuch der Deutschen Ornithologie*,' with whom he was united by ties of the closest friendship. For some time he busily occupied himself in the formation of a fine collection of birds and

quadrupeds, and first appeared in the character of a writer in a 'Catalogue Systématique du Cabinet d'Ornithologie et de la Collection de Quadrumanes de C. J. Temminck ; avec une courte description des Oiseaux non-décrits.' His next appearance in print was as the author of the text of the first volume of the splendid work of Madame Knip, 'Histoire Naturelle des Pigeons,' Paris, 1808, which was followed by his 'Histoire Naturelle Générale des Pigeons et Gallinacés,' Paris, 1813-15, three vols. 8vo. These works established his reputation as one of the most accurate and laborious of systematic ornithologists, and recommended him to the notice of the then existing government. King Louis appointed him one of his Chamberlains, and decorated him with the Order of Union, which he had just established. After the expulsion of the French, when the peace of Europe was again threatened, he became for a short time Captain of a volunteer corps of cavalry formed in Amsterdam ; but these distractions withdrew him only for a short time from his favourite pursuits. In 1815 he published, in one vol. 8vo, his 'Manuel d'Ornithologie, ou Tableau Systématique des Oiseaux qui se trouvent en Europe,' which was afterwards expanded into four vols. 8vo, Paris, 1835-40, and was illustrated by an atlas by Werner, containing figures of nearly all the birds described. In this, which must be regarded as one of his most important works, he attempted to establish a system differing in many respects from those which had preceded ; but the accuracy of the descriptions, the extent and careful elaboration of the synonymy, the detailed observations on the habits and change of plumage of the birds, and the attention paid to their geographical distribution especially distinguish this Manual as a most valuable contribution to Ornithological Science. His next great work, for which he had long been preparing, was commenced in 1820, and completed in 1844, under the title of 'Nouveau Recueil de Planches Coloriées d'Oiseaux,' intended as a supplement to the 'Planches Enluminées' of Buffon, and containing 600 splendid folio plates. The name of Baron Meiffren-Laugier is associated with his on the title ; but it is well known that the Baron had no share in the scientific elaboration of the work. In the same year in which he commenced this great work, he was named, on the death of Brugman, Director of the Natural History Museum at Leyden, to which he transferred his own extensive collection, and which, under his superintendence, became in a few years equal in many respects, and in some superior, to the principal Museums in other states of Europe. The

formation of this immense collection and the publication of his great ornithological work did not, however, so completely occupy his time as to preclude him from giving some portion of his attention to the study of the mammalia; and his two volumes of 'Monographies de Mammalogie,' published in 4to at Paris and at Leyden, between 1825 and 1841, attest the extent of his acquirements in that department of Zoological Science. His original predilection for everything connected with the East Indies had been strengthened and renewed by the acquisition and description of a multitude of zoological novelties from the Dutch possessions in the Eastern Islands, and was strongly evinced in his work entitled 'Coup d'œil général sur les Possessions Néerlandaises dans l'Inde Archipélagique,' 3 tom. 8vo, Leide, 1847-9. Nor must I omit to mention the splendid work, in three volumes folio, published under his superintendence, chiefly by the officers of the Leyden Museum, under the title of 'Verhandelingen over de natuurlijke Geschiedenis des Nederlandsche overzeesche bezittingen,' or the important aid given by him to the 'Fauna Japonica' of Von Siebold, likewise published under his direction. His last work, published at Leyden in 1853 and the two following years, under the title of 'Esquisses Zoologiques sur la côte de Guinée,' affords conclusive evidence that, at the age of 77, his industry was undiminished, his faculties were unimpaired, and he continued to enjoy uninterrupted good health; but in the course of that year it became evident that his health was suffering, and he died on the 30th of January in the present year, having nearly completed his 80th year. He was thrice married, and has left a widow and three sons by his last marriage. On his first visit to England, in 1819, he laid before our Society "An Account of some new species of Birds of the genera *Psittacus* and *Columba*, in the Museum of the Linnean Society," the greater part of which, he states, were brought from the south, east, and north coasts of New Holland by Mr. Brown, who communicated much useful information derived from his notes. This valuable memoir was published in the thirteenth volume of our 'Transactions;' and in the following year, 1820, M. Temminck was elected a Foreign Member of the Linnean Society. Besides the honours which he received in his own country, he was a Correspondent of the Academy of Sciences of Paris, of the Royal Academy of Sciences of Berlin, of the Imperial Academy of St. Petersburg, and of many other scientific bodies. He had also received the decorations of the Lion of the Netherlands, of the Legion of Honour, and of the

Portuguese Order of the Conception. Many of his detached memoirs, in addition to the more important works above quoted, will be found in the 'Annales Générales des Sciences Physiques,' in the 'Bijdragen tot de Natuurkundige Wetenschappen,' in the 'Tijdschrift voor Natuurlijke Geschiedenis,' and in the 'Proceedings of the Zoological Society.'

The Secretary also announced that twenty Fellows, two Foreign Members, and one Associate, had been elected since the last Anniversary.

At the election which subsequently took place, Thomas Bell, Esq., was re-elected President; Francis Boott, Esq., M.D., Treasurer; John Joseph Bennett, Esq., Secretary; and George Busk, Esq., Under- (Zoological) Secretary. The following five Fellows were elected into the Council in the room of others going out:—viz. Charles Cardale Babington, Esq.; William Benjamin Carpenter, Esq., M.D.; Charles Darwin, Esq.; Daniel Hanbury, Esq.; and S. James A. Salter, Esq., M.B.

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

In pursuance of the Resolution of the Special General Meeting of June 17th, 1856, the Council, on the 24th of June, 1856, invited the Members to enter into a subscription for defraying the expenses attendant on the Society's removal to Burlington House; and the Treasurer now reported the following

LIST OF SUBSCRIBERS.

Thomas Bell, Esq. (<i>President</i>).	£50	0	0		
	£	s.	d.		£ s. d.
Adams, H., Esq.	2	2	0	Bennett, J. J., Esq. (<i>Secretary</i>)	20 0 0
Alexander, R. C., Esq., M.D.	10	0	0	Bentham, G., Esq.	20 0 0
Ansell, T., Esq., M.D.	2	2	0	Bentley, R., Esq.	5 0 0
Archer, W., Esq.	5	0	0	Blackwall, J., Esq.	10 0 0
Ashton, R. J., Esq.	5	0	0	Boott, F., Esq., M.D., V.P. (<i>Treasurer</i>)	20 0 0
Atkinson, W., Esq.	5	5	0	Borrer, W., Esq.	10 0 0
Babington, C. C., Esq., M.A.	5	0	0	Botfield, B., Esq.	20 0 0
Baird, W., Esq., M.D.	1	1	0	Bowerbank, J. S., Esq.	20 0 0
Barlow, Rev. John, M.A.	5	0	0		
Bedingfeld, Rev. J.	1	1	0		

	£	s.	d.		£	s.	d.
Brisbane, Gen. Sir T. M., Bart.	10	0	0	Howson, Rev. J., M.A.	2	2	0
Brooke, H. J., Esq.	5	0	0	Hudson, R., Esq.	20	0	0
Brown, R., Esq., D.C.L., V.P.	20	0	0	Iliff, W. T., Esq., M.D.	1	1	0
Brydges, Sir H. J. J., Bart.	10	0	0	Janson, T. C., Esq.	11	4	0
Buccleuch, H. G. the Duke of	20	0	0	Jesse, J., Esq.	5	0	0
Buckton, G. B., Esq.	10	10	0	Jones, J. D., Esq., M.D.	1	1	0
Burchell, W. J., Esq., D.C.L.	5	0	0	Kennedy, B., Esq.	5	0	0
Busk, G., Esq.	10	10	0	Kippist, R., Esq.	5	0	0
Cautley, Sir P. T., K.C.B.	5	0	0	Lance, J. H., Esq.	2	2	0
Christy, H., Esq.	20	0	0	Lindley, J., Esq., Ph.D.	20	0	0
Collingwood, C., Esq., M.A.	1	1	0	Lyell, Sir C., M.A., D.C.L.	6	0	0
Couch, J., Esq.	0	10	0	M'Andrew, R., Esq.	10	0	0
Cuming, H., Esq.	5	0	0	Mallard, Lieut. C., R.N.	5	0	0
Currey, F., Esq.	2	2	0	Mann, T. W., Esq.	2	2	0
Darwin, C., Esq., M.A.	20	0	0	Miers, J., Esq.	20	0	0
Daubeny, C. G. B., Esq., M.D.	5	0	0	Miles, Rev. C. P., M.A.	5	0	0
Deane, H., Esq.	2	0	0	Mitchell, D. W., Esq.	1	1	0
Dickinson, J., Esq.	20	0	0	Morson, T. N. R., Esq.	5	0	0
Dillwyn, L. L., Esq., M.P.	10	0	0	Murchison, Sir R. I., D.C.L.	10	0	0
Dyster, F. D., Esq., M.D.	5	0	0	Osborn, W., Esq.	3	3	0
Edgeworth, M. P., Esq.	15	0	0	Owen, R., Esq., D.C.L., V.P.	10	10	0
Ewer, W., Esq.	20	0	0	Owen, R. B., Esq., M.D.	2	0	0
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				Stockdale, Rev. W., M.A.	5	0	0
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				Tagart, Rev. E.	5	0	0
				Tagart, F., Esq.	5	0	0
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Watson, H. C., Esq.	10	0	0	Total	£1108	15	0
Westwood, J. O., Esq.	2	2	0				

June 3rd, 1858.

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

Woodyer Merricks Buckton, Esq., was elected a Fellow.

The special thanks of the Society were directed to be presented to Professor Andersson, of Stockholm, for his very acceptable present of a cast from the bust of Linnæus (at the age of 64 years) in the Meeting-Room of the Academy of Sciences at Stockholm.

Read, first, a Note "On the death of the Common Hive-Bee, supposed to be occasioned by a parasitic Fungus;" by the Rev. H. Higgins. Communicated by the President. (See "Zoological Proceedings," vol. iii. p. 29.)

Read, secondly, a Paper "On some points in the Anatomy of *Nautilus pompilius*;" by T. H. Huxley, Esq., F.R.S. Communicated by the Zoological Secretary. (See "Zoological Proceedings," vol. iii. p. 36.)

Read, thirdly, "Natural-History Extracts from the Journal of Captain Denham, H.M. Surveying Vessel 'Herald,' 1857, 1858;" Communicated by the Hydrographic Office of the Admiralty. (See "Zoological Proceedings," vol. iii. p. 32.)

Read, fourthly, a "Notice of the discovery of a gigantic species of *Equisetum*, upwards of twenty feet high, at Cañaloo in the

Andes of Peru;" by Richard Spruce, Esq. Communicated by Dr. J. D. Hooker, F.L.S.

Read, fifthly, a Note "On the Nidi and habits of a species of *Lumbricus*, found in the London Clay near Highgate;" by J. W. Wetherell, Esq. Communicated by James Yates, Esq., F.L.S. (See "Zoological Proceedings," vol. iii. p. 31.)

Read, sixthly, a "Description of *Amorphopus*, a new genus of *Crustacea*, of the Family of *Pinnotheridæ*;" by Thomas Bell, Esq., President of the Linnean Society.

June 17th, 1858.

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

The necessary business of the meeting having been disposed of, it was proposed by the President, and unanimously resolved:—

"That in consequence of the recent death of Robert Brown, Esq., Vice-President, and formerly President of the Society, and in consideration of his long connexion with and eminent services to the Society and to Natural Science, the meeting should now adjourn."

In proposing this resolution, the President made the following observations:—

GENTLEMEN,—It becomes my very painful duty to advert for a few moments to the unspeakable loss which has accrued to science in general, and to the Linnean Society particularly, since our last meeting. At that time I could not shut my eyes to the probability that before we should again meet, science and society would be deprived of one who was equally the ornament of both. That event, as you are well aware, has now occurred, and Robert Brown is removed from amongst us. I will not, on such an occasion as the present, attempt to offer you a formal eulogy on one whom you all knew so well, and loved and respected so warmly. I will not dwell upon his unequalled attainments in his favourite science, on the extent and variety of his learning, on his wide and profound research, his acute discrimination, his solid good sense, the

quiet reflective wisdom of his decisions on points of doubt and difficulty,—these and the other qualities of his clear and acute intellect will hereafter have full justice done to them by an abler hand than mine. But I cannot suppress the expression of my deep sorrow at the loss of that warm and kindly heart, that cheerful and genial spirit, those cordial and benevolent affections, and that intense love of justice, which combined to render our departed friend as heartily and warmly loved as he was deeply respected and revered.

One of our lamented friend's latest acts evinced the unflinching interest which he continued to the last to take in the welfare of the Linnean Society. Only a week before his death he placed in Mr. Bennett's hands, to be given up to the Society, the two bonds for one hundred pounds each, which he held as security for two shares of the loan by which we were enabled to purchase the Linnean collection. You will agree with me that such a proof of his attachment, on the near approach of his final separation from us, ought not to be passed over without a grateful record.

I am spared the necessity of detaining you with any longer detail, by the opportunity of referring you to a beautiful and touching notice of his great merits which appears in the 'Times' of this morning, in which you will easily recognize the hand of one of our most valued members, who knew him perhaps better than any other, and by whose unceasing tender and all but filial devotion, his last days and nights were soothed and comforted and cheered. The latest moments of that true and affectionate friend, to what period soever his life may be prolonged, will be brightened by the hallowed reflection of the peace which he brought to the dying hours of him whom he so much loved and revered.

July 1st, 1858.

Special Meeting.

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

The meeting having been specially summoned for the Election of a Member of Council in place of Robert Brown, Esq., V.P., deceased, George Bentham, Esq., was elected a Member of Council in his place.

The President nominated George Bentham, Esq., to be a Vice-President in the place of Robert Brown, Esq., for the ensuing year.

It was moved by Sir C. Lyell, seconded by Mr. Bennett, and resolved unanimously:—

“That this Meeting desires most emphatically to record its deep sense of the eminent services rendered by the late Robert Brown, Esq., both to the Linnean Society and to Botanical Science, by the entire devotion of a long life and of talents of the highest order, to the promotion of the great objects for which the Society was formed.

“That it looks back with heartfelt satisfaction to the long period of sixty years, during which Mr. Brown was connected with the Society, as an Associate, as Librarian, as a Fellow, as a Vice-President, and as President; and is profoundly sensible of the honour which the Society has derived from its long and intimate connexion with so great a master in Botanical Science.

“That while thus recording its high appreciation of the eminent talents of this great man, and of their successful application to the pursuits of Natural Science, this Meeting cannot refrain from also paying a just tribute to the simple-hearted benevolence of disposition, the high moral purity of mind, and the unswerving rectitude of judgment, which formed the most striking distinctions of his individual character.

“That, influenced by these various considerations, this Meeting deeply deploras the loss which the Linnean Society and Natural Science have sustained by the death of so distinguished, and at the same time so estimable, a man.”

Read, first, a Letter from Sir Charles Lyell, F.L.S., and Dr. J. D. Hooker, F.L.S., addressed to the Secretary, as introductory to the following Papers on the laws which affect the production of Varieties, Races, and Species, viz.:—

1. An “Extract from a MS. work on Species, by Charles Darwin, Esq., F.R.S., F.L.S., &c., sketched in 1839 and copied in 1844.”

2. An “Abstract of a Letter addressed by Mr. Darwin to Professor Asa Gray, of Boston, U.S., in October 1857.”

3. An “Essay on the Tendency of Varieties, &c. to depart

indefinitely from the Original Type," by A. R. Wallace, Esq. (For these Papers, see "Zoological Proceedings," vol. iii. p. 45.)

Read, secondly, "Notes on the Organization of *Pharonis Hippocrepis*;" by F. D. Dyster, Esq., M.D., F.L.S. (See "Transactions," vol. xxii.)

Read, thirdly, "Observations on the Metamorphosis of *Ammocætus*;" by — Highley, Esq. Communicated by the President.

Read, fourthly, a "Description of *Hanburya*, a new genus of *Cucurbitacæ*;" by Berthold Seemann, Esq., Ph.D., F.L.S.

Read, fifthly, a MS. Memoir by the late Professor Pavon, entitled "Nueva Quinologia;" with observations by John Eliot Howard, Esq., F.L.S.

Read, sixthly, two Letters "On the Vegetation of the Portuguese territories in Western Africa," addressed to William Wilson Saunders, Esq., V.P.L.S., by Dr. Friedrich Welwitsch. (See "Botanical Proceedings," vol. iii.)

ADDITIONS

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RECEIVED FROM JUNE 20, 1857, TO JUNE 30, 1858.

[Continued from Vol. II. page lvi.]

TITLES.	DONORS.
ACADEMIES and SOCIETIES.	
Amsterdam:—Kon. Akademie van Wetenschappen. Verslagen en Mededeelingen. Afdeeling <i>Natuurkunde</i> , deel 5, stuk 2 & 3, & deel 6. Amsterdam, 1856–57, 8vo. —— — Afdeeling <i>Letterkunde</i> , deel 2, stuk 2–4. <i>Ib.</i> 1856–57, 8vo.	THE ACADEMY.
Basel:—Naturforschende Gesellschaft. Verhandlungen, heft 4. Basel, 1857, 8vo.	THE SOCIETY.
Batavia:—Bataviaasch Genootschap van Kunsten en Wetenschappen. Tijdschrift voor Indische Taal-, Land-, en Volkenkunde, deel 3–5. Batavia, 1854–56, 8vo.	THE SOCIETY.
Berlin:— Königl. Akademie der Wissenschaften. Abhandlungen aus dem Jahre 1856. Berlin, 1857, 4to. Monatsbericht; von Januar—Dec. 1857. <i>Ib.</i> 1857–58, 8vo.	THE ACADEMY.
Verein zur Beförderung des Gartenbaues in den K. Preussischen Staaten. Verhandlungen, Neue Reihe, jahrg. 4, heft 2 & 3. Berlin, 1857, 8vo.	THE SOCIETY.
Berwickshire Naturalists' Club. Proceedings, vol. 3, no. 7, and vol. 4, no. 1. London and Alnwick, 1857, 8vo.	THE CLUB.

- | | TITLES. | DONORS. |
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| ACADEMIES and SOCIETIES (<i>continued</i>). | | |
| Bombay :— | | |
| | Asiatic Society (Bombay Branch). Journal, no. 20. Bombay, 1857, 8vo. | THE SOCIETY. |
| | Hon. East India Company's Observatory. Magnetical and Meteorological Observations made at, in the years 1854-56. Bombay, 1856-57, fol. | THE COMPANY. |
| | Bonn :—Naturhistorischer Verein. Verhandlungen, jahrg. 13, heft 4, & 14, heft 1. Bonn, 1856-57, 8vo. | THE ASSOCIATION. |
| Boston :— | | |
| | American Academy of Arts and Sciences. Memoirs, New Series, vol. 6, part 1. Cambridge and Boston, 1857, 4to. | THE ACADEMY. |
| | Society of Natural History. Proceedings, vol. 5, sheets 21-27, and vol. 6, sheets 1-10. Boston, 1856, 8vo. | THE SOCIETY. |
| | Breslau :—Imperial Academy "Naturæ Curiosorum." Nova Acta, vol. 23, supplementum. Vratisl. et Bonnæ, 1856, 4to. | THE ACADEMY. |
| Brussels :—Académie Royale des Sciences, &c. | | |
| | Mémoires couronnés, &c. Collection in 8vo : tome 8. Bruxelles, 1858, 8vo. | |
| | Bulletins. 2 ^e série, tomes 1-3. <i>Ib.</i> 1857, 8vo. | |
| | Annuaire. 24 ^e année. <i>Ib.</i> 1858, 12mo. | THE ACADEMY. |
| | Calcutta :—Asiatic Society. Journal, vols. 14-23. Calcutta, 1845-54, 8vo. | THE SOCIETY. |
| | Canada :—Geological Survey. Report of Progress for the years 1853-56 (with plans of lakes and rivers between Lake Huron and R. Ottawa). Toronto, 1857, 4to. | SIR W. E. LOGAN. |
| | Charleston, S. Car. :—Elliott Society of Natural History. Proceedings, sheets 7-11. 1856-57, 8vo. | THE SOCIETY. |
| | Cherbourg :—Société des Sciences Naturelles. Mémoires, tome 4. Paris, 1856, 8vo. | THE SOCIETY. |
| Copenhagen :—Kong. Danske Videnskarbernes Selskab. | | |
| | Oversigt i aar. 1856. Kjöbenhavn, 8vo. | |
| | Supplément aux Tables du Soleil. <i>Ib.</i> 1857, 4to. | THE SOCIETY. |
| | Cornwall :—R. Cornwall Polytechnic Society. Annual Report (24th). Falmouth, 1856, 8vo. | THE SOCIETY. |

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Dublin:—

Geological Society. Journal, vol. 1, parts 2-4; vol. ii. parts 1-3; and vol. 7, parts 3-5. Dublin, 1834-57, 8vo.

THE SOCIETY.

Natural History Society. Journal and Proceedings for 1856-57. Dublin, 8vo.

THE SOCIETY.

Royal Irish Academy.

Transactions, vol. 22, part 2. Dublin, 1850, 4to.

Catalogue of the Antiquities of Stone, Earthen, and Vegetable Materials in its Museum, by W. R. Wilde.

Dublin, 1857, 8vo.

THE ACADEMY.

Edinburgh:—Royal Society.

Transactions, vol. 21, part 4. Edinburgh, 1857, 4to.

Proceedings, no. 47. *Ib.* 1857, 8vo.

THE SOCIETY.

Giessen:—Oberhessischen Gesellschaft für Natur- und heilkunde. Bericht 4-6. Giessen, 1854-7, 8vo.

THE SOCIETY.

Göttingen:—Kongl. Gesellschaft der Wissenschaften, &c. Abhandlungen, band 7. Göttingen, 1857, 4to.

THE SOCIETY.

Halle:—Naturwissenschaftlicher Verein für Sachsen, &c. Zeitschrift für die gesammten Naturwissenschaften: redigirt von C. Giebel und W. Heintz. Band 10, heft 7-12.

Berlin, 1857, 8vo.

THE SOCIETY.

Lausanne:—Société Vaudoise des Sciences Naturelles. Bulletin, nos. 38-41. Lausanne, 1856-57, 8vo.

THE SOCIETY.

Leeds:—

Geological and Polytechnic Society of the West Riding.

Report of the Proceedings for 1856-57. Leeds, 1857,

8vo.

THE SOCIETY.

Philosophical and Literary Society. Report (37th). Leeds,

1857, 8vo.

THE SOCIETY.

Liège:—Société R. des Sciences. Mémoires, tomes 11 & 13.

Liège, 1856-58, 8vo.

THE SOCIETY.

Lisbon:—Academia R. das Sciencias.

Historia e Memorias. 2ª serie, tomo 1-3. Lisboa, 1843-56,

4to.

Memorias:—Nova Serie.

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— Leges et Consuetudines, vol. 1. fasc. 1. <i>Ib.</i> 1856, fol.	THE ACADEMY.
Liverpool:—Literary and Philosophical Society. Proceedings, no. 11. Liverpool, 1857, 8vo.	THE SOCIETY.
London:—	
Art-Union.	
Report of the Council for 1857; with a List of the Members. London, 1857, 8vo.	
Almanac for 1858. <i>Ib.</i> 12mo.	THE ART-UNION.
Athenæum. List of the Members, 1857; and Donations to the Library in 1854–56. London, 1857, 12mo.	THE CLUB.
British Association. Report of the 26th Meeting. London, 1857, 8vo.	THE ASSOCIATION.
Entomological Society. Transactions. New Series, vol. 4, part 4. London, 1857, 8vo.	THE SOCIETY.
Geological Society. Quarterly Journal, vol. 13, parts 2–4, and vol. 14, parts 1 & 2. London, 1857, 8vo.	THE SOCIETY.
Geological Survey of Great Britain. Memoirs.	
British Organic Remains; decades 5, 8, & 9. London, 1855–58, 4to.	
Mining Records. Mineral Statistics of the United Kingdom for 1853–56; by Robert Hunt, F.R.S. <i>Ib.</i> 1855–57, 8vo.	
On the Tertiary Fluvio-marine Formation of the Isle of Wight; by Professor E. Forbes, F.R.S. <i>Ib.</i> 1856, 8vo.	
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The Geology of the country around Cheltenham; by Edward Hull, A.B., F.G.S., &c. <i>Ib.</i> 1857, 8vo.	
HER MAJESTY'S GOVERNMENT.	

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Medical and Chirurgical Society.

Transactions, vol. 40. London, 1857, 8vo.

Proceedings, vol. 1, no. 3, and vol. 2, no. 1. *Ib.* 1857-58,
8vo. THE SOCIETY.Microscopical Society:—v. *Journals*.Pharmaceutical Society:—v. *Journals*.

Royal Society.

Philosophical Transactions for 1856, and parts 1 & 2 for
1857. London, 1856-58, 4to.Proceedings, vol. 8, nos. 26-31. *Ib.* 1857-58, 8vo.

THE SOCIETY.

Royal Agricultural Society. Journal, vol. 18. London, 1857,
8vo. THE SOCIETY.

Royal Astronomical Society.

Memoirs, vols. 25 & 26. London, 1857-58, 4to.

Monthly Notices, vols. 16 & 17. *Ib.* 1856-57, 8vo.

THE SOCIETY.

Royal Geographical Society.

Journal, vol. 27. London, 1857, 8vo.

Proceedings, vol. 1, nos. 9-11, and vol. 2, nos. 1 & 2. *Ib.*
1857-58, 8vo. THE SOCIETY.

Royal Institution.

Notices of the Meetings, part 7. London, 1857, 8vo.

List of the Members, &c., with the Report of the Visitors
for 1856. *Ib.* 1857, 8vo.Classified Catalogue of the Library, by B. Vincent, Assist.
Sec. *Ib.* 1857, 8vo. THE INSTITUTION.

Society of Arts. Journal, nos. 239-92. London, 1857-58.

THE SOCIETY.

Zoological Society.

Transactions, vol. 4, part 4. London, 1857, 4to.

Proceedings, nos. 294-95, and 327-49. London, 1856-58,
8vo.

Illustrations to do. for 1855 and 1856., 8vo. THE SOCIETY.

Madrid:—R. Academia de Ciencias. 3^{ra} serie. Ciencias
Naturales, tomo 2, parte 2. Madrid, 1857, 4to.

THE ACADEMY.

Manchester:—Literary and Philosophical Society. Memoirs,
2nd series, vol. 14. London, 1857, 8vo. THE SOCIETY.

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| Montreal:—Natural History Society. Canadian Naturalist and Geologist, vol. 2. no. 1. Montreal, 1857, 8vo. | THE SOCIETY. |
| Moscow:—Société Imp. des Naturalistes. Bulletin, tome 29, nos. 2-4, and tome 30, no. 1. Moscow, 1856-57, 8vo. | THE SOCIETY. |
| Munich:—Kön. Bayerische Akademie der Wissenschaften. Abhandlungen der Mathematisch-physicalischen Classe, band 8, abth. 1. München, 1857, 4to. | |
| Gelehrte Anzeigen, band 42-44. <i>Ib.</i> 1856-57, 4to. | THE ACADEMY. |
| Neustadt-a.-d.-Hayn.:—Pollichia (ein Naturwissenschaftliche Verein der Bayerischen Pfalz). Jahresbericht 14. Neustadt-a.-d.-H., 1856, 8vo. | THE ASSOCIATION. |
| Newcastle-upon-Tyne:—Tyneside Naturalists' Field Club. Transactions, vol. 3, part 3. Newcastle-upon-Tyne, 1857, 8vo. | THE CLUB. |
| New York:—American Geographical and Statistical Society. Reports on Syrian Exploration. New York, 1857, 8vo. | THE SOCIETY. |
| Paris:— | |
| Académie des Sciences de l'Institut. Comptes Rendus, tomes 44 & 45. Paris, 1857, 4to. | THE ACADEMY. |
| Muséum d'Histoire Naturelle. Archives, tome 9, livr. 4. Paris, 1856-57, 4to. | |
| | THE ADMINISTRATION OF THE MUSEUM. |
| Société Botanique. Bulletin, tome 2, nos. 3 & 4, tome 4, and tome 5, no. 1. Paris, 1855-58, 8vo. | THE SOCIETY. |
| Société Entomologique de France. Annales, 3 ^e série, tomes 2-5. Paris, 1854-57, 8vo. | THE SOCIETY. |
| Petersburg:—Académie Imp. des Sciences. | |
| Mémoires. 6 ^e série. Sciences Naturelles, tome 7. St. Pétersbourg, 1855, 4to. | |
| Mémoires présentés par divers Savants, tome 7. <i>Ib.</i> 1854, 4to. | |
| Comptes Rendus, 1852-55. <i>Ib.</i> 1853-56, 8vo. | THE ACADEMY. |
| Philadelphia:— | |
| Academy of Natural Sciences. | |
| Journal. New Series, vol. 3, part 4. Philadelphia, 1858, 4to. | |

TITLES.

DONORS.

ACADEMIES and SOCIETIES (*continued*).

Philadelphia:—Academy of Natural Sciences (*continued*).

Proceedings, vol. 8, nos. 5 & 6 (1856), sheets 1–16 for 1857,
and sheets 1–6 for 1858. *Ib.* 8vo.

Act of Incorporation, By-laws, &c. *Ib.* 1857, 8vo.

THE ACADEMY.

American Philosophical Society.

Transactions. New Series, vol. 11, part 1. Philadelphia,
1857, 4to.

Proceedings, nos. 55 & 56. *Ib.* 1856, 8vo. THE SOCIETY.

Stettin:—Entomologischer Verein.

Entomologische Zeitung, jahrgang 18. Stettin, 1857, 8vo.

Linnæa Entomologica, band 12. Berlin, 1858, 8vo.

THE ASSOCIATION.

Stockholm:—Kongl. Vetenskaps-Akademien.

Handlingar för 1854. Afdel. 2. Stockholm, 1856, 8vo.

— ny Följd. Band 1. Häftet 1. *Ib.* 1855, 4to.

Öfversigt. Årg. 13. *Ib.* 1856, 8vo.

Års-berättelser om Botaniska Arbeten, &c., för 1852–54;
af J. E. Wikström, & N. J. Andersson, *Ib.* 1856–57,
8vo.

Berättelse om Framstegen i Insekternas, Myriapodernas,
&c. Natural-historia för 1853–54, af C. H. Boheman.
Ib. 1857, 8vo. THE ACADEMY.

Turin:—R. Accademia delle Scienze. Memorie, serie 2, tomo
16. Torino, 1857, 4to. THE ACADEMY.

Vienna:—

Kaiserl. Akademie der Wissenschaften.

Denkschriften. Mathem.-naturw. Classe, band 12–13.
Wien, 1856–57, 4to.

Sitzungsberichte. Mathem.-naturw. Classe, band 20, heft 2
& 3, bd. 21, 22, 23 & 24. *Ib.* 1856–57, 8vo.

— Register. zu band 11–20. *Ib.* 1856, 8vo.

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[Read January 21, 1858.]

Of the various genera of Decapod Crustacea none are more interesting, or more difficult of description, than those which constitute the family Galatheadæ.

The interest attaching to these forms arises from the intermediate position which they occupy in the natural arrangement of the class, their structure placing them between the Macrura and Brachyura; in accordance with which we find that, whilst Professor M.-Edwards classes them among the Macrura, Professor Bell, in his work on the British Crustacea, places them (more correctly, as we think) in the intermediate group of Anomura.

This opinion is fully borne out both in the development of the animals and in their structure in the adult state.

The early form of the larva bears, anteriorly, a resemblance to the Brachyural type, whilst the caudal appendages assimilate to those of the Macrura. The same conditions obtain in the young of Anomura. At the time of birth, the larva, like that of the Brachyura, has only the two gnathopoda developed, whilst the

termination of the tail is like that of a fish, as in the *Macrura*. In the adult, the internal antennæ possess short flagella and complementary appendages, such as exist in the order *Brachyura*, whilst the external antennæ have the long and slender flagella proper to the *Macrura*. The *scale*, however, commonly appended to the external antennæ in the latter order is wanting, a circumstance which exhibits a relation to the *Brachyura*.

An examination of the legs shows that the coxæ are fused with the thorax, as in the *Brachyura*, and not articulated with it as in the *Macrura*, whilst, on the other hand, the posterior division and caudal termination approach the *Macrural* type more nearly than that of the *Brachyura*, the animal thus assuming a character intermediate between the two orders.

But in the description of the several species of the genus *Galathea*, a peculiar difficulty appears to arise, originating in the affinity which they bear to each other. So close, in fact, is the approximation, that the descriptions of the best writers will scarcely avail for the distinction of the individual species without the assistance of figures. This arises from the fact that the general characters, upon which the descriptions are based, vary, in this genus, only in their comparative degrees of development.

In the three species recognized in Professor Bell's work on the British Crustacea, it will be found that each species retains the same characters in greater or less degree.

Galathea strigosa is peculiar for the spinous character of the carapace and cheliform legs. Every spine, however, is repeated in both the other species, only less developed. We find the rostrum furnished with four lateral teeth on each side, a character which also exists in each of the other species; and although close observation may detect a slightly different arrangement in the relative position of these teeth, the differences are not of sufficient importance to enable a naturalist thence to derive a specific distinction, unless the peculiarity is seconded by some more unqualified character less liable to be affected by any peculiarity of condition.

In order to arrive at more certain results in the identification of species, we think that the microscopic examination of the surface of the integument will be found peculiarly useful.

This mode of examination of species may also be applied to a considerable extent throughout the Crustacea generally with great advantage; and if found valuable in recent, there can be no doubt that it will prove of far greater importance in extinct forms, where

parts on which the identification of species usually rests are lost, and fragments only of the animal obtainable.

It should be borne in mind that, as the structure in question undergoes modifications more or less considerable in different parts of the animal, it will always be advisable to compare the corresponding parts with each other.

Applying this test to the known species of *Galathea*, we perceive that the structure of the integument upon the arms, independent of the marginal spines, exhibits a squamiform appearance, but that the scales, which characterize the structure, possess features peculiar to each species.

In *Galathea strigosa* the scales are convex, distant from each other, smooth at the edge, and fringed with long hairs. In *G. squamifera* they are convex, closely placed, scalloped at the edge, and without hairs. In *G. nexa* the scales are obsolete, tufts of hair representing the supposed edges. In *G. depressa*, n. sp., the scales are broad, less convex than in *G. strigosa* and *G. squamifera*, smooth, closely set, and fringed with short hairs. In *G. Andrewsii* they are small, distant, very convex, tipped with red, and slightly furnished with hair.

As another instance of the practical application of the microscopical examination of the surface, I would refer to two species of Amphipoda, classed by Leach under the name of *Gammarus Locusta*, from his inability to assign them any separate specific characters. In the structure of their integuments, however, these two forms will be found to exhibit widely different microscopical appearances.

Again, there exists in the same group three or four species, the description of any one of which would apply to either of the others; and it is probable they would never have been ranked as separate species had not their habitats been geographically distant. Thus *Gammarus Olivii*, M.-Ed., *G. affinis*, M.-E., *G. Kröyji*, Rathke, and *G. gracilis*, R., can only be specifically determined by a microscopic examination of the integument.

The same may be said of other Amphipoda, such as *Urothoe inostratus*, Dana, from South America, which so nearly resembles in form the *U. elegans* of the British shores.

GALATHEA DISPERSA, mihi.

G. rostro brevi, dentibus 4 utrinque ornato, 2 anterioribus minoribus; pedibus anterioribus elongatis, sparse spinosis; chelarum digitis parallelis.

Galathea with short rostrum, armed on each side with 4 teeth, the two posterior being less important than the two anterior. The fingers of the chelæ impinge through their whole length; outer margin of the hand furnished with 3 or 4 small spines.

Hab. Trawling-ground, Plymouth, common; Moray Frith, Scotland.

This species unites *G. Andrewsii* with *G. nexa*, and, I think, has often been mistaken for the young of the latter; but *G. nexa*, so far as my experience goes, is a species peculiar to the north of England, whereas *G. dispersa*, I anticipate, will be found to be the most universally dispersed, in deep water, of any of the species known. It can always be detected from *G. nexa* by the form of the hand and the manner in which the fingers impinge: in *G. nexa* the hand is broad towards the extremity, and the fingers meet only at the apex; in *G. dispersa* the hand gradually narrows to the apex, and the fingers meet each other through their whole length, the inner margin of the finger being finely serrated, the thumb not.

It also may be distinguished from *G. Andrewsii* by the breadth of the hands, which are narrow and round in *G. Andrewsii*, and moderately broad and flat in *G. dispersa*.

By an examination of the texture of the integument under a magnifying power of low degree, the surface of *G. dispersa* will be seen distinctly to differ from that of any of the others; it is covered with flat scales, fringed with short cilia. The length of the animal, including the arms, is about $2\frac{1}{4}$ inches.

Catalogue of Hymenopterous Insects collected at Celebes by Mr. A. R. WALLACE. By FREDERICK SMITH, Esq., Assistant in the Zoological Department, British Museum. Communicated by W. W. SAUNDERS, Esq., F.R.S., F.L.S.

[Read April 15th, 1858.]

THIS collection of the Hymenoptera of Celebes is specially interesting, as adding greatly to our knowledge of the geographical range of many well-known species, while the additions made to the Fossorial group contain many of great beauty and rarity. A new species belonging to the tribe of Solitary Wasps, *Odynerus clavicornis*, is perhaps the most interesting insect in the collection; this Wasp has clavate antennæ, the flagellum being broadly dilated towards the apex, convex above and concave beneath. I am not acquainted with any other insect belonging to the Vespidious group which exhibits such an anomaly.

Fam. ANDRENIDÆ, *Leach.*Gen. SPHECODES, *Latr.*

1. SPHECODES INSULARIS. *S. niger*, abdominis segmentis primo secundo et tertio (basi) rubris; alis hyalinis.

Male. Length $3\frac{1}{2}$ lines. Head and thorax black, closely and strongly punctured; the face below the antennæ with silvery-white pubescence; the joints of the flagellum submoniliform; the mandibles ferruginous. Thorax: the tegulæ pale rufo-testaceous, wings hyaline, the nervures ferruginous; the metathorax coarsely rugose; the articulations of the legs and the tarsi ferruginous. Abdomen: the first, second, and base of the third segments red, the apical ones black, very finely and closely punctured, with the apical margins of the segments smooth and shining; a black spot in the middle of the basal segment.

Hab. Celebes.

Gen. NOMIA, *Latr.*

1. NOMIA PUNCTATA. *N. nigra nitida punctata*, alis nigro-fuscis.

Male. Length $4\frac{1}{2}$ lines. Shining black: head and thorax coarsely punctured, the metathorax ruggedly sculptured, truncate at the apex, the truncation and sides smooth with a few fine punctures; the abdomen closely and rather finely punctured, the apical margins of the segments smooth and shining. The tips of the mandibles, the tarsi and apex of the abdomen rufo-testaceous, the wings fuscous.

Hab. Celebes.

2. NOMIA FLAVIPES. *N. nigra pedibus flavis*, abdomine cinereo fasciato, alis hyalinis.

Female. Length $3\frac{1}{4}$ lines. Black; the face and cheeks densely clothed with short cinereous pubescence, the vertex thinly so; the margins of the prothorax, mesothorax and scutellum with a line of pale ochraceous pubescence, the disk of the thorax thinly covered with short pubescence of the same colour, the emargination of the metathorax as well as its sides with longer pubescence of the same colour; the base of the abdomen and basal margin of the second and following segments covered with short cinereous pubescence. The flagellum beneath fulvous; the mandibles ferruginous. The legs reddish-yellow, with the coxæ and base of the femora black; the wings hyaline; the tegulæ yellow, the nervures pale testaceous.

Hab. Celebes.

3. NOMIA FORMOSA. *N. capite thoraceque nigris*; abdomine chalybeo; marginibus apicalibus segmentorum cæruleo fasciatis.

Female. Length $5\frac{1}{2}$ lines. Head and thorax black and very closely punctured; the face covered with griseous pubescence; the clypeus with a central longitudinal carina. Thorax: the apical margin of the prothorax, the margins of the scutellum, and the sides of the meta-

thorax covered with a dense short ochraceous pubescence; the disk of the thorax thinly sprinkled with short black hairs; the posterior tibiæ obscurely ferruginous; the tarsi ferruginous; the legs covered with bright golden-yellow pubescence; wings subhyaline, the nervures ferruginous; the tegulæ yellow with a fuscous stain in the middle. Abdomen obscurely chalybeous, closely punctured, the two basal segments strongly so; the apical margins of the segments with smooth shining narrow blue fasciæ.

Male. Closely resembling the female, but with the legs black; the posterior femora incrassate, the tibiæ narrow at their base and broadly dilated at their apex, which, as well as the calcaria, are pale testaceous. This species closely resembles a species from North China, *N. chalybeata*, Westw. MS., from which it is readily distinguished by the form of the fourth ventral segment, which is notched in the middle, rounded, and then emarginate with the lateral angles rounded; in the species from China the margin is arched, and fringed with fulvous pubescence.

4. *NOMIA HALIPTOIDES*. *N. nigra*, pube cinerea tecta, abdominis segmentis intermediis pube alba fasciatis.

Female. Length $4\frac{1}{2}$ lines. Black; head and thorax opaque, and thinly clothed with cinereous pubescence, that on the disk of the thorax and margin of the scutellum slightly ochraceous. The flagellum fulvous beneath, the mandibles ferruginous at their apex; the tarsi ferruginous, wings hyaline, nervures fuscous, stigma testaceous. Abdomen shining, delicately punctured; the basal margins of the second, third, and fourth segments with a band of cinereous pubescence, attenuated in the middle.

Hab. Celebes.

Fam. DASYGASTRÆ.

1. *MEGACHILE INCISA*. *M. nigra*, rude et dense punctata, facie fulvo pubescente; alis fuscis, segmentis abdominis marginibus multo depressis.

Male. Length $5\frac{1}{2}$ lines. Black; closely and strongly punctured, the punctures confluent on the abdomen. The face clothed with fulvous pubescence. The tarsi obscurely rufo-piceous, the claws ferruginous; wings dark fuscous, their base hyaline. Abdomen: the apical margins of the segments smooth, impunctate, their basal margins very deeply depressed; a deep fovea at the tip of the apical segment; the head, thorax, and abdomen clothed beneath with short cinereous pubescence.

Hab. Celebes.

2. *MEGACHILE FULVIFRONS*. *M. nigra*, delicatule punctata; facie dense fulvo pubescente; thoracis lateribus abdomineque subtus fulvo pubescentibus; fasciis marginalibus abdominis fulvis.

Female. Length 7 lines. Black; head and thorax closely punctured, the abdomen delicately so and shining; the mandibles stout, with two acute teeth at their apex, shining and covered with oblong punctures; the face, sides of the thorax, and abdomen beneath, densely clothed with fulvous pubescence; the apical margins of the segments of the abdomen above with narrow fasciæ of short fulvous pubescence; the abdomen in certain lights has a metallic tinge.

The *male* is similarly clothed to the female, the margins of the segments are deeply depressed, and that of the apical segment slightly notched in the middle.

Hab. Celebes.

3. MEGACHILE TERMINALIS. *M. nigra*, capite thoraceque dense punctatis; abdomine pube nigra vestito; segmentis duobus apicalibus pube alba vestitis; alis fuscis.

Female. Length 9 lines. Black; the face with tufts of black pubescence above the insertion of the antennæ; mandibles very stout, with an acute tooth at their apex, the inner margin subdentate, and covered with fine cinereous pubescence. Thorax with black pubescence at the sides of the metathorax; the wings dark fuscous. Abdomen clothed with black pubescence; the fifth and sixth segments clothed with ochraceous pubescence above, that on the sixth nearly white.

Hab. Celebes.

This species resembles the *M. ornata*; but when viewed beneath, the different colour of the pollen-brush at once separates them.

Gen. CERATINA, *Spin.*

1. *Ceratina viridis*, *Guér. Icon. Reg. Ann.* 444. t. 73. f. 6.

Hab. India (Bengal, N. India), Ceylon, Celebes, China.

2. *Ceratina hieroglyphica*, *Smith, Cat. Hym. Ins.* ii. 226.

Hab. Northern India, Celebes, Philippine Islands, Hong Kong.

Fam. DENUDATÆ.

1. STELIS ABDOMINALIS. *S. dense punctata*, capite thoraceque nigris, abdomine ferrugineo; alis nigro-fuscis violaceo iridescentibus.

Male. Length 5 lines. Head and thorax black, abdomen ferruginous; head and thorax strongly punctured, the scutellum very strongly so; the sides of the face and the anterior margin of the face fringed with white pubescence. The posterior margin of the scutellum rounded; wings dark brown with a violet iridescence. Abdomen ferruginous and closely punctured.

Hab. Celebes.

2. CÆLIOXYS FULVIFRONS. *C. nigra*, rude punctata, facie pube fulva vestita; alis fuscis cupreo iridescentibus.

Male. Length 6 lines. Black; the head and thorax with large con-

fluent punctures; the face clothed with fulvous pubescence. Thorax: a stout tooth on each side of the scutellum at its base; wings dark brown with a coppery effulgence, subhyaline at their base; beneath clothed with short cinereous pubescence. Abdomen: elongate, conical; closely punctured, with the apical and basal margins of the segments smooth; the apical segment with a tooth on each side at its base and four at its apex; beneath the margins of the segments fringed with pale pubescence; the apical margin of the fourth segment notched in the middle; the fifth entirely clothed with pale pubescence.

Hab. Celebes.

Fam. SCOPULIPEDES.

Gen. ANTHOPHORA, *Latr.*

1. *Anthophora zonata*, *Linn. Syst. Nat.* i. 955. 19.

Hab. India, Ceylon, Malacca, Sumatra, Borneo, Philippine Islands, Hong Kong, Shanghai, Celebes.

Gen. XYLOCOPA, *Latr.*

1. *Xylocopa fenestrata*, *Fabr. Syst. Piez.* p. 339. 6. ♂.

Hab. India, Celebes.

2. *Xylocopa æstuans*, *Linn. Syst. Nat.* 961. 53.

Hab. India, Java, Singapore, Celebes.

3. *Xylocopa Dejeanii*, *St. Farg. Hym.* ii. 209. 59.

Hab. Java, Borneo, Sumatra, Celebes.

4. *Xylocopa collaris*, *St. Farg. Hym.* ii. 189. 26.

Hab. India, Sumatra, Malacca, Borneo, Celebes.

5. **XYLOCOPA NOBILIS.** *X. nigra*, pube nigra induta; abdominis basi pube flava, apice lateritio.

Female. Length 11 lines. Black; a narrow line of pale fulvous pubescence on the margin of the thorax in front, a patch of the same colour on each side of the metathorax, and the basal segment of the abdomen covered above with similar pubescence; the apical margin of the third and fourth segments, and the fifth and six entirely, covered with bright brick-red pubescence; the wings black, with coppery iridescence.

Hab. Celebes.

Fam. SOCIALES.

1. **APIS ZONATA.** *A. nigra*, thoracis lateribus dense ochraceo pubescentibus; alis fumatis; abdomine nitido, segmentis secundo tertio quartoque basi niveo pubescentibus.

Worker. Length 8-8½ lines. Black; the head and thorax opaque, the abdomen shining; the clypeus smooth and shining, the flagellum rufo-piceous beneath; the anterior margin of the labrum narrowly,

and the apex of the mandibles, ferruginous; the face with a little fine short cinereous pubescence above the insertion of the antennæ; the vertex with long black pubescence; the eyes covered with short black pubescence. Thorax: the sides with ochraceous pubescence; wings smoky, the superior pair darkest at their anterior margin beyond the stigma. Abdomen: a snow-white band at the basal margin of the second, third, and fourth segments, the bands continued beneath, but narrower.

Hab. Celebes, Philippine Islands.

Specimens of this species denuded of their white bands would approach the *A. unicolor* of Latreille; but that insect is described as having the anterior wings black; in the present species both pairs are of the same smoky colour, not approaching black.

Fam. MUTILLIDÆ.

Gen. MUTILLA.

1. *Mutilla sexmaculata*, *Swed. Nov. Act. Holm.* viii. 286. 44. ♀.

Mutilla fuscipennis, *Fabr. Syst. Piez.* 436. 35. ♂.

Hab. India (Punjaub, &c.), China, Java, Celebes.

2. *Mutilla unifasciata*, *Smith, Cat. Hym.* pt. iii. p. 38.

Hab. India, Celebes.

3. *Mutilla rufogastra*, *St. Farg. Hym.* iii. 629. 51. ♂.

Hab. India, Celebes.

4. **MUTILLA VOLATILIS.** *M. nigra*, rude punctata et pubescens; capite abdomineque nitidis, alis fusco-hyalinis.

Male. Length 5-6 lines. Black. Head and thorax very coarsely punctured; head and disk of the thorax punctured; the metathorax opaque, with a central abbreviated channel and covered with large shallow punctures; the eyes notched on their inner margin; wings fuscous and iridescent; the tegulæ smooth and shining. Abdomen shining and rather finely punctured; the basal segment narrow and campanulate; the margins of the segments thickly fringed with silvery-white hair; the cheeks, sides of the thorax, and beneath the legs and abdomen with scattered long silvery-white hairs.

Hab. Celebes.

Fam. SCOLIADÆ, *Leach.*

Gen. SCOLIA, *Fabr.*

1. *Scolia erratica*, *Smith, Cat. Hym. Ins.* pt. iii. p. 88. 10.

Scolia verticalis, *Burm. Abh. Nat.-Ges. Halle*, i. 37. 61.

Hab. India, Sumatra, Celebes.

2. *Scolia aurulenta*, *Smith, Cat. Hym. Ins.* pt. iii. p. 102. 80. (nec *Fabr.*).

Hab. Philippine Islands, Celebes.

3. *Scolia fimbriata*, *Burm. Abh. Nat.-Ges. Halle*, i. p. 32. 24.

Hab. Java, Celebes.

4. *Scolia dimidiata*, *Guér. Voy. Coq. Zool.* ii. pt. 2. p. 248.

Hab. Senegal, Celebes.

5. *SCOLIA TERMINATA*. *S. nigra*, clypeo mandibulisque flavis, thorace flavo variegato, alis hyalinis, abdomine flavo quinque-fasciato, apicisque marginibus flavis.

Male. Length 5 lines. Black; the clypeus, labrum, and mandibles yellow; the former with a triangular black spot in the middle; the latter ferruginous at their apex. The posterior margin of the prothorax, the tegulæ, a transverse curved line on the scutellum, and a spot on the postscutellum yellow; the anterior and intermediate tarsi, tibiæ, and knees, and the posterior tibiæ outside, yellow; a black line on the intermediate tibiæ beneath, and the apical joints of the tarsi fuscous; wings hyaline, the nervures ferruginous. Abdomen brightly prismatic; the margins of all the segments with a narrow yellow fascia, those on the second and third segments terminating at the sides in a large rounded macula; the fascia very narrow or obliterated on the sixth segment; the fasciæ on the second and third segments continued beneath.

Hab. Celebes.

6. *SCOLIA AGILIS*. *S. nigra*, mandibulis clypeoque flavis, alis fulvo-hyalinis, abdomine prismatico flavo quadrifasciato.

Male. Length 8 lines. Black and punctured, with thin long griseous pubescence; the vertex, disk of the thorax, and the abdomen shining; the mandibles and clypeus yellow, the latter with a black bell-shaped spot in the middle; wings fulvo-hyaline, the nervures ferruginous; the tibiæ with a yellow line outside. Abdomen beautifully prismatic; the first and three following segments with a yellow fascia on their apical margins, the second and two following much attenuated in the middle, or the fourth interrupted.

Hab. Celebes.

7. *SCOLIA FULVIPENNIS*. *S. nigra*, antennis capiteque supra basin antennarum rubris, alis fulvo-hyalinis.

Male. Length 7 lines. Black; the antennæ and the head above their insertion ferruginous, the scape black, the head coarsely punctured. Thorax: coarsely punctured; the mesothorax with an abbreviated deeply impressed line in the middle of its anterior margin; wings fulvo-hyaline, the nervures ferruginous; the apex of the wings slightly fuscous, the anterior pair with two submarginal cells and one recurrent nervure. Abdomen: shining, punctured, and prismatic.

Hab. Celebes.

8. *SCOLIA ALECTO*. *S. nigra*, capite supra basin antennarum rubro; alis nigris violaceo micantibus.

Female. Length 14 lines. Black and shining; head red above the insertion of the antennæ, very smooth and glossy, with a few punctures at the sides of and in front of the ocelli; antennæ black; the mandibles with a fringe of ferruginous hairs on their inferior margin. Thorax: smooth on the disk, which has a few scattered punctures at the sides; the scutellum punctured and shining; the thorax in front and the metathorax with black pubescence, the latter widely emarginate at the verge of the truncation, the lateral angles produced; wings black with a bright violet iridescence. Abdomen punctured, with the middle of the second, third, and fourth segments smooth and shining in the middle; the first segment with a smooth shining carina at its base slightly produced forwards, the abdomen with a slight metallic lustre. The wings with one marginal and three submarginal cells, and one recurrent nervure.

Male. Smaller than the female, and differs in having the clypeus red and the red colour running down behind the eyes, the antennæ longer, and the abdomen with a bright metallic iridescence.

Hab. Celebes.

9. *SCOLIA MINUTA.* *S. nigra*, abdomine iridescente, segmentorum marginibus apicalibus flavo fasciatis, alis subhyalinis iridescentibus.

Male. Length 4 lines. Head and thorax black and shining, with scattered pale pubescence; the mandibles and clypeus yellow, the latter with an anchor-shaped black spot. Thorax: the posterior margin of the prothorax and the anterior and intermediate tibiæ and tarsi yellow; a minute yellow spot on the postscutellum yellow; the wings subhyaline, the nervures fusco-ferruginous. Abdomen: the apical margins of the segments with a narrow yellow border, the second and third uniting with a lateral spot; the sixth segment immaculate; the apex pale testaceous.

Hab. Celebes.

Fam. POMPILIDÆ, *Leach.*

1. *Pompilus analis*, *Fabr. Syst. Piez.* p. 209. 42.

Hab. India, Java, Ceylon, Celebes.

2. *POMPILUS SALTITANS.* *P. niger*, pedibus subferrugineis, prothoracis margine postica flava; alis flavo-hyalinis, apice fuscis, abdomine pilis cinereis fasciato.

Female. Length 6 lines. Black and thinly covered with ashy pile. The scape, labrum, mandibles and palpi ferruginous; the clypeus widely emarginate anteriorly. The posterior margin of the prothorax angular and with a yellow border; the scutellum prominent, covered on each side with a dense silvery-white pile, the postscutellum with two spots of the same; the wings flavo-hyaline, their apex with a broad dark-fuscous border, the nervures ferruginous, the tegulæ yellow; the posterior wings palest; legs pale ferruginous, the coxæ black with

their tips pale; the apical joints of the tarsi blackish, the spines of the legs black. Abdomen: the first, second, and third segments with a fascia of silvery-white pile at their basal margins; the apex of the abdomen ferruginous.

Hab. Celebes.

3. **POMPILUS CONTORTUS.** *P. niger, cinereo-pilosus, prothorace flavo postice marginato; alis subhyalinis, marginibus apicalibus fuscis, pedibus subferrugineis.*

Female. Length $5\frac{1}{2}$ lines. Black; the head, thorax, and four basal segments of the abdomen covered with ashy pile; the first and second segments with their apical margins naked. The scape yellow in front; the flagellum beneath, the labrum, mandibles and palpi ferruginous; the joints of the antennæ arcuate, particularly the apical ones; the apex of each joint is oblique, giving the antennæ a twisted appearance. Thorax: the posterior margin of the prothorax angular and with a broad yellow border; the scutellum compressed and prominent; wings subhyaline with a broad fuscous border at their apex, the tegulæ yellow; legs pale ferruginous, with their coxæ and trochanters black; the apical joints of the tarsi fuscous. Abdomen with a yellow macula at the tip.

Hab. Celebes.

4. **POMPILUS PILIFRONS.** *P. niger, facie argenteis pilis dense tecta; thorace abdomineque flavo maculatis, alis subhyalinis, apice fuscis.*

Female. Length $4\frac{1}{2}$ lines. Black; the face densely covered with silvery-white pile; a narrow line at the inner orbits of the eyes, the palpi and mandibles yellow; the latter ferruginous at their apex. The posterior margin of the prothorax rounded and yellow; a minute yellow spot on the mesothorax touching the scutellum, the thorax and abdomen covered with a changeable silky pile; the wings subhyaline, their nervures fuscous, a broad dark fuscous border at the apex of the superior pair. A transverse spot on each side of the basal margin of the second and third segments, and an emarginate fascia on that of the fifth, yellow.

5. **POMPILUS DECEPTOR.** *P. rufescenti-flavus; vertice nigro, alis anticis apice fuscis.*

Male. Length 6 lines. Pale reddish-yellow; the antennæ slightly dusky above; a black transverse stripe on the vertex between the eyes, and another issuing from it in the middle and passing beyond the ocelli. Thorax: a black stripe on each side of the mesothorax over the tegulæ; the wings subhyaline, the nervures ferruginous, the superior pair fuscous at their apex. Abdomen immaculate.

Subgenus PRIOCNEMIS.

1. **PRIOCNEMIS RUFIFRONS.** *P. niger; facie, antennis, tibiis tarsisque*

ferrugineis, alis fulvo-hyalinis; abdominis segmento apicali flavo unimaculato.

Female. Length $9\frac{1}{2}$ lines. Black; the face above the clypeus, as high as the anterior ocellus, reddish-yellow; the extreme edge of the clypeus, the labrum and base of the mandibles ferruginous; the antennæ reddish-yellow. Thorax: fulvo-hyaline, with a dark fuscous border at the apex; the knees, tibiæ and tarsi reddish-yellow; the two latter spinose. Abdomen: gradually tapering to an acute point at the apex, the sixth segment with an elongate red spot.

Hab. Celebes.

Subgenus AGENIA.

1. *Agenia blanda*, Guér. *Voy. Coq. Zool.* ii. pt. 2. p. 260.

2. *AGENIA BIMACULATA*. *A. nigra*, cinereo-pilosa, clypeo plagis duabus flavis; antennarum articulis apicalibus, tibiis tarsisque anticis et intermediis femoribusque posticis ferrugineis; alis subhyalinis, nervuris nigris.

Female. Length 7 lines. Black, and covered with ashy pile; a large macula on each side of the clypeus, the mandibles and palpi yellow; the base and apex of the mandibles rufo-piceous; the flagellum pale ferruginous, more or less fuscous above towards the base. Thorax: the posterior margin of the prothorax arched; the anterior and intermediate tibiæ and tarsi and the femora at their apex beneath, also the posterior femora, pale ferruginous; the wings subhyaline, the nervures dark fuscous. Abdomen: the apical margins of the segments obscurely and narrowly rufo-piceous, the apex ferruginous.

Hab. Celebes.

Gen. MACROMERIS, St. Farg.

1. *Macromeris splendida*, St. Farg. *Hym.* iii. 463. 1. ♂.

Hab. India, China, Malacca, Borneo, Java, Celebes.

Gen. MYGNIMIA, Smith.

1. *Mygnimia iridipennis*, Smith, *Journ. Proc. Linn. Soc.* ii. p. 98.

Hab. Celebes, Borneo.

This insect, a female, is 5 lines larger than *M. iridipennis*; but I can point out no other distinction beyond a slight difference in the colour of the wings: the specimen from Borneo has a metallic bluish-green iridescence, the Celebes insect has a violet iridescence; notwithstanding which I am inclined to regard them as one species.

2. *MYGNIMIA FUMIPENNIS*. *M. aurantiaco-rubra*, alis obscure fuscis.

Female. Length 9 lines. Orange-red; the anterior margin of the clypeus entire; the labrum produced, its anterior margin widely emarginate; eyes large, black and ovate. Thorax: the posterior margin

of the prothorax rounded; the mesothorax with a longitudinal fuscous stripe on each side, widest anteriorly; the metathorax truncate; above, transversely striate; the tibiæ and tarsi spinose; wings dark fuscous, with a pale semitransparent macula at the base of the second discoidal cell and a dark fuscous macula beyond; the insect entirely covered with a fine orange-red downy pile.

Hab. Celebes.

Fam. SPHEGIDÆ.

1. SPHEX PRÆDATOR. *S. niger, rude punctatus, facie pube fulva vestita; alis fuscis cupreo iridescentibus.*

Male. Length $10\frac{1}{2}$ lines. Black; the head and thorax opaque. Abdomen shining blue-black. The face with silvery pile on each side of the clypeus, and sprinkled with erect black hairs. Thorax: the posterior margin of the prothorax with a line of silvery pubescence; the metathorax with a short light-brown pubescence at the apex, and thinly clothed with black hairs; wings dark brown, with a brilliant violet iridescence. Abdomen blue-black, smooth and shining.

Hab. Celebes.

2. AMMOPHILA INSOLATA. *A. nigra, scapo mandibulis, pedibus, abdominisque segmentis primo et secundo ferrugineis; alis subhyalinis.*

Female. Length $8\frac{1}{2}$ lines. Black; the scape, the base of the flagellum beneath, the anterior margin of the clypeus and the mandibles ferruginous; the latter black at their apex. Thorax: the prothorax smooth and shining; the meso- and metathorax above transversely striated, the scutellum longitudinally so; the legs ferruginous, with their coxæ black; a spot of silvery-white pubescence on each side of the metathorax at its base, and two at its apex close to the insertion of the petiole; the wings fulvo-hyaline with the nervures ferruginous. Abdomen: the petiole and the following segment red, the base of the third also slightly red; the three apical segments obscurely blue, with a thin glittering pile.

The *male* differs in having the legs black, their articulations only being ferruginous; the head entirely black with the face densely covered with silvery-white pile. The thorax is sculptured as in the other sex; the petiole more elongate and slender, the basal joint black, the second and the first segment ferruginous beneath; the rest of the abdomen blue.

Hab. Celebes.

Gen. PELOPÆUS, Latr.

1. Pelopæus Madraspatanus, *Fabr. Syst. Piez.* p. 203. 3.

Hab. Malabar, Madras, Nepaul, Bengal, Celebes.

2. Pelopæus Bengalensis, *Dahlb. Syst. Nat.* i. 941. 2.

Hab. India, Philippine Islands, China, Isle of France, Celebes.

3. *PELOPÆUS INTRUDENS*. *P. niger*; clypeo bidentato, tibiis anticis et intermediis, femorumque apice, femoribusque posticis basi, trochanteribus, tibiis dimidio basali, petioloque rufescenti-flavis; alis fulvo-hyalinis.

Female. Length 11 lines. Black; the face with silvery pubescence; the clypeus with two large blunt teeth at its apex, formed by a deep notch in its anterior margin; the scape reddish-yellow in front. The meso- and metathorax transversely striated; the wings fulvo-hyaline, the nervures ferruginous; the anterior and intermediate tibiæ and the femora at their apex, the posterior femora at their base, the trochanters, the tibiæ with their basal half and the middle of the basal joint of the posterior tarsi, reddish-yellow; the petiole of the abdomen of a paler yellow; the abdomen smooth and shining. The male only differs in being rather smaller.

Hab. Celebes.

Mr. Wallace says of this species, "A common house-wasp in Macassar; builds mud cells on rafters."

Note.—In describing the species of this genus collected by Mr. Wallace at Borneo, I incorrectly gave that locality for *P. javanus*. The insect mistaken for that species may be shortly characterized as *P. benignus*, length 12 lines. Opaque-black, with the petiole shining; the metathorax transversely striated; the wings pale fulvo-hyaline, the nervures ferruginous; the scape in front, the anterior and intermediate tibiæ, the apex of the femora, and the basal joint of the tarsi reddish-yellow; the posterior legs, with the trochanters and basal half of the femora, yellow.

4. *PELOPÆUS FLAVO-FASCIATUS*. *P. niger*; capite thoraceque flavo variegato; pedibus abdominisque basi ferrugineis; alis hyalinis, apice fuscis, abdominisque segmento tertio fascia lata flava ornato.

Female. Length 9 lines. Black; the clypeus yellow; the mandibles and scape ferruginous, the former black at their base, the latter yellow in front; the sides of the face with a bright golden pile. Thorax: the posterior margin of the prothorax, the tegulæ, scutellum, and a quadrate spot on each side of the metathorax at its base yellow; the legs ferruginous, with the coxæ, trochanters, and claw-joint of the tarsi black; wings fulvo-hyaline, the nervures ferruginous, a fuscous spot at the apex of the anterior pair; the meso- and metathorax transversely striated, the latter with a yellow spot at the insertion of the petiole. Abdomen: the petiole slightly curved upwards, the first segment ferruginous; a broad yellow fascia at the apex of the third segment, the apex of the fourth with a narrow obscure fascia; the abdomen covered with a fine silky pile.

Hab. Celebes.

Fam. BEMBICIDÆ, *Westw.*

1. *Bembex trepanda*, *Dahlb. Hym. Europ.* i. p. 181.

Hab. India, Celebes.

Fam. LARRIDÆ.

Genus LARRA, *Fabr.*

- 1.
- Larra prismatica*
- ,
- Smith, Journ. Proc. Linn. Soc. ii. p. 103.*

Hab. Malacca, Celebes.Genus LARRADA, *Smith.*

- 1.
- Larrada aurulenta*
- ,
- Smith, Cat. Hym. Ins. pt. iv. 276. 6.*

Sphex aurulenta, *Fabr. Mant. i. 274. 10.**Hab.* India, Java, Sumatra, Celebes, Philippine Islands, China, Cape of Good Hope, Gambia.

- 2.
- Larrada exilipes*
- ,
- Smith, Cat. Hym. Ins. pt. iv. p. 278.*

3. LARRADA ÆDILIS.
- L. nigra*
- ; facie argenteo-pilosa, alis subhyalinis, articulis apicalibus tarsorum rufo-testaceis, abdomine lævi et nitido.

Female. Length $5\frac{1}{2}$ lines. Black; head and thorax subopaque, the abdomen shining; the face densely covered with silvery pile, the cheeks, sides of the thorax and abdomen thinly so; the tips of the mandibles and apical joints of the tarsi ferruginous, the latter obscurely so. The metathorax transversely and rather finely rugose, the truncation more strongly striated; the scutellum shining; the wings subhyaline, the nervures ferruginous; the tibiæ with scattered spines, the tarsi spinose.

4. LARRADA AURIFRONS.
- L. nigra*
- ; facie mesothoracis metathoracisque lateribus aurato pubescentibus, abdominis marginibus segmentorum trium basalium argentato piloso fasciatis; alis fuscis.

Male. Length 8 lines. Black; the face and outer orbits of the eyes clothed with golden pile; the lateral margins of the mesothorax and the metathorax thinly clothed with golden pile; wings dark fuscous with a violet iridescence; the three basal segments of the abdomen with fasciæ of silvery pile.*Hab.* Celebes.

5. LARRADA PERSONATA.
- L. capite thoraceque nigris, abdomine ferrugineo.*

Female. Length $8\frac{1}{2}$ lines. Head, thorax, and legs black; the two former closely punctured and thinly covered with short cinereous pubescence; the metathorax with the punctures running into transverse striæ in the middle; the sides of the thorax and the legs with a fine silky silvery-white pile; the tibiæ and tarsi strongly spinose; wings fusco-hyaline; abdomen entirely red, smooth and shining.*The male* is smaller, and has the four apical segments of the abdomen black, the face, cheeks, and apical margins of the segments of the abdomen with silvery pile.*Hab.* Celebes.

This is probably merely a variety of *L. simillima*, wanting the black apex to the abdomen; it very much resembles the *L. anathema* of Europe.

6. LARRADA RUFIPES. *L. nigra*, mandibulis pedibusque rufis; alis hyalinis, venis pallide testaceis; abdomine sericeo-piloso.

Female. Length 7 lines. Black; the head smooth and shining; the clypeus, the cheeks, and face anteriorly, covered with silvery pile; the scape in front, the mandibles, and palpi ferruginous. Thorax: the sides and beneath with a thin silvery-white pile; the legs ferruginous with the coxæ black, the posterior pair red beneath; the thorax closely punctured, the metathorax transversely striated; wings fulvo-hyaline, the nervures pale-testaceous. Abdomen shining, very closely and delicately punctured; thinly covered with a fine white silky pile, which is very bright on the margins of the segments, which are slightly rufo-piceous.

The *male* closely resembles the female, and is similarly sculptured and coloured.

Hab. Celebes.

7. LARRADA FESTINANS. *L. nigra*; facie abdominisque marginibus segmentorum argentato-pilosis.

Female. Length 3 lines. Black; the face and cheeks thinly covered with silvery pile. Thorax: the disk very closely punctured, the metathorax rugose; the sides and the legs with a fine glittering sericeous pile, the wings subhyaline, their apical margins fuscous, the nervures fuscous. Abdomen smooth and shining, covered with a thin silky pile, the apical margins with bright silvery fasciæ, only observable in certain lights.

The *male* closely resembles the female, but has the face more silvery.

Hab. Celebes.

Genus MORPHOTA, *Smith.*

1. MORPHOTA FORMOSA. *M. capite thoraceque nigris*; abdomine rufo, apice nigro, pilis argentatis ornato.

Female. Length 5 lines. Black, with the two basal segments of the abdomen red; covered with a brilliant changeable silvery pile, most dense on the face, cheeks, sides of the metathorax, and on the apical margins of the abdominal segments. The mandibles ferruginous, with their apex piceous. The vertex smooth, and having *three distinct ocelli*; the head more produced behind the eyes than in *Larrada*. Thorax: the prothorax subtuberculate at the sides; wings subhyaline and iridescent, the nervures fuscous, the tegulæ pale testaceous behind. The apical margin of the first segment of the abdomen rufo-fuscous.

Hab. Celebes.

The insects belonging to the genus *Morphota* differ from those of *Larrada* in having three distinct ocelli, the vertex without any depres-

sions, and the head much less compressed than in *Larrada*; the recurrent nervures are received nearer to the base and apex of the second submarginal cell; the species have, in fact, a distinct habit, and do not assimilate with the species of *Larrada*.

Genus TACHYTES, *Panz.*

1. TACHYTES MOROSUS. *T. niger*, scutello abdomineque nitidis, facie argenteo-pilosa; marginibus lateralibus abdominis segmentorum argentatis.

Female. Length $4\frac{1}{2}$ lines. Black; the face covered with silvery pile; the thorax finely and very closely punctured; the metathorax opaque and finely rugose, thinly covered with cinereous pubescence; the anterior tarsi ciliated on the exterior, and the intermediate and posterior tibiæ with a few dispersed spines; wings fusco-hyaline and iridescent, the nervures fusco-ferruginous, the costal nervure black. Abdomen smooth and shining; the apical margins of the intermediate segments slightly depressed, with the sides sericeous.

Fam. CRABRONIDÆ.

Genus OXYBELUS, *Latr.*

1. *Oxybelus agilis*, *Smith, Cat. Hym. Ins. pt. iv. 387. 25.*

Hab. India, Celebes.

Genus CRABRO, *Latr.*

1. CRABRO (RHOPALUM) AGILIS. *C. obscuro-nigra*, clypeo argentato, capite, thorace abdomineque flavo variis.

Female. Length 4 lines. Black, opaque; head larger than the thorax, quadrate; the ocelli in a curve on the vertex; the clypeus and lower portion of the cheeks with silvery pile; the scape, two basal joints of the flagellum, the palpi, and the mandibles, yellow; the latter rufo-piceous at their apex. The margin of the prothorax, the tubercles, the scutellum, the tibiæ and tarsi, the anterior femora and the intermediate pair at their apex yellow; the anterior femora black above; the wings subhyaline and iridescent, the nervures testaceous. Abdomen: with an elongate clavate petiole; the first segment with an oblique yellow macula on each side, the third with a large lateral macula at its base, and the following segments entirely yellow.

Hab. Celebes.

This species closely resembles the *C. Westermanni* of Dahlbome, from the Cape of Good Hope.

Genus CERCERIS, *Latr.*

1. *Cerceris instabilis*, *Smith, Cat. Hym. Ins. pt. iv. 452. 74.*

Hab. India, China, Celebes.

2. *Cerceris unifasciata*, *Smith, Cat. Hym. Ins.* pt. iv. 456. 84.

Hab. North China, Celebes.

3. *Cerceris fuliginosa*, *Smith, Cat. Hym. Ins.* pt. iv. 454. 79.

Hab. Celebes.

4. *CERCERIS VARIPES*. *C. nigra*, facie flavo varia; alis fuscis basi hyalinis; pedibus variegatis; abdomine flavo maculato.

Male. Length 6 lines. Black; a line down the inner orbits of the eyes, continued along the lower margins of the face, and uniting with the clypeus, which as well as a line above it between the antennæ are yellow; a spot on the scape in front, and the mandibles, yellow; the latter rufo-piceous at their apex. Thorax: a spot on each side of the prothorax, a minute one on the tegulæ; the postscutellum, the intermediate and posterior coxæ and trochanters, the anterior tibiæ behind, the femora beneath, and the intermediate and posterior tibiæ yellow; the femora reddish above and at their articulations; the posterior femora and tibiæ black, with the tarsi rufo-testaceous; the anterior wings and the apex of the posterior pair brown, the base of the anterior pair hyaline. Abdomen: the second and three following segments with a short yellow stripe on each side.

Hab. Celebes.

Tribe VESPIDÆ.

Fam. EUMENIDÆ, *Westw.*

Genus ZETHUS, *Fabr.*

1. *Zethus cyanopterus*, *Sauss. Mon. Guêpes Sol.* i. 23. 2.

Genus MONTEZUMIA, *Sauss.*

1. *Montezumia Indica*, *Sauss. Mon. Guêpes Sol.* i. *supp.* 167. 59. t. 9. f. 4.

Hab. India, Celebes.

Genus RHYNCHIUM, *Spin.*

1. *Rhynchium hæmorrhoidale*, *Sauss. Mon. Guêpes Sol.* i. 109. 12.

Vespa hæmorrhoidalis, *Fabr. Syst. Piez.* p. 259. 28.

Hab. India, Java, Cape of Good Hope, Celebes.

2. *Rhynchium argentatum*, *Sauss. Mon. Guêpes Sol.* i. 115. 22.

Vespa argentata, *Fabr. Syst. Piez.* p. 260. 39.

Hab. India, Celebes.

3. *Rhynchium atrum*, *Sauss. Mon. Guêpes Sol.* i. 109. 11.

Hab. India, Celebes.

4. *Rhynchium parentissimum*, *Sauss. Mon. Guêpes Sol.* p. 111. 14.—

Var. *R. hæmorrhoidale*?

Hab. India, Java, Celebes.

Genus EUMENES.

1. *Eumenes circinalis*, *Fabr. Syst. Piez.* p. 286. 4.

Hab. India, Sumatra, Celebes.

2. *Eumenes fulvipennis*, *Smith, Cat. Hym. Ins.* pt. v. 24. 26.

Hab. Celebes.

3. EUMENES VINDEK. *E. niger*, *flavo variegatus*, *alis subhyalinis iridescentibus*.

Male. Length 6 lines. Black; strongly punctured and shining; a minute spot behind the eyes, another in their emargination, the clypeus, with two minute spots above it, a spot at the base of the mandibles, and the scape in front yellow. Thorax: a subinterrupted line on its anterior margin, the tubercles, a spot on the tegulæ behind, and the legs yellow; the coxæ, femora at their base, and the posterior tibiæ outside dusky; wings light brown and iridescent, the anterior margin of the superior pair darkest. Abdomen delicately punctured; the apical margin of the first segment with a narrow yellow border slightly interrupted on each side; the apical segments with a thin cinereous pile.

Hab. Celebes.

4. EUMENES ARCHITECTUS. *E. niger*, *clypeo*, *prothoracis margine postscutello abdominisque segmenti primi margine flavis*.

Female. Length 6 lines. Black and closely punctured; a line behind the eyes near their vertex, a spot between the antennæ and the clypeus, yellow; the latter black at the apex, which is notched; the labrum and mandibles reddish-yellow, the latter black at their base. Thorax: the anterior margin yellow; the tubercles, tegulæ, post-scutellum, an interrupted line on each side of the metathorax, the tibiæ, tarsi, and femora at their apex, yellow; the coxæ spotted with yellow and the posterior tibiæ dusky; the wings fusco-hyaline; a black line across the tegulæ. Abdomen: an ovate spot on each side of the petiole, its apical margin, a transverse ovate spot on each side of the first segment, and its posterior margin yellow; the following segments covered with a grey silky pile.

Male. Differs from the female in having the clypeus entirely yellow, the metathorax and abdomen entirely black; only the apical margin of the petiole is yellow, it is also longer.

Hab. Celebes.

5. EUMENES FLORALIS. *E. niger*; *clypeo flavo*; *thorace pedibusque ferrugineo-flavo variegatis*.

Male. Length $6\frac{1}{2}$ lines. Black; strongly punctured and shining; the clypeus and a spot above yellow; a narrow abbreviated line behind the eyes, a minute spot in their emargination, and the tips of the mandibles orange-red; the flagellum fulvous beneath. Thorax: the anterior and posterior margin of the prothorax, the tubercles, and a

spot on the tegulæ behind, a line on the postscutellum and the legs, orange-red, the coxæ black, and the tarsi dusky; the wings slightly brownish with a violet iridescence. Abdomen immaculate, with a minute spot on the posterior border of the petiole; the third and following segments with a fine cinereous pile.

Hab. Celebes.

Genus ODYNERUS, *Latr.*

1. *Odynerus ovalis*, *Sauss. Mon. Guêpes Sol.* 215. 122. t. 19. f. 4.

Hab. India, China, Celebes.

2. ODYNERUS (ANCISTROCERUS) CLAVICORNIS. *O. niger, flavo varius*; capite thoraceque fortiter, abdomine delicatule punctatis, antennis clavatis.

Male. Length $4\frac{1}{2}$ lines. Black; head and thorax strongly punctured and shining; a spot on the mandibles, the labrum, the clypeus, a spot above, the scape in front, a line in the emargination of the eyes and a spot behind them, yellow; the flagellum broadly clavate, the joints transverse, the apex of the club and the terminal hook reddish-yellow, the thickened part of the club concave beneath, the hook bent into the cavity. Thorax: two spots on the anterior margin, a spot on the tegulæ in front, and the legs, reddish-yellow, the coxæ dusky; the metathorax coarsely rugose and deeply concave-truncate. Abdomen: the first segment with a transverse carina at its base, in front of which is an irregularly cut deep transverse channel forming a second carina in front of the groove; the segments finely punctured, the first and second segments with a yellow posterior border, the fourth and following segments rufo-piceous.

Hab. Celebes.

3. ODYNERUS (LEIONOTUS) INSULARIS. *O. niger, flavo et aurantio variegatus*; abdominis basi ferruginea.

Male. Length 6 lines. Black; the head and thorax strongly punctured; the mandibles, clypeus, a line above extending to the anterior ocellus, the emargination of the eyes, a spot at their vertex and a line at their outer orbits, yellow; the antennæ reddish-yellow, with the scape pale yellow in front and a narrow fuscous line above; the yellow marking more or less stained orange. Thorax: the prothorax orange, its anterior border, the tubercles, tegulæ, two spots on the scutellum and postscutellum, the lateral margins of the metathorax and the legs, yellow, the latter with reddish stains; wings subhyaline, the superior pair with a fuscous cloud at their apex. The base of the abdomen and a large macula on each side of the second segment ferruginous; the apical margin of the segments with a yellow border, the first and second with a minute notch in the middle; the first and second segments entirely ferruginous beneath.

4. *ODYNERUS FULVIPENNIS*. *O. niger, flavo varius, pedibus ferrugineis, alis fulvo-hyalinis.*

Male. Black; head and thorax closely and strongly punctured; the clypeus and two spots above, a line along the lower margin of the sinus of the eyes, a narrow line behind them, the scape in front, and the mandibles yellow; the tips of the latter rufo-piceous; the antennæ and legs ferruginous; an interrupted yellow line on the anterior margin of the thorax; the wings fulvo-hyaline; the veins which enclose the marginal and second and third submarginal cells fuscous, the rest pale testaceous; a fuscous cloud in the marginal cell. Abdomen: the apical margin of the second segment with a yellow fascia, the following segments with red fasciæ.

Hab. Celebes.

Genus *ICARIA*, *Sauss.*

1. *Icaria ferruginea*, *Sauss. Mon. Guêpes Soc. p. 37. 15.*

Hab. India, Celebes.

2. *ICARIA PILOSA*. *I. nigra, rude punctata et densissime pubescens, clypeo flavo, thorace, pedibus abdomineque ferrugineo variegatis; alis subhyalinis, anticis apice fusco maculatis.*

Male. Length $7\frac{1}{2}$ lines. Black; closely and strongly punctured; the clypeus, a line on the mandibles, and the scape in front, yellow; tips of the mandibles, the scape above, and the base of the flagellum ferruginous. Thorax: the prothorax, scutellum and postscutellum, ferruginous; the tegulæ and legs pale ferruginous, the coxæ black; wings fusco-hyaline, with a dark cloud in the marginal cell extending to the apex of the wing; a fainter cloud traverses the margin of the wing to its base. Abdomen: the first, second and third segments with a reddish-yellow fascia, that on the second segment continued beneath; a longitudinal broad stripe of the same colour on each side of the second segment; its apical margin serrated.

Hab. Celebes.

Genus *POLISTES*, *Latr.*

1. *Polistes sagittarius*, *Sauss. Mon. Guêpes Soc. p. 56. 12.*

Various specimens from Greece and Celebes have the thorax more or less ferruginous.

Hab. India, Celebes, China, Greece.

2. *Polistes Picteti*, *Sauss. Mon. Guêpes Soc. 69. 28. t. 6. f. 8.*

Hab. Ceram, Australia, Celebes.

3. *Polistes fastidiosus*, *Sauss. Mon. Guêpes Soc. p. 60. 18.*

Hab. Africa (Gambia), Celebes.

4. *Polistes stigma*, *Fabr. Syst. Piez. p. 261. 41.*

Hab. India, Ceram, Celebes.

5. *Polistes Philippinensis*, *Sauss. Mon. Guêpes Soc. 58. 14 (var.).*

Hab. Philippine Islands.

Genus *VESPA*, *Linn.*

1. *Vespa affinis*, *Fabr. Syst. Piez.* p. 254. 6 (var. *V. cincta*?).

Hab. India, China, Singapore, Celebes.

2. *VESPA FERVIDA*. *V. nigra*, delicatule punctata; clypei margine antica, macula pone oculos, margineque postica segmenti primi abdominis flavis; alis fulvo-hyalinis.

Female. Length 13 lines. Black; closely and finely punctured; the clypeus convex and strongly punctured, emarginate anteriorly, the emargination with a yellow border; the eyes extending to the base of the mandibles, which have three stout teeth at their apex and a narrow yellow line at their inner margin. Thorax: the postscutellum yellow, and a minute yellow spot on the outer margin of the tegulæ; the wings rufo-hyaline, darkest along the anterior margin of the superior pair; the nervures ferruginous, gradually becoming darker at the base of the wings, the costal nervure black.

Worker. Length 9 lines. Very closely resembles the female, but in addition to the yellow markings of that sex has the anterior margin of the clypeus yellow, a narrow transverse line between the antennæ, another along the lower margin of the notch of the eyes, an abbreviated stripe behind them at the base of the mandibles, a spot beneath the postscutellum and a narrow yellow line along the posterior margin of the basal segment of the abdomen.

Hab. Celebes.

Fam. TENTHREDINIDÆ.

Genus *TENTHREDO*, *Linn.*

1. *TENTHREDO (ALLANTUS) PURPURATA*. *T. capite thoraceque cæruleo-viridibus*, abdomine purpureo, alis fuscis iridescentibus.

Size, length 4 lines. Head and thorax blue-green, abdomen purple; wings dark fuscous with a violet iridescence; an oblique white line on each side beneath the scutellum; legs and antennæ black.

Hab. Celebes.

Fam. ICHNEUMONIDÆ.

Genus *MEGISCHUS*, *Brullé.*

1. *Megischus indicus*, *Westw. Trans. Ent. Soc.* new ser. i. 1851.

Hab. Philippine Islands, Celebes.

Genus *MESOSTENUS*, *Brullé.*

1. *MESOSTENUS ALBO-SPINOSUS*. *M. niger*, albo varius, abdominis segmentis albo marginatis, metathorace spinis duabus albis armato.

Female. Length $5\frac{1}{2}$ lines. Black; a half-circular spot on the clypeus, a heart-shaped one above it, a spot at the base of the mandibles, the orbits of the eyes, interrupted at their vertex, yellowish white, the palpi of the same colour, and a broad incomplete annulus on the

antennæ beyond their middle. Thorax: the mesothorax with two deeply impressed oblique lines inclined inwards and terminating at an ovate spot in the middle of the disk, the scutellum and an oblique line on each side a little before it, a horseshoe-shaped spot in the middle of the metathorax, and a little below it on each side a conical tooth, yellowish white; four spots beneath the wings, one on each side of the metathorax, and the coxæ beneath, white; the legs ferruginous, with the intermediate pair dusky behind, the posterior pair entirely so, the femora being black; the wings hyaline, nervures fuscous. Abdomen: punctured and with a white fascia on the margins of the three basal segments; the two apical segments with very narrow fasciæ.

Hab. Celebes.

This species is closely allied to the *M. literatus* of Brullé; but it differs too much, I think, to be identical with it.

2. *PIMPLA TRIMACULATA*. *P. flava*, oculis, macula circa ocellos, vittulis tribus mesothoracis setisque caudalibus nigris.

Female. Length 6 lines. Yellow; the antennæ fuscous above, also a fuscous cloud at the apex of the anterior wings, the wings hyaline with the nervures black; a spot on the scape within, and three longitudinal stripes on the mesothorax, black; the latter slightly punctured anteriorly; the metathorax smooth and shining, with three oblique carinæ on each side, and a small subovate enclosed space in the middle of the disk. Abdomen punctured, all the segments margined at their apex, and each with a deeply impressed line at their extreme lateral margins; the sixth segment with two minute black spots at its basal margin, the two apical segments smooth and shining; the ovipositor black.

Hab. Celebes.

This species is closely allied to the *P. trilineata* of Brullé.

Fam. BRACONIDÆ.

1. *BRACON INSINUATOR*. *B. capite*, thorace pedibusque ferrugineis; antennis, tibiis tarsisque posticis et abdomine nigris; alis nigro-fuscis, macula hyalina sub stigmatæ.

Female. Length $7\frac{1}{2}$ lines. Head and thorax smooth, shining, and ferruginous, the legs ferruginous, with the posterior tibiæ and tarsi black; the antennæ black, with the scape and following joint ferruginous; wings dark brown, with their extreme base pale testaceous; a hyaline stripe runs from the stigma across the first submarginal cell and passes a little below it. Abdomen black, smooth, and shining, with the lateral margins of the basal segment pale yellow-testaceous; this segment has on each side a longitudinal carina, and between them is a highly polished bell-shaped form; the second segment with deep oblique depressions at the sides, and deeply

longitudinally rugose-striate, leaving the apical margin smooth and shining; the second segment is similarly sculptured, and the third has a transverse groove at its base.

Hab. Celebes.

2. *BRACON INTRUDENS*. *B. rufescenti-flavus*, antennis setisque caudalibus nigris; alis nigro-fuscis, basi fasciaque angusta transversa flavis.

Female. Length 9 lines. Pale reddish-yellow; the eyes, flagellum, and ovipositor black; the scape and the following segment yellow; the head and thorax smooth and shining, both pubescent at the sides and beneath, the legs covered with a similar pale pubescence; the face with an upright horn between the antennæ, and a raised flattened plate in front of it. Abdomen: the basal segment with the lateral margins raised, and having on each side an elongate broad depression extending its entire length; the three following with an oblique depression on each side at the base of the segment; the third, fourth, and fifth segments distinctly margined at their apex; the ovipositor the length of the insect.

Hab. Celebes.

Genus AGATHIS, *Latr.*

1. *AGATHIS SCULPTURALIS*. *A. nigra*, prothorace, pedibus anticis mediisque ferrugineis; abdomine lævigato nitido.

Male. Length $5\frac{1}{2}$ lines. Black; the mouth, prothorax, anterior and intermediate legs, ferruginous; the face with two teeth or horns between or a little before the insertion of the antennæ, and another at the side of each, close to their insertion. Thorax: the mesothorax with two deeply impressed lines in front, running inwards, and uniting about the middle, and with two or three deep transverse channels before their junction; the lateral margins of the mesothorax deeply impressed; the metathorax ruggedly sculptured; the posterior coxæ and femora closely punctured; wings black with a hyaline spot in the first submarginal cell. Abdomen very smooth and shining, with a deeply impressed line on each side of the basal segment.

Hab. Celebes.

2. *AGATHIS MODESTA*. *A. rufescenti-flava*; antennis, vertice, tibiis posticis apice, tarsisque nigris; alis fusco maculatis.

Female. Length 4 lines. Reddish-yellow: the antennæ and vertex, black. The mesothorax with two deeply impressed longitudinal oblique lines, and two parallel ones between them; the metathorax reticulated; wings hyaline, with a dark fuscous stain crossing the anterior pair at the base of the first submarginal cell, these hyaline to the middle of the stigma, beyond which they are fuscous; a subhyaline spot at the apex of the marginal cell, and another beneath it at the inferior margin of the wing; the posterior tarsi dusky, and the tips of the tibiæ black.

Hab. Celebes.

3. *AGATHIS NITIDA*. *A. nigra*, nitida; facie, pectore, pedibus anticis et intermediis, plaga infra alas, scutelloque pallide ferrugineis.
Length 4 lines. Black and shining; the face, mandibles, head beneath, legs, pectus, sides of the thorax beneath the wings, the scutellum and the basal half of the abdomen beneath, pale ferruginous; the mesothorax with two longitudinal oblique lines on the disk, which have two parallel ones between them; the metathorax coarsely rugose; the wings dark brown, with the base of the stigma pale, and a hyaline spot beneath it. Abdomen very smooth and shining, with the apical margins of the segments narrowly rufo-piceous; the posterior legs incrassate and dark rufo-piceous.

Fam. CHRYSIDIDÆ.

Genus HEDYCHRUM, *Latr.*

1. *HEDYCHRUM FLAMMULATUM*. *H. viridi-purpureo lavatum*; capite thoraceque fortiter, abdomine delicatule, punctatis; alis fuscis basi hyalinis.
Length 3 lines. Bright green; the vertex, two oblique stripes on the prothorax, meeting in the centre of its anterior margin, a broad longitudinal stripe on the disk of the mesothorax, and the sides of the scutellum and postscutellum deep purple. Abdomen: the middle of the basal segment, the second and third segments at their base, broadly purple; the apical margin of the third tinged with purple; wings subfuscous, with their base hyaline. The head and thorax coarsely and closely punctured, the abdomen finely so; the tarsi with the claws unidentate.

Hab. Celebes.

Genus CHRYSIS, *Linn.*

1. *CHRYSIS PURPUREA*. *C. læte purpurea*, capite, thorace abdominisque basi rugosis punctatis, segmentis abdominis secundo et tertio delicatule punctatis, apice quadridentato.
Length 3 lines. Bright purple; the head, thorax, and base of the abdomen strongly and coarsely punctured, the rest of the abdomen finely punctured; the disk of the thorax and apical margins of the segments of the abdomen reflecting bright tints of green; the wings subhyaline, the nervures dark fuscous; the apical margin of the third segment of the abdomen with four teeth, the two central ones approximating, separated by a deep notch, the lateral teeth more distant, separated from the others by a wide emargination.

Hab. Celebes.

2. *CHRYSIS INSULARIS*. *C. nigro-purpurea*, violaceo et viridi lavata; capite, thorace abdominisque basi rude punctatis.
Length 5 lines. Dark purple, with violet and green reflections; the face, legs, and thorax beneath, green; wings slightly fuscous, and

iridescent; the head and thorax closely and coarsely punctured; the base of the abdomen roughly punctured, the two following segments much more finely so; the apical segment armed with six teeth, the outer ones subacute.

Hab. Celebes.

3. *CHRYSIS SUMPTUOSA*. *C. fortiter punctata*, metallico-*viridis auro lavata*; thoracis disco, abdominis segmentis secundo et tertio basi *purpureis*; segmento apicali *marginem integro*.

Length $3\frac{1}{4}$ lines. Golden-green; the thorax at the sides and posteriorly with bright coppery effulgence; an oblong purple spot on the disk of the thorax; the metathorax and its lateral teeth vivid green, the vertex and prothorax splashed with gold. Abdomen: the basal segment bright green, with a bright coppery or golden effulgence at the sides; the second segment purple at the base, coppery at the apex, and with a suffusion of green between these tints; the third segment is similarly coloured, with the apical margin entire; the insect closely and strongly punctured throughout.

Hab. Celebes.

Description of a new Genus of Crustacea, of the Family Pinnotheridæ; in which the fifth pair of legs are reduced to an almost imperceptible rudiment. By THOMAS BELL, Esq., Pres. L. S.

[Read June 3rd, 1858.]

Fam. PINNOTHERIDÆ, *Edwards*.

Genus AMORPHOPUS, *Bell*.

CHAR. GEN.:—Corpus subcylindricum. Testa semicircularis, margine posteriore recto.—*Antennæ externæ minimæ*, articulo basali orbitam subtus partim claudente.—*Antennularum fossulæ transversæ, continuæ, et ab orbitis haud separatæ*.—*Pedipalpi externi articulo quarto ovato, palpo tri-articulato, ad angulum antico-interiorem articuli quarti inserto*.—*Oris apertura antice arcuata*.—*Orbitæ apertæ, margine inferiore carente, superiore integro*.—*Oculi transversim positi*.—*Pedes antici robusti, inæquales; pedum paria secundum, tertium et quartum longa, subcompressa; par quintum exiguum, simplicissimum, rudimentarium, in incisura articuli basalis paris quarti insertum*.—*Abdomen MARIS segmentis tertio cum quarto, et quinto cum sexto coalitis; FEMINÆ ?*

Sp. unica. *Amorphopus cylindraceus*, mihi.

Description.—The body is nearly cylindrical, somewhat depressed, the carapace very much curved from the point to the back, quite

straight from side to side ; the anterior and lateral margins forming nearly a semicircle, the posterior margin straight ; the orbits are deeply cut in the anterior margin of the carapace, looking upwards ; the inferior margin wanting ; the oral aperture much arched anteriorly ; the external footjaws with the third articulation somewhat rhomboid, the fourth irregularly oval, and the palpi three-jointed, inserted at its anterior and inner angle. Epistome extremely small, transversely linear ; the external antennæ placed directly beneath the orbits, the basal joints partly filling them beneath. The antennules folded transversely in large open fossæ, which are scarcely at all separated from each other, and are open to the orbits, the eyes lying transversely ; the peduncles short and thick ; the sternum is semicircular, the segments separated by very deep grooves ; the abdomen very long and narrow, the first and second joint transversely linear, the third and fourth united and forming a triangle truncated anteriorly at the articulation of the portion formed by the fifth and sixth joints united, and which with the seventh form a very narrow and linear piece extending forwards to the posterior margin of the oral aperture ; the first pair of legs robust, unequal (the right being the larger in the only specimen at present observed) ; the hand in each as broad as it is long ; that of the smaller conspicuously tuberculated, that of the larger much less so ; the former with the fingers nearly meeting throughout their length, those of the latter only at the tips ; the second, third, and fourth pairs of legs are long, somewhat compressed, the third joint tuberculated on the under side, the third pair the longest ; the fifth pair is reduced to a mere rudiment, in the form of a minute tubercle inserted in a little notch at the base of the first joint of the fourth pair, and scarcely discernible by the naked eye.

Observations.—The relation of this genus to the Pinnotheridæ is tolerably obvious, in the smallness of the antennæ, the direction and arrangement of the eyes, and particularly in the form of the oral aperture, and of the external footjaws. I shall not, however, enter upon the consideration of these relations, as I am about shortly to offer to the Society a review and monograph of the whole of this family. The most remarkable peculiarity in the genus is the apparent absence of the fifth pair of legs, which can only be discovered to exist at all by examination with the help of a lens. In this respect I doubt not that the Fabrician genus *Hexapus*, adopted and figured by De Haan, will be found to agree with it, although it is very remarkable that the anomalous condi-

tion of this part never excited any particular attention on the part of either of these distinguished naturalists; and De Haan describes Fabricius's species, *Hexapus sexpes*, as if there were nothing especial or abnormal in a Decapod having only six pairs of legs besides the claws. Mr. White made a similar mistake on one occasion, when he described an anomourous genus allied to *Lithodes*, in which the fifth pair of legs were not visible; but when, at my suggestion, a more careful examination was made, they were found, as was anticipated, in a rudimentary form, concealed under the edge of the carapace. I believe that I can discover even in De Haan's figure something like a little tubercle at the base of the fourth leg, which is probably the rudimentary representative of the fifth.

Death of the Common Hive Bee, supposed to be occasioned by a parasitic Fungus. By the Rev. HENRY HIGGINS. Communicated by the President.

[Read June 3rd, 1858.]

ON the 18th of March last, Timpron Martin, Esq., of Liverpool, communicated to me some circumstances respecting the death of a hive of bees in his possession, which induced me to request from him a full statement of particulars. Mr. Martin gave me the following account:—

“In October last I had three hives of bees which I received into my house. Each doorway was closed, and the hive placed upon a piece of calico; the corners were brought over the top, leaving a loop by which the hive was suspended from the ceiling. The hives were taken down about the 14th of March; two were healthy, but all the bees in the third were dead. There was a gallon of bees. The two hives containing live bees were much smaller; but in each of them were dead ones. Under whatever circumstances you preserve bees through the winter, dead ones are found at the bottom, in the spring. The room, an attic, was dry; and I had preserved the same hives in the same way during the winter of 1856. In what I may call the dead hive there was abundance of honey when it was opened; and it is clear that its inmates did not die for want. It is not a frequent occurrence for bees so to die; but I have known another instance. In that case the hive was left out in the ordinary way, and possibly cold was the cause of death. I think it probable that my bees died about a month before the 14th of

March, merely from the circumstance that some one remarked about that time that there was no noise in the hive. They might have died earlier; but there were certainly live bees in the hive in January. I understand there was an appearance of mould on some of the combs. There was ample ventilation, I think; indeed, as the bees were suspended, they had more air than through the summer when placed on a stand."

When the occurrence was first made known to me, I suggested that the bees might probably have died from the growth of a fungus, and requested some of the dead bees might be sent for examination. They were transmitted to me in a very dry state; and a careful inspection with a lens afforded no indications of vegetable growth. I then broke up a specimen, and examined the portions under a compound microscope, using a Nachet No. 4. The head and thorax were clean; but on a portion of the sternum were innumerable very minute, linear, slightly curved bodies, showing the well-known oscillatory or swarming motion. Notwithstanding the agreement of these minute bodies with the characters of the genus of *Bacterium* of the Vibrionia, I regarded them as spermatia, having frequently seen others undistinguishable from them under circumstances inconsistent with the presence of *Confervæ*, as in the interior of the immature peridia and sporangia of Fungals.

In the specimen first examined there were no other indications of the growth of any parasite; but from the interior of the abdomen of a second bee I obtained an abundance of well-defined globular bodies resembling the spores of a fungus, varying in size from $\cdot00016$ to $\cdot00012$ in. Three out of four specimens subsequently examined contained similar spores within the abdomen. No traces of a mycelium were visible; the plants had come to maturity, fruited, and withered away, leaving only the spores.

The chief question then remaining to be solved was as to the time when the spores were developed; whether before or after the death of the bees. In order, if possible, to determine this, I placed four of the dead bees in circumstances favourable for the germination of the spores, and in about ten days I submitted them again to examination. They were covered with mould, consisting chiefly of a species of *Mucor*, and one also of *Botrytis* or *Botryosporium*. These fungi were clearly extraneous, covering indifferently all parts of the insects, and spreading on the wood on which they were lying. On the abdomen of all the specimens, and on the clypeus of one of them, grew a fungus wholly unlike the sur-

rounding mould. It was white and very short, and apparently consisted entirely of spores arranged in a moniliform manner, like the fertile filaments of a stemless *Penicillium*. These spores resembled those found in the abdomen of the Bees, and proceeded I think, from them. The filaments were most numerous at the junction of the segments. The spores did not resemble the globules in *Sporendonema muscæ* of the English Flora, neither were they apparently enclosed.

The Rev. M. J. Berkeley, to whom I sent some of the bees, procured, by scraping the interior of the abdomen with a lancet, very minute, curved linear bodies from $\frac{1}{8000}$ to $\frac{1}{10000}$ in. long, which he compares to Vibrios. He also found mixed with them globular bodies, but no visible stratum of mould.

From the peculiar position of the supposed spores within the abdomen of the bees, and from the subsequent growth of a fungus unlike any of our common forms of Mucedines, I think it probable that the death of the bees was occasioned by the presence of a parasitic fungus.

Notice of the occurrence of recent Worm Tracks in the Upper Part of the London Clay Formation near Highgate. By JOHN W. WETHERELL. Communicated by JAMES YATES, Esq., M.A., F.L.S.

[Read June 3rd, 1858.]

THE London clay is very tenacious, and near the surface is generally of a brown colour, probably owing to the decomposition of the iron pyrites which it contains. It abounds in selenite or sulphate of lime, and in nodules which often contain organic remains. Fossil wood with *Teredo antenautæ* is also met with, and pyritous casts of univalve and bivalve shells. Lower down the stratum becomes more compact and is of a bluish or blackish colour, and its fossil contents are in a fine state of preservation. During the last summer, while examining the London Clay in the vicinity of Highgate in search of fossils, my attention was directed to certain appearances in it which I could not account for. This led to a further examination, when I found they were produced by the borings of *Lumbrici* or earth-worms. These appearances consisted of long tubes passing nearly perpendicularly through the clay and terminating in receptacles or *nidi*, each tube leading to a separate receptacle. As these receptacles

occurred in large numbers, I had an opportunity of examining a great many of them with various results. In one instance, I found a dead worm coiled up; in another, a portion of a worm protruding into the lower part of the tube. Again, *nidi* were found partially filled with only the casts of worms, whilst others contained more or less of a species of *Conferva*; and, lastly, I obtained some with the cavities partially or wholly filled up. The receptacles varied in shape, from a sphere to an oval, and were extremely thin and fragile. They also varied in size from a pea to a nut. Externally they presented an appearance so singularly contorted, that I could not help considering they were moulded from the casts of worms. They did not appear to have any attachment to the surrounding clay, except at the point of junction with the tube; and the clay beneath them presented no unusual appearance.

Internally they generally exhibited impressions of the worm; but occasionally I detected some of the round and contorted appearances which I have mentioned as being so conspicuous on the outside. I cannot speak with precision as to the length of the tubes, as the clay when examined had been broken up into large rough masses in digging for the foundations of houses. The largest noticed was about three inches long, and the general width one-eighth of an inch. They often run parallel to each other, but at unequal distances. I now have to notice what I consider a remarkable circumstance, namely, that all the tubes contained a solid cylinder of clay, and in every instance where the worms occurred under the circumstances above recorded, they were found to be dead. Researches of this kind are calculated to throw a light on some of those singular phenomena which geologists occasionally meet with in the older rocks.

[*Mem.*—Several specimens of clay, containing the worm-tubes as above described, were exhibited to the meeting.]

Natural History—Extracts from the Journal of Captain Denham, H.M. Surveying Vessel 'Herald,' 1857. Communicated by Captain WASHINGTON, through the Secretary.

[Read June 3rd, 1858.]

WE found upon the larger islands the small species of the Kangaroo, bearing the native name Wallaby (*Halmaturus Billar-*

dierii), which, when mixed with other meats, affords a fine-flavoured soup.

On the islets are flocks of the Cape Banca goose, which Mr. Smith informed me were only to be found in these straits in the vicinity of Flinders Island, from Cape Banca to Cape Frankland (west about), and that they are readily domesticated, and hatch from three to seven eggs, and afford an acceptable dish. I obtained a live specimen, which Dr. Rayner of this ship describes thus:—“*Cereopsis Novæ Hollandiæ*. Body about the size of a common goose; bill short, vaulted, obtuse, two-thirds of which is covered by an expanded cere of a pale greenish-yellow colour, the tip of the bill being black, arcuated, and truncated. Nostrils large, round, open, and situated in the middle of the bill. Wings ample, third quill longest. Legs long, light dull-red, and naked to a little above the knee. Feet black, webbed, the membrane being deeply notched, great toe articulated to the metatarsus. Plumage slate-grey, with black spots upon the wings and back. Wing-feathers dusky black, and edged at the tip with pale grey. Irides light hazel.”

We likewise obtained specimens of the following wildfowl:—

AVES.

A BRONZE-WING PIGEON,	<i>Phaps elegans</i> .
QUAIL,	<i>Corturnix pectoralis (Gould)</i> .
OYSTER-CATCHER,	<i>Hæmatopus fuliginosus</i> .
RING PLOVER,	<i>Hiaticula bicincta</i> .
WILD DUCK,	<i>Anas punctata (Cuvier)</i> .
GREAT GULL,	<i>Larus pacificus</i> .
LESSER GULL,	<i>Xema Jamesonii</i> .
MUTTON BIRD,	<i>Puffinus brevicaudus (Brandt)</i> .
SOUTHERN GANNET,	<i>Sula australis (Gould)</i> .
SMALL PENGUIN,	<i>Spheniscus minor (Temminck)</i> .

The Mutton Bird we observed streaming from island to island; and I learnt from Mr. Benvenuto Smith the following particulars of its habits from his own observations.

The male birds come in from sea in the month of September, and prepare the burrows for the reception of the hens. The hen bird does not make her appearance till about the 25th November, when she lays and sits at once.

The Mutton Bird lays but one egg; they are employed rearing the young bird until the month of May, at which time the old birds leave the young ones to shift for themselves; the young birds remain in the burrows till they are starved down, and then

set off to sea, and are not seen again amongst the islands till September. The cock and hen sit alternately night and day; and all the labour of providing for the young is equally shared.

There are at this date about ninety people living on the small islands in "Franklin Inlet" who make a livelihood by gathering the oil, feathers, and eggs of the Mutton Bird.

Upwards of 2000 gallons of the oil are extracted from the birds annually; and although 300,000 birds are known to be destroyed each year, they appear undiminished in numbers. The oil burns well, and is of a bright-red colour.

I was presented by Mr. Smith with two Paper Nautilus shells (*Argonauta tuberculosa*) found on the shore of Flinders Island this season, a circumstance which he has remarked occurs but every seventh year, when many hundreds are thrown up: the shells are rarely obtained perfect, as they are extremely fragile, and the sea fowl pick the fish out of them.

Our Botanic Collector, Mr. Milne, ascertained, from what he obtained himself and from what we could contribute from our individual visits to the islets, the existence of plants, which he believes to be indigenous, belonging to the following families and genera, viz.

Amentaceæ.	Umbelliferæ.
Asteraceæ.	Graminaceæ.
Rosaceæ.	Junceæ.
Geraniaceæ.	Solanum.
Euphorbiaceæ.	Geranium.
Myrtaceæ.	

Testing the chances of fish refreshment at this anchorage, we found little encouragement for hook and line; but the two favouring opportunities which the weather allowed for hawling the seine produced as tabulated on opposite page.

We found the Reef Islands in this sound so abundant in rabbits since Captain Stokes's forethought had set some loose upon them, that, in two visits of four hours with but four guns, 100 brace were brought on board.

I took care to follow my esteemed brother officers' example and the system of introducing such productions, and obtained a dozen couple alive for letting loose in Shark Bay.

[A coloured drawing of *Cereopsis Novæ Hollandiæ* accompanied Captain Denham's observations.]

Locality.	How many haws and phase of O.	Trawl-seine, or hook and line.		Natural History Names.	Common Names.	No. of sorts.	Pounds weight.
		Depth of water.	Nature of bottom.				
West side	6 haws	with seine.	with seine.	Mugil	Mullet	23	28
Flinders Isl. ...	...	$\frac{1}{2}$	...	Hemiramphus	Gar-fish.....	10	5
Settlement ...	O	1 fathom	Sand	Platycephalus	Flat-head, small	3	1
Bay	14 days	on	and		Raia	Sting Ray.....	2	29
H.W.F. & C.D X. 30.	...	a flat	weed	Iulis	Small fish of the Basse family...	Several	...
Range 10 ft. ...	L.W.	...	...	Labrax	Basse	1	1
East side of	7 haws	with seine (mar.).	...	Myliobatis	Ray	11	375
Hummock ...	D		Mugil.....	Mullet	20	30
Island centre...	26 days	1 to 3 fams.	Sandy beach	Platycephalus	Flat-head	3	2
				Siphyracua.....	Barracouta	1	1
				Scomberox	Saury	27	17
Bay	at $\frac{3}{4}$ flood	...	...	Sepiotenthis	Cuttle-fish.....	Several	...
					Total .....	...	489

On some points in the Anatomy of *Nautilus pompilius*. By T. H. HUXLEY, F.R.S., Professor of Natural History, Government School of Mines.

[Read June 3rd, 1858.]

SOME time ago my friend Dr. Sinclair, of New Zealand, had the kindness to offer me two specimens of the Pearly Nautilus which had been brought to him from New Caledonia, preserved in Goadby's solution. I gladly accepted the present, and looked forward to the dissection of the rare animal with no little pleasure; but on proceeding to examine one of the specimens, I found its anatomical value greatly diminished by the manner in which a deposit from the solution had glued together some of the internal viscera. Other parts of the Nautilus, however, were in a very good state of preservation; and I have noted down such novel and interesting peculiarities as they presented, in the hope that an account of them will be acceptable to the Linnean Society.

Of the six apertures which, besides the genital and anal outlets, open into the branchial cavity of *Nautilus pompilius*, one on each side lies immediately above and in front of that fold of the inner wall of the mantle which forms the lower root of the smaller and inner gill, and encloses the branchial vein of that gill. The aperture is elongated and narrow, with rather prominent lips. It measures about $\frac{1}{8}$ th of an inch.

The other two apertures are larger, and lie at a distance of $\frac{7}{16}$ ths of an inch below and behind the other. They are in close juxtaposition, being separated only by a thin triangular fold of membrane, which constitutes the inner lip of the one and the outer lip of the other.

The inner aperture is the larger, measuring $\frac{3}{16}$ ths of an inch in long diameter, and having the form of a triangle with its base directed posteriorly. The outer aperture is not more than $\frac{1}{8}$ th of an inch long. The two apertures lie just above the edge of the fold of membrane which runs from the inner root of the larger or outer branchia, across the branchial cavity and beneath the rectum, to the other side.

These apertures lead into five sacs, which collectively constitute what has been described as the pericardium. The sacs into which the superior apertures open, by a short wide canal with folded walls, are situated on each side of and above the rectum. Their inner boundaries are separated by a space of not less than $\frac{5}{8}$ ths of an

inch in width, in which lie the vena cava and the oviduct. Each cavity has a rounded circumference, and a transverse diameter of about half an inch. In a direction at right angles to this diameter the dimensions vary with its state of distension; but a quarter of an inch would be a fair average.

The anterior or outer wall of the cavity is formed by the mantle; the posterior, inner, or visceral wall by a delicate membrane. The former separates it from the branchial cavity; the latter from the fifth sac, to be described by-and-by. I could find no natural aperture in the thin inner wall, so that I conceive no communication can take place between either of these sacs and the fifth sac.

Two irregular, flattened, brownish, soft plates depend from the posterior wall of the sac into its cavity; their attached edges are fixed along a line which is directed from behind obliquely forwards and upwards.

The outer and smaller of the inferior apertures on each side leads into a sac of similar dimensions and constitution to the preceding, but having a less rounded outline in consequence of its being flattened in one direction against its fellow of the opposite side, from which it is separated only by a delicate membranous wall, whilst on another side it is applied against the inferior wall of the superior sac, and is in like manner separated from it only by a thin and membranous partition.

Like the upper sacs, each of these has two dark-brown, lamellar, glandular masses depending from its membranous visceral wall.

A delicate, but broad, triangular membranous process, about $\frac{1}{4}$ th of an inch long, hangs down freely from the visceral wall of the cavity just behind the opening of the short canal which connects the sac with its aperture.

The third and largest aperture on each side opens directly into a very large fifth cavity, whose boundary is formed anteriorly by the visceral walls of the sacs already described, and behind this by the mantle itself as far as the horny band which marks and connects the insertion of the shell-muscles.

In fact this cavity may be said to be co-extensive with the attached part of the mantle,—the viscera, enclosed within their delicate “peritoneal” membranous coat, projecting into and nearly filling it, but nevertheless leaving a clear space between themselves and the delicate posterior wall of the mantle.

A layer of the “peritoneal” membrane extends from the posterior edge of the muscular expansion which lies between the shell-muscles and from the upper wall of the dilatation of the vena cava,

and passes upwards and backwards like a diaphragm to the under surfaces of the gizzard and liver. It is traversed by the aorta, to whose coats it closely adheres.

Along a line nearly corresponding with the horny band which proceeds from the insertions of the shell-muscles and encircles the mantle below, the pallial wall is produced inwards and forwards into a membranous fold or ligament, which I will call the pallio-visceral ligament; and this pallio-visceral ligament becoming attached to various viscera, divides the great fifth chamber into an anterior inferior, and a posterior superior portion, which communicate freely with one another.

Commencing with its extreme right-hand end, the ligament is inserted into the line of reflection of the mantle, and then into the wall of the oviduct, which becomes enclosed as it were within the ligament. The latter then ends in a free edge on the inner side of the oviduct, and is continued along it until it reaches the inferior surface of the apex of the ovary, into which it is inserted.

The free edge is arcuated; and the rectum passes over it, but is in no way connected with it.

Here, therefore, is one great passage of communication between the anterior and posterior divisions of the fifth chamber.

On the left side, this aperture is limited by the heart, whose posterior edge is, on the left side, connected by means of a ligamentous band with the surface of the apex of the ovary; but on the right, for the greater part of its extent, receives a process of the pallio-visceral ligament. Between the ovario-cardiac ligament and this process lies the small oval aperture already described by Professor Owen, which gives passage to the siphonal artery. It constitutes the middle aperture of communication between the two divisions of the fifth chamber.

The left-hand end of the ligament is inserted into the upper wall of the dilated end of the vena cava; but between this point and the heart it has a free arcuated edge, as on the right side.

Thus there are in reality three apertures of communication between the two divisions of the fifth chamber, the middle, by far the smallest, being alone hitherto known.

A delicate membranous band passes from the whole length of the middle line of the rectum to the heart and to the ovary.

The singular "pyriform appendage" of the heart lies in the left process of the ligament, its anterior edge nearly following the arcuated contour of that process.

The siphuncular process of the mantle was broken in my speci-

men; but its aperture appeared to communicate quite freely with the posterior division of the fifth chamber.

Four sets of brownish, glandular-looking bodies depend into the anterior division of the fifth chamber, from parts of the delicate septa dividing this from the four small sacs, corresponding with the insertions of the glandular bodies above described.

In fact, on distending the vena cava with air, it is found that the four branchial arteries traverse these septa, and that the appendages in question are diverticula of their walls. Consequently the anterior wall of each branchial vein is produced into two glandular appendages, which hang into one of the four smaller sacs, while the posterior wall is produced into a single mass of appendages, which hangs into the anterior division of the fifth chamber.

Although, as I believe, the five chambers do not communicate directly, all the appendages must nevertheless be equally bathed with sea-water, which enters by the apertures of the chambers.

An impacted yellowish-white concretionary matter filled the anterior chamber; and a small quantity of it lay as a fine powder at the bottom of the posterior one. In the latter, however, its presence might, by possibility, have been accidental. My colleague, Dr. Percy, who kindly undertook to examine this substance, informs me that he has been unable to detect uric acid in it. The follicular appendages of the branchial arteries present remarkable differences in their external appearance. The eight which hang into the four anterior chambers are similar, slightly festooned, but otherwise simple lamellæ; while the four which depend into the posterior chambers are produced into a number of papillary processes. This external difference is obvious enough: whether it be accompanied by a corresponding discrepancy in minute structure I am unable to say; for I have not as yet been able to arrive at any satisfactory results from the microscopic examination of the altered tissues, and, as will be seen below, the only observer who has had the opportunity of examining the Nautilus in the fresh state has not noted any difference of structure in the two sets of follicles.

One is naturally led to seek among other mollusks for a structure analogous to the vast posterior aquiferous chamber of the Nautilus; and it appears to me that something quite similar is offered by the *Ascidiodida* and the *Brachiopoda*. In both cases, the viscera, inclosed within a delicate tissue, project into a large cavity communicating freely with the exterior by the cloacal aper-

ture in the one case, and by the funnel-shaped channels which have been miscalled "hearts" in the other.

The rudimentary renal organs of the Ascidian are developed in the walls of the cavity in question; and an aquiferous chamber of smaller dimensions has the same relation to the kidney in Lamellibranchiata—in Gasteropoda, Heteropoda, Pteropoda, and dibranchiate Cephalopoda. But although such is likely enough to be the case, we do not know at present that the aquiferous chambers in any of the last named mollusks attain an extension similar to that which obtains in Nautilus.

On comparing the observations detailed above with the statements of previous writers, I find that, in his well-known "Memoir on the Pearly Nautilus" (1832), Professor Owen describes "on each side, at the roots of the branchiæ," "a small mamillary eminence with a transverse slit which conducts from the branchial cavity into the pericardium. There is, moreover, a foramen at the lower part of the cavity (*o*, pl. 5) permitting the escape of a small vessel; and by the side of this vessel a free passage is continued between the gizzard and ovary into the membranous tube or siphon that traverses the divisions of the shell, thus establishing a communication between the interior of that tube and the exterior of the animal."

The foramen here described is easily seen; but, as I have stated, there are other modes of communication between the so-called pericardium and the cavity with which the siphuncle communicates, of a far more extensive nature.

With respect to the pericardium itself, Professor Owen states, "The peritoneum, after lining the cavity which contains the crop and liver, and enveloping those viscera, forms two distinct pouches at the bottom of the pallial sac, in one of which, the left, is contained the gizzard, and in the other the ovary; anterior to these, and on the ventral aspect of the liver, is another distinct cavity, of a square shape, which contains the heart and principal vessels, with the glandular appendages connected therewith." This is what the author terms the pericardium.

As Van der Hoeven has pointed out, however, the gizzard lies to the right and the ovary to the left. Moreover, the gizzard is superior to the ovary, so as only to overlap it a little above; and I can find no evidence of the existence of such distinct pouches as those described.

Professor Owen states that the branchiæ "arise by a common peduncle from the inner surface of the mantle." My own obser-

vations, however, and Van der Hoeven's figures, of both male and female, lead me to believe that the peduncles of the branchiæ are perfectly distinct from one another.

The follicles of the branchial arteries are thus described in the "Memoir on the Pearly Nautilus:"—"They are short and pyriform and closely set together. To each of the branchial arteries are appended three clusters of these glands, of which one is larger than the united volume of both the others; and the larger cluster is situated on one side of the vessel and the two smaller on the opposite side. Each of these clusters is contained in a membranous receptacle proper to itself, partitioned off, as it were, from the pericardium, but communicating with it. . . . The two canals which form the communication between the pericardium and the branchial cavity commence at the receptacle of the lesser cluster attached to the superior branchial arteries, and terminate at the papillæ before mentioned, which are situated at the roots of the branchiæ. The pericardium and these receptacles of the glands, when first laid open, were found filled with a coagulated substance so closely compacted as to require a careful removal, bit by bit, before the contained follicles and vessels could be brought into view."

Like Valenciennes and Van der Hoeven, I have been unable to find any communication between the four sacs in which the small double clusters of follicles are contained, and the "pericardium;" and I hold it to be certain that the other four sets of follicles are not contained in sacs at all, but lie free in the "pericardium" or posterior chamber.

No notice is here taken of the widely different characters of the anterior and posterior follicles; and the figure gives both a similar structure.

Valenciennes ("Nouvelles Recherches sur le Nautille Flambé," 'Archives du Muséum,' ii., 1841) pointed out the existence of three pairs of apertures opening into the branchial sac, besides the genital and anal openings; and he affirms that they open into as many closed sacs, which communicate neither with one another nor with the cavity that contains the heart. M. Valenciennes indicates the difference in the structure of the anterior and posterior venous appendages. He seems to me to have seen something of the part which I have described as the pallio-visceral ligament; but I cannot clearly comprehend either his figure or his description.

Van der Hoeven, in his 'Contributions to the Knowledge of the Animal of *Nautilus pompilius*,' 1850, confirmed the statement

of Valenciennes with regard to the existence of three pairs of apertures; but he showed, in opposition to him, that one of these pairs of apertures communicated with the pericardium. The sacs into which the other two pairs open are, according to this anatomist, blind. In the aperture of the anterior blind sac he found a concretionary matter which he supposed to contain uric acid, but chemical analysis did not confirm the supposition. Van der Hoeven refers to some observations by Vrolik; but as these are in Dutch, and have not, so far as I can find, been translated into either French, German, or English, I know not what they may contain.

In his more recent essay, translated in 'Wiegmann's Archiv' for 1857, under the title of "Beitrag zur Anatomie von *Nautilus pompilius*," Van der Hoeven states that he has again found hard concretions in the chamber enclosing the appendage of the anterior branchial artery, and that these on chemical analysis yielded phosphate of lime and traces of fat and albumen, but no uric acid.

Mr. Macdonald, in a valuable paper on the anatomy of *Nautilus umbilicatus*, published in the Philosophical Transactions for 1855, thus describes the follicular appendages of the branchial arteries:—

"These follicles are subcylindrical in form, somewhat dilated at the free extremity, to which is appended a folded and funnel-shaped process of membrane, which expands rather suddenly, presenting a jagged and irregular border. They open by a smooth and oval or slit-like, orifice into the afferent pulmonary vessels, on each of which, as Professor Owen has observed, they are disposed in three clusters. The outer membrane is smooth and glassy, homogeneous in structure and sprinkled over with minute rounded and transparent bodies, probably the nuclei of cells. Beneath this layer, flat bundles of fibres, apparently muscular, are traceable here and there, principally disposed in a longitudinal direction, and sometimes branched. The lining membrane consists of a loose epithelial pavement in many respects similar to that of the uriniferous tubules of the higher animals, the cells containing, besides the nuclei, numerous minute oil-globules, or a substance much resembling concrete fatty matter. This membrane is thrown up into an infinite number of papillæ and corrugations, so as to augment the extent of surface considerably. The papillæ are more numerous at the inner part or towards the attached end; and a circlet of longitudinally disposed folds radiate from the bottom of the follicles, in which a number of small pits or fenestrations are sometimes visible. The sides of these folds are wrinkled

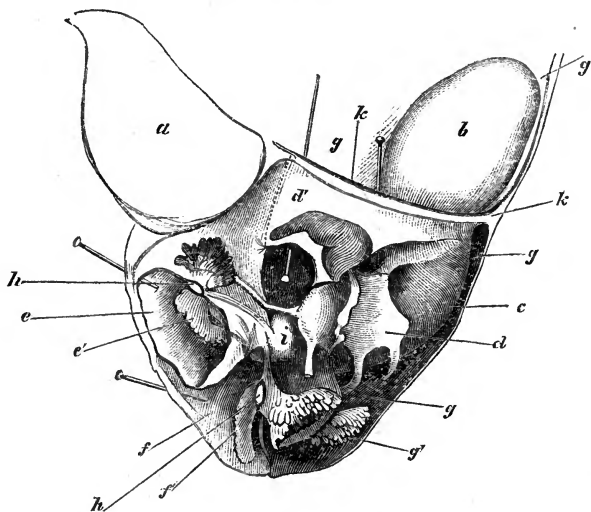
transversely so as to present a median zigzag elevation. The funnel-shaped membranous process above noticed is continuous with the lining membrane, consisting of an extension of the same epithelial pavement; but the cells are somewhat larger and more regular in form. The cavity of each follicle, therefore, communicates with the exterior through the centre of this process; and the aperture is thus guarded by a kind of circular valve, permitting the escape of secreted matter, but effectually preventing the entrance of fluid from without."

In his fig. 9, pl. xv., Mr. Macdonald depicts certain "crystalline bodies often occurring within the follicles."

From what Mr. Macdonald states, one would be led to conclude that all the follicles have the same structure; but I suspect this to be an oversight.

In the second edition of Professor Owen's Lectures on the Invertebrata (1855), I find no mention of Valenciennes' discovery

Nautilus pompilius. Fig. 1.



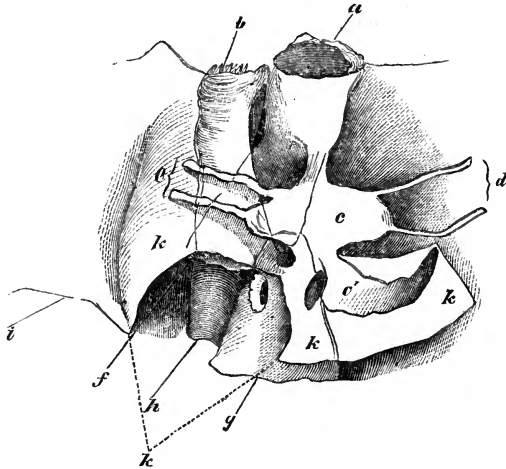
Viewed from the left side and a little behind.

Two of the anterior chambers, and the fifth or posterior chamber, laid open. Natural size.

a. Shell muscle. *b.* Ovary. *c.* Intestine. *d.* Heart; *d'*. its pyriform appendage. *e.* Superior anterior chamber; *e'*. its follicles. *f.* Inferior anterior chamber; *f'*. its follicles. *g.* Posterior chamber; *g'*. Follicles. *h.* Cut ends of branchial arteries. *i.* Termination of vena cava. *k.* Pallio-visceral ligament.

of the additional four apertures; but the author states that "on each side, at the roots of the anterior branchiæ, there is a small mamillary eminence with a transverse slit, which conducts from the branchial cavity to one of the compartments of the pericardium containing two clusters of venous glands. There are also two similar, but smaller, slits, contiguous to one another, near the root of the posterior branchia on each side, which lead to and may admit sea-water into the compartments containing the posterior cluster of the venous follicles." In this work the ovary is not only described, but *figured*, on the right side of the gizzard. The figure, however, rightly places the greater part of the ovary below that organ.

Nautilus pompilius. Fig. 2.



Natural Size.

The pallio-visceral ligament seen from below: torn on the right side to show the rectum and oviduct; cut through on the left side along the dotted line close to *d'* in the preceding figure.

a. Anus. *b.* Oviducal aperture. *c.* Heart. *d.* Left branchial veins. *e.* Right branchial veins. *f.* Oviduct cut through. *g.* Ovary. *h.* Rectum. *i.* Mantle. *k k k.* Pallio-visceral ligament; *k'* its torn portion. The oval "aperture for the siphonal artery" is seen to the left of *c'*, and the right-hand style in *Fig. 1* passes through it.

On the Tendency of Species to form Varieties; and on the Perpetuation of Varieties and Species by Natural Means of Selection. By CHARLES DARWIN, Esq., F.R.S., F.L.S., & F.G.S., and ALFRED WALLACE, Esq. Communicated by Sir CHARLES LYELL, F.R.S., F.L.S., and J. D. HOOKER, Esq., M.D., V.P.R.S., F.L.S., &c.

[Read July 1st, 1858.]

London, June 30th, 1858.

MY DEAR SIR,—The accompanying papers, which we have the honour of communicating to the Linnean Society, and which all relate to the same subject, viz. the Laws which affect the Production of Varieties, Races, and Species, contain the results of the investigations of two indefatigable naturalists, Mr. Charles Darwin and Mr. Alfred Wallace.

These gentlemen having, independently and unknown to one another, conceived the same very ingenious theory to account for the appearance and perpetuation of varieties and of specific forms on our planet, may both fairly claim the merit of being original thinkers in this important line of inquiry; but neither of them having published his views, though Mr. Darwin has for many years past been repeatedly urged by us to do so, and both authors having now unreservedly placed their papers in our hands, we think it would best promote the interests of science that a selection from them should be laid before the Linnean Society.

Taken in the order of their dates, they consist of:—

1. Extracts from a MS. work on Species*, by Mr. Darwin, which was sketched in 1839, and copied in 1844, when the copy was read by Dr. Hooker, and its contents afterwards communicated to Sir Charles Lyell. The first Part is devoted to “The Variation of Organic Beings under Domestication and in their Natural State;” and the second chapter of that Part, from which we propose to read to the Society the extracts referred to, is headed, “On the Variation of Organic Beings in a state of Nature; on the Natural Means of Selection; on the Comparison of Domestic Races and true Species.”

2. An abstract of a private letter addressed to Professor Asa Gray, of Boston, U.S., in October 1857, by Mr. Darwin, in which

* This MS. work was never intended for publication, and therefore was not written with care.—C. D. 1858.

he repeats his views, and which shows that these remained unaltered from 1839 to 1857.

3. An Essay by Mr. Wallace, entitled "On the Tendency of Varieties to depart indefinitely from the Original Type." This was written at Ternate in February 1858, for the perusal of his friend and correspondent Mr. Darwin, and sent to him with the expressed wish that it should be forwarded to Sir Charles Lyell, if Mr. Darwin thought it sufficiently novel and interesting. So highly did Mr. Darwin appreciate the value of the views therein set forth, that he proposed, in a letter to Sir Charles Lyell, to obtain Mr. Wallace's consent to allow the Essay to be published as soon as possible. Of this step we highly approved, provided Mr. Darwin did not withhold from the public, as he was strongly inclined to do (in favour of Mr. Wallace), the memoir which he had himself written on the same subject, and which, as before stated, one of us had perused in 1844, and the contents of which we had both of us been privy to for many years. On representing this to Mr. Darwin, he gave us permission to make what use we thought proper of his memoir, &c.; and in adopting our present course, of presenting it to the Linnean Society, we have explained to him that we are not solely considering the relative claims to priority of himself and his friend, but the interests of science generally; for we feel it to be desirable that views founded on a wide deduction from facts, and matured by years of reflection, should constitute at once a goal from which others may start, and that, while the scientific world is waiting for the appearance of Mr. Darwin's complete work, some of the leading results of his labours, as well as those of his able correspondent, should together be laid before the public.

We have the honour to be yours very obediently,

CHARLES LYELL.

JOS. D. HOOKER.

J. J. Bennett, Esq.,

Secretary of the Linnean Society.

- I. *Extract from an unpublished Work on Species, by C. DARWIN, Esq., consisting of a portion of a Chapter entitled, "On the Variation of Organic Beings in a state of Nature; on the Natural Means of Selection; on the Comparison of Domestic Races and true Species."*

De Candolle, in an eloquent passage, has declared that all nature is at war, one organism with another, or with external nature.

Seeing the contented face of nature, this may at first well be doubted; but reflection will inevitably prove it to be true. The war, however, is not constant, but recurrent in a slight degree at short periods, and more severely at occasional more distant periods; and hence its effects are easily overlooked. It is the doctrine of Malthus applied in most cases with tenfold force. As in every climate there are seasons, for each of its inhabitants, of greater and less abundance, so all annually breed; and the moral restraint which in some small degree checks the increase of mankind is entirely lost. Even slow-breeding mankind has doubled in twenty-five years; and if he could increase his food with greater ease, he would double in less time. But for animals without artificial means, the amount of food for each species must, *on an average*, be constant, whereas the increase of all organisms tends to be geometrical, and in a vast majority of cases at an enormous ratio. Suppose in a certain spot there are eight pairs of birds, and that *only* four pairs of them annually (including double hatches) rear only four young, and that these go on rearing their young at the same rate, then at the end of seven years (a short life, excluding violent deaths, for any bird) there will be 2048 birds, instead of the original sixteen. As this increase is quite impossible, we must conclude either that birds do not rear nearly half their young, or that the average life of a bird is, from accident, not nearly seven years. Both checks probably concur. The same kind of calculation applied to all plants and animals affords results more or less striking, but in very few instances more striking than in man.

Many practical illustrations of this rapid tendency to increase are on record, among which, during peculiar seasons, are the extraordinary numbers of certain animals; for instance, during the years 1826 to 1828, in La Plata, when from drought some millions of cattle perished, the whole country actually *swarmed* with mice. Now I think it cannot be doubted that during the breeding-season all the mice (with the exception of a few males or females in excess) ordinarily pair, and therefore that this astounding increase during three years must be attributed to a greater number than usual surviving the first year, and then breeding, and so on till the third year, when their numbers were brought down to their usual limits on the return of wet weather. Where man has introduced plants and animals into a new and favourable country, there are many accounts in how surprisingly few years the whole country has become stocked with them. This increase would

necessarily stop as soon as the country was fully stocked; and yet we have every reason to believe, from what is known of wild animals, that *all* would pair in the spring. In the majority of cases it is most difficult to imagine where the checks fall—though generally, no doubt, on the seeds, eggs, and young; but when we remember how impossible, even in mankind (so much better known than any other animal), it is to infer from repeated casual observations what the average duration of life is, or to discover the different percentage of deaths to births in different countries, we ought to feel no surprise at our being unable to discover where the check falls in any animal or plant. It should always be remembered, that in most cases the checks are recurrent yearly in a small, regular degree, and in an extreme degree during unusually cold, hot, dry, or wet years, according to the constitution of the being in question. Lighten any check in the least degree, and the geometrical powers of increase in every organism will almost instantly increase the average number of the favoured species. Nature may be compared to a surface on which rest ten thousand sharp wedges touching each other and driven inwards by incessant blows. Fully to realize these views much reflection is requisite. Malthus on man should be studied; and all such cases as those of the mice in La Plata, of the cattle and horses when first turned out in South America, of the birds by our calculation, &c., should be well considered. Reflect on the enormous multiplying power *inherent and annually in action* in all animals; reflect on the countless seeds scattered by a hundred ingenious contrivances, year after year, over the whole face of the land; and yet we have every reason to suppose that the average percentage of each of the inhabitants of a country usually remains constant. Finally, let it be borne in mind that this average number of individuals (the external conditions remaining the same) in each country is kept up by recurrent struggles against other species or against external nature (as on the borders of the Arctic regions, where the cold checks life), and that ordinarily each individual of every species holds its place, either by its own struggle and capacity of acquiring nourishment in some period of its life, from the egg upwards; or by the struggle of its parents (in short-lived organisms, when the main check occurs at longer intervals) with other individuals of the *same* or *different* species.

But let the external conditions of a country alter. If in a small degree, the relative proportions of the inhabitants will in most cases simply be slightly changed; but let the number of

inhabitants be small, as on an island, and free access to it from other countries be circumscribed, and let the change of conditions continue progressing (forming new stations), in such a case the original inhabitants must cease to be as perfectly adapted to the changed conditions as they were originally. It has been shown in a former part of this work, that such changes of external conditions would, from their acting on the reproductive system, probably cause the organization of those beings which were most affected to become, as under domestication, plastic. Now, can it be doubted, from the struggle each individual has to obtain subsistence, that any minute variation in structure, habits, or instincts, adapting that individual better to the new conditions, would tell upon its vigour and health? In the struggle it would have a better *chance* of surviving; and those of its offspring which inherited the variation, be it ever so slight, would also have a better *chance*. Yearly more are bred than can survive; the smallest grain in the balance, in the long run, must tell on which death shall fall, and which shall survive. Let this work of selection on the one hand, and death on the other, go on for a thousand generations, who will pretend to affirm that it would produce no effect, when we remember what, in a few years, Bakewell effected in cattle, and Western in sheep, by this identical principle of selection?

To give an imaginary example from changes in progress on an island:—let the organization of a canine animal which preyed chiefly on rabbits, but sometimes on hares, become slightly plastic; let these same changes cause the number of rabbits very slowly to decrease, and the number of hares to increase; the effect of this would be that the fox or dog would be driven to try to catch more hares: his organization, however, being slightly plastic, those individuals with the lightest forms, longest limbs, and best eyesight, let the difference be ever so small, would be slightly favoured, and would tend to live longer, and to survive during that time of the year when food was scarcest; they would also rear more young, which would tend to inherit these slight peculiarities. The less fleet ones would be rigidly destroyed. I can see no more reason to doubt that these causes in a thousand generations would produce a marked effect, and adapt the form of the fox or dog to the catching of hares instead of rabbits, than that greyhounds can be improved by selection and careful breeding. So would it be with plants under similar circumstances. If the number of individuals of a species with plumed seeds could be increased by greater powers of dissemination within its own area

(that is, if the check to increase fell chiefly on the seeds), those seeds which were provided with ever so little more down, would in the long run be most disseminated; hence a greater number of seeds thus formed would germinate, and would tend to produce plants inheriting the slightly better-adapted down*.

Besides this natural means of selection, by which those individuals are preserved, whether in their egg, or larval, or mature state, which are best adapted to the place they fill in nature, there is a second agency at work in most unisexual animals, tending to produce the same effect, namely, the struggle of the males for the females. These struggles are generally decided by the law of battle, but in the case of birds, apparently, by the charms of their song, by their beauty or their power of courtship, as in the dancing rock-thrush of Guiana. The most vigorous and healthy males, implying perfect adaptation, must generally gain the victory in their contests. This kind of selection, however, is less rigorous than the other; it does not require the death of the less successful, but gives to them fewer descendants. The struggle falls, moreover, at a time of year when food is generally abundant, and perhaps the effect chiefly produced would be the modification of the secondary sexual characters, which are not related to the power of obtaining food, or to defence from enemies, but to fighting with or rivalling other males. The result of this struggle amongst the males may be compared in some respects to that produced by those agriculturists who pay less attention to the careful selection of all their young animals, and more to the occasional use of a choice mate.

II. *Abstract of a Letter from C. DARWIN, Esq., to Prof. ASA GRAY, Boston, U.S., dated Down, September 5th, 1857.*

1. It is wonderful what the principle of selection by man, that is the picking out of individuals with any desired quality, and breeding from them, and again picking out, can do. Even breeders have been astounded at their own results. They can act on differences inappreciable to an uneducated eye. Selection has been *methodically* followed in *Europe* for only the last half century; but it was occasionally, and even in some degree methodically, followed in the most ancient times. There must have been also a kind of unconscious selection from a remote period, namely in

* I can see no more difficulty in this, than in the planter improving his varieties of the cotton plant.—C. D. 1858.

the preservation of the individual animals (without any thought of their offspring) most useful to each race of man in his particular circumstances. The "roguing," as nurserymen call the destroying of varieties which depart from their type, is a kind of selection. I am convinced that intentional and occasional selection has been the main agent in the production of our domestic races; but however this may be, its great power of modification has been indisputably shown in later times. Selection acts only by the accumulation of slight or greater variations, caused by external conditions, or by the mere fact that in generation the child is not absolutely similar to its parent. Man, by this power of accumulating variations, adapts living beings to his wants—may be said to make the wool of one sheep good for carpets, of another for cloth, &c.

2. Now suppose there were a being who did not judge by mere external appearances, but who could study the whole internal organization, who was never capricious, and should go on selecting for one object during millions of generations; who will say what he might not effect? In nature we have some *slight* variation occasionally in all parts; and I think it can be shown that changed conditions of existence is the main cause of the child not exactly resembling its parents; and in nature geology shows us what changes have taken place, and are taking place. We have almost unlimited time; no one but a practical geologist can fully appreciate this. Think of the Glacial period, during the whole of which the same species at least of shells have existed; there must have been during this period millions on millions of generations.

3. I think it can be shown that there is such an unerring power at work in *Natural Selection* (the title of my book), which selects exclusively for the good of each organic being. The elder De Candolle, W. Herbert, and Lyell have written excellently on the struggle for life; but even they have not written strongly enough. Reflect that every being (even the elephant) breeds at such a rate, that in a few years, or at most a few centuries, the surface of the earth would not hold the progeny of one pair. I have found it hard constantly to bear in mind that the increase of every single species is checked during some part of its life, or during some shortly recurrent generation. Only a few of those annually born can live to propagate their kind. What a trifling difference must often determine which shall survive, and which perish!

4. Now take the case of a country undergoing some change. This will tend to cause some of its inhabitants to vary slightly—

not but that I believe most beings vary at all times enough for selection to act on them. Some of its inhabitants will be exterminated; and the remainder will be exposed to the mutual action of a different set of inhabitants, which I believe to be far more important to the life of each being than mere climate. Considering the infinitely various methods which living beings follow to obtain food by struggling with other organisms, to escape danger at various times of life, to have their eggs or seeds disseminated, &c. &c., I cannot doubt that during millions of generations individuals of a species will be occasionally born with some slight variation, profitable to some part of their economy. Such individuals will have a better chance of surviving, and of propagating their new and slightly different structure; and the modification may be slowly increased by the accumulative action of natural selection to any profitable extent. The variety thus formed will either coexist with, or, more commonly, will exterminate its parent form. An organic being, like the woodpecker or misseltoe, may thus come to be adapted to a score of contingences—natural selection accumulating those slight variations in all parts of its structure, which are in any way useful to it during any part of its life.

5. Multiform difficulties will occur to every one, with respect to this theory. Many can, I think, be satisfactorily answered. *Natura non facit saltum* answers some of the most obvious. The slowness of the change, and only a very few individuals undergoing change at any one time, answers others. The extreme imperfection of our geological records answers others.

6. Another principle, which may be called the principle of divergence, plays, I believe, an important part in the origin of species. The same spot will support more life if occupied by very diverse forms. We see this in the many generic forms in a square yard of turf, and in the plants or insects on any little uniform islet, belonging almost invariably to as many genera and families as species. We can understand the meaning of this fact amongst the higher animals, whose habits we understand. We know that it has been experimentally shown that a plot of land will yield a greater weight if sown with several species and genera of grasses, than if sown with only two or three species. Now, every organic being, by propagating so rapidly, may be said to be striving its utmost to increase in numbers. So it will be with the offspring of any species after it has become diversified into varieties, or subspecies, or true species. And it follows, I think, from the foregoing facts, that the varying offspring of each species will try

(only few will succeed) to seize on as many and as diverse places in the economy of nature as possible. Each new variety or species, when formed, will generally take the place of, and thus exterminate its less well-fitted parent. This I believe to be the origin of the classification and affinities of organic beings at all times; for organic beings always *seem* to branch and sub-branch like the limbs of a tree from a common trunk, the flourishing and diverging twigs destroying the less vigorous—the dead and lost branches rudely representing extinct genera and families.

This sketch is *most* imperfect; but in so short a space I cannot make it better. Your imagination must fill up very wide blanks.

C. DARWIN.

III. *On the Tendency of Varieties to depart indefinitely from the Original Type.* By ALFRED RUSSEL WALLACE.

One of the strongest arguments which have been adduced to prove the original and permanent distinctness of species is, that *varieties* produced in a state of domesticity are more or less unstable, and often have a tendency, if left to themselves, to return to the normal form of the parent species; and this instability is considered to be a distinctive peculiarity of all varieties, even of those occurring among wild animals in a state of nature, and to constitute a provision for preserving unchanged the originally created distinct species.

In the absence or scarcity of facts and observations as to *varieties* occurring among wild animals, this argument has had great weight with naturalists, and has led to a very general and somewhat prejudiced belief in the stability of species. Equally general, however, is the belief in what are called “permanent or true varieties,”—races of animals which continually propagate their like, but which differ so slightly (although constantly) from some other race, that the one is considered to be a *variety* of the other. Which is the *variety* and which the original *species*, there is generally no means of determining, except in those rare cases in which the one race has been known to produce an offspring unlike itself and resembling the other. This, however, would seem quite incompatible with the “permanent invariability of species,” but the difficulty is overcome by assuming that such varieties have strict limits, and can never again vary further from the original type, although they may return to it, which, from the

analogy of the domesticated animals, is considered to be highly probable, if not certainly proved.

It will be observed that this argument rests entirely on the assumption, that *varieties* occurring in a state of nature are in all respects analogous to or even identical with those of domestic animals, and are governed by the same laws as regards their permanence or further variation. But it is the object of the present paper to show that this assumption is altogether false, that there is a general principle in nature which will cause many *varieties* to survive the parent species, and to give rise to successive variations departing further and further from the original type, and which also produces, in domesticated animals, the tendency of varieties to return to the parent form.

The life of wild animals is a struggle for existence. The full exertion of all their faculties and all their energies is required to preserve their own existence and provide for that of their infant offspring. The possibility of procuring food during the least favourable seasons, and of escaping the attacks of their most dangerous enemies, are the primary conditions which determine the existence both of individuals and of entire species. These conditions will also determine the population of a species; and by a careful consideration of all the circumstances we may be enabled to comprehend, and in some degree to explain, what at first sight appears so inexplicable—the excessive abundance of some species, while others closely allied to them are very rare.

The general proportion that must obtain between certain groups of animals is readily seen. Large animals cannot be so abundant as small ones; the carnivora must be less numerous than the herbivora; eagles and lions can never be so plentiful as pigeons and antelopes; the wild asses of the Tartarian deserts cannot equal in numbers the horses of the more luxuriant prairies and pampas of America. The greater or less fecundity of an animal is often considered to be one of the chief causes of its abundance or scarcity; but a consideration of the facts will show us that it really has little or nothing to do with the matter. Even the least prolific of animals would increase rapidly if unchecked, whereas it is evident that the animal population of the globe must be stationary, or perhaps, through the influence of man, decreasing. Fluctuations there may be; but permanent increase, except in restricted localities, is almost impossible. For example, our own observation must convince us that birds do not go on increasing every year in a geometrical ratio, as they would do, were there not

some powerful check to their natural increase. Very few birds produce less than two young ones each year, while many have six, eight, or ten; four will certainly be below the average; and if we suppose that each pair produce young only four times in their life, that will also be below the average, supposing them not to die either by violence or want of food. Yet at this rate how tremendous would be the increase in a few years from a single pair! A simple calculation will show that in fifteen years each pair of birds would have increased to nearly ten millions! whereas we have no reason to believe that the number of the birds of any country increases at all in fifteen or in one hundred and fifty years. With such powers of increase the population must have reached its limits, and have become stationary, in a very few years after the origin of each species. It is evident, therefore, that each year an immense number of birds must perish—as many in fact as are born; and as on the lowest calculation the progeny are each year twice as numerous as their parents, it follows that, whatever be the average number of individuals existing in any given country, *twice that number must perish annually*,—a striking result, but one which seems at least highly probable, and is perhaps under rather than over the truth. It would therefore appear that, as far as the continuance of the species and the keeping up the average number of individuals are concerned, large broods are superfluous. On the average all above *one* become food for hawks and kites, wild cats and weasels, or perish of cold and hunger as winter comes on. This is strikingly proved by the case of particular species; for we find that their abundance in individuals bears no relation whatever to their fertility in producing offspring. Perhaps the most remarkable instance of an immense bird population is that of the passenger pigeon of the United States, which lays only one, or at most two eggs, and is said to rear generally but one young one. Why is this bird so extraordinarily abundant, while others producing two or three times as many young are much less plentiful? The explanation is not difficult. The food most congenial to this species, and on which it thrives best, is abundantly distributed over a very extensive region, offering such differences of soil and climate, that in one part or another of the area the supply never fails. The bird is capable of a very rapid and long-continued flight, so that it can pass without fatigue over the whole of the district it inhabits, and as soon as the supply of food begins to fail in one place is able to discover a fresh feeding-ground. This example strikingly shows us that the procuring a constant supply

*t is now
thinner*

of wholesome food is almost the sole condition requisite for ensuring the rapid increase of a given species, since neither the limited fecundity, nor the unrestrained attacks of birds of prey and of man are here sufficient to check it. In no other birds are these peculiar circumstances so strikingly combined. Either their food is more liable to failure, or they have not sufficient power of wing to search for it over an extensive area, or during some season of the year it becomes very scarce, and less wholesome substitutes have to be found; and thus, though more fertile in offspring, they can never increase beyond the supply of food in the least favourable seasons. Many birds can only exist by migrating, when their food becomes scarce, to regions possessing a milder, or at least a different climate, though, as these migrating birds are seldom excessively abundant, it is evident that the countries they visit are still deficient in a constant and abundant supply of wholesome food. Those whose organization does not permit them to migrate when their food becomes periodically scarce, can never attain a large population. This is probably the reason why woodpeckers are scarce with us, while in the tropics they are among the most abundant of solitary birds. Thus the house sparrow is more abundant than the redbreast, because its food is more constant and plentiful,—seeds of grasses being preserved during the winter, and our farm-yards and stubble-fields furnishing an almost inexhaustible supply. Why, as a general rule, are aquatic, and especially sea birds, very numerous in individuals? Not because they are more prolific than others, generally the contrary; but because their food never fails, the sea-shores and river-banks daily swarming with a fresh supply of small mollusca and crustacea. Exactly the same laws will apply to mammals. Wild cats are prolific and have few enemies; why then are they never as abundant as rabbits? The only intelligible answer is, that their supply of food is more precarious. It appears evident, therefore, that so long as a country remains physically unchanged, the numbers of its animal population cannot materially increase. If one species does so, some others requiring the same kind of food must diminish in proportion. The numbers that die annually must be immense; and as the individual existence of each animal depends upon itself, those that die must be the weakest—the very young, the aged, and the diseased,—while those that prolong their existence can only be the most perfect in health and vigour—those who are best able to obtain food regularly, and avoid their numerous enemies. It is, as we commenced by remarking, “a struggle for existence,” in

true

which the weakest and least perfectly organized must always succumb.

Now it is clear that what takes place among the individuals of a species must also occur among the several allied species of a group,—viz. that those which are best adapted to obtain a regular supply of food, and to defend themselves against the attacks of their enemies and the vicissitudes of the seasons, must necessarily obtain and preserve a superiority in population; while those species which from some defect of power or organization are the least capable of counteracting the vicissitudes of food, supply, &c., must diminish in numbers, and, in extreme cases, become altogether extinct. Between these extremes the species will present various degrees of capacity for ensuring the means of preserving life; and it is thus we account for the abundance or rarity of species. Our ignorance will generally prevent us from accurately tracing the effects to their causes; but could we become perfectly acquainted with the organization and habits of the various species of animals, and could we measure the capacity of each for performing the different acts necessary to its safety and existence under all the varying circumstances by which it is surrounded, we might be able even to calculate the proportionate abundance of individuals which is the necessary result.

If now we have succeeded in establishing these two points—1st, *that the animal population of a country is generally stationary, being kept down by a periodical deficiency of food, and other checks*; and, 2nd, *that the comparative abundance or scarcity of the individuals of the several species is entirely due to their organization and resulting habits, which, rendering it more difficult to procure a regular supply of food and to provide for their personal safety in some cases than in others, can only be balanced by a difference in the population which have to exist in a given area*—we shall be in a condition to proceed to the consideration of *varieties*, to which the preceding remarks have a direct and very important application.

Most or perhaps all the variations from the typical form of a species must have some definite effect, however slight, on the habits or capacities of the individuals. Even a change of colour might, by rendering them more or less distinguishable, affect their safety; a greater or less development of hair might modify their habits. More important changes, such as an increase in the power or dimensions of the limbs or any of the external organs, would more or less affect their mode of procuring food or the range of

country which they inhabit. It is also evident that most changes would affect, either favourably or adversely, the powers of prolonging existence. An antelope with shorter or weaker legs must necessarily suffer more from the attacks of the feline carnivora; the passenger pigeon with less powerful wings would sooner or later be affected in its powers of procuring a regular supply of food; and in both cases the result must necessarily be a diminution of the population of the modified species. If, on the other hand, any species should produce a variety having slightly increased powers of preserving existence, that variety must inevitably in time acquire a superiority in numbers. These results must follow as surely as old age, intemperance, or scarcity of food produce an increased mortality. In both cases there may be many individual exceptions; but on the average the rule will invariably be found to hold good. All varieties will therefore fall into two classes—those which under the same conditions would never reach the population of the parent species, and those which would in time obtain and keep a numerical superiority. Now, let some alteration of physical conditions occur in the district—a long period of drought, a destruction of vegetation by locusts, the irruption of some new carnivorous animal seeking “pastures new”—any change in fact tending to render existence more difficult to the species in question, and tasking its utmost powers to avoid complete extermination; it is evident that, of all the individuals composing the species, those forming the least numerous and most feebly organized variety would suffer first, and, were the pressure severe, must soon become extinct. The same causes continuing in action, the parent species would next suffer, would gradually diminish in numbers, and with a recurrence of similar unfavourable conditions might also become extinct. The superior variety would then alone remain, and on a return to favourable circumstances would rapidly increase in numbers and occupy the place of the extinct species and variety.

The *variety* would now have replaced the *species*, of which it would be a more perfectly developed and more highly organized form. It would be in all respects better adapted to secure its safety, and to prolong its individual existence and that of the race. Such a *variety could not* return to the original form; for that form is an inferior one, and could never compete with it for existence. Granted, therefore, a “tendency” to reproduce the original type of the species, still the variety must ever remain preponderant in numbers, and under adverse physical conditions *again alone survive*.

But this new, improved, and populous race might itself, in course of time, give rise to new varieties, exhibiting several diverging modifications of form, any of which, tending to increase the facilities for preserving existence, must, by the same general law, in their turn become predominant. Here, then, we have *progression and continued divergence* deduced from the general laws which regulate the existence of animals in a state of nature, and from the undisputed fact that varieties do frequently occur. It is not, however, contended that this result would be invariable; a change of physical conditions in the district might at times materially modify it, rendering the race which had been the most capable of supporting existence under the former conditions now the least so, and even causing the extinction of the newer and, for a time, superior race, while the old or parent species and its first inferior varieties continued to flourish. Variations in unimportant parts might also occur, having no perceptible effect on the life-preserving powers; and the varieties so furnished might run a course parallel with the parent species, either giving rise to further variations or returning to the former type. All we argue for is, that certain varieties have a tendency to maintain their existence longer than the original species, and this tendency must make itself felt; for though the doctrine of chances or averages can never be trusted to on a limited scale, yet, if applied to high numbers, the results come nearer to what theory demands, and, as we approach to an infinity of examples, become strictly accurate. Now the scale on which nature works is so vast—the numbers of individuals and periods of time with which she deals approach so near to infinity, that any cause, however slight, and however liable to be veiled and counteracted by accidental circumstances, must in the end produce its full legitimate results.

Let us now turn to domesticated animals, and inquire how varieties produced among them are affected by the principles here enunciated. The essential difference in the condition of wild and domestic animals is this,—that among the former, their well-being and very existence depend upon the full exercise and healthy condition of all their senses and physical powers, whereas, among the latter, these are only partially exercised, and in some cases are absolutely unused. A wild animal has to search, and often to labour, for every mouthful of food—to exercise sight, hearing, and smell in seeking it, and in avoiding dangers, in procuring shelter from the inclemency of the seasons, and in providing for the subsistence and safety of its offspring. There is no muscle of

its body that is not called into daily and hourly activity; there is no sense or faculty that is not strengthened by continual exercise. The domestic animal, on the other hand, has food provided for it, is sheltered, and often confined, to guard it against the vicissitudes of the seasons, is carefully secured from the attacks of its natural enemies, and seldom even rears its young without human assistance. Half of its senses and faculties are quite useless; and the other half are but occasionally called into feeble exercise, while even its muscular system is only irregularly called into action.

Now when a variety of such an animal occurs, having increased power or capacity in any organ or sense, such increase is totally useless, is never called into action, and may even exist without the animal ever becoming aware of it. In the wild animal, on the contrary, all its faculties and powers being brought into full action for the necessities of existence, any increase becomes immediately available, is strengthened by exercise, and must even slightly modify the food, the habits, and the whole economy of the race. It creates as it were a new animal, one of superior powers, and which will necessarily increase in numbers and outlive those inferior to it.

Again, in the domesticated animal all variations have an equal chance of continuance; and those which would decidedly render a wild animal unable to compete with its fellows and continue its existence are no disadvantage whatever in a state of domesticity. Our quickly fattening pigs, short-legged sheep, pouter pigeons, and poodle dogs could never have come into existence in a state of nature, because the very first step towards such inferior forms would have led to the rapid extinction of the race; still less could they now exist in competition with their wild allies. The great speed but slight endurance of the race horse, the unwieldy strength of the ploughman's team, would both be useless in a state of nature. If turned wild on the pampas, such animals would probably soon become extinct, or under favourable circumstances might each lose those extreme qualities which would never be called into action, and in a few generations would revert to a common type, which must be that in which the various powers and faculties are so proportioned to each other as to be best adapted to procure food and secure safety,—that in which by the full exercise of every part of his organization the animal can alone continue to live. Domestic varieties, when turned wild, *must* return to something near the type of the original wild stock, *or become altogether extinct.*

We see, then, that no inferences as to varieties in a state of nature can be deduced from the observation of those occurring among domestic animals. The two are so much opposed to each other in every circumstance of their existence, that what applies to the one is almost sure not to apply to the other. Domestic animals are abnormal, irregular, artificial; they are subject to varieties which never occur and never can occur in a state of nature: their very existence depends altogether on human care; so far are many of them removed from that just proportion of faculties, that true balance of organization, by means of which alone an animal left to its own resources can preserve its existence and continue its race.

The hypothesis of Lamarck—that progressive changes in species have been produced by the attempts of animals to increase the development of their own organs, and thus modify their structure and habits—has been repeatedly and easily refuted by all writers on the subject of varieties and species, and it seems to have been considered that when this was done the whole question has been finally settled; but the view here developed renders such an hypothesis quite unnecessary, by showing that similar results must be produced by the action of principles constantly at work in nature. The powerful retractile talons of the falcon- and the cat-tribes have not been produced or increased by the volition of those animals; but among the different varieties which occurred in the earlier and less highly organized forms of these groups, *those always survived longest which had the greatest facilities for seizing their prey*. Neither did the giraffe acquire its long neck by desiring to reach the foliage of the more lofty shrubs, and constantly stretching its neck for the purpose, but because any varieties which occurred among its antitypes with a longer neck than usual *at once secured a fresh range of pasture over the same ground as their shorter-necked companions, and on the first scarcity of food were thereby enabled to outlive them*. Even the peculiar colours of many animals, especially insects, so closely resembling the soil or the leaves or the trunks on which they habitually reside, are explained on the same principle; for though in the course of ages varieties of many tints may have occurred, *yet those races having colours best adapted to concealment from their enemies would inevitably survive the longest*. We have also here an acting cause to account for that balance so often observed in nature,—a deficiency in one set of organs always being compensated by an increased development of some others—powerful wings accompanying weak

feet, or great velocity making up for the absence of defensive weapons; for it has been shown that all varieties in which an unbalanced deficiency occurred could not long continue their existence. The action of this principle is exactly like that of the centrifugal governor of the steam engine, which checks and corrects any irregularities almost before they become evident; and in like manner no unbalanced deficiency in the animal kingdom can ever reach any conspicuous magnitude, because it would make itself felt at the very first step, by rendering existence difficult and extinction almost sure soon to follow. An origin such as is here advocated will also agree with the peculiar character of the modifications of form and structure which obtain in organized beings—the many lines of divergence from a central type, the increasing efficiency and power of a particular organ through a succession of allied species, and the remarkable persistence of unimportant parts such as colour, texture of plumage and hair; form of horns or crests, through a series of species differing considerably in more essential characters. It also furnishes us with a reason for that “more specialized structure” which Professor Owen states to be a characteristic of recent compared with extinct forms, and which would evidently be the result of the progressive modification of any organ applied to a special purpose in the animal economy.

We believe we have now shown that there is a tendency in nature to the continued progression of certain classes of *varieties* further and further from the original type—a progression to which there appears no reason to assign any definite limits—and that the same principle which produces this result in a state of nature will also explain why domestic varieties have a tendency to revert to the original type. This progression, by minute steps, in various directions, but always checked and balanced by the necessary conditions, subject to which alone existence can be preserved, may, it is believed, be followed out so as to agree with all the phenomena presented by organized beings, their extinction and succession in past ages, and all the extraordinary modifications of form, instinct, and habits which they exhibit.

Ternate, February, 1858.





Contributions to the Anatomy and Natural History of the Cetacea. By R. KNOX, Esq., M.D., F.R.S.E. Communicated by the Secretary.

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Part I. THE DOLPHINS.

THE dissection of the Cetacea, and more especially of the larger kinds, is attended with great difficulty, and not unfrequently entails heavy expenses on those who attempt it. For these reasons I have thought that zoologists might be pleased to have, even now, submitted to them the results of numerous dissections made many years ago, when, not stinted in means, and having the aid of excellent assistants, I attempted the dissection even of the gigantic Arctic Rorqual, the largest, perhaps, of all living beings. Certain of the details have been from time to time laid before the public, but in an extremely scattered and incomplete form, and without the illustrations (artistic), which explain so much better than any verbal description. The greater part is still before me in manuscript. It is my intention in the following contributions to endeavour to connect them together, adding to those already published many facts I find in MSS. The original drawings, made by my brother and by Messrs. Edward Forbes and Henry Goodsir (who were at that time my students and assistants), are still in my possession.

Determination of Species.—The determination of species as regards the *Cetacea* is one of much difficulty; Cuvier met this difficulty by an appeal to anatomy. The number of vertebræ composing the vertebral column (exclusive of the cephalic) seemed to me a tolerably secure guide in the determination of species,—being aware, however, that some doubted the method, believing that the number of the vertebræ might vary, first, with the individual, secondly with the age of the specimen. I still continue to be of my original opinion, that the number of vertebræ comprising the vertebral column, properly so called, may safely be trusted in determining the species of the *Cetacea*; and with this view I drew up the following Table, excepting from it the genus *Dugong*, which I have never considered to be a Cetacean:—

Tabular View of the Number of the Vertebrae in certain Cetacea.
(Cephalic vertebrae excluded.)

SPECIES.	Authorities.				
	CUVIER.	RUDOLPHI.	KNOX.	J. HUNTER.	HUNTER (Glasgow.)
1. MYSTICETUS.					
Skeleton of the fœtus (the cervical reckoned as 7) of the <i>Mysticetus</i> <i>borealis</i> , Greenland.....			48		
Adult <i>Mysticetus</i> , Whale of Commerce .	unknown				
<i>B. Mysticetus australis</i> , True Whale of the Cape Seas.....	59				
2. BALÆNOPTERA.					
Gigantic Northern Ror- qual			65		
Specimen of Rorqual de- scribed by Rudolphi .		54			
<i>B. rostrata</i> of Fabri- cius ; on the authority of Van Beneden :					
A. Rorqual					48
Great Whale at Ant- werp. Van Beneden. Species not stated ...					61 or 62.
The lesser Rorqual of the North.....			48	46	46
Great Rorqual of the Cape.....	52				
3. PHYSETER.					
Sperm Whale or Ca- chalot	60				
4. DELPHINUS.					
<i>D. Delphis</i>	67				
<i>D. Delphis</i> . In my museum			81		
<i>D. Delphis</i> . In the Museum of Dr. R. Hunter, Glasgow.....					90
<i>D. Delphis</i> . Dissected by John Hunter				60	
<i>D. Phocæna</i>	66		65	51	
<i>D. Ebsenii</i> . Van Bene- den					90

In a late number of the 'Bulletins of the Royal Academy of Brussels' I find some valuable remarks in respect of these points by M. Van Beneden. He praises, and deservedly, no doubt, the exertions of M. Eschricht to collect a proper Museum of the Cetacea. It appears, according to M. Eschricht, that at no age whatever do we find in true whales (meaning, I presume, the

Mysticetus borealis and *australis*) any distinct vertebræ in the cervical region as in other mammals. A fusion of all into one bone or cartilage seems to take place even in the youngest fœtus. In the fœtus examined by me of this species (a specimen removed from the uterus of a true *Mysticetus* killed in the Greenland seas), I do not recollect the precise appearance of the cervical vertebræ; but the skeleton is in existence, and shall be referred to. To the skeleton of the Rorqual now in the Museum at Antwerp, and which seems to me of the same species as the one I dissected in Scotland (and of which the skeleton, prepared with infinite care by my brother and myself, was presented by me to the Town Council of Edinburgh, and is now preserved in the Zoological Gardens of the same city), he gives the following vertebræ:—

Skeleton of the Rorqual at Antwerp—Cervical . .	7
Dorsal . .	14–15
Lumbar . .	15
Caudal . .	25*
	—
Total	61 or 62

In the skeleton of the Great Rorqual now in the Zoological Gardens at Edinburgh, and originally dissected and prepared by my brother and myself, these vertebræ are—

Cervical	7
Dorsal	15
Lumbar and Caudal	43
	—
Total	65

In that of the Lesser Rorqual I dissected in 1830, the skeleton of which I think is still preserved in the Museum of the University of Edinburgh, we found—

	Vertebræ.
Cervical	7
Dorsal	11
Lumbar	13
Caudal	17
	—
Total	48

The specimen was that of a young animal, and of the same species,

* It is stated that some of the last of these are of wood. The skeleton in Edinburgh is perfect.

I believe, as the one described by Mr. Hunter and Fabricius ; it is a distinct species, and not merely the young of the Great Rorqual.

I shall return to the Dugong, as not being a Cetacean, in a future Section : its skeleton has been examined in a masterly way by De Blainville, an anatomist and observer of the highest order, since the time I wrote and published my Memoir on the Dugong.

The first great step in the anatomy of the Cetacea is unquestionably due to Cuvier ; but his dissections were almost confined to the genus *Delphinus*, or the common Porpoise of our coasts. I repeated all his dissections, and found them, as they almost always were, scrupulously exact ; but when I came to examine Cetacea with whalebone instead of teeth, I was surprised to find how different, in fact, the anatomy of the two great families was. Scarcely in any great natural family do we find Cuvier's favourite theory of anatomical and physiological co-relations so entirely at fault as in the Cetacea. The teeth or whalebone, as natural-history characters, lead to no results ; the whole structure of the interior defies all *à-priori* reasoning. The brain in whalebone-whales does not fill the interior of the cranium ; so that the capacity of the one is no measure of the solid bulk of the other. Their food is various, having no relation to the teeth or buccal appendages ; vascular structures surround the spinal marrow, and extend in the *Balænoptera* into the cavity of the cranium, which seem to be without any analogy in other mammals, or, at the least, a very obscure one, and whose functions are wholly unknown.

Cetacea might with some propriety be divided into whales with whalebone, and whales with teeth. Those with whalebone have rudimentary teeth in both jaws in the foetal state. Fossil Cetacea exist, and they seem to have been of both kinds, but, no doubt, were generically and specifically distinct from the recent. Judging from the remains of those I have seen, I am inclined to think that those with teeth were of a stronger and firmer build in the skeleton than those called recent ; that the neck was longer, and the caudal portion of the column shorter than in the recent kinds, and that they approached the Saurians in form. There is a remarkable want of symmetry in the crania of some of the Cetacea ; but most remarkable is the cranium of the Narwhal. Of this fact I have already spoken, in the article published in the Transactions of the Royal Society of Edinburgh.

Delphinus Phocæna. Dissection of a small Cetacean sent to me from Orkney in the month of May 1835.—This species is said to abound on the coasts, and to furnish a kind of fishery to the in-

habitants. On dissection we found 81 vertebræ, exclusive of the cephalic. The species must be quite distinct from those previously and subsequently examined by myself and many others, in which the number of vertebræ ranged from 61 to 66. It is also, I think, distinct from the specimen I saw in Dr. R. Hunter's Museum in Glasgow, in which the number of vertebræ was 90, exclusive of the cephalic in all the cases. Thus it stands with regard to the Cetacea called Porpoises and Dolphins.

In certain species of *Delphinus* the vertical column is composed of 61 vertebræ, in others of 65, in others of 66, in others of 81, in others of 90.

The specimen I now describe was, no doubt, that of a young animal; and the skeleton was prepared, consequently, as a natural one. This method has the advantage of security against the loss of any important osseous structures, which too frequently happens when the bones require to be macerated. The bones contained little oil, and weighed, head included, only $7\frac{1}{4}$ lbs.; the whole animal, when entire, weighed 14 stone, or 196 lbs.; the skeleton therefore was about a twenty-fourth part of the whole weight. It was a female. The external nostrils terminated in a single orifice of a semilunar shape, with the concavity turned towards the snout. Measurements of young animals have not the importance of those of the adult; but I give them here because I think that the specimen, although young, had nearly attained its full growth:—

	ft.	in.
Total length over the dorsum	6	$5\frac{2}{8}$
" " lateral surface	6	$11\frac{2}{8}$
" " abdominal surface	6	$11\frac{2}{8}$
From the snout to the nostrils	0	$11\frac{4}{8}$
From the nostrils to the dorsal fin	1	$6\frac{3}{8}$
Base of the dorsal fin	0	11
From dorsal fin to foot of tail	3	$0\frac{2}{8}$
Breadth of pectoral limb	0	$4\frac{4}{8}$
From the snout to the organs of generation . .	3	$9\frac{4}{8}$
Circumference anterior to the arm	2	9
" " dorsal fin	3	$2\frac{4}{8}$
" posterior to dorsal fin	2	10
" at setting on of the tail	0	$8\frac{4}{8}$
Length of pectoral limb	0	10
Breadth of tail	1	2
Greatest height of the dorsal fin	0	9

From the notes taken at the time, I find that my brother remarks that the Dolphin of Orkney differed a good deal in shape from those found in the Forth and seas in the South of Scotland. There were, moreover, 16 more vertebræ than in the skeleton of the Common Porpoise of authors. The teeth generally weighed $2\frac{1}{2}$ grains each.

Further, the muscles of the tongue, intrinsic as well as extrinsic, were extremely well developed. The isthmus faucium was 3 inches long. All this part was extremely glandular. A well-marked muscular gullet followed, composed of two layers of muscular fibres,—one circular internally, and one longitudinal externally. These latter sent a slip to the base of the arytænoid cartilages. The mucous membrane of the gullet had no true epidermic covering, and in this respect differed remarkably from the first gastric compartment, from which a cuticular lining could be peeled off, as strong as that from the sole of the foot in man. The larynx presented that organization so well described by the illustrious Cuvier, and which I believe to be peculiar to the whales with teeth. It differs very much, as I explained long ago, in its arrangement from that of Whalebone Whales,—a fact of which I think Cuvier was not aware. The cricoid cartilage was imperfect in form; the hyo-epiglottic muscles very strong. The proper arytænoid were present, and strong, but did not extend so high as in man; the thyro-arytænoid muscles were very fully developed. In the interior of the larynx there were no projections nor ventricles, no cuneiform cartilages, nor cornicula laryngis. The rings of the trachea formed complete circles.

Stomach.—The cuticular lining is limited to the first cavity or compartment. It is in the second compartment that is found the curious glandular arrangement first, I believe, described by me in the 'Transactions of the Royal Society of Edinburgh.' This structure is most probably not limited to the second compartment. There are four distinct compartments in the stomach of this animal. A dilated duodenum follows, 6 inches in length. It is possible that this may have been in some instances mistaken for a stomach. The valvulæ conniventes commence with the jejunum; these are longitudinal, and extend to within about 6 inches of the anus, terminating at a point where the intestine seems enlarged. The length of the intestines, large and small, was 90 feet; circumference generally about 2 inches. Thousands and tens of thousands of parasitical worms were found in the stomach, but none in the intestine. In the stomach also we found four mandibles of

the cuttlefish, but no remains of anything in the intestines, and no parasites.

Heart and Vessels.—The heart weighed exactly one pound. The Eustachian valve was small, that of Thebesius imperfect. The aorta proceeded for about 3 inches of its course before giving off any branches. At a point corresponding to the 15th or 16th lumbar vertebra the vessel divided into the common iliacs. The *art. sacri media*, its continuation, continued its course protected by the V-bones, and giving off branches corresponding to the intervertebral spaces.

Brain and Nervous System.—The erectile tissue surrounding the spinal cord and origin of the spinal nerves in the Cetacea did not extend into the interior of the cranium. The entire encephalic mass weighed $2\frac{1}{2}$ lbs.: cerebrum, 2 lbs.; cerebellum, $\frac{1}{4}$; pons and medulla, $\frac{1}{4}=2\frac{1}{2}$. Compared with a drawing of Camper of the *Delphinus Phocæna*, the brain was found to differ remarkably, in being much broader in the line of the middle and posterior lobes. In no animal did I ever find the fibrous structure of the brain so well marked; and this extended to the cerebellum*. I give here some measurements of the brain, which may be of use to future observers. The brain is short from before backwards, but broad transversely:—

Antero-posterior diameter	5 $\frac{2}{8}$ inches.	
Breadth	8	”
Greatest breadth of the cerebellum	4	”
Length of the cerebellar hemisphere	4 $\frac{6}{8}$	”
Depth of ditto	3 $\frac{2}{8}$	”
Weight of the encephalic mass	2 $\frac{1}{2}$	lbs.
Depth of the interhemispherical fissure	1 $\frac{2}{8}$	inches.
Length of the corpus callosum	1 $\frac{7}{8}$	”
Weight of cerebrum	2	} = 2 $\frac{1}{2}$ lbs.
” cerebellum	0 $\frac{1}{4}$	
” the pons and med. oblongata	0 $\frac{1}{4}$	

Nerves.—The 7th pair was found to be unexpectedly large and firm, including both portions. The anterior roots of the spinal nerves were far more numerous than the posterior or dorsal.

* “The substance of the brain is more visibly fibrous than I ever saw it in any other animal, the fibres passing from the ventricles as from a centre to the circumference, which fibrous texture is also continued through the cortical substance.”—HUNTER, “On Whales,” ‘Animal Economy,’ Palmer’s edit. p. 373.

Muscles.—The panniculus carnosus, strong and fleshy, extended nearly over the whole trunk. The recti abdominis were powerful, and attached inferiorly in this way:—A portion runs to the pelvic bones; a much stronger to a strong aponeurosis, situated between the anus and the root of the tail.

The erector muscles of the spine (sacrolumbalis, longissimus dorsi and multifidus spinæ) weighed fully 16 lbs. They had but slender costal attachments; but their spinal (small delicate tendons) were innumerable. The scaleni were very large; and the vessels held the same relation to them as in man. The serratus magnus was comparatively small. The larger rhomboid had no spinal attachment; the minor rhomboid seemed to be the larger of the two. The pectorals were comparatively small. The adipose tissue appeared to be wholly confined to the subcutaneous region. The muscles were of a deep brown colour, full of blood, with a short, dark, and well-flavoured fibre: when cooked, they had a strong resemblance in flavour and taste to the flesh of the hare.

PART II. THE BALÆNA WHALES, OR WHALES WITH WHALEBONE.

In February 1834 a young whale of the family of Balæna Whales was caught near the Queensferry, in the Firth of Forth. One much larger had been seen some time before, but escaped. I purchased it for dissection, although I was aware that it was impossible for me, during the hurry of the winter session, to devote much time to it. But I had able assistants (Mr. Henry Goodsir, Mr. Edward Forbes, and my brother), from whom I expected a good deal of aid. Some very beautiful drawings of this whale, made for me by Mr. Edward Forbes and by my brother, are still in my possession.

It was easy to see, by the dorsal fin and by the numerous plaits or folds on the abdominal surface of the throat and chest, before any dissection, that the specimen was a young Balænopterus whale, differing in a great many points from the true whale or *Mysticetus*: for, 1st, the form of the head was entirely different; 2nd, it had a dorsal fin; and, 3rd, occupying the lower surface of the throat and thorax were numerous folds of the integuments. To this class of whales I have been in the habit of giving the name of Rorqual, to distinguish them from the other class of Whalebone Whales, the *Mysticetus* both *borealis* and *australis*.

It appears from my notes, that at that time M. G. Cuvier considered the species I now describe as identical with the Great Rorqual I had described about two years previously; but I felt convinced then, as now, that they form distinct species, and in this opinion some continental anatomists seem to coincide.

Being persuaded that there was some inaccuracy in former drawings of the species, I had the specimen suspended and drawn with great care by Mr. Edward Forbes. This position explained the mechanism of the mouth, showing its great size, even in the short Balæna Whales; its great capacity in the *Mysticetus* had never been doubted.

As to the species, the conclusion I arrived at was, that the specimen belonged to that termed by Fabricius *rostrata*, and that individuals of the species had been seen by John Hunter, Sir James Watson, and Fabricius.

Measurements.

	ft.	in.
Total length of the specimen	9	11
Circumference immediately behind the pectoral extremities	5	2
Circumference where the folds or rugæ terminated	4	8 $\frac{1}{4}$
Ditto of the tail at its origin	1	5 $\frac{1}{2}$
Length from the back fin to the setting on of the tail	2	10
„ from the snout to the ear	3	0
„ from snout to nostrils	1	4
„ of lower jaw	2	3
„ of arm; inner side	1	3
„ from the angle of the mouth to the arm	1	3
„ from snout to arm	2	9
„ of tail in depth	0	11
„ of back fin at the base	0	8
Height of back fin	0	8 $\frac{1}{2}$
From top to tip of tail	2	8 $\frac{1}{2}$
Stomach:—1st compartment, in length	1	2
2nd „ „	1	4
3rd „ „	0	8
4th „ „	0	7
5th „ „	0	3
Spleen weighed 4 ounces; its length was	0	5
Liver, 9 lbs.		
Small intestines, length	20	0

	ft. in.
Large „ „	2 4
Kidney, weight $2\frac{1}{4}$ lbs.	
Brain (including 2 inches of spinal marrow), $3\frac{1}{2}$ lbs.	
Cerebellum, pons, and 2 inches of spinal marrow, $\frac{3}{4}$ lb.	
Great hemisphere of the brain measured 3 inches in length, in breadth, $6\frac{1}{2}$; at the base, 8 inches.	
Tuber annulare	0 $1\frac{2}{8}$
Olfactory nerves, in length	0 $1\frac{1}{2}$
Ditto, breadth.	0 $2\frac{1}{2}$
Skeleton:—Length of cranium.	2 11
Greatest breadth between the orbits .	1 3
Length of vertebral column	7 8

When we compare the skeleton of this Rorqual with the Gigantic Rorqual I also dissected, we find as follows:—

	<i>R. giganteus.</i>	<i>R. minor.</i>	
Cervical vertebræ 7	7	vertebræ 7	
Dorsal. 15	15	11	
Lumbar, sacral, caudal 43	43	30	
	65	48	

These differences must be specific.

At the extremity of the snout in either jaw there were 8 strong bristles, being the only vestiges of hair found on the external surface. The mouth was of great size; the tongue large and tolerably free, and of a pale rose or vermilion colour. The baleen, where deepest, measured about 4 inches; there were 370 plates on each side; but anteriorly and posteriorly these plates were reduced to mere bristles.

The isthmus faucium allowed the closed hand to pass through it; through this isthmus I do not believe that any water ever passes into the pharynx, unless it be accidentally, as in man. The “spout” of the Whalebone Whale is composed, no doubt, of the pulmonary vapour, and not of any water received into the pharynx from the mouth.

The stomach seemed composed of five compartments externally, but presented only four when laid open, the fifth being manifestly the duodenum. In the intestines no remains of food were found, but abundance of intestinal worms, and a substance strongly resembling the human meconium. There was an ilio-cæcal valve as

distinct as in man. In the rectum the folds of the mucous membrane were transverse.

Organs of Respiration.—The external nostrils were double; and the cavities of the nostrils provided with the remarkable cartilages and muscular apparatus I discovered and described in the anatomy of the Great Rorqual. In this specimen they were about 4 inches in length, but of as many feet in the large Rorqual. The mode of breathing in the Rorquals does not differ much from that in man, with the exception of the apparatus of the protruding cartilages, which in man are rudimentary.

The *Olfactory Nerves* were quite as large as in other mammals; and in this respect the Balæna Whales are quite unlike the Dolphins*.

The trachea communicated, near its upper part, with a sac or pouch; the lungs were each composed of a single lobe. The rings of the trachea were mostly deficient anteriorly. In the heart the foetal arrangements had wholly disappeared. The dura mater seemed divisible into three layers, the external being vascular. A remarkable vascular substance connected with this layer covers the back part of the brain and cerebellum, extending into the spinal canal, and even into the chest. At the base of the brain the vascular plexus was about 2 inches in thickness. It is, as is well known, a sort of erectile tissue, of whose functions we are wholly ignorant. It is not confined to this course, but extends to the neck, and, passing through the foramina intervertebralia, fills the intercostal spaces exterior to the pleura.

There was evidently a canal in the centre of the spinal marrow. Wherever the nerves of the lungs and stomach were traced, they terminated in loops. We did not observe in the Great Rorqual any tracheal pouch like that in the smaller; but it may have escaped notice: if absent in the Great Rorqual, it would be another proof of the distinctness of the species.

The doubts raised by M. St. Hilaire, as to the Whale being a mammal in the true sense of the term, were set aside long ago by an appeal to facts. The young of the Whale tribe suckle like the young of all mammals; nevertheless I showed, in 1834, that

* In his paper "On the Structure of Whales" (Phil. Trans. 1787), Hunter remarks that the organ of smell "is peculiar to the large and small Whalebone Whales." He further remarks, that, "in those that have olfactory nerves, the lateral ventricles are not continued into them as in many quadrupeds;" and he notices "the want of the olfactory nerves in the genus of the Porpoise."—'Anim. Economy,' Palmer's edit. pp. 372, 373, 376.

the lactiferous glands in the *Balenopterae* differ in structure from the same organs in most mammals.

I do not find in my notes anything to add to the description of the Great Rorqual already published in the 'Transactions of the Royal Society of Edinburgh' for 1827, to which I beg leave to refer the reader.

A single remark must be added regarding the nature of the vascular plexus which, in the Cetacea, surrounds the spinal marrow, and extends into the chest. On selecting the artery which seemed to form the plexus, which was, if I rightly recollect, in this instance an intercostal artery, and dissecting it under water, I found, to my surprise, that the artery, so long as I followed it, never gave off any branches, but continued of the same calibre throughout, making innumerable flexuosities or turnings. Thus, on a plexiform mass of this kind being cut across, the first impression is, that a great number of arterial branches or arteries have been divided, whilst in fact the entire plexus seems to be formed of one artery.

As was to be expected of animals so much withdrawn from human observation, there is but little to say on the natural history of the Cetacea properly so called. Their food, no doubt, is various, and seems to have little or no relation to the character of their dentition. The enormous Cachalot, with its vast teeth implanted only in one jaw, is generally understood to prey chiefly on the Cuttlefish. The food of the true Whale, or *Mysticetus*, is well known to be the Clio and other smaller Mollusca, with which certain regions of the ocean abound; the same, or similar, is probably the food of the more active and restless Rorquals, found in both hemispheres. The Dolphins, or Toothed Whales, generally prey, no doubt, on fishes of various kinds; yet, even as regards these, it has been proved by my esteemed friend, the late Mr. Henry Goodsir, that some of the largest, following in the wake of the herring shoals, prey not on these, but on the various microscopic food (the Entomostraca and other marine animals) which I was the first to prove to be the natural food of many excellent gregarious freshwater fish, as the Vendace, Early Loch Leven Trout, the Brown Trout of the Highland and Scottish lakes generally, and of the Herring itself*. It is scarcely necessary to add, that the complex apparatus connected with the exterior

* See Memoirs in the 'Transactions of the Royal Society of Edinburgh' for 1832.

nostrils of the Dolphins is wholly wanting in the *Balæna* Whales,—a fact of which M. Cuvier was not aware when he wrote his celebrated Treatise on Comparative Anatomy.

Appendix.—Since writing the above, I have received an answer to a letter I addressed to my friend, John Goodsir, Esq., Professor of Anatomy in the University of Edinburgh. The request contained in my letter to Mr. Goodsir was, to examine for me the skeleton of a foetal *Mysticetus* now in the University Museum. The foetus from which this skeleton was prepared was removed from the uterus of the mother, killed in the North Seas by the seamen of a whaling ship, by one of my former students, Mr. R. Auld, who presented the specimen to me. The point at issue was the composition of the cervical vertebræ in the true or Greenland Whale, the *Balæna Mysticetus*. M. Van Beneden, to whose memoir I have referred in the commencement of this, says, on the authority of Eschricht, that at no age whatever do we find in true Whales (meaning, I presume, the *Mysticetus borealis* and *australis*) any distinct vertebræ in the cervical region, as in other mammals. A fusion of all into one bone or cartilage seems to take place even in the youngest foetus. Now, I had enjoyed the rare opportunity of dissecting the foetus of the *Mysticetus*, and I knew that the skeleton, prepared with the greatest care, was still preserved in the Museum of the University of Edinburgh. I wrote to Mr. Goodsir to re-examine this point for me, for I did not find in my notes any confirmation of the observations of Eschricht. Mr. Goodsir's reply to my note is as follows:—

“ University, Edinburgh,
Sept. 30, 1857.

“ MY DEAR SIR,

“ In the skeleton of the foetal *Mysticetus* now in the University Museum, the bodies of the axis and atlas have shrivelled up together, having evidently consisted of cartilage only; but the bodies of the five posterior cervical vertebræ are beautifully distinct, having well-formed osseous centres, which give them more of the configuration of the succeeding vertebral bodies than they present in their compressed form in the adult.

“ The neural arches in the cervical region of this skeleton are five in number; the two anterior, which are distinctly those of the atlas and axis, have an osseous nodule on each side, where the transverse processes pass off. The third arch belongs to the third vertebra, the fourth and fifth to the sixth and seventh. These three arches are cartilaginous, and present no osseous centres. It

is impossible to determine from the preparation whether the arches of the fourth and fifth vertebræ had been cut away in dissecting the parts, or whether they have shrivelled up in drying; but as the skeleton was very carefully prepared, and as these two arches are deficient (at least laterally) in the adult *Mysticetus*, I presume that the cartilaginous matrices were at least extremely delicate in the fœtus.

“I believe I have stated all the facts, afforded by this skeleton, which bear upon your questions. They appear to me to afford no support to the views to which they refer.

“Yours very sincerely,
(Signed) “JOHN GOODSIR.”

The conclusion I arrived at is this,—that the actual number of cervical vertebræ in the *Mysticetus* is, as in most other mammals, seven, and that, notwithstanding their earlier fusion, they are originally quite distinct.

Extract of a Letter from Dr. BAIKIE to Sir JOHN RICHARDSON, M.D., C.B., F.R. & L.S., dated 29th October, 1857, Rabba, on the Qworra.

[Read January 21st, 1858.]

“IN natural history my collection is advancing, especially in skins and skeletons of birds. I am collecting skulls of all the domesticated animals, and skeletons of the sheep and goats. I have got a few fish, including a prettily-marked *Diodon* or *Tetraodon*, probably new, and a *Myletes* which I did not meet with formerly. The *Siluridæ* are the most abundant fishes; and one species closely resembles the *Hypophthalmus*, figured by Rüppell in his ‘Fishes of the Nile and Red Sea.’ I have not met with another *Polypterus*. I shall get a *Lepidosiren* in the river, and have heard of an electrical fish, I believe a *Malopteruris*, such as I formerly found. I enclose two scales of a fish which is said to grow to the length of 5 feet, but of which I have specimens half that size only,—also a sketch of a curious fish 2½ feet, which I put into spirits; it has neither ventral nor anal fins, a very peculiar caudal, and a slender head, while the dorsal extends along the whole back; eyes very small; teeth numerous and hard, but not sharp.” He adds, in a postscript, that he had got the *Lepidosiren*. He had collected

700 species of plants, and numerous fine fruits, which he says "will rejoice Sir William Hooker's heart."

Dr. Baikie's postscript, however, mentions that his vessel had been wrecked about twelve miles above Lagos, and that she sunk in a few minutes after she struck. He does not say what was the fate of his collections, but states that all the party had fever from fatigue and sleeping in swamps after the wreck.—J. R.

Catalogue of the Dipterous Insects collected in the Aru Islands
by Mr. A. R. WALLACE, with Descriptions of New Species.
By FRANCIS WALKER.

ARU ISLAND.

Fam. MYCETOPHILIDÆ, *Haliday*.

Gen. SCIARA, *Meigen*.

Div. A. a., *Meig.* vi. 305.

1. SCIARA SELECTA, n. s. *Mas.* Nigra, cinereo-tomentosa, antennis sat validis, pedibus piceis, alis cinereis, venis costalibus crassis.
Male. Black, with cinereous tomentum; antennæ rather stout; legs piceous; wings greyish; veins black; radial and cubital veins thick; radial vein extending to the fork of the subapical. Length of the body $1\frac{3}{4}$ line; of the wings 4 lines.

Fam. BIBIONIDÆ, *Haliday*.

Gen. PLECIA, *Hoffmansegg*.

2. *Plecia dorsalis*, *Walk.* See Vol. I. p. 5.

Fam. CULICIDÆ, *Haliday*.

3. CULEX SCUTELLARIS, n. s. *Mas.* Nigro-fuscus, capite thoraceque argenteo trivittatis, scutello rufescente; abdominis segmentis argenteo fasciatis, genibus et tarsorum posticorum fasciis niveis; alis subcinereis, venis nigris ciliatis.
Male. Blackish brown. Head and thorax with three silvery stripes, the middle one very distinct; scutellum reddish; pectus with silvery gloss; abdomen with silvery bands, which are narrow above, broad beneath; femora pale towards the base; knees snow-white; hind tarsi with 5 broad snow-white bands; middle tarsi with the first and second joints white at the base; wings slightly greyish; veins black, fringed. Length of the body 3 lines; of the wings 5 lines.

Fam. TIPULIDÆ.

Gen. MEGISTOCERA, *Wied.*

4. *Megistocera tuscana*, *Wied. Auss. Zweifl.* 1. 55. 1.
Inhabits also Java.

Gen. GYNOPLISTIA, *Westw.*

5. *GYNOPLISTIA JURGIOSA*, n. s. *Mas. et Fœm.* Nigra, capite rufescente, alis cinereis, plagis costalibus nigro-fuscis.—*Mas.* Abdomine ochraceo, apice nigro, femoribus basi testaceis.—*Fœm.* Abdomine atro fasciis albidis apice luteo.

Male and Female. Black. Head reddish; antennæ testaceous at the base; thorax testaceous in front; wings greyish, blackish-brown along the costa, and with three subcostal blackish-brown patches, the third continued along the veins towards the hind border. *Male.* Abdomen ochraceous, black at the tip; femora testaceous at the base; halteres testaceous. *Female.* Abdomen deep black, with whitish bands on the sutures; tip luteous. Length of the body 5-6 lines; of the wings 9-10 lines.

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

6. *Ptilocera quadridentata.* See Vol. I. p. 7.
7. *MASSICYTA INFLATA*, n. s. *Fœm.* Nigra, capite viridi maculis nigris, antennis basi ferrugineis, pectoris callis duobus scutelloque testaceis, abdomine basi sordide albido lineis tribus nigris, fasciis duabus canotomentosis, segmentis tertio quartoque apice ferrugineis, tibiis basi tarsisque albidis, alis subcinereis fusco marginatis, stigmatate nigricante, halteribus testaceis.
- Female.* Black. Head dull green, with several black spots; mouth testaceous; antennæ dark ferruginous towards the base; two pectoral calli and the scutellum testaceous; abdomen at the base dingy-whitish and semihyaline, and with three black lines; third and fourth segments with hoary bands, their hind borders ferruginous; tibiæ towards the base, and tarsi, whitish; hind tibiæ with the two colours most distinctly marked; wings grey, with broad brownish borders; stigma blackish; veins black; halteres testaceous. Length of the body 6 lines; of the wings 11 lines.
8. *MASSICYTA CERIOIDES*, n. s. *Fœm.* Nigra, capite testaceo maculis nigris, antennis basi ferrugineis, pectoris callis duobus, thoracis vittis duabus interruptis, scutello abdominisque fasciis tribus viridibus, segmento abdominali secundo maculis duabus testaceis, tarsis albis, alis nigricanti-fuscis, halteribus viridibus.

Female. Black. Head testaceous, with some black spots on the vertex. Antennæ dark ferruginous towards the base. An interrupted stripe on each side of the thorax, two pectoral calli, the scutellum, and the hind borders of the second, third, and fourth abdominal segments green. Abdomen testaceous at the base beneath; first band interrupted, having before it two testaceous spots. Knees lurid; tarsi white. Wings blackish brown; stigma and veins black; halteres apple-green. Length of the body 5-6 lines; of the wings 10-12 lines.

Gen. SALDUBA, n. g.

Male. *Corpus* angustum, sublineare. *Caput* transversum; vertex angustus. *Oculi* magni. *Antennæ* capite transverso valde longiores; articuli primo ad septimum breves; flagellum longum, lanceolatum, subarcuatum. *Thorax* longus, subcompressus; scutellum inerme. *Abdomen* planum, thorace paullo longius. *Pedes* graciles; postici longi. *Alæ* angustæ.

Male. Body narrow, nearly linear. Head slightly transverse, nearly as broad as the thorax; vertex narrow. Eyes large. Antennæ shorter than the thorax; joints from the first to the seventh short; flagellum long, lanceolate, slightly curved. Thorax long, slightly increasing in breadth from the head to the base of the wings. Abdomen nearly flat and linear, a little longer than the thorax. Legs slender; hind pair long. Wings narrow; veins complete, distinctly marked; first cubital areolet rather short, divided from the second by the oblique first cubital rim; discal areolet large, hexagonal; subanal and anal veins united at some distance from the border.

9. SALDUBA DIPHYSOIDES, n. s., *Mas.* Nigra, ore flavo, thorace vittis quatuor subauratis, abdominis apice cinereo, pedibus albidis, femoribus posticis apices versus tibiisque posticis nigris, alis cinereis, venis stigmatæque nigris, halteribus testaceis.

Male. Black. Mouth yellow; thorax with four stripes of slightly gilded tomentum; tip of the abdomen with cinereous tomentum; legs whitish, hind femora towards the tips and hind tibiæ black; wings greyish, veins and stigma black; halteres testaceous. Length of the body $4\frac{1}{2}$ lines; of the wings 8 lines.

Gen. STRATIOMYS.

10. STRATIOMYS CONFERTISSIMA, n. s. *Fæm.* Nigra, subtus ferruginea, capite fulvo, antennis basi fulvis, thorace vittis quatuor subauratis, scutelli margine fulvo, ventre piceo basi testaceo, pedibus fulvis nigro fasciatis; alis subcinereis, venis stigmatæque nigris, halteribus testaceis.

Female. Black, ferruginous beneath. Head, antennæ at the base, border of the scutellum, and legs tawny; antennæ a little shorter than the breadth of the head; thorax with four slightly gilded

stripes; abdomen beneath piceous, testaceous at the base; femora and tibiæ with broad black bands; wings greyish, stigma and veins black; halteres testaceous. Length of the body 4 lines; of the wings $7\frac{1}{2}$ lines.

11. *STRATIOMYS NEXURA*, n. s. *Mas et Fæm.* Nigra, antennis basi fulvis, capite transverso brevioribus, abdominis lateribus, ventre, tibiis, tarsis halteribusque fulvis, alis limpidis, venis testaceis. *Mas.* Thorace atro piloso. *Fæm.* Thorace nigro-æneo angustiore.

Male and female. Black. Head rather prominent; antennæ tawny towards the base, shorter than the breadth of the head; spines of the scutellum, abdomen beneath, tibiæ, tarsi, and halteres tawny; wings limpid, veins testaceous. *Male.* Thorax deep black, pilose; abdomen tawny along each side. *Female.* Head shining; thorax æneous black, narrower than that of the male; abdomen with the tawny stripes much narrower than those of the male. Length of the body $3\frac{1}{2}$ lines; of the wings $6\frac{1}{2}$ lines.

Gen. *CLITELLARIA*, *Meigen.*

12. *Clitellaria bivittata*, *Fabr.* See Vol. I. p. 7.

Gen. *GABAZA*, n. g.

Fæm. *Corpus* breve, latum. *Caput* transversum, thorace paullo angustius; facies valde obliqua. *Antennæ* capite transverso breviores; articuli breves, transversi; arista longa, gracilis, filiformis. *Scutellum* prominens, spinis duabus minutis. *Abdomen* transversum, thorace multo latius. *Pedes* graciles, breviusculi. *Alæ* sat angustæ; venæ tenues.

Female. Body short, broad. Head transverse, a little narrower than the thorax; face very oblique. Antennæ shorter than the breadth of the head; joints short, transverse; arista slender, filiform, longer than the preceding part, which is lanceolate. Scutellum prominent, armed with two minute spines. Abdomen transverse, much broader than the thorax. Legs slender, somewhat short. Wings rather narrow; veins feeble, in structure like those of *Stratiomys*.

13. *GABAZA ARGENTEA*, n. s. *Fæm.* Nigra, antennis fulvis, arista alba, thorace abdomineque argenteo-tomentosis, tarsis albedo-testaceis, alis limpidis, venis pallidis.

Female. Coal-black. Antennæ tawny, arista white; thorax and abdomen with bright silvery tomentum; tarsi whitish testaceous; wings limpid, veins pale. Length of the body 2 lines; of the wings $3\frac{1}{2}$ lines.

Gen. *SARGUS*, *Fabr.*

14. *Sargus metallinus*, *Fabr.* See Vol. I. p. 110.

15. *SARGUS COMPLENS*, n. s. *Fæm.* Rufescente-fulvus, capitis vertice nigro, antennis testaceis, abdomine fasciis latis abbreviatis piceis, tarsis posticis basi tibiisque posticis nigris, alis cinereis, basi sub-luridis, apud costam exteriorem nigro-fuscis.

Female. Reddish tawny. Head black above, testaceous beneath; antennæ testaceous; abdomen with four broad abbreviated piceous bands; legs tawny, hind tibiæ black with a tawny apical mark, hind tarsi black towards the base; wings greyish, slightly lurid towards the base, blackish-brown about the exterior part of the costa, veins black, tawny towards the base; halteres testaceous, tawny towards the tips. Length of the body 6 lines; of the wings 14 lines.

16. *SARGUS ROGANS*, n. s. *Mas et Fæm.* Capitis vertice nigro, antennis pedibusque testaceis, tibiis tarsisque posticis nigris, alis sub-cinereis apice obscurioribus. *Mas.* Luteo-testaceus. *Fæm.* Ferruginous.

Male and Female. Head black above; antennæ and legs testaceous; hind tibiæ and hind tarsi black; wings greyish, darker towards their tips; veins black, tawny towards the base. *Male.* Lutescent testaceous. *Female.* Ferruginous; wings darker than those of the male. Length of the body 5 lines; of the wings 10 lines.

Gen. *NERUA*, n. g.

Fæm. *Corpus* longiusculum, sublineare. *Caput* transversum, thorace non latius. *Antennæ* breves; articulus tertius rotundus; arista apicalis, longa, tenuis, setiformis. *Thorax* productus. *Scutellum* spinis quatuor longiusculis. *Abdomen* depressum, sublineare, thorace vix latius, non longius. *Pedes* graciles, non longi. *Alæ* angustæ; venæ bene determinatæ.

Female. Body rather long, nearly linear. Head transverse, not broader than the thorax. Antennæ short; third joint round; arista apical, long, slender, setiform. Thorax long. Abdomen flat, thin, nearly linear, hardly broader and not longer than the thorax. Legs slender, not long. Wings narrow; veins distinctly marked, in structure like those of *Clitellaria*.

This genus may be distinguished from *Culcua* by the shape of the abdomen.

17. *NERUA SCENOPINOIDES*, n. s. *Fæm.* Atra, nitens, antennis fulvis, scutelli spinis pedibusque albis, alis nigrocinereis, postice pallidioribus, venis nigris, halteribus testaceis.

Female. Coal-black, shining; antennæ tawny; thorax slightly tomentose; spines of the scutellum and legs white; wings blackish grey, paler towards the hind border, veins black; halteres testaceous. Length of the body 3 lines; of the wings 5 lines.

Gen. ADRAGA, n. g.

Mas. Corpus sublineare. *Caput* thorace non latius. *Oculi* connexi. *Antennæ* brevissimæ; articulus tertius rotundus; arista apicalis, gracilis, setiformis. *Thorax* sutura transversa bene determinata. *Scutellum* prominens, trigonum, marginatum. *Abdomen* thorace paullo brevius, non latius. *Pedes* breviusculi, validi, non dilatati. *Alæ* mediocres.

Male. Body nearly linear, rather thick. Head not broader than the thorax. Eyes connected. *Antennæ* very short; third joint round; arista apical, long, slender, setiform. Thorax with the transverse suture very distinct. Scutellum prominent, triangular, with a border. Abdomen a little shorter and not broader than the thorax. Legs stout, rather short, not dilated. Wings moderately broad; veins in structure like those of *Clitellaria*.

18. ADRAGA UNIVITTA, n. s. *Mas.* Nigra, subtilissime punctata, antennis piceis, thorace vitta cinerea, tarsis posterioribus albis, alis nigricantibus.

Male. Coal-black, hardly shining; *antennæ* piceous; thorax and abdomen very minutely punctured; thorax with a stripe of cinereous tomentum; posterior tarsi white; wings blackish, veins black. Length of the body 3 lines; of the wings 5 lines.

Gen. OBRAPA, n. g.

Fæm. Corpus breve, latum, crassum, convexum. *Caput* transversum, thorace angustius. *Antennæ* breves; articulus tertius rotundus; arista apicalis, gracilis, setiformis. *Thorax* sutura transversa bene determinata. *Abdomen* transversum, thorace paullo latius, valde brevius. *Pedes* breviusculi, validi; antici subdilatati. *Alæ* mediocres.

Female. Body short, broad, thick, convex. Head transverse, narrower than the thorax. *Antennæ* short; third joint round; arista apical, slender, setiform. Thorax with the transverse suture very distinct. Scutellum large, prominent, with a marginal suture. Abdomen transverse, a little broader than the thorax, and not more than half its length. Legs stout, rather short, the fore pair slightly dilated. Wings moderately broad, veins rather irregular; discal areolet large, quadrilateral; externomedial veins, subanal vein, and anal vein very slight; subanal vein and anal vein united at some distance from the border.

19. OBRAPA PERILAMPOÏDES, n. s. *Fæm.* Atra, nitens, subtilissime punctata, capite glabro, antennis piceis, tarsis posterioribus albidis, alis limpidis, venis albidis basi nigris, halteribus niveis.

Female. Deep black, shining, very minutely punctured; head smooth; *antennæ* piceous; posterior tarsi whitish, with black tips; wings limpid, veins whitish, black towards the base; halteres snow-white. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

20. *OBRAPA CELYPHOIDES*, n. s. *Fam.* Atra, nitens, subtilissime punctata, capite glabro, antennis piceis, tarsis albidis, alis nigro-cinereis, venis nigris, halteribus niveis.

Female. Deep black, very minutely punctured. Head smooth; antennæ piceous; tarsi whitish; wings blackish cinereous, veins black; halteres snow-white. Length of the body 2 lines; of the wings 4 lines.

Fam. *TABANIDÆ*, *Leach.*

Gen. *TABANUS*, *Linn.*

21. *TABANUS RECUSANS*, n. s. *Fam.* Piceus, cinereo-subtomentosus, callo nigro angusto, antennis rufis apice nigris, humeris rufescentibus, abdomine basi glaucescente, tibiis obscure ferrugineis, alis nigro-fuscis, apice margineque postico cinereis.

Female. Piceous, slightly covered with cinereous tomentum. Callus of the head black, long, slender, entire; antennæ red, black towards the tips, angle of the third joint very small; thorax reddish on each side in front of the forewings; abdomen with glaucous tomentum towards the base; tibiæ mostly dark ferruginous; wings blackish-brown, cinereous towards the tips and along the hind border; veins black; forebranch of the cubital vein simple, very slightly undulating, its tip, like that of the radial vein, clouded with blackish-brown. Length of the body $6\frac{1}{2}$ lines; of the wings 12 lines.

Fam. *ASILIDÆ*, *Leach.*

Subfam. *DASYPOGONITES*, *Walk.*

Gen. *DASYPOGON*, *Fabr.*

22. *DASYPOGON INOPINUS*, n. s. *Fam.* Piceus, facie aurata, mystace parvo albo, antennis ferrugineis, apices versus nigris, capite transverso longioribus, articulo tertio lineari, pectore fasciis tribus canis, abdominis segmentis ferrugineo fasciatis, alis luridis, apud costam nigro-fuscis, halteribus testaceis.

Female. Piceous. Face flat, brightly gilded; epistoma not prominent; mystax with a few white bristles; mouth black; antennæ ferruginous, black towards the tips, longer than the breadth of the head; third joint linear, longer than the first and the second together; pectus with three hoary bands; abdomen subclavate, nearly twice the length of the thorax; a ferruginous band on the hind border of each segment; legs mostly ferruginous; wings lurid, blackish-brown towards the costa, veins black; halteres testaceous. Length of the body 8 lines; of the wings 14 lines.

23. *DASYPOGON HONESTUS*, n. s. Lutescente-fulvus, capite, antennis, pedibus alisque nigris, thorace vitta schistacea nigro marginata vit-

tisque duabus lateralibus cinereis, pectore postico nigro, abdomine
—?, tibiis tarsisque posticis fulvis.

Luteous-tawny. Head, antennæ, hind part of the pectus, and legs black, shining; mystax with very few bristles; antennæ almost as long as the breadth of the head, third joint long, slender, linear; thorax with a slate-coloured blackish-bordered stripe, a short slate-coloured stripe on each side; abdomen wanting; hind tibiæ and tarsi tawny; wings blackish, veins black. Length of the body 4? lines; of the wings 7 lines.

Subfam. LAPHRITES, *Walk.*

Gen. LAPHRIA, *Fabr.*

24. *Laphria scapularis*, *Wied. Auss. Zweifl.* 1. 516. 29.

Inhabits also Java.

25. *Laphria aurifacies*, *Macq.* See Vol. I. p. 10.

26. LAPHRIA GLORIOSA, n. s. *Mas et Fœm.* Aurata, capite pectoreque albis, abdomine purpureo, guttis lateralibus albis, basi viridi, lateribus pedibusque cyaneis, alis fuscis basi cinereis, halteribus testaceis.

Male and Female. Head and pectus with white tomentum and hairs; mystax with a few black bristles; mouth and antennæ black; third joint of the latter linear, conical at the tip, longer than the first and the second together; thorax with cupreous-gilded tomentum; abdomen purple, green at the base, blue and with a row of white dots along each side; legs blue; wings brown, cinereous towards the base, veins black; halteres testaceous. *Male.* Legs very thick and pilose. Length of the body 9 lines; of the wings 16 lines.

27. LAPHRIA SOCIA, n. s. *Fœm.* Cyaneo-viridis, capite aurato, antennarum articulo tertio longissimo subfusiformi, thoracis tomento subaurato, vitta media nuda, pectore argenteo, abdomine purpureo-cyaneo basi viridi maculis lateralibus argenteis, alis nigro-cinereis basi cinereis.

Female. Bluish-green. Head brightly gilded, hind part silvery; mystax with six long black bristles; third joint of the antennæ very elongate subfusiform; thorax with slightly gilded tomentum, excepting a broad bare middle stripe; pectus with silvery tomentum; abdomen purplish-blue, green towards the base, with spots of silvery tomentum along each side; hind borders of the ventral segments white; wings grey, blackish-grey for almost half the length from the tips and along three-fourths of the length of the hind border, veins black; halteres ferruginous. Length of the body $8\frac{1}{2}$ lines; of the wings 16 lines.

28. LAPHRIA CONSOBRINA, n. s. *Fœm.* Purpurea, capite aurato, pectore argenteo, abdomine viridi-cyaneo, maculis lateralibus argenteis, alis nigricantibus basi cinereis.

Female. Purple. Head brightly gilded, hind part silvery, underside with white hairs; mystax with six long black bristles; pectus with silvery tomentum; abdomen greenish blue, with spots of silvery tomentum along each side; hind borders of the ventral segments white; wings slightly grey, blackish for full half the length from the tips and along full three-fourths of the length of the hind border, veins black; halteres ferruginous, with black tips. Length of the body $7\frac{1}{2}$ lines; of the wings 14 lines.

This species much resembles *L. socia*, but may be distinguished by the difference of colour, and more especially by the more undulating first branch vein, by the much less oblique third externo-medial vein, and by the subanal vein, which is united to the anal vein much nearer the border.

29. *LAPHRIA SODALIS*, n. s. *Mas*. Cyanea, capite aurato, antennarum articulo tertio fusiformi, thoracis lateribus purpureo-viridibus, pectore ventrique argenteis, abdomine maculis lateralibus argenteis, alis cinereis, apice posticeque nigricantibus.

Male. Blue. Head brightly gilded, vertex and hind part silvery, underside with white hairs; mystax with four long black bristles, and with several gilded bristles; third joint of the antennæ elongate-fusiform; sides of the thorax varied with green and purple; abdomen with spots of silvery tomentum along each side, underside and pectus silvery; wings grey, black towards the tips and along half the length of the hind border; halteres white. Length of the body 7 lines; of the wings 13 lines.

The veins of this species are hardly different from those of *L. consobrina* in structure, excepting the third externo-medial, which is united to the fourth nearer the border.

30. *LAPHRIA COMES*, n. s. *Mas et Fæm.* Viridi-cyanea, capite aurato, antennarum articulo tertio fusiformi, pectore ventrisque lateribus argenteis, abdomine viridi (mas) aut purpureo-cyaneo (fæm.) maculis lateralibus argenteis, alis nigricantibus basi cinereis.

Male and Female. Greenish blue. Head brightly gilded, hind part silvery; mystax with six long black bristles; third joint of the antennæ elongate-fusiform; pectus with silvery tomentum; abdomen green in the male, purplish-blue in the female, with silvery spots along each side, underside with two silvery stripes; wings blackish, grey at the base and along the costa for more than one-third of the length, veins and halteres black. Length of the body 6– $6\frac{1}{2}$ lines; of the wings 11–12 lines.

This may be only a small variety of *L. consobrina*; but the wings are not darker towards the costa as in that species, and the first branch-vein is much more straight.

31. *LAPHRIA CONSORS*, n. s. *Mas et Fæm.* Viridis (mas) aut cyanea (fæm.), capite aurato, antennarum articulo tertio brevifusiformi, pectore

argenteo, abdomine æneo-viridi (mas) aut cyaneo-purpureo (fœm.) maculis lateralibus argenteis, alis nigricantibus, basi cinereis.

Male and Female. Green (male) or blue (female). Head gilded, hind part silvery; mystax with a few black bristles; third joint of the antennæ short-fusiform; pectus silvery; abdomen æneous-green in the male, bluish-purple in the female, with silvery spots along each side; wings blackish, grey at the base and along the costa for more than one-third of the length; veins and halteres black. Length of the body $4\frac{1}{2}$ –5 lines; of the wings 8–9 lines.

The straight and not oblique third externo-medial vein distinguishes this species from all the preceding *Laphriæ*.

32. *LAPHRIA GERMANA*, n. s. *Fœm.* Cyanea, facie aurata, antennarum articulo tertio longissime subfusiformi, abdominis maculis lateralibus pectoreque argenteis, alis cinereis, basi subcinereis, halteribus albis.

Female. Blue. Head gilded in front, vertex and hind part silvery; mystax with six black bristles; third joint of the antennæ very long, subfusiform; pectus silvery; abdomen purplish blue, shorter than in the preceding species, with silvery spots along each side; wings grey, slightly grey towards the base; halteres white. Length of the body $3\frac{1}{2}$ lines; of the wings 7 lines.

33. *LAPHRIA FLAGRANTISSIMA*, n. s. *Mas.* Rufescente-cervina, capite aurato, antennis pedibusque rufescentibus, thorace vittis tribus latissimis (lateralibus abbreviatis) pectoreque nigricantibus, alis lutescentibus, plaga postica interiore fasciaque latissima exteriore nigricantibus.

Male. Reddish fawn colour. Head gilded; mystax with numerous gilded bristles; mouth lanceolate, very stout; antennæ reddish, third joint long, lanceolate, abruptly acuminate at the tip; thorax with three very broad blackish stripes; disk of the pectus black; abdomen with the segments darker towards the base, underside black towards the tip; legs reddish, stout; tarsi with black bands beneath; wings somewhat luteous, with a large blackish patch on the hind border near the base, and with a very broad blackish band near the tip; halteres testaceous. Length of the body 11 lines; of the wings 22 lines.

34. *LAPHRIA JUSTA*, n. s. *Mas.* Lutea, capite aurato, ore, antennis apice, thoracis maculis duabus posticis, pectore, abdominis fasciis latis femoribusque nigris, alis cinereis, apud costam luridis.

Male. Luteous. Head gilded; mystax with numerous gilded bristles; mouth short, black; antennæ reddish tawny, third joint lanceolate, black except at the base; thorax with the disk somewhat darker, two large black spots hindward; pectus black; abdomen linear, with a broad black band on the fore border of each segment; femora black above except at the tips, hind femora black also beneath; wings

greyish, slightly clouded with dark grey, lurid along the costa for three-fourths of the length; halteres testaceous. Length of the body 8 lines; of the wings 14 lines.

35. *LAPHRIA MANIFESTA*, n. s. *Mas et Fœm.* Fulva, capite argenteo (mas) aut pallide aurato (fœm.), antennis apice nigris, thoracis disco et abdominis maculis subtrigonis subæneo-ferrugineis, scutello quadrisetoso, alis subcinereis.

Male and Female. Tawny. Head silvery in the male, pale-gilded in the female; mystax with several slender bristles; mouth lanceolate; third joint of the antennæ very elongate-subfusiform, black towards the tip; disk of the thorax and nearly triangular dorsal spots of the abdomen ferruginous with a slight æneous tinge; pectus testaceous, slightly silvery; wings slightly greyish; veins black, testaceous at the base, where the wings also have a testaceous tinge; halteres testaceous. Length of the body $4\frac{1}{2}$ –5 lines; of the wings 8–9 lines.

36. *LAPHRIA APERTA*, n. s. *Fœm.* Testacea, capite subargenteo, antennis abdominisque apice nigris, alis nigricantibus basi limpidis, halteribus albidis.

Female. Testaceous. Head with whitish slightly silvery tomentum; mystax with very few bristles; antennæ black, third joint long, linear, conical at the tip; thorax with a very indistinct darker stripe; abdomen black towards the tip; wings blackish, limpid towards the base; veins black, testaceous at the base; halteres whitish. Length of the body 4 lines; of the wings 7 lines.

37. *LAPHRIA DECLARATA*, n. s. *Mas.* Fulva, capite albo, facie argentea micante, antennis tibiisque posticis nigris, thorace atro, alis cinereis, venis nigris, halteribus testaceis.

Male. Tawny, slender. Head white, face brilliant silvery; mystax with four bristles; mouth black, short, slender; eyes flat in front; antennæ black, almost as long as the breadth of the head; third joint long, slender, lanceolate; thorax deep black; scutellum reddish tawny; hind tibiæ black, with tawny tips; wings greyish, veins black; discal veinlet and third externomedial vein forming one straight line, as in the genus *Atomosia*; halteres testaceous. Length of the body $3\frac{1}{2}$ lines; of the wings 6 lines.

Subfam. ASILITES, *Walk.*

Gen. TRUPANEA, *Macq.*

38. *TRUPANEA CONTRADICENS*, n. s. *Mas et Fœm.* Nigricans, cinereo-subtomentosa, thoracis vittis pectoreque cano-tomentosis, pedibus nigris, tibiis rufis apice nigris, alis fusco-cinereis, areola radialis schistaceo vittata. *Mas.* Capite subaurato, barba testaceo-albida, abdominis segmentis lutescente marginatis. *Fœm.* Capite barbaque albidis, abdomine stylato, segmentis cano marginatis.

Male and Female. Blackish. Antennæ and legs black; thorax slightly

covered with cinereous tomentum; stripes, pectus, and underside of the abdomen hoary; tibiæ red, with black tips; wings brownish grey; radial areolet with a slate-coloured stripe. *Male*. Head slightly gilded; mystax with a few black bristles and many gilded bristles; beard testaceous-whitish; sides of the abdomen and hind borders of the segments lutescent. *Female*. Head and beard whitish; mystax with many black bristles and a few white bristles; abdomen with an apical style, more than one-third of the length of the preceding part, sides and hind borders of the segments hoary. Length of the body 12-14 lines; of the wings 14-18 lines.

Gen. ASILUS, *Linn.*

39. *Asilus longistylus*, *Wied. Auss. Zweifl.* 1. 433. 13.

Inhabits also Java.

Gen. OMMATIUS, *Illiger.*

40. OMMATIUS NOCTIFER, n. s. *Mas.* Niger, capite aurato, thoracis incisuris, scutello, pectore, segmentorum abdominalium marginibus ventreque canis, tibiis fulvis apice nigris, alis cinereis costa apiceque nigricantibus, halteribus ferrugineis.

Male. Black. Head gilded; mystax with a few black and several gilded bristles; sutures of the thorax, scutellum, sides, pectus, hind borders of the abdominal segments, and underside hoary; tibiæ tawny, with black tips; wings cinereous, blackish along the costa and towards the tips, veins black; halteres ferruginous. Length of the body 6-6½ lines; of the wings 11-12 lines.

41. OMMATIUS LUCIFER, n. s. *Mas.* Æneo-niger, capite argenteo, pectore albido, abdominis segmentis ferrugineo marginatis, pedibus testaceis, femoribus nigro-vittatis, tarsis nigris, alis limpidis apice nigricantibus costa atra apud medium incrassata, halteribus testaceis.

Male. Bronze-black. Head silvery in front; mystax with a few black and a few whitish bristles; pectus whitish; hind borders of the abdominal segments ferruginous; legs testaceous; femora striped with black; tarsi black, ferruginous at the base; wings limpid, blackish at the tips; costa deep black, incrassated in the middle; halteres testaceous. Length of the body 6 lines; of the wings 11 lines.

42. OMMATIUS RETRAHENS, n. s. *Fœm.* Cinereo-niger, facie argentea, pectore albido, pedibus testaceis, tarsis, femoribus tibiisque apice femoribusque posticis nigris, alis limpidis apice subcinereis, halteribus testaceis.

Female. Cinereous-black. Head silvery white in front; mystax with very few white and black bristles; pectus whitish; legs testaceous; tips of the anterior femora and of the middle tibiæ black; hind femora and hind tarsi black; anterior tarsi and hind tibiæ black, testaceous towards the base; wings limpid, slightly cinereous towards the tips;

veins black; halteres testaceous. Length of the body 4 lines; of the wings 7 lines.

Gen. LEPTOGASTER, *Meigen*.

43. LEPTOGASTER FERRUGINEUS, n. s. *Mas*. Ferrugineus, pectore albo, abdomine nigro, segmentorum marginibus ventreque testaceis, pedibus fulvis, femoribus apice nigris, tibiis piceo vittatis, tibiis posticis tarsisque nigris basi testaceis, alis sublimpidis, halteribus testaceis apice piceis.

Male. Ferruginous. Head pale, gilded in front, hind side and pectus white; mouth and antennæ tawny, the latter blackish towards the tips; abdomen black; hind borders of the segments and under side testaceous; legs tawny; anterior femora with a testaceous band before the tips, which are black; hind femora and anterior tibiæ striped with piceous, the latter black towards the tips; tarsi and hind tibiæ black, testaceous at the base; wings very slightly greyish, veins black; halteres testaceous, piceous towards the tips. Length of the body 7 lines; of the wings 10 lines.

44. LEPTOGASTER LONGIPES, n. s. *Mas*. Ferrugineus, pectore albido, abdomine piceo, segmentis apice fulvescentibus, pedibus anterioribus fulvescentibus, posticis piceis longissimis, femoribus posticis basi testaceis, alis subcinereis basi obscurioribus costa venisque nigris, halteribus testaceis apice nigris.

Male. Ferruginous. Head testaceous in front; mouth and antennæ black; pectus whitish; abdomen piceous, hind borders of the segments somewhat tawny; legs somewhat tawny; hind legs piceous, very long, their femora testaceous at the base; wings slightly greyish, darker towards the base, costa and veins black; halteres testaceous, with black knobs. Length of the body 4 lines; of the wings 8 lines.

45. LEPTOGASTER ALBIMANUS, n. s. *Mas*. Niger, capite antico pectoreque albis, antennis basi ferrugineis, abdominis segmentis cano fasciatis, femoribus, tibiis tarsisque basi albis, femoribus posticis luteo fasciatis, alis limpidis, halteribus albidis apice piceis.

Male. Black. Head in front and the pectus white; antennæ ferruginous at the base; abdomen long, a hoary band on the hind border of each segment; femora, tibiæ, and tarsi white at the base; hind legs long, rather stout; hind femora with a luteous band; wings limpid, veins black; halteres whitish, with piceous knobs. Length of the body 5 lines; of the wings 7 lines.

Fam. LEPTIDÆ, *Westw*.

Gen. LEPTIS, *Fabr*.

46. *Leptis ferruginosa*, *Wied*. See Vol. I. p. 118.

Gen. CHRYSOPILA, *Macq*.

47. *CHRYSOPILA VACILLANS*, n. s. *Mas et Fœm*. Lutescens, capite

nigro, thorace subvittato, abdominis segmentis nigro fasciatis, alis sublimpidis apud costam flavescens, venis fusco latissime marginatis, stigmatibus nigro-fusco.

Male and Female. Lutescent. Head of the female black, shining; thorax with two brown bands which are paler and indistinct hindward; abdomen with a broad black band on each segment; tarsi blackish towards the tips; wings nearly limpid, yellowish along the costa, veins exteriorly with very broad brownish borders, stigma blackish brown. Length of the body $3\frac{1}{2}$ lines; of the wings 6 lines.

Fam. BOMBYLIDÆ, *Leach.*

Subfam. THEREVITES, *Walk.*

48. THEREVA CONGRUA, n. s. *Mas.* Nigra, glaucescente albo tomentosa, albo pilosa, capite argenteo, thorace trivittato et bilineato, pedibus nigris, femoribus albis, alis cinereis stigmatibus elongato venisque nigris.

Male. Black, with glaucous-white tomentum and with white hairs. Head silvery in front; thorax with three blackish brown stripes, the middle one with a dark stripe on each side, broader and more distinct than the lateral pair; abdomen beneath and legs black, femora white; wings grey, with an elongated black stigma and black veins; halteres black. Length of the body 5 lines; of the wings 8 lines.

Subfam. BOMBYLITES, *Walk.*

Gen. ANTHRAX, *Fabr.*

49. ANTHRAX PELOPS, n. s. *Mas.* Ferruginea, thoracis margine rufo piloso, pectore abdomineque nigris, abdomine fasciis duabus, maculis duabus apicalibus, plagaque ventrali subtrigona argenteis, alis cinereis, basi costaque nigris.

Male. Closely allied to *A. Tantalus*. Dark ferruginous. Head above, antennæ, pectus, abdomen, and legs black; thorax bordered with red hairs; pectus with a silvery dot on each side; abdomen with red hairs on each side at the base, with two silvery bands, with two silvery apical spots, and with a ventral, nearly triangular, silvery patch; wings cinereous, black at the base and along five-sixths of the length of the costa, veins and halteres black. Length of the body 8 lines; of the wings 18 lines.

50. Anthrax semiscita, *Walk.* See Vol. I. p. 118.

51. Anthrax degenera, *Walk.* See Vol. I. p. 15.

Gen. GERON, *Meigen.*

52. GERON SIMPLEX, n. s. *Mas.* Ater, antennis pedibusque nigris, alis subcinereis, halteribus fulvis.

Male. Deep black. Eyes bright red; proboscis a little longer than the thorax; antennæ and legs black; wings slightly greyish, veins black; halteres tawny. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

Fam. EMPIDOÆ, *Leach.*

Gen. HYBOS, *Fabr.*

53. HYBOS BICOLOR, n. s. *Mas.* Fulvus, ore antennisque testaceis, abdomine, femoribus posticis apice tibiisque anticis piceis, tarsis anterioribus ferrugineis, alis obscure cinereis.

Male. Tawny. Mouth and antennæ testaceous; abdomen, hind femora at the tips, and fore tibiæ piceous, anterior tarsi ferruginous; wings dark grey, veins black. Length of the body $3\frac{1}{2}$ lines; of the wings 7 lines.

Fam. DOLICHOPIDÆ, *Leach.*

Gen. PSILOPUS, *Meigen.*

54. Psilopus æneus, *Fabr. Syst. Antl.* 268. 9.

Inhabits also Java.

55. PSILOPUS BENEDICTUS, n. s. *Mas et Fæm.* Aureo-viridis, facie pectoreque argenteis, antennis testaceis apice nigris, thorace vittis tribus cupreis, abdomine fasciis cupreo-purpureis, maculis lateralibus albidis, pedibus testaceis tibiis posticis tarsisque nigris, alis subcinereis, costam versus et apud venas transversas nigrofuscis, halteribus testaceis. *Fæm.* Vertice cyaneo-purpureo, abdomine fasciis cyaneis.

Male and Female. Golden green. Face silvery; antennæ testaceous, black towards the tips, arista full as long as the thorax; thorax with three cupreous stripes; pectus silvery; abdomen with cupreous purple bands and with whitish spots along each side; legs testaceous, tarsi and hind tibiæ black; wings slightly greyish, blackish brown along the costa and about the transverse veins, veins black, fore branch of the præbrachial vein curved inward, discal transverse vein undulating; halteres testaceous. *Female.* Vertex bluish purple; abdomen with blue bands. Length of the body $4-4\frac{1}{2}$ lines; of the wings 7-8 lines.

56. PSILOPUS LUCIGENA, n. s. *Mas.* Aureo-viridis, facie pectoreque argenteis, antennis tarsisque nigris, thorace vittis tribus rufo-cupreis, abdomine fasciis cupreo-purpureis, femoribus lutescentibus, tibiis piceis, femoribus anticis apice nigricantibus, alis nigris apice albis, halteribus fulvis apice nigris.

Male. Golden green. Face and pectus silvery; antennæ black, arista longer than the thorax; thorax with three broad reddish cupreous stripes; abdomen with broad cupreous purple bands; femora lutescent, tibiæ piceous, fore femora blackish towards the tips, tarsi

black; wings black, tips snow-white, fore branch of the præbrachial vein slightly curved inward, discal transverse vein much curved outward; halteres tawny, with black tips. Length of the body $4\frac{1}{2}$ lines; of the wings 9 lines.

57. *PSILOPUS flavicornis*, *Wied. Auss. Zweifl.* 11. 227. 31.

Inhabits also Sumatra.

58. *PSILOPUS TERMINIFER*, n. s. *Mas.* Aureo-viridis, vertice cyaneo-purpureo, facie pectoreque argenteis, antennis, pedibus halteribusque testaceis, abdomine apicem versus atro fasciis duabus cupreis, alis subcinereis apice nigris.

Male. Golden-green, slender. Vertex bluish-purple; face and pectus silvery; antennæ testaceous, arista about half the length of the body; fourth and fifth segments of the abdomen deep black with a cupreous band on the hind border of each segment, tip blue; legs and halteres testaceous; wings greyish, paler along the hind border, tips black, fore branch of the præbrachial vein slightly curved inward, discal transverse vein slightly undulating. Length of the body 3 lines; of the wings 5 lines.

59. *PSILOPUS ORCIFER*, n. s. *Fæm.* Purpureus, facie pectoreque subcinereis, antennis, pedibus halteribusque nigris, abdomine cyaneo-viridi segmentorum marginibus posticis purpureis, alis nigricantibus margine postico cinereo. *Var.* Viridis, vertice cyaneo, abdominis segmentis basi nigris.

Female. Purple, rather stout. Face and pectus slightly cinereous; antennæ, legs, and halteres black; abdomen bluish-green, hind borders of the segments purple; wings blackish, cinereous along the hind border, fore branch of the præbrachial vein forming an obtuse angle, discal transverse vein very undulating. *Var.* Green. Vertex blue; abdominal segments black at the base. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

60. *PSILOPUS EGENS*, n. s. *Mas et Fæm.* Purpureus, facie pectoreque cyaneo-viridi cinereo subtomentosis, antennis, pedibus halteribusque nigris, metathorace viridi, abdomine cyaneo, suturis nigris, alis cinereis.

Male and Female. Purple. Face and pectus slightly covered with cinereous tomentum, the latter bluish-green; antennæ black, arista much more than half the length of the body; metathorax green; abdomen blue, sutures black; legs and halteres black; wings grey, fore branch of the præbrachial vein much curved inward, discal transverse vein straight; length of the body $2\frac{1}{2}$ – $2\frac{3}{4}$ lines; of the wings 5 lines.

Gen. DOLICHOPUS, *Latr.*

61. *DOLICHOPUS TRIGONIFER*, n. s. *Fæm.* Cupreo-viridis, facie argentea, antennis, pedibus halteribusque testaceis, pectore, ventre ab-

dominisque maculis lateralibus trigonis albidis, abdomine purpureo marginibus posticis nigris, tarsis posterioribus nigricantibus, alis cinereis.

Female. Cupreous green. Face silvery; antennæ, legs, and halteres testaceous; pectus, abdomen beneath, and triangular spots on each side whitish; abdomen purple, hind borders of the segments black; posterior tarsi blackish; wings grey, veins black, præbrachial vein forming a right angle at its flexure, between which and the border it is much curved inward, discal transverse vein very slightly curved outwards. Length of the body 3 lines; of the wings 5 lines.

This species resembles the *Psilopi* in the structure of the præbrachial vein.

Gen. DIAPHORUS, *Meigen.*

62. DIAPHORUS RESUMENS, n. s. *Mas et Fæm.* Obscure viridis (mas) aut niger (fæm.), facie pectoreque albidis, antennis piceis, abdomine nigro-cupreo basi obscure testaceo, pedibus anterioribus tibiisque posticis basi obscure testaceis, pedibus posticis nigris, alis nigricantibus apud marginem posticum pallidioribus, halteribus testaceis.

Male and Female. Dark green (male) or black (female). Face and pectus whitish; antennæ piceous; abdomen cupreous-black, dull testaceous towards the base; hind legs black, hind tibiæ towards the base and anterior legs dull testaceous; wings blackish, paler along the hind border, veins black, præbrachial vein and discal transverse vein straight; halteres testaceous. Length of the body 2 lines; of the wings $3\frac{1}{2}$ lines.

Fam. SYRPHIDÆ, *Leach.*

Gen. CERIA, *Fabr.*

63. CERIA SMARAGDINA, n. s. *Fæm.* Saturate metallico-viridis, subtilissime punctata, faciei lateribus cupreis, antennis nigris, arista nivea, thorace bivittato, abdomine æneo-viridi, tarsis nigris, alis dimidio costali nigro, halteribus testaceis.

Female. Deep metallic green, very finely punctured. Head blue in front, sides of the face cupreous-purple; mouth, antennæ, and tarsi black; arista snow-white; thorax with two almost contiguous darker stripes; abdomen æneous green, with the exception of the petiole, which is very thick; wings slightly greyish, costal half black; halteres testaceous. Length of the body 7 lines; of the wings 14 lines.

64. CERIA RELICTA^{*}, n. s. *Mas.* Nigra, faciei lateribus, thoracis maculis quatuor humeralibus, pectoris fasciis duabus lateralibus, scutello, abdominis maculis duabus basalibus fasciisque duabus flavis, tibiis flavescensibus apice piceis, alis apud costam nigris, halteribus testaceis.

Male. Black. Head yellow beneath, and in front with the exception of a black stripe on the disk of the face; arista white; thorax with

* "Relicta" here should be "relictura": - see next page.

two yellow spots on each side in front; scutellum yellow; pectus with an oblique yellow band on each side; abdomen not petiolated, with a tumid yellow spot on each side at the base, hind borders of the third and fourth segments yellow; femora at the tips and tibiæ yellow, the latter piceous towards the tips, tarsi piceous; wings greyish-black towards the costa, excepting a lurid costal streak which extends along half the length from the base; halteres testaceous. Length of the body 6 lines; of the wings 11 lines.

65. *CERIA RELICTA*, n. s. *Fæm.* Nigra, faciei lateribus abdominisque fasciis duabus flavis, antennis ferrugineo variis, pedibus fulvis, alis cinereis costam versus nigris, halteribus stramineis.

Female. Black. Head yellow, beneath and in front with the exception of a black stripe on the disk of the face; first and third joints of the antennæ somewhat ferruginous, arista white; thorax with two indistinct yellowish marks on the transverse suture, hind border of the scutellum and hind borders of the second and third abdominal segments yellow; legs tawny, tibiæ paler towards the base; wings green, black for nearly half the breadth from the costa; halteres straw-colour. Length of the body 6 lines; of the wings 11 lines.

This may prove to be the female of *C. relictura*, notwithstanding its great difference from that species in the marks of the thorax and of the abdomen, and in the colour of the legs.

Gen. MICRODON, *Meig.*

66. *MICRODON FULVICORNIS*, n. s. *Mas.* Niger, aureo-subpubescens, antennis, abdomine, pedibus halteribusque fulvis, femoribus nigris, tibiis nigro vittatis, alis fuscis postice cinereis.

Male. Black. Head with gilded pubescence, cinereous behind and beneath; antennæ tawny, second joint above towards the tip and third joint piceous; thorax slightly covered with gilded tomentum; pectus with cinereous tomentum; abdomen with gilded tomentum towards the tip; legs tawny, femora mostly black, tibiæ with black stripes; wings cinereous, dark-brown about the costa, veinlet which bisects the subapical areolet incomplete, as it is also in the following species; halteres tawny. Length of the body 6 lines; of the wings 12 lines.

67. *MICRODON APICALIS*, n. s. *Mas et Fæm.* Niger, aureo-pubescens, thorace abdomineque fasciatis, pedibus halteribusque fulvis, alis nigro-fuscis postice obscure cinereis.

Male and Female. Black, with gilded tomentum, which forms two bands on the thorax, and one on each side of the pectus; abdomen with three gilded tomentose bands, the third subapical, first segment ferruginous beneath; legs tawny, femora at the base and coxæ black; wings blackish-brown, dark cinereous hindward; halteres tawny. Length of the body 5-6 lines; of the wings 10-12 lines.

Gen. GRAPTOMYZA, *Wied.*

68. GRAPTOMYZA TIBIALIS, n. s. *Mas*. Testacea, vertice pectorisque fasciis duabus piceis, antennis supra nigris, abdominis lateribus fasciis duabus subtrigonis apiceque nigris, alis cinereis.

Male. Testaceous. Vertex and mouth piceous; epistoma with a piceous line on each side; third joint of the antennæ black above; abdomen black along each side and at the tip, and with two black bands which are angular in front; wings cinereous. Length of the body $3\frac{1}{2}$ lines; of the wings 6 lines.

Gen. ERISTALIS, *Latr.*

69. Eristalis splendens, *Leguillon, Voy. aut. du Monde; Macq. Dipt. Exot.* 11. 2. 49. 28.

Inhabits also Solomon's Islands.

70. ERISTALIS RESOLUTUS, n. s. *Mas et Fœm.* Niger, capite antice albo, thorace vittis duabus fasciaque pectorisque disco cinereis, scutello fulvo, abdomine fasciis interruptis æneo-viridibus, tibiis basi fulvescentibus, alis fuscis (mas) aut obscure fuscis (fœm.) basi cinereis, halteribus testaceis.

Male and Female. Black. Head shining, with white tomentum beneath and on each side of the face; third joint of the antennæ piceous, arista simple; thorax with two cinereous stripes and with one cinereous band, somewhat chalybeous towards the scutellum, which is tawny; the band continued on each side of the pectus, whose disk is cinereous; abdomen with an interrupted æneous-green band on the second segment, third and fourth segments æneous-green, each with three large black spots; tibia somewhat tawny towards the base; wings brown (male) or dark brown (female), cinereous towards the base; halteres testaceous. Length of the body 6 lines; of the wings 10 lines.

71. ERISTALIS CONDUCTUS, n. s. *Fœm.* Niger, faciei lateribus albis, antennis, scutello, abdominis fasciis pedibusque testaceis, thorace antico albido, alis subcinereis apice obscurioribus.

Female. Black. Head shining, with white tomentum behind, beneath and on each side of the face; antennæ, scutellum, and legs testaceous, arista simple; thorax whitish in front, the whitish part continued in a short band on each side of the pectus; abdomen testaceous at the base and beneath, and with three testaceous bands; hind tibia with black tips; wings slightly greyish, darker towards the tips, cubital vein much less bent than usual; halteres testaceous. Length of the body $3\frac{1}{2}$ lines; of the wings 6 lines.

72. ERISTALIS SUAVISSIMUS, n. s. *Fœm.* Fulvus, capite testaceo vertice nigro, thorace vittis quinque testaceis, abdomine nigro maculis sex lutescentibus, segmentorum marginibus posticis æneis, pedibus nigris testaceo fasciatis, alis sublimpidis punctis duobus costalibus nigris.

Female. Tawny. Head with testaceous tomentum, vertex black, shining; antennæ testaceous, arista simple; thorax with five testaceous stripes; pectus with two oblique testaceous bands on each side; abdomen black, with six somewhat luteous spots, the basal pair larger and darker than the middle pair, which are larger than the hind pair, apical segment with two testaceous points, hind borders of the segments æneous above, testaceous beneath; legs black, tibiæ at the base and tarsi testaceous; wings nearly limpid, costa with two black points; halteres testaceous. Length of the body $5\frac{1}{2}$ lines; of the wings 10 lines.

73. *ERISTALIS MUSCOIDES*, n. s. *Mas.* Cyaneo-iridis subchalybeus, capitis callo antennisque fulvis, faciei lateribus albo tomentosus, thorace subvittato, abdomine nigro maculis æneo-iridibus, pedibus nigris, alis subcinereis, halteribus albis.

Male. Bluish-green, with a slight chalybeous tinge. Face with white tomentum along each side, middle callus tawny, shining; antennæ pale tawny, arista plumose; thorax with three indistinct black stripes, the lateral pair oblique, callus on each side beneath pale tawny; abdomen black, second segment with a broad interrupted bluish green band, third segment with four æneous-green streaks, fourth segment also with four streaks which are united on the hind border, ventral segments whitish on each side; legs black; femora bluish black towards the base; wings slightly cinereous; halteres white. Length of the body 4 lines; of the wings 8 lines.

Gen. *HELOPHILUS*, *Meigen*.

74. *Helophilus quadrivittatus*, *Wied. Auss. Zweifl.* 11. 168. 22. (*Eristalis*).

Inhabits also Hindostan.

75. *HELOPHILUS MESOLEUCUS*, n. s. *Fæm.* Niger, faciei lateribus niveo tomentosus, thorace vittis quatuor canis, scutello, abdominis fascia antica latissima interrupta basique lutescentibus, alis cinereis, venis basi halteribusque fulvis.

Female. Black. Face with snow-white tomentum on each side; thorax with four hoary stripes; pectus with a cinereous disk; scutellum pale luteous; abdomen pale luteous at the base, and with a broad interrupted pale luteous band on the second segment, third and fourth segments somewhat chalybeous, the former livid along the fore border, under side with two lateral abbreviated pale luteous stripes; hind femora thick; wings grey, veins towards the base, and halteres, tawny. Length of the body $6\frac{1}{2}$ lines; of the wings 12 lines.

Gen. *XYLOTA*, *Meigen*.

76. *XYLOTA VENTRALIS*, n. s. *Fæm.* Nigro-chalybea, capite albo tomentoso, scutello fulvo, vittis duabus ventralibus latis abbreviatis

testaceis, pedibus piceo et testaceo variis, alis fuscis basi cinereis, halteribus testaceis.

Female. Blackish chalybeous. Head with whitish tomentum, excepting the callus on the vertex and another on the front; mouth and antennæ black; scutellum tawny; abdomen beneath with two very broad testaceous stripes extending from the base to two-thirds of the length; legs dingy testaceous, femora and hind tibiæ partly piceous, hind femora thick, piceous, slightly chalybeous, armed with spines beneath; wings dark brown, cinereous towards the base; halteres testaceous. Length of the body $4\frac{1}{2}$ lines; of the wings 8 lines.

Gen. ORTHONEURA, *Macq.*

77. ORTHONEURA BASALIS, n. s. *Fem.* Chalybeo-nigra, nitens, cano-subtomentosa, antennis ferrugineis basi fulvis articulo tertio elongato, tarsis posterioribus piceis, tarsis anticis tibiisque anterioribus fulvis, his nigro fasciatis, alis subcinereis fusco fasciatis, halteribus testaceis.

Female. Chalybeous-black, very shining, partly and slightly covered with hoary tomentum; antennæ tawny, third joint ferruginous, long, linear, tawny at the base; anterior tibiæ tawny with a black band, fore tarsi tawny, hinder tarsi piceous; wings greyish, with a sub-apical brown band which is abbreviated hindward, veins towards the base and halteres testaceous; alulæ whitish. Length of the body $3\frac{1}{2}$ lines; of the wings 6 lines.

Gen. SYRPHUS, *Fabr.*

78. *Syrphus ægrotus*, *Fabr.* See Vol. I. p. 124.

79. *Syrphus ericetorum*, *Fabr. Ent. Syst. iv.* 287. 34.

Inhabits also Sierra Leone, Hindostan, and Java.

Fam. MUSCIDÆ, *Latr.*

Subfam. TACHINIDES, *Walk.*

Gen. MASICERA, *Macq.*

80. MASICERA NOTABILIS, n. s. *Mas.* Nigra, longiuscula, capite abdominisque fasciis albis, frontalibus atris, pectore cano, scutelli margine postico abdominisque lateribus ferrugineis, alis cinereis, venis fusco marginatis.

Male. Black, rather long, with long stout bristles; head white, silvery, with white hairs behind and beneath, frontalia deep black, widening slightly to the face, facialia without bristles, epistoma not prominent; eyes bare; palpi ferruginous at the tips; antennæ extending to the epistoma, third joint slightly widening towards the tip, nearly four times the length of the second, arista slender, very much longer than the third joint; pectus and sides of the thorax hoary, hind border of the scutellum ferruginous; abdomen fusiform, much longer

than the thorax, with a broad slightly interrupted white band on the fore border of each segment, sides of the second and third segments slightly ferruginous; wings grey, veins black bordered with brown, præbrachial vein forming a slightly acute angle at its flexure, near which it is much curved inward, and is thence straight to its tip, discal transverse vein curved inward, parted by less than its length from the border, and by rather more than half its length from the flexure of the præbrachial; alulæ white; halteres testaceous. Length of the body 6 lines; of the wings 12 lines.

81. *MASICERA?* *TENTATA*, n. s. Nigra, cinereo-tomentosa, capite argenteo frontalibus atris, antennarum articulo tertio basi rufo, thorace quadrivittato, abdomine?, pedibus longiusculis, alis nigricantibus postice cinereis.

Black, with cinereous tomentum and with moderately stout bristles. Head silvery with white hairs behind and beneath, frontalia deep black, slightly widening towards the face, facialia without bristles, epistoma not prominent; antennæ extending nearly to the epistoma; third joint cinereous, slender, linear, red towards the base, rounded at the tip, more than four times the length of the second; arista slender, much longer than the third joint; thorax with four slender black stripes; scutellum not cinereous; abdomen wanting; legs rather long and slender; wings blackish, cinereous hindward and at the tips, veins black, præbrachial vein forming a very obtuse angle at its flexure, from whence it is almost straight to its tip, discal transverse vein slightly 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; alulæ large, yellowish white; halteres piceous. Length of the body 4? lines; of the wings 7 lines.

82. *MASICERA SOLENNIS*, n. s. *Fæm.* Nigra, breviscula, cinereo-tomentosa, capite albo, frontalibus atris, thorace quadrivittato, scutelli margine postico ferrugineo, abdomine subtessellato, alis cinereis.

Female. Black, rather short, with cinereous tomentum. Head white, with white hairs behind and beneath, frontalia deep black, widening towards the face, facialia without bristles, epistoma not prominent; eyes bare; antennæ almost reaching the epistoma, third joint cinereous, linear, rounded at the tip, more than four times the length of the second, arista slightly stout towards the base, much longer than the third joint; thorax with four slender black stripes; scutellum ferruginous along the hind border; abdomen short-conical, with three broad interrupted cinereous bands; legs rather short; wings grey, veins black, præbrachial vein forming a slightly obtuse angle at its flexure, from whence it is almost straight to its tip, discal transverse vein nearly straight, parted by much less than its length from the border and by a little less than its length from the flexure of the præbrachial; alulæ cinereous. Length of the body 3 lines; of the wings 5 lines.

83. *MASICERA SIMPLEX*, n. s. *Fœm.* Nigra, capite albo, frontalibus atris, thorace cinereo-tomentoso quadrivittato, abdomine fasciis cinereis late interruptis, alis cinereis.

Female. Black, with stout bristles. Head white, with white hairs beneath, frontalia deep black, linear, face oblique, facialia without bristles, epistoma not prominent; eyes bare; antennæ almost reaching the epistoma, third joint cinereous, linear, rather broad, almost truncated at the tip, about four times the length of the second, arista slender, very much longer than the third joint; thorax and pectus with cinereous tomentum, the former with four slender black stripes; abdomen shining, subelliptical, a little longer than the thorax, with a widely interrupted cinereous band on the fore border of each segment; legs stout; wings cinereous; veins black; præbrachial vein forming a very obtuse angle at its flexure, from whence it is straight to its tip, discal transverse vein almost straight, parted by hardly less than its length from the border, and by very much more than its length from the flexure of the præbrachial; alulæ white. Length of the body $3\frac{1}{2}$ lines; of the wings 6 lines.

84. *MASICERA GUTTATA*, n. s. *Fœm.* Nigra, capite albo, frontalibus atris, thoracis vittis tribus pectoreque cinereis, abdomine guttis lateralibus albis, alis cinereis.

Female. Black, with short slight bristles. Head white, frontalia deep black, widening slightly towards the epistoma, face oblique, facialia without bristles, epistoma not prominent; antennæ reaching the epistoma, third joint linear, slightly truncated at the tip, full four times the length of the second, arista slender; thorax with three cinereous stripes; pectus cinereous; abdomen elongate-oval, a little longer than the thorax, a row of white dots along each side on the fore borders of the segments; wings cinereous, a little darker along the costa towards the base, veins black, præbrachial vein forming a very obtuse angle at its flexure, from whence it is almost straight to its tips; discal transverse vein straight, parted by more than its length from the border and by nearly twice its length from the flexure of the præbrachial; alulæ whitish. Length of the body $2\frac{1}{2}$ lines; of the wings 4 lines.

Gen. *EURYGASTER*, *Macq.*

85. *EURYGASTER TENTANS*, n. s. *Fœm.* Nigra, latiuscula, cinereo tomentosa, capite albo, frontalibus atris, thorace vittis quatuor nigris, scutelli margine postico ferrugineo, abdomine subtessellato, alis cinereis apud costam subfuscis.

Female. Black, rather broad, with cinereous tomentum. Head white, with white hairs behind and beneath, frontalia deep black, narrow, widening towards the face, which is oblique, facialia with bristles along more than one-third of the length from the frontalia, epistoma not prominent; eyes pubescent, palpi ferruginous; antennæ ex-

tending to the epistoma, third joint cinereous, hardly widening from the base to the tip, which is somewhat truncated, arista slender, very much longer than the third joint; thorax with four indistinct black stripes; scutellum ferruginous hindward; abdomen conical, not longer than the thorax, with three broad, slightly interrupted, cinereous bands, second segment indistinctly ferruginous on each side; legs stout; wings grey, slightly brownish in front, veins black, testaceous towards the base, præbrachial vein forming an obtuse angle at its flexure, hardly curved inward from thence to its tip, discal transverse vein very slightly undulating, parted by much less than its length from the border and from the flexure of the præbrachial; alulæ whitish. Length of the body $4\frac{1}{2}$ lines; of the wings 8 lines.

86. EURYGASTER DECIPIENS, n. s. *Fœm.* Nigra, aureo-tomentosa, capite antico argenteo frontalibus atris, antennis ferrugineis, thorace vittis quatuor nigris, abdomine fulvo subtessellato vitta basali nigra, pedibus fulvis, alis cinereis.

Female. Black, stout, with gilded tomentum. Head silvery white in front and beneath, frontalia deep black, widening slightly towards the upright face, the bristles on each side hardly extending to the facialia, epistoma not prominent; eyes bare; antennæ ferruginous, extending to the epistoma, third joint linear, somewhat truncated at the tip, more than four times the length of the second joint, arista slender, much longer than the third joint; thorax with numerous long bristles, with four slight black stripes; pectus cinereous; abdomen tawny, conical, not longer than the thorax, with short stout bristles, and with three broad, slightly gilded, somewhat interrupted bands, a short black stripe at the base; legs tawny, stout, tibiæ darker than the femora, tarsi piceous; wings grey, somewhat darker in front, veins black, præbrachial vein forming a right angle at its flexure, near which it is much curved inward, discal transverse vein nearly straight, parted by more than half its length from the border, and by a little less than its length from the flexure of the præbrachial; alulæ slightly cinereous. Length of the body 4 lines; of the wings 7 lines.

87. EURYGASTER PHASIOÏDES, n. s. *Mas.* Nigra, cano-tomentosa, capite albo frontalibus atris, antennis, scutello, abdomine femoribusque fulvis, abdomine fasciis duabus posticis albidis vittaque nigra, alis cinereis basi albis, costa plagaque nigricantibus.

Male. Black, with hoary tomentum. Head white, frontalia deep black, widening towards the upright face, facialia with bristles along more than half the length from the epistoma, which is not prominent; eyes bare; palpi testaceous; antennæ tawny, extending to the epistoma, third joint linear, slightly rounded at the tip, more than four times the length of the second joint, arista slender, much longer than the third joint; thorax with four very slender black stripes;

abdomen tawny, short-oval, not longer than the thorax, with a black stripe which does not extend to the tip, third and fourth segments with a white band along each fore border; legs very stout, femora tawny; wings cinereous, white and with testaceous veins at the base, blackish along the costa, and with a broad black band which is abbreviated hindward, præbrachial vein forming an obtuse angle at its flexure, from whence it is very slightly curved inward to its tip, discal transverse vein nearly straight, parted by much less than its length from the border, and by hardly less than its length from the flexure of the præbrachial; alulæ whitish. Length of the body $3\frac{1}{2}$ lines; of the wings 6 lines.

Subfam. DEXIDES, *Walk.*

Gen. RUTILIA, *Desv.*

88. *Rutilia plumicornis*, *Guérin, Macq. Dipt. Exot.* 11. 3. 82. 3. Pl. 9. f. 8.

Inhabits also Offak, New Guinea.

89. *RUTILIA ANGUSTIPENNIS*, n. s. *Fæm.* Nigro-viridis, capite cinereo frontalibus atris, thoracis lateribus subpurpurascens, scutello purpureo, abdomine viridi basi purpureo, tibiis ferrugineis, alis angustis lanceolatis obscure fuscis basi nigris.

Female. Blackish-green. Head cinereous, frontalia deep black, widening much towards the face, epistoma very prominent, arista stout, bare; thorax with almost obsolete stripes, purplish along each side; scutellum mostly purple; abdomen dark green, purple at the base; legs black, tibiæ ferruginous; wings narrow, lanceolate, dark brown, black towards the base, præbrachial vein forming a much rounded angle at its flexure, near which it is slightly curved inward, and is thence straight to its tip, discal transverse vein very slightly undulating, parted by less than half its length from the border, and by much more than half its length from the flexure of the præbrachial; alulæ dark brownish cinereous. Length of the body 8 lines; of the wings 16 lines.

Gen. DEXIA, *Meigen.*

90. *DEXIA PECTORALIS*, n. s. *Fæm.* Testacea, capite pectoreque albis frontalibus atris, antennis fulvis, thorace cinereo vittis quatuor nigris, abdomine fulvo apicem versus spinoso fasciis duabus nigris, pedibus longis tibiis tarsisque nigris, alis cinereis venis subfusco late marginatis.

Female. Testaceous. Head white, frontalia deep black, widening towards the face, facialia without bristles, epistoma prominent; antennæ tawny, not reaching the epistoma, third joint of the antennæ long, linear, arista plumose; thorax cinereous, with four black stripes, of which the inner pair are much narrower than the outer pair; scu-

tellum tawny hindward ; pectus white ; abdomen tawny, with a few spines towards the tip, hind borders of the third and fourth segments and tips black ; legs long, black, coxæ and femora testaceous ; wings grey, veins very broadly bordered with pale brown, præbrachial vein forming a slightly obtuse angle at its flexure, between which and its tip it is slightly curved inward, discal transverse vein undulating, parted by about half its length from the border, and by a little less than its length from the flexure of the præbrachial ; alulæ cinereous Length of the body 4 lines ; of the wings 9 lines.

Gen. PROSENA, *St.-Farg.*

91. PROSENA ARGENTATA, n. s. *Mas et Fœm.* Testacea (mas) aut nigra (fœm.), capite thoraceque argenteis, antennis fulvis, abdomine longo fasciis vittaque nigris (mas) aut brevior fasciis cinereis lateribusque basi testaceis (fœm.), pedibus nigris femoribus testaceis, alis subfuscescentibus (mas) aut cinereis (fœm.).

Male and Female. Head and thorax with bright silvery tomentum, facialia without bristles, epistoma slightly prominent ; eyes bare ; mouth black, testaceous towards the base, full as long as the thorax ; antennæ tawny, not reaching the epistoma, arista plumose ; legs black, coxæ and femora testaceous ; wings grey, veins black. *Male.* Testaceous. Pectus mostly white ; abdomen elongate-conical, with slight whitish reflexions, dorsal stripe and hind borders of the segments black ; legs long ; wings brownish towards the costa and about the veins, præbrachial vein forming a slightly obtuse angle at its flexure, between which and its tip it is very slightly curved inward, discal transverse vein hardly undulating, parted by less than half its length from the border, and by less than its length from the flexure of the præbrachial. Length of the body 5 lines ; of the wings 10 lines.

Female. Black. Pectus silvery ; scutellum deep black ; abdomen conical, with broad cinereous bands, first and second segments with broad interrupted testaceous bands, a testaceous mark on each side of the third segment at the base ; legs rather long, femora with black tips ; præbrachial vein forming a right angle at its flexure, curved inward from thence to its tip, discal transverse vein curved inward near its hind end, parted by less than its length from the border and from the flexure of the præbrachial. Length of the body $3\frac{1}{2}$ lines ; of the wings 7 lines.

Subfam. SARCOPHAGIDES, *Walk.*

Gen. SARCOPHAGA, *Meigen.*

92. SARCOPHAGA COMPTA, n. s. *Fœm.* Nigra, cinereo-tomentosa, capite aurato subtus fulvo piloso, thorace vittis tribus nigris, abdomine tessellato, alis obscure cinereis.

Female. Black, with cinereous tomentum. Head gilded in front, clothed behind and beneath with tawny hairs, frontalia deep black,

hardly widening towards the face; thorax with three black very distinctly marked stripes, the middle one dilated on the scutellum; abdomen distinctly tessellated with six large cinereous excavated spots; wings grey, præbrachial vein forming a right 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 much 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 5 lines; of the wings 10 lines.

93. *SARCOPHAGA INVARIATA*, n. s. *Mas et Fœm.* Nigra, cinereo-tomentosa, capite *maris* albo, thorace vittis quinque nigris, abdomine tessellato, alis cinereis.

Male and Female. Black, with cinereous tomentum. Thorax with five black stripes, the lateral pair incomplete; abdomen distinctly tessellated, the spots being much excavated; wings grey, præbrachial vein forming a right 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 much less than its length from the border, and by rather more than half its length from the flexure of the præbrachial; alulæ white. *Male.* Head silvery white, frontalia deep black, linear; tomentum of the thorax and of the abdomen more whitish than that of the female. *Female.* Frontalia slightly widening towards the face. Length of the body 4-4½ lines; of the wings 8 lines.

Subfam. MUSCIDES, *Walk.*

Gen. *IDIA*, *Meigen.*

94. *Idia australis*, *Walk. Cat. Dipt. pt. 4. 809.* = *I. xanthogaster*, *Wied.*
Inhabits also Australia.

95. *IDIA ÆQUALIS*, n. s. *Fœm.* *Ænea*, capite subtuberculato, thoracis lateribus pectoreque albido-testaceis lineis duabus lateralibus æneis, abdomine fulvo fasciis tribus æneis, pedibus testaceis tibiis apice femoribusque æneis, alis cinereis apice nigricantibus.

Female. *Æneous*-whitish, testaceous beneath. Head with minute tubercles on each side of the front, frontalia piceous, linear; thorax with an æneous stripe on each side in a line with the base of the wings, and with numerous points between these lines and the disk; abdomen pale tawny, with three æneous bands on the hind borders of the segments; legs testaceous, tibiæ towards the tips and femora æneous; wings greyish, with blackish tips, præbrachial vein forming an obtuse and much-rounded angle at its flexure, from whence it is almost straight to its tip, discal transverse vein parted by about half its length from the border and by about its length from the flexure of the præbrachial; alulæ very slightly cinereous; halteres testaceous. Length of the body 3½ lines; of the wings 6 lines.

Gen. MUSCA, *Linn.*

96. *MUSCA GLORIOSA*, n. s. (genus *Silbomyia*, *Macq.*). *Fæm.* Cyaneo-viridis, capite lætissime aurato frontalibus atris, antennis pedibusque nigris, thorace vittis quatuor cupreis, pectore maculis quatuor albis, abdomine viridi-cyaneo, vitta tenui purpurea, alis cinereis apud costam nigris, alulis albis.

Female. Golden green. Head brilliantly gilded, frontalia deep black, widening towards the face; a brilliantly-gilded lanceolate streak between the antennæ, which are black; epistoma piceous, slightly prominent; thorax with four cupreous stripes; pectus with four white tomentose spots; abdomen greenish blue with a very slender purple stripe; legs black, femora blackish green; wings grey, black for full one-third of the breadth from the costa, præbrachial vein forming a very obtuse angle at its flexure, from whence it is nearly straight to its tip, discal transverse vein very slightly 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 pure white. Length of the body 6 lines; of the wings 12 lines.

97. *MUSCA OPULENTA*, n. s. (genus *Silbomyia*, *Macq.*) *Fæm.* Aureo-viridis, capite aurato, frontalibus atris, antennis piceis, thorace vittis quatuor subobsoletis cupreis, pectore maculis duabus albis, alis cinereis apud costam nigris, alulis albis.

Female. Golden green. Head brightly gilded, frontalia deep black, linear, epistoma piceous, slightly prominent; antennæ piceous; thorax with four almost obsolete cupreous stripes; pectus with a spot of white tomentum on each side; abdomen with a very indistinct cupreous stripe; tibiæ and tarsi black; wings grey, black along the costa, præbrachial vein forming a right angle at its flexure, near which it is slightly curved inward, and is thence straight to its tip, discal transverse vein undulating, parted by more than half its length from the border and from the flexure of the præbrachial; alulæ white. Length of the body $4\frac{1}{2}$ lines; of the wings 8 lines.

98. *MUSCA MACULARIS*, n. s. (genus *Chrysomyia*? *Desv.*) *Mas et Fæm.* Aureo-viridis, capite argenteo antice aurato frontalibus atris, antennis pedibusque nigris, thorace vittis tribus cupreis vix conspicuis, scutello cyaneo, pectore maculis quatuor lateralibus albo tomentosis, abdomine viridi-cyaneo maculis quatuor lateralibus albis, alis cinereis basi nigricantibus, alulis nigricantibus.

Male and Female. Golden green. Head brightly gilded, white behind; antennæ, tibiæ, and tarsi black; thorax with three indistinct cupreous stripes; scutellum blue; pectus with two white tomentose spots on each side; abdomen greenish blue with two transverse white spots on each side; femora blackish-green; wings grey, blackish at the base, præbrachial vein forming a slightly obtuse angle at its flexure, nearly straight from thence to its tip, discal transverse vein curved

outward towards its fore end, parted by about half its length from the border, and by much less than its length from the flexure of the præbrachial; alulæ blackish. *Female*. Head with a silvery white vertex, frontalia deep black, linear. Length of the body 56 lines; of the wings 10-12 lines.

99. *MUSCA MARGINIFERA*, n. s. (genus *Lucilia*, *Desv.*) *Fæm.* Viridicyanea, capite albido frontalibus atris, antennis pedibusque nigris, abdominis segmentis purpureo marginatis, alis cinereis basi subnigricantibus, alulis cinereis.

Female. Greenish-blue. Head whitish, frontalia deep black, linear, face and third joint of the antennæ cinereous; abdomen with a purple band on the hind border of each segment; legs black; wings grey, almost blackish at the base, præbrachial vein forming a hardly obtuse angle at its flexure, between which and its tip it is hardly curved inward, discal transverse vein nearly straight, parted by about half its length from the border, and by more than half its length from the flexure of the præbrachial; alulæ cinereous. Length of the body $4\frac{1}{2}$ lines; of the wings 9 lines.

100. *MUSCA BENEDICTA*, n. s. (genus *Pyrellia*, *Desv.*) *Mas.* Aureoviridis, capite albo, antennis pedibusque nigris, alis cinereis basi subluridis venis basi fulvis, alulis testaceo-cinereis. *Var.?* Abdominis apice purpureo.

Male. Golden green. Head white in front; antennæ and legs black; wings cinereous, slightly lurid towards the base, veins tawny towards the base, præbrachial vein curved at the flexure, almost straight from thence to the tip, discal transverse vein slightly undulating, parted by full half its length from the border, and by little less than its length from the flexure of the præbrachial; alulæ cinereous with a testaceous tinge. *Var.?* or a distinct species: darker; abdomen purple at the tip. Length of the body 3 lines; of the wings 6 lines.

101. *MUSCA OBTRUSA*, n. s. (genus *Pyrellia*, *Desv.*) *Mas et Fæm.* Purpureo-cyanea, antennis pedibusque nigris, alis cinereis, alulis obscurioribus.

Very nearly allied to *M. refixa* and to *M. perfixa*, but differing slightly in the veins of the wings. *Male and Female*. Blue, more or less mingled with purple. Head black, slightly cinereous in front; antennæ and legs black; wings grey, veins black, præbrachial vein forming an almost angular curve at its flexure, nearly straight from thence to its tip, discal transverse vein very slightly undulating, parted by little more than half its length from the border, and by about its length from the flexure of the præbrachial; alulæ dark cinereous. Length of the body $2\frac{1}{2}$ -3 lines; of the wings 5-6 lines.

102. *Musca domestica*, *Linn.* See Vol. I. p. 128.

103. *MUSCA OBSCURATA*, n. s. *Fæm.* Nigra, subcinerascens, capite postico albo, thorace vittis quatuor angustis nigris, abdomine tessel-

lato, alis obscure cinereis apud costam nigricantibus, alulis testaceo-cinereis.

Female. Black, slightly covered with cinereous tomentum. Head white behind; thorax with four slender black stripes; abdomen distinctly tessellated with four rows of cinereous reflecting spots; wings very dark grey, blackish towards the costa, præbrachial vein forming a somewhat rounded and very slightly obtuse angle at its flexure, hardly curved inward from thence to its tip, discal transverse vein slightly undulating, parted by less than half its length from the body, and by more than half its length from the flexure of the præbrachial; alulæ cinereous, with a testaceous tinge. Length of the body $3\frac{1}{2}$ lines; of the wings 7 lines.

104. *MUSCA PATIENS*, n. s. *Fœm.* Nigra, cinereo-tomentosa, frontilibus antennisque piceis, thorace vittis quatuor tenuissimis nigris, abdomine tessellato, alis cinereis.

Female. Black, with cinereous tomentum. Head whitish behind, frontalia piceous, linear; antennæ piceous; thorax with four very slender black stripes; abdomen tessellated; wings grey, veins black, præbrachial vein forming an obtuse and somewhat rounded angle at its flexure, from whence it is hardly curved inward to its tip, 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 cinereous, with testaceous borders. Length of the body 3 lines; of the wings 6 lines.

105. *MUSCA ERISTALOÏDES*, n. s. (genus *Pollenia*? *Desv.*) *Mas et Fœm.* Aureo tomentosa, crassa, subtus testacea, capite antico albo frontalibus antice rufis, antennis piceis basi rufis, thorace vittis tribus abbreviatis fulvis, scutello cyaneo, abdomine cyaneo basi fasciisque duabus albis, pedibus fulvis, tibiis tarsisque nigris, alis cinereis apud costam fusciscentibus. *Var. mas.* Minor, thorace vittis tribus nigris.

Male and Female. Body thick; head white; frontalia of the female piceous, linear, red in front; epistoma prominent; proboscis long; palpi whitish; antennæ piceous, red at the base; thorax with gilded tomentum, and with three tawny bands which are abbreviated hindward, scutellum blue; pectus testaceous; abdomen blue, white at the base and with two white bands on the 3rd and 4th segments, 1st segment with a transverse blue spot on each side; legs tawny, tibiæ and tarsi black; wings grey, blackish along the exterior part of the costa, præbrachial vein forming a right but rounded angle at its flexure, near which it is curved inward and is thence straight to its tip, discal transverse vein slightly undulating, parted by a little more than half its length from the border, and by much more than half its length from the flexure of the præbrachial; alulæ testaceous. *Var. Male.* Smaller; thorax with three black stripes; abdomen with only

one white band, which is on the 4th segment. Length of the body 4-5 lines; of the wings 8-10 lines.

Gen. BENGALIA, *Desv.*

106. BENGALIA SPISSA, n. s. *Mas et Fæm.* Fulva, capite nigro antice albo, antennis testaceis, pectore fasciis duabus obliquis albidis, pedibus nigris femoribus basi coxisque fulvis, alis cinereis.

Male and Female. Tawny. Head black, with silvery tomentum in front, epistoma not prominent; palpi black; antennæ testaceous; pectus with an oblique whitish band on each side; legs black, femora towards the base and coxæ tawny; wings grey, veins black, testaceous towards the base, præbrachial vein forming an obtuse and rounded angle at its flexure, which is very near the border of the wing, straight from thence to its tip, discal transverse vein straight, parted by much less than its length from the border, and by very much more than its length from the flexure of the præbrachial; alulæ testaceous. Length of the body $3\frac{1}{2}$ lines; of the wings 7 lines.

Subfam. ANTHOMYIDES, *Walk.*

Gen. ARICIA, *Macq.*

107. ARICIA SIGNIFICANS, n. s. *Mas et Fæm.* Fulva, subtus testacea, capite nigro argenteo-tomentoso, antennis testaceis, thorace vittis tribus albidis, abdominis apice picco, alis cinereis.

Male and Female. Tawny, testaceous beneath. Head black, with silvery tomentum, vertex much broader in the female than in the male; palpi tawny; antennæ testaceous; thorax with three whitish stripes in the disk, and with one on each side; abdomen piceous at the tip; tarsi blackish towards the tips; wings cinereous, veins black, tawny towards the base, discal transverse vein hardly undulating, parted by more than its length from the præbrachial transverse, and by less than its length from the border; alulæ pale cinereous, with testaceous borders. Length of the body 4 lines; of the wings 7 lines.

108. ARICIA CANIVITTA, n. s. *Fæm.* Fulva, subtus testacea, capite nigro, facie argentea, palpis antennisque testaceis, thoracis disco, abdominis plagis duabus trigonis pedibusque nigris, thorace vitta cana, alis cinereis.

Female. Tawny, testaceous beneath. Head black, face silvery; palpi and antennæ testaceous; disk of the thorax blackish, with a broad hoary stripe; disk of the scutellum piceous; second and third segments of the abdomen with triangular black bands; legs black, coxæ and trochanters testaceous; wings grey, veins black, discal transverse vein hardly curved inward, parted by more than half its length from the border, and by a little less than its length from the præbrachial transverse; alulæ pale cinereous, with testaceous borders. Length of the body $3\frac{1}{2}$ lines, of the wings 7 lines.

Gen. ANTHOMYIA, *Meigen*.

109. ANTHOMYIA PROCELLARIA, n. s. *Mas.* Nigra, subtus albida, capite argenteo, thorace fasciis duabus (prima interrupta) albis, abdomine vitta tenui fasciisque interruptis albidis, alis cinereis, halteribus testaceis.

Nearly allied to *A. pluvialis* and to *A. tonitru*. *Male.* Black, whitish beneath. Head silvery; thorax with two whitish bands, the first interrupted in the middle, widened on each side; scutellum elongate; abdomen with a slender whitish stripe, and with interrupted whitish bands, which are widened on each side; wings grey, veins black, discal transverse vein nearly straight, parted by less than half its length from the border and by hardly less than its length from the præbrachial transverse; alulæ grey, with testaceous borders; halteres testaceous. Length of the body 3 lines; of the wings 6 lines.

Gen. CÆNOSIA, *Meigen*.

110. CÆNOSIA LUTEICORNIS, n. s. *Mas.* Cana, capite antennisque pallide luteis, abdomine basi testaceo maculis octo nigris, pedibus halteribusque testaceis, alis sublimpidis apice nigris.

Male. Hoary. Head pale luteous, frontalia darker, widening towards the face; palpi white; antennæ pale luteous, extending to the epistoma, third joint long, slender, linear, arista plumose for half the length from the base; abdomen testaceous towards the base, with four dorsal black spots and with two black spots on each side towards the tip; legs testaceous; wings nearly limpid, with a black apical spot, discal transverse vein nearly straight, parted by less than its length from the border and by very much more than its length from the præbrachial transverse; alulæ white; halteres testaceous. Length of the body 3 lines; of the wings 5 lines.

Subfam. HELOMYZIDES, *Fallen*.Gen. CÆLOPA, *Meigen*.

111. CÆLOPA INCONSPICUA, n. s. *Fœm.* Cinerea, antennis piceis, pectore antico, abdomine pedibusque fulvis, his nigro variis, alis cinereis, halteribus testaceis.

Female. Cinereous, flat. Antennæ piceous; fore part of the pectus, abdomen and legs tawny, the latter with diffuse blackish bands; wings grey, veins black, with the usual structure, tawny towards the base; halteres testaceous. Length of the body 2 lines; of the wings $3\frac{1}{2}$ lines.

Gen. XARNUTA, *Walk*.

112. Xarnuta leucotelus, *Walk*. See Vol. I. p. 28.

Gen. *HELOMYZA*, *Fallen*.

113. *HELOMYZA PICIPES*, n. s. *Fæm.* Fulva, capite, antennis femoribusque nigris, abdominis segmentis nigro marginatis, tibiis tarsisque piceis, alis cinereis apud costam luridis vena discali transversa fusco subnebulosa, halteribus testaceis. *Var.* Thoracis vitta lata abdomineque piceis.

Female. Tawny. Head and antennæ black, arista plumose; thorax with two slender, darker, almost obsolete stripes; hind borders of the abdominal segments black; legs piceous, femora black, coxæ tawny; wings grey, with a lurid tinge towards the costa, discal transverse vein straight, slightly clouded with brown, parted by about half its length from the border, and by more than twice its length from the præbrachial transverse; halteres testaceous. *Var.* Thorax with a broad piceous stripe; abdomen piceous. Length of the body 3 lines; of the wings 6 lines.

114. *HELOMYZA ATRIPENNIS*, n. s. *Mas.* Fulva, scutello nigro, pectore piceo, abdomine ferrugineo, alis nigris postice cinereis.

Male. Tawny. Antennæ pale tawny, arista plumose; thorax with two slender, darker, almost obsolete stripes; scutellum black; pectus piceous; abdomen ferruginous; wings black, cinereous along the hind border for more than half its length from the base, veins as in the preceding species. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

115. *HELOMYZA RESTITUTA*, n. s. *Fæm.* Testacea, abdomine punctis sex nigris, alis cinereis apice nigricantibus venis transversis nigricante nebulosis.

Female. Testaceous. Third, fourth, and fifth segments of the abdomen with two black points on each fore border; wings grey, with a slight lurid tinge towards the costa, blackish at the tips, transverse veins clouded with blackish, veins with the usual structure. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

Gen. *DRYOMYZA*, *Fallen*.

116. *DRYOMYZA SEMICYANEA*, n. s. *Fæm.* Ferruginea, vertice piceo, antennis fulvis, thorace cyanescente, abdomine cyaneo basi ferrugineo, pedibus testaceis, alis subcinereis apud costam luridis.

Female. Ferruginous. Vertex piceous, face slightly covered with whitish tomentum; antennæ tawny, arista very minutely pubescent; thorax tinged with blue; abdomen blue, tawny at the base; legs testaceous; wings greyish, lurid along the costa, veins tawny, præbrachial vein forming a very slight angle where it joins the discal transverse, with a slight curve from thence to its tip, præbrachial transverse stout, slightly clouded, discal transverse straight, upright, parted by much less than half its length from the border and by a

little more than its length from the præbrachial transverse; halteres testaceous. Length of the body $3\frac{1}{2}$ – $4\frac{1}{2}$ lines; of the wings 7–9 lines.

Gen. SEPEDON, *Latr.*

117. SEPEDON COSTALIS, n. s. *Mas*. Cinerea, capite testaceo guttis quatuor nigris, antennis nigris basi testaceis arista alba, abdomine pedibusque fulvis femoribus posticis denticulatis, alis fusciscenti-cinereis, costa testacea.

Male. Cinereous. Head testaceous, with a black dot on each side above and two more towards the mouth; antennæ black, testaceous at the base, second joint very long, arista white; thorax with four slender indistinct darker lines, pectus hoary; abdomen and legs tawny, tarsi piceous, hind femora denticulated; wings brownish cinereous, slightly testaceous along the costa; halteres testaceous. Length of the body $4\frac{1}{2}$ lines; of the wings 8 lines.

Subfam. LAUXANIDES, *Walk.*

Gen. LAUXANIA, *Latr.*

118. LAUXANIA DUPLICANS, n. s. *Fæm.* Nigro-cyanea, antennis piceis, articulo tertio longissimo, tarsis basi albidis, tibiis intermediis sordide albidis, alis limpidis.

Female. Blackish-blue, shining. Antennæ piceous, third joint very long, reddish beneath, arista bare; legs black, tarsi whitish towards the base, middle tibiæ dingy whitish; wings limpid, veins pale, discal transverse vein white, parted by a little less than its length from the border and by nearly twice its length from the præbrachial transverse; halteres white. Length of the body 2 – $2\frac{1}{2}$ lines; of the wings 3–4 lines.

119. LAUXANIA MINUENS, n. s. *Fæm.* Nigra, nitens, antennis longis arista nuda, tarsis albidis, alis sublimpidis, halteribus albis.

Female. Black, shining. Third joint of the antennæ long, arista bare; tarsi whitish; wings very slightly greyish, veins pale, of the usual structure; halteres white. Length of the body $1\frac{1}{4}$ line; of the wings $2\frac{1}{2}$ lines.

Gen. LONCHÆA, *Fallen.*

120. LONCHÆA? INOPS, n. s. *Mas et Fæm.* Nigra, nitens, antennis piccis arista plumosa, scutello ferrugineo, tibiis, tarsis halteribusque fulvis, alis subcinereis.

Male and Female. Black, shining. Antennæ piceous, third joint short, arista plumose; scutellum somewhat ferruginous; tibiæ, tarsi, and halteres tawny; wings slightly greyish, veins pale, discal transverse vein parted by much less than its length from the border and by nearly twice its length from the flexure of the præbrachial. Length of the body $1\frac{1}{2}$ line; of the wings 3 lines.

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

121. LAMPROGASTER QUADRILINEA, n. s. *Mas et Fœm.* Cyaneo-viridis; capite pedibusque nigris; antennis piceis, basi rufis; thorace vittis quatuor albidis; abdomine purpureo-cyaneo; alis limpidis, litura basali, fasciis duabus (prima abbreviata, secunda interrupta) strigaeque costali apicali nigris.

Male and Female. Bluish green. Head black; proboscis red at the tip; antennæ piceous, red at the base; thorax with two whitish stripes on each side; abdomen purplish blue; legs black, tarsi with pale tomentum towards the base; wings limpid, two black streaks, one basal including a limpid dot, the other apical, first band oblique, extending from the costa to the disk, second widely interrupted in the middle, its hind part occupying the discal transverse vein; veins black, testaceous along the costa; præbrachial vein forming a slight angle at its junction with the discal transverse, the latter parted by not more than one-fourth of its length from the border, and by more than its length from the præbrachial transverse. Length of the body $3\frac{1}{2}$ - $4\frac{1}{2}$ lines; of the wings 7-9 lines.

122. LAMPROGASTER MARGINIFERA, n. s. *Fœm.* Testacea; capite maculis duabus fasciaque nigro-æneis; thoracis disco nigro-æneo, vittis tribus testaceis, vittis duabus lateralibus albidis, scutelli margine testaceo; abdominis dorso nigro-æneo; alis limpidis, fasciis plurimis fuscis.

Female. Testaceous. Head with two blackish æneous spots on the vertex, and with a blackish æneous band in front; mouth and antennæ tawny; disk of the thorax blackish æneous, with three testaceous stripes which are united in front, the middle one slender, the lateral pair united on the border of the scutellum, a whitish stripe on each side; abdomen blackish æneous above; wings limpid, with eight or nine irregular brown bands; veins black, testaceous along the costa; discal transverse vein parted by much less than its length from the border, and by about its length from the præbrachial transverse. Length of the body 4 lines; of the wings 9 lines.

123. LAMPROGASTER DELECTANS, n. s. *Fœm.* Ferruginea; capite testaceo, postice albedo, vertice luteo fasciis duabus nigris, vittis quatuor anticis antennisque nigris; thorace vittis septem et metathoracis fascia albidis; abdomine cyaneo-viridi, basi discoque fulvis; pedibus nigricantibus, femoribus testaceis apice nigris; alis sublimpidis, costa, striga obliqua subcostali guttaque marginali nigricantibus.

* *Ort. æchis*

Female. Ferruginous. Head testaceous, whitish behind; vertex luteous, blackish in front and behind; fore part with four blackish stripes; antennæ blackish; thorax with seven whitish stripes, the middle one broad, the inner pair very slender, the second pair broad, the third pair lateral; abdomen bluish green, slightly varied with

purple, base and fore part of the disk tawny; legs blackish; femora testaceous, with black tips; wings nearly limpid, with a slight lurid tinge in the discal areolet, blackish along the costa, and with a blackish oblique streak which extends from the costa along the præbrachial transverse vein; a blackish dot on the hind end of the discal transverse vein; veins black, discal transverse vein parted by about one-fourth of its length from the border, and by a little more than its length from the præbrachial transverse which is very oblique; alulæ white; halteres testaceous, with black knobs. Length of the body 5 lines; of the wings 9 lines.

124. *LAMPROGASTER SCUTELLARIS*, n. s. *Mas.* Subcinereo-nigra; oculis albido submarginatis; thorace vittis tribus cinereis, vittis duabus lateralibus, scutelli subquadrati margine, tibiis intermediis tarsisque albidis; alis nigricantibus, fasciis duabus integris duabusque macularibus incompletis albidis.

Male. Black, with a slight cinereous tinge; eyes partly bordered with whitish; third joint of the antennæ elongate-conical; arista plumose, the bristles few; thorax with three indistinct cinereous stripes, and with two whitish lateral stripes; scutellum nearly quadrate, with a whitish border; middle tibiæ, knees and tarsi whitish, the latter with black tips; wings blackish, whitish at the base, and with four whitish bands, first and third bands entire, second and fourth macular, very irregular and incomplete; veins black; discal transverse vein straight, parted by about one-fourth of its length from the border, and by hardly more than its length from the præbrachial transverse. Length of the body 2 lines; of the wings 4 lines.

This species has some resemblance to the genus *Platystoma*, and differs rather from the characters of *Lamprogaster*; it and the two following species, which are still more aberrant, will probably be considered as three new genera.

125. *LAMPROGASTER CELYPHOÏDES*, n. s. *Mas et Fem.* Atra, nitens, brevis, lata; capite, antennis pedibusque testaceis; abdomine nigro-cyaneo; alis limpidis, strigis transversis subcostalibus fusciscentibus.

Male and Female. Deep black, shining, short, broad. Head testaceous, face transverse; antennæ testaceous, third joint elongate-conical; arista bare; abdomen blackish blue, second segment very large, third and following not visible; legs testaceous; wings limpid, with four transverse pale brown subcostal streaks; discal transverse vein parted by less than half its length from the border, and by less than its length from the flexure of the præbrachial; halteres testaceous. Length of the body 2-2½ lines; of the wings 4½ lines.

126. *LAMPROGASTER TETYROÏDES*, n. s. *Mas.* Atra, nitens, brevissima, latissima; capite transverso, subruguloso; thorace scitissime punctato; abdomine cyaneo; tarsis flavis; alis nigris albido punctatis apud marginem posticum obscure cinereis.

Male. Deep black, shining, very short and broad. Head transverse, slightly rugulose; third joint of the antennæ conical; arista thinly plumose; thorax very finely punctured; scutellum almost semicircular; abdomen blue, smooth; tarsi yellow; wings black, dark grey towards the hind border, with whitish points towards the costa; discal transverse vein parted by about its length from the border and by more than its length from the præbrachial transverse. Length of the body $2\frac{1}{2}$ lines; of the wings 5 lines.

Gen. PLATYSTOMA, *Latr.*

127. PLATYSTOMA FUSIFACIES, n. s. *Mas et Fœm.* Cinerea; capite postice et apud oculos albo; vertice pallide luteo (mas) aut rufo (fœm.); facie plana, fusiformi, subargentea; antennis piceis; thoracis vittis tribus pectoreque canis; abdomine conico punctis albis; alis limpidis, guttis transversis interioribus fasciisque exterioribus nigricantibus.

Male and Female. Cinereous. Head white hindward and about the eyes, black and shining towards the mouth; vertex pale luteous in the male, red in the female; face flat, fusiform, somewhat silvery; antennæ piceous, third joint long, slender, linear, arista plumose; thorax with three hoary stripes, the middle one much broader than the lateral pair; pectus hoary; abdomen conical, with numerous white points; wings limpid, with blackish dots towards the base, and with four exterior blackish bands, two of which are dilated towards the costa, and there contain some limpid dots; veins black, discal transverse vein straight, parted by about one-fourth of its length from the border, and by more than its length from the præbrachial transverse; halteres whitish. Length of the body $3\frac{1}{2}$ –5 lines; of the wings 8–10 lines.

128. PLATYSTOMA MULTIVITTA, n. s. *Mas.* Cinerea; capite postice et apud oculos albo, vertice luteo, facie et antennis fulvis; thoracis vittis octo pectoreque canis; abdominis segmentis cano fasciatis; ventre ferrugineo; pedibus nigris; alis limpidis, fasciis quatuor strigisque interioribus nigricantibus.

Male. Cinereous. Head white behind and about the eyes, vertex luteous; face and antennæ tawny, third joint of the latter long, slender, linear; arista very slightly plumose; thorax with eight hoary stripes; pectus hoary; abdomen with a hoary band on the fore border of each segment; legs black; wings limpid, with four blackish bands, and with some blackish marks nearer the base; two blackish streaks between the first and second bands; veins black; discal transverse vein straight, parted by one-fourth of its length from the border, and by very much more than its length from the præbrachial transverse; halteres black. Length of the body 4 lines; of the wings 8 lines.

Gen. DACUS, *Fabr.*

129. *DACUS EXPANDENS*, n. s. *Fæm.* Fulvus, latiusculus; antennarum articulo tertio piceo angusto lineari longissimo; abdomine vitta tenui nigricante; alis limpidis, costa vittaque postica fusciscentibus.

Female. Tawny, rather broad, very slightly covered with hoary tomentum, which forms stripes on the thorax and indistinct bands on the abdomen; third joint of the antennæ piceous, slender, linear, very long; arista bare; abdomen with a slender blackish stripe; wings limpid, brownish along the costa, and with a short oblique brownish stripe extending from the base to the interior border; veins black, discal transverse vein oblique, parted by full one-fourth of its length from the border, and by more than its length from the præbrachial transverse; halteres testaceous. Length of the body 4 lines; of the wings 8 lines.

130. *DACUS PECTORALIS*, n. s. *Fæm.* Cinereo-niger; capite fulvo, facie guttis duabus nigris; antennarum articulo tertio piceo angusto lineari longissimo; callis duabus humeralibus, fasciis duabus obliquis pectoralibus lateralibus, scutello tarsisque testaceis; thoracis vittis tribus abdominisque una canis; pedibus fulvis piceo cinctis; alis limpidis, costa vittaque postica fusciscentibus.

Female. Black, slightly covered with cinereous tomentum. Head tawny, with two small black dots on the face; third joint of the antennæ piceous, slender, linear, very long, arista bare; thorax with three indistinct hoary stripes; humeral calli, an oblique band on each side of the pectus, scutellum and tarsi, testaceous; abdomen with one hoary stripe; legs tawny, with diffuse piceous bands; wings limpid, brownish along the costa, and with a short oblique brownish stripe, extending from the base to the interior border; veins black; discal transverse vein parted by less than one-fourth of its length from the border, and by a little more than its length from the præbrachial transverse; halteres testaceous. Length of the body $3\frac{3}{4}$ lines; of the wings $7\frac{1}{2}$ lines.

131. *DACUS LATIFASCIA*, n. s. *Fæm.* Niger; capite postice et apud oculos albedo; antennarum articulo tertio vix longo; thoracis fascia, metathorace pectorisque fasciis duabus obliquis canis; abdomine cyaneo; femoribus albidis apice nigris; alis albo-limpidis, costa atra, fasciis duabus latissimis nigris; halteribus testaceis.

Female. Black. Head whitish behind and about the eyes; third joint of the antennæ linear, round at the tip, hardly long, arista plumose; thorax with a band on the hind border of the scutum; metathorax and an oblique band on each side of the pectus hoary; abdomen blue; coxæ and femora whitish, the latter with black tips; wings limpid white, deep black along the costa, and with two very broad black bands; veins black; discal transverse vein very oblique, parted

by about one-sixth of its length from the border, and by little more than half its length from the præbrachial transverse; halteres testaceous. Length of the body 4 lines; of the wings 8 lines.

132. *DACUS MUTILLOIDES*, n. s. *Fæm.* Rufescens; capite nigro, positice et apud oculos albo; antennarum articulo tertio angusto lineari longissimo; thoracis vittis tribus, pectoris fasciis duabus obliquis lateralibus abdominisque fasciis duabus (secunda interrupta) albis, abdominis dimidio postico nigro-æneo; pedibus piceis; alis sublimpidis, costæ apice venisque transversis nigro nebulosis; halteribus albidis.

Female. Reddish. Head black, white behind and about the eyes and on the grooves of the face; antennæ black, reddish at the base, third joint slender, linear, very long, arista bare, rather stout; thorax with three whitish stripes; pectus with a more distinct oblique white band on each side; metathorax whitish; abdomen æneous, pubescent, finely punctured, reddish and slightly contracted towards the base, with two white bands, the second widely interrupted; oviduct long, lanceolate; legs piceous; wings nearly limpid, clouded with black at the tip of the costa and on the præbrachial transverse vein, hardly clouded on the discal transverse vein; veins black; discal transverse vein straight, parted by about one-fourth of its length from the border, and by much more than its length from the præbrachial transverse; halteres whitish. Length of the body 5 lines; of the wings 8 lines.

133. *DACUS LONGIVITTA*, n. s. *Mas.* Æneo-viridis, subpubescens, subtilissime punctatus; capite nigro apud oculos albido, epistomate ferrugineo, antennarum articulo tertio longo lineari; thorace subvittato; pedibus nigris, femoribus ferrugineis; alis subcinereis, costa vittaque apud venam præbrachialem nigris; halteribus piceis.

Male. Æneous green, with slight hoary tomentum, very finely punctured. Head black, whitish about the eyes; epistoma ferruginous, prominent; antennæ black, ferruginous at the base, third joint long, linear, conical at the tip; arista bare; thorax with an indistinct broad hoary stripe; abdomen compressed, nearly linear; legs black; femora ferruginous; wings slightly greyish, black along the costa and with a black stripe which extends along the præbrachial vein to the discal transverse vein; veins black; discal transverse vein straight, oblique, parted by a little more than half its length from the border, and by very much more than its length from the præbrachial transverse; halteres piceous. Length of the body 4-6 lines; of the wings 5-7 lines.

134. *DACUS LATIVENTRIS*, n. s. *Fæm.* Nigro-viridis, subtilissime punctatus; capite piceo apud oculos albido; antennis fulvis, articulo tertio sublanceolato; abdomine brevi, lato; pedibus nigris, femoribus anticis fulvis; alis subcinereis, costa vittaque apud venam præbra-

chialem nigris, vena discali transversa nigricante nebulosa ; halteribus albidis.

Female. Blackish green, very minutely punctured. Head piceous, whitish about the eyes; epistoma ferruginous, slightly prominent; antennæ tawny, third joint rather long, somewhat lanceolate, arista bare; abdomen nearly round, broader than the thorax; legs black, fore femora tawny; wings very slightly greyish, black along the costa to the tip of the præbrachial vein, with a black stripe along the præbrachial vein to the discal transverse vein, and with a blackish tinge about the discal transverse vein and along the adjoining part of the hind border; veins black, discal transverse straight, vein parted by less than half its length from the border, and by very much more than its length from the præbrachial transverse; halteres whitish. Length of the body 2 lines; of the wings 4 lines.

135. *DACUS OBTRUDENS*, n. s. *Mas.* Nigro-viridis, subtilissime punctatus; capite nigro apud oculos albedo; antennis piceis basi rufescentibus, articulo tertio lineari longissimo; abdomine lineari maculis duabus lateralibus testaceis; pedibus nigris, femoribus apice tarsisque posticis basi fulvis; alis subcinereis, costa, apice maculaque apud venam transversam discalem nigricantibus; halteribus albis.

Male. Dark green, very minutely punctured. Head black, whitish about the eyes, ferruginous towards the epistoma; antennæ piceous, reddish towards the base; third joint linear, very long, arista bare; abdomen linear, compressed, with a testaceous spot on each side before the middle; legs black, femora tawny towards the tips, hind tarsi tawny at the base; wings slightly greyish, blackish along the costa and at the tips, and about the transverse veins; veins black, tawny at the base; discal transverse vein straight, oblique, parted by about half its length from the border, and by a little more than its length from the præbrachial transverse; halteres white. Length of the body 4 lines; of the wings 7 lines.

136. *DACUS POMPILOIDES*, n. s. *Mas.* Niger; capite albedo, epistomate ferrugineo; antennis piceis basi rufis, articulo tertio longo lineari; abdomine nigro-cyaneo; pedibus piceis; alis subcinereis, striga costali basali, fascia tenui postice abbreviata et triente apicali strigam subcineream includente nigricantibus; halteribus albis.

Male. Black. Head with whitish tomentum, epistoma ferruginous, prominent; antennæ piceous, red at the base, third joint long, linear, arista bare; abdomen linear, blackish blue, longer than the thorax; legs piceous; wings slightly greyish, with a blackish costal streak extending from the base, with a slender blackish band which is abbreviated hindward, and with more than one-third of the apical part blackish and including a slightly greyish streak; veins black, discal transverse vein straight, oblique, parted by a little less than its length from the border and by about its length from the præbrachial trans-

verse; halteres white. Length of the body $3\frac{1}{2}$ lines; of the wings 6 lines.

Gen. BREA, n. g.

Platystomæ affinis. Facies lata. Antennæ breves; articulus tertius longiconicus; arista nuda. Femora intermedia incrassata, denticulata. Allied to Platystoma. Face broad; antennæ short, third joint elongate-conical; arista bare; middle femora incrassated, denticulated beneath.

137. BREA DISCALIS, n. s. *Mas. Nigra; capite testaceo apud oculos albido, fronte ochracea; antennis piceis basi rufescentibus; thorace vitta lata cana; abdomine fulvo, disco nigro cupreo; pedibus fulvis, femoribus anticis apice tibiisque anticis basi nigris; alis sublimpidis, fascia media lata postice abbreviata guttam limpida subcostalem includente lineaque transversa exteriori nigricantibus; halteribus testaceis.*

Male. Black. Head testaceous, whitish about the eyes, front ochraceous; antennæ piceous, reddish at the base; thorax with a broad hoary stripe; abdomen tawny, with a blackish cupreous disk; legs tawny, fore femora at the tips and fore tibiæ at the base black; wings nearly limpid, with a broad middle blackish band, which is abbreviated hindward and includes a limpid dot by the costa, and has beyond it a blackish transverse line; veins black, testaceous towards the base; discal transverse vein straight, upright, parted by half its length from the border, and by much more than its length from the præbrachial transverse; halteres testaceous. Length of the body 4 lines; of the wings 7 lines.

138. BREA CONTRARIA, n. s. *Mas et Fæm. Nigra; capite fulvo apud oculos albido, fronte ochracea; antennis rufescentibus; thorace vitta cana; abdomine purpureo apice cyaneo; pedibus nigris, femoribus anticis tarsisque testaceis; alis sublimpidis, fascia lata media postice abbreviata, guttis interioribus lineaque transversa exteriori nigricantibus.*

Male and Female. Black. Head tawny, whitish about the eyes; antennæ reddish; thorax with a hoary stripe; sides and pectus also hoary; abdomen purple, blue towards the tip; legs black; tarsi and fore femora testaceous; wings nearly limpid, with a broad blackish middle band which is abbreviated hindward, with some interior blackish dots, and with an exterior transverse blackish line; veins black; discal transverse vein straight, parted by less than half its length from the border, and by less than its length from the præbrachial transverse; halteres black. Length of the body $3-3\frac{1}{2}$ lines; of the wings 6-7 lines.

Gen. ADRAMA, n. g.

Mas. Corpus longiuseculum. Caput thorace vix latius, setis duabus posticis erectis. Antennæ sat longæ; articulus tertius linearis, apice

conicus; arista pubescens. *Abdomen* sublineare, thorace longius et angustius. *Pedes* mediocres; femora posteriora spinis minutis armata. *Alæ* sat longæ.

Male. Body rather long. Head transverse, hardly broader than the thorax, with two erect setæ on the hind part of the vertex; face vertical; epistoma slightly prominent. Antennæ nearly reaching the epistoma; third joint long, linear, conical at the tip; arista pubescent. Abdomen almost linear, longer and narrower than the thorax. Legs moderately long and slender; posterior femora with minute spines beneath. Wings rather long; discal transverse vein straight, upright, parted by hardly half its length from the border, and by rather more than its length from the præbrachial transverse.

139. *ADRAMA SELECTA*, n. s. *Mas*. Testacea; capite guttis tribus nigris; thorace disco antico vittisque duabus posterioribus nigris; tibiis tarsisque anticis piceis, tibiis posticis subpiceis; alis subfuscescentibus, fascia lata limpida nigricante marginata postice abbreviata.

Male. Testaceous. Head with a black dot above the antennæ and one on each side of the epistoma; thorax with the fore part of the disk black, and with two hindward black stripes; fore tibiæ and fore tarsi piceous; hind tibiæ somewhat piceous; wings slightly brownish, with two blackish bands, the first on the præbrachial transverse vein, abbreviated hindward, the second on the discal transverse vein, abbreviated in front, intermediate space limpid, veins testaceous, black towards the tips; halteres pale testaceous. Length of the body $4\frac{1}{2}$ lines; of the wings 8 lines.

Gen. ORTALIS, *Fallen.*

140. *ORTALIS PROMPTA*, n. s. *Fæm.* Nigro-viridis; capite piceo apud oculos albedo; antennis rufescentibus; thorace vitta abdomineque fasciis cinereis; pedibus nigris; alis limpidis, vittis tribus nigris, prima postice abbreviata, secunda tertiaque latis; halteribus albidis.

Female. Blackish green. Head piceous, whitish about the eyes; epistoma somewhat prominent; antennæ reddish, third joint somewhat lanceolate, piceous towards the tip; arista bare; thorax with a cinereous stripe; sides and pectus also cinereous; abdomen with two cinereous bands; legs black; wings limpid white, slightly cinereous towards the base, with three black bands, the first abbreviated hindward, the second and third very broad; veins black, discal transverse vein curved inward, parted by much less than its length from the border and by a little less than its length from the præbrachial transverse; halteres whitish. Length of the body $3\frac{1}{2}$ lines; of the wings 6 lines.

141. *ORTALIS COMPLENS*, n. s. *Mas et Fæm.* Nigro-viridis; capite antennisque testaceis, articulo tertio brevi, arista plumosa; abdomine atro; pedibus testaceis, femoribus nigris; alis albo limpidis, strigis

duabus apiceque nigro-cinereis, fasciis tribus satis nigricantibus; halteribus albis. *Mas.* Vertice luteo postice nigro, femoribus apice testaceis, alarum fasciis subconnexis. *Fem.* Vertice nigro, tibiis nigris, posticis basi testaceis.

Male and Female. Blackish green. Head testaceous; antennæ testaceous, third joint short, conical; arista plumose; abdomen deep black; legs testaceous; femora black; wings limpid white, with three broad blackish stripes, the second emitting a branch from its outer side to the costa, a streak connected with the outer side of the third band, and the tips blackish cinereous; discal transverse vein straight, parted by much less than its length from the border, and by a little more than its length from the præbrachial transverse; halteres white. *Male.* Vertex luteous, black hindward; femora with testaceous tips; bands of the wings partly connected. *Female.* Vertex black; tibiæ black, the hind pair testaceous towards the base. Length of the body $1\frac{1}{2}$ –2 lines; of the wings 3–4 lines.

Gen. TRYPETA, *Meigen*.

142. TRYPETA MULTISTRIGA, n. s. *Fæm.* Testacea; thorace pectoreque nigro-strigatis; abdomine maculis quatuor lateralibus anterioribus fascia lata apiceque nigris; femoribus posterioribus nigro vittatis; alis nigricantibus basi marginali maculis guttisque albis.

Female. Testaceous. Third joint of the antennæ short, conical; arista plumose; thorax with black bristles on each side, with eight black streaks, four in front, of which the middle pair are very short, four hindward, the middle pair short, the outer pair connected in front of the scutellum, two lateral black streaks; pectus with a black interrupted streak on each side; disk also black; abdomen with two transverse black spots on each side towards the base, and with a broad black band; oviduct black, flat, lanceolate, obtuse at the tip; posterior femora striped with black; wings blackish, limpid for a space from the base along the costa and along the hind border, and with twelve white marks of various size, four discal, eight marginal; discal transverse vein nearly straight, parted by one-fourth of its length from the border, and by about its length from the præbrachial transverse. Length of the body $3\frac{1}{2}$ lines; of the wings 6 lines.

143. TRYPETA DORSIGUTTA, n. s. *Mas.* Atra; capite piceo vitta testacea, subtus albo; antennis testaceis; thorace cinereo punctis lateralibus albis, pectore albido; abdominis segmentis testaceo marginatis; tibiis albido fasciatis, tarsis albidis; alis albo-limpidis, strigis basalibus fascisque duabus latis nigricantibus, prima antice furcata; halteribus albis.

Male. Deep black. Head piceous, with cinereous tomentum, white behind and beneath, a testaceous stripe on the vertex; antennæ testaceous, black at the base, third joint conical, white at the base,

arista plumose; thorax with cinereous tomentum, white points along each side; pectus whitish; hind borders of the abdominal segments testaceous with cinereous tomentum; tibiæ with a dingy whitish band; tarsi dingy whitish; wings limpid white, with several blackish marks towards the base and with two broad blackish bands, the first forked in front; discal transverse vein nearly straight, parted by less than its length from the border, and by more than twice its length from the præbrachial transverse; halteres white. Length of the body $2\frac{1}{2}$ lines; of the wings 4 lines.

144. *TRYPETA BASALIS*, n. s. *Mas.* Nigra, nitens; capite antennisque fulvis, vertice maculis duabus piceis; abdomine basi pedibusque testaceis; alis limpidis, striga basali, fasciis tribus costaque apicali nigricantibus; halteribus testaceis.

Male. Black, slender, shining. Head tawny, with two elongated piceous spots on the vertex; antennæ tawny, third joint linear, rather long, arista bare; abdomen nearly fusiform, testaceous at the base; legs testaceous; wings limpid, with a blackish oblique streak extending from the base, with three blackish bands, and with a blackish costal streak extending round the tip, first and third bands slender, second broad, abbreviated like the first hindward; discal transverse vein straight, parted by about one-fourth of its length from the border, and by less than its length from the præbrachial transverse; halteres testaceous. Length of the body $1\frac{1}{2}$ line; of the wings 3 lines.

145. *TRYPETA IMPLETA*, n. s. *Fæm.* Cinerea; capite albedo; antennarum articulo tertio albedo apice nigro; thorace vitta fusca, scutello albedo, abdomine nigro; pedibus albidis nigro fasciatis; alis albis, maculis plurimis nigricantibus ex parte confluentibus; halteribus albidis.

Female. Cinereous. Head whitish; third joint of the antennæ short, conical, whitish, blackish at the tip, arista plumose; thorax with a brown stripe; scutellum whitish; abdomen black; legs whitish, with black bands; wings white, with many blackish spots, some of them confluent; discal transverse vein straight, parted by much less than its length from the border, and by a little less than its length from the præbrachial transverse; halteres whitish. Length of the body $1\frac{1}{2}$ line; of the wings 3 lines.

146. *TRYPETA SUBOCELLIFERA*, n. s. *Mas.* Cana; antennis albidis; thorace guttis fuscis, scutelli margine albedo; abdomine fusco apicem versus cano maculis fuscis; pedibus albidis fusco fasciatis; alis limpidis, maculis nigricantibus pallido signatis ex parte confluentibus.

Male. Hoary. Antennæ whitish, third joint short, conical, arista plumose; thorax with some slight brown dots; scutellum brown, hind borders of the scutellum white; abdomen brown, hind borders of the segments and apical part cinereous, the latter with brown dots; legs whitish, with brown bands; wings limpid, with several blackish

dots containing pale marks, some of them confluent and forming a middle band; discal transverse vein straight, enclosed in a pale streak, parted by much less than its length from the border and by much more than its length from the præbrachial transverse; halteres whitish. Length of the body $1\frac{1}{2}$ line; of the wings 3 lines.

Subfam. ACHIIDES, *Walk.*

Gen. ACHIAS, *Fabr.*

147. ACHIAS LONGIVIDENS, n. s. *Mas et Fæm.* Viridi-cinerea; capite testaceo fasciis duabus vittisque tribus anticis nigris; antennis nigris; thorace vittis quatuor purpureo-nigris, pectore ferrugineo; abdomine viridi-fulvo; pedibus piceis; alis limpidis, costa lurido-nigricante, vena transversa discali fusco nebulosa; halteribus testaceis apice nigris. *Mas.* Oculis longissime petiolatis, scutello viridi, femoribus basi fulvis. *Fæm.* Oculis subpetiolatis, scutello nigro-purpureo.

Male and Female. Greenish cinereous. Head with two black bands on the vertex and with four black stripes in front; antennæ black, third joint linear, very long, arista plumose; thorax with four purplish black stripes, middle pair abbreviated hindward and having behind them a spot of the same hue, lateral pair interrupted; pectus ferruginous; abdomen tawny, with bright green reflections, testaceous beneath; legs piceous; wings limpid, blackish, and with a lurid tinge along the costa, whence a short oblique blackish streak proceeds by the præbrachial transverse vein; discal transverse vein clouded with brown, hardly curved, parted by less than one-third of its length from the border, and by much more than its length from the præbrachial transverse, which is very oblique; halteres testaceous, with black tips. *Male.* Head with the fore black band interrupted; eyes with very long petioles, the latter about three-fourths of the length of the body; scutellum green; femora tawny towards the base. *Female.* Eyes with short petioles, extending a little beyond the sides of the thorax; scutellum blackish purple. Length of the body 5-6 lines; of the wings 12-13 lines.

148. ACHIAS LATIVIDENS, n. s. *Fæm.* Viridi-cinerea; capite testaceo, vittis tribus anticis nigris, oculis subpetiolatis; antennis nigris; thorace vittis quatuor purpureo-nigris, scutello cyaneo basi viridi, pectore fulvo; abdomine viridi-fulvo; pedibus nigris, femoribus basi luteis, tibiis luteo fasciatis; alis subcinereis, vitta costali nigricante interrupta lurida strigata, vena transversa discali fusco nebulosa; halteribus testaceis apice nigris.

Female. Greenish cinereous. Head testaceous, with three black stripes on the face; eyes very slightly petiolated; antennæ black; thorax with four purplish black stripes; scutellum blue, green at the base; pectus tawny; abdomen tawny, with bright green reflections; legs black; femora luteous towards the base; tibiæ with indistinct luteous

bands; wings slightly greenish, with a blackish interrupted costal stripe containing luteous streaks; discal transverse vein clouded with brown; veins in structure like those of the preceding species; halteres testaceous, with black tips. Length of the body 6 lines; of the wings 13 lines.

This species at first sight seems like a variety of the preceding one, but the petioles of the eyes are shorter and thicker, the costal stripes of the wings are interrupted, and the shade on the discal transverse vein is more diffuse.

149. *ACHIAS AMPLIVIDENS*, n. s. *Fæm.* Fulva, subtus testacea; oculis extantibus non petiolatis; thorace submetallico, vittis quinque cinereis; abdomine purpureo basi testaceo, tibiis tarsisque nigris; alis subcinereis, costa nigro-fusca, venis transversis nigro-fusco nebulosis.

Female. Tawny, testaceous beneath. Head testaceous; eyes very prominent, but hardly petiolated; antennæ tawny; thorax slightly metallic, with five cinereous stripes, which are abbreviated hindward, the inner pair slender; abdomen purple, testaceous at the base; legs black; coxæ and femora testaceous, the latter with black tips; wings slightly greyish, costal stripe brown, blackish towards the tip; præbrachial transverse vein clouded with blackish, discal transverse vein clouded with a much paler hue than that of the præbrachial transverse vein, in structure like those of the two preceding species; halteres testaceous, with black tips. Length of the body $4\frac{1}{2}$ lines; of the wings 9 lines.

Subfam. ————— ?

Gen. *POLYARA*, n. g.

Mas. *Corpus* longiusculum. *Caput* transversum; facies lata, plana, non obliqua. *Palpi* lati. *Antennæ* parvæ; articulus tertius longiconicus; arista plumosa. *Thorax* oblongo-subquadratus. *Abdomen* sublineare, thorace multo longius et angustius. *Pedes* breves, tenues. *Alæ* latiusculæ; venæ optime determinatæ; venæ duæ transversæ inter venas radialem et cubitalem; vena præbrachialis apicem versus valde flexa.

Male. Body rather long. Head transverse, a little broader than the thorax; face broad, flat, vertical. *Palpi* broad. *Antennæ* small; third joint elongate-conical, not extending more than half the length to the epistoma; arista plumose. *Thorax* oblong-subquadrate. *Abdomen* nearly linear, much longer and more slender than the thorax. *Legs* short, rather slender; fore femora somewhat setose beneath. *Wings* rather broad, flat in repose; veins very strongly marked; a transverse vein between the cubital and mediastinal veins; two transverse veins between the radial and cubital veins; cubital vein slightly angular between the præbrachial transverse vein and the tip of the wing; præbrachial vein much curved towards its tip.

The structure of the wing veins in this genus is very peculiar, and it does not agree well with any of the established subfamilies of *Muscidæ*.

150. *POLYARA INSOLITA*, n. s. *Mas.* Testacea; faciei sulcis albidis; abdomine lutescente fulvo; alis subcinereis, nigricante-fusco submarginatis et subfasciatis.

Male. Testaceous, paler beneath. Facial grooves for the antennæ whitish; thorax with some almost obsolete stripes, the middle pair approximate, slender, somewhat more distinct than the others; abdomen somewhat lutescent-tawny; wings slightly greyish, irregularly blackish-brown along the costa, brown at the tips, and with a brown band which is indistinct in front but much darker on the discal transverse vein; præbrachial vein largely bordered with brown; veins black, testaceous towards the base, discal transverse vein straight, parted by about one-sixth of its length from the border, and by rather less than half its length from the præbraehial transverse; alulæ very small. Length of the body $5\frac{1}{2}$ lines; of the wings 10 lines.

Subfam. SEPSIDES, *Walk.*

Gen. ANGITULA, n. g.

Fæm. *Corpus* convexum, glaberrimum, nitidissimum. *Caput* subrotundum; epistoma valde prominens. *Antennæ* epistoma non attingentes; articulus tertius longiusculus, linearis, apice conicus; arista subpubescens. *Thorax* anticus valde productus et attenuatus; scutellum bispinosum; metathorax magnus, declivis. *Abdomen* longi-subfusiforme; segmentum primum gibbosum. *Pedes* longi, graciles; coxæ anticæ longissimæ. *Alæ* longæ, angustæ; alulæ obsoletæ.

Female. Body convex, very smooth and shining. Head nearly round; front subquadrate; face short; epistoma very prominent. Mouth short. Antennæ not reaching the epistoma; third joint linear, rather long, conical at the tip; arista somewhat pubescent. Thorax much produced and attenuated in front; scutellum armed with two spines; metathorax slanting, well developed. Abdomen elongate-subfusiform, longer and much more slender than the thorax; first segment gibbous above. Legs long, slender, without bristles; fore coxæ very long. Wings long, narrow; discal transverse vein straight, upright, parted by less than half its length from the border, and by nearly twice its length from the præbrachial transverse.

151. *ANGITULA LONGICOLLIS*, n. s. *Fæm.* Nigro-ænea; capite subtus albedo, frontis disco rufescente, fascia albida; antennis piceis basi rufis; pedibus nigris, femoribus basi coxisque anticis albidis; alis limpidis, costa nigra.

Female. Æneous black. Head whitish beneath, front with a reddish disk, face whitish. Antennæ piceous, first and second joints red;

legs black, bare; femora towards the base and fore coxæ whitish; wings limpid, with a black costal line extending to the tip of the præbrachial vein; veins and halteres black. Length of the body 5 lines; of the wings 8 lines.

Gen. SEPSIS, *Fallen*.

152. SEPSIS BASIFERA, n. s. *Mas et Fæm.* Nigra; thorace nigro-æneo; tarsi, femoribus basi pedibusque anticis testaceis; alis limpidis, costa basi nigra. *Mas.* Metatarsis intermediis dilatatis, alis apice vix nigricantibus. *Fæm.* Alis apice nigris.

Male and Female. Black, shining. Thorax æneous black; pectus cinereous; tarsi, femora at the base, and fore legs, pale testaceous; wings limpid; costa at the base and veins black. *Male.* Basal joint of the intermediate tarsi dilated; wings hardly blackish at the tips. *Female.* Wings black at the tips. Length of the body 2-2½ lines; of the wings 3-3½ lines.

Gen. CALOBATA, *Fabr.*

153. Calobata albitarsis, *Wied. Auss. Zweifl.* 71. 544. 22. Inhabits also Java and Australia.

154. Calobata indica, *Desv. Ess. Myod.* 737. 4. (Nerius). Inhabits also Hindostan.

155. Calobata Abana, *Walk. Cat. Dipt.* pt. 4. 1054.

156. CALOBATA SEPSOIDES, n. s. *Fæm.* Nigra; antennis ferrugineis, articulo tertio conico brevi, arista nuda; pedibus testaceis nigricante subnotatis, femoribus anticis nigris basi testaceis, tibiis anticis nigris, tarsi anticis niveis, posticis albidis; alis subcinereis, fasciis duabus indistinctis fuscescentibus.

Female. Black, shining. Antennæ ferruginous, third joint short, conical, arista bare; pectus slightly covered with cinereous tomentum; legs testaceous, with a few very indistinct blackish marks; fore femora black, testaceous towards the base; fore tibiæ black; fore tarsi snow-white, black at the base; hind tarsi whitish; wings greyish, with two almost obsolete brownish bands; discal transverse vein parted by less than its length from the border and by about four times its length from the præbrachial transverse. Length of the body 5 lines; of the wings 7 lines.

Gen. CARDIACEPHALA, *Macq.*

157. CARDIACEPHALA DEBILIS, n. s. *Fæm.* Testacea, gracilis; thorace linea transversa interrupta nigra; pedibus anticis parvis, posterioribus longis, tarsi albis brevissimis, tibiis anterioribus piceis; alis limpidis apice cinereis, fascia lata pallide lutea.

Female. Testaceous, slender. Vertex somewhat luteous; third joint of

the antennæ conical, very short, arista bare; thorax attenuated in front, with a transverse interrupted black line hindward; abdomen longer than the thorax, lanceolate hindward; fore legs short, posterior legs long; tarsi white, very short; anterior tibiæ piceous; middle femora rather thicker than the hind pair; wings limpid, grey towards the tips, with a pale luteous middle band; veins testaceous, cubital and præbrachial converging towards the tips of the wings, discal transverse vein straight, parted by less than its length from the border and by about thrice its length from the præbrachial transverse. Length of the body $3\frac{1}{2}$ lines; of the wings 5 lines.

Subfam. PSILIDES, *Walk.*

Gen. LISSA, *Meigen.*

158. LISSA CYLINDRICA, n. s. *Mas.* Cyanea, gracilis, cylindrica; antennis piceis basi albidis, arista plumosa; abdomine piceo basi apiceque cyaneis; pedibus albidis, femoribus posterioribus nigris apice albidis, femoribus posticis subtus spinosis, tibiis posticis nigris; alis subcinereis apice subfuscis; halteribus albidis apice nigris.

Male. Blue, slender, cylindrical. Head broader than the thorax; antennæ whitish, third joint piceous, arista plumose; abdomen piceous, slightly increasing in breadth to the tip, blue at the base and at the tip, hind borders of the first and second segments whitish; legs whitish, posterior femora black, whitish at the base and towards the tips, hind femora spinose beneath, hind tibiæ black; wings slightly greyish, brownish towards the tips; veins black, præbrachial and perbrachial very near together for more than half their length, discal transverse vein straight, parted by more than its length, and by about four times its length from the præbrachial transverse; halteres whitish, with black tips. Length of the body $3\frac{1}{2}$ lines; of the wings 5 lines.

Gen. NERIUS, *Fabr.*

159. *Nerius duplicatus*, *Wied. Auss. Zweifl.* 11. 553. 8.
Inhabits also Java.

Subfam. OSCINIDES, *Haliday.*

Gen. OSCINIS, *Fabr.*

160. OSCINIS LINEIPLENA, n. s. *Mas.* Fusca; capite subtus testaceo apud oculos albo, vitta frontali alba; thorace pectoreque lineis sex albidis; abdomine sordide testaceo, pedibus albidis, tibiis tarsisque apice femoribusque anticis nigris; alis subcinereis, halteribus albidis.

Male. Brown. Head testaceous in front and beneath, white about the eyes, with a white stripe on the front; thorax and pectus with six whitish stripes on each, thorax with an indistinct middle testaceous

stripe; abdomen dull testaceous; legs whitish; tibiæ and tarsi at the tips and fore femora black; wings greyish; veins black, discal transverse vein oblique, parted by more than its length from the border, and by full twice its length from the præbrachial transverse; halteres whitish. Length of the body 2 lines; of the wings 3 lines.

161. *OSCNIS NOCTILUX*, n. s. *Mas.* Atra; capite pallide flavo subtus albo; antennis luteis, arista nuda; scutello, maculis duabus pectoralibus abdominisque apice albis; tibiis tarsisque intermediis testaceis; alis nigricantibus postice cinereis, halteribus niveis.

Male. Black. Head pale yellow, black hindward, white beneath; antennæ pale luteous, third joint very short, arista bare; scutellum white; pectus with a white spot on each side; abdomen white at the tip; middle legs with testaceous tibiæ and tarsi; hind wings blackish, cinereous hindward; halteres snow-white. Length of the body $\frac{3}{4}$ line; of the wings $1\frac{1}{2}$ line.

Subfam. GEOMYZIDES, *Fallen.*

Gen. DROSOPHILA, *Fallen.*

162. *DROSOPHILA?* FINIGUTTA, n. s. *Mas.* Fulva; capite antice testaceo, antennis testaceis, articulo tertio conico; abdomine maculis quatuor apicalibus nigris, tarsis nigris; alis cinereis venis nigris.

Male. Tawny. Head testaceous in front; antennæ testaceous, third joint conical; abdomen with two black spots on each side at the tip; legs testaceous; tarsi black; wings grey; veins black, discal transverse vein straight, parted by full half its length from the border and by full twice its length from the præbrachial transverse; halteres testaceous. Length of the body $1\frac{1}{2}$ line; of the wings 3 lines.

163. *DROSOPHILA?* MELANOSPILA. *Fæm.* Testacea; antennarum articulo tertio conico, arista plumosa; thoracis disco abdominisque guttis duabus apicalibus atris; tarsis piceis; alis subcinereis.

Female. Testaceous. Vertex luteous; third joint of the antennæ conical; arista plumose; disk of the thorax and a dot on each side of the tip of the abdomen deep black; tarsi piceous; wings slightly greyish; veins black, discal transverse vein straight, parted by about half its length from the border and by twice its length from the præbrachial transverse. Length of the body 1 line; of the wings 2 lines.

164. *DROSOPHILA?* IMPARATA. *Fæm.* Pallide testacea; pedibus pallidioribus; alis subcinereis, venis pallidis.

Female. Pale testaceous, with a few bristles. Legs paler than the body; wings slightly greyish; veins pale, discal transverse vein straight, parted by about twice its length from the border and by more than twice its length from the præbrachial transverse. Length of the body $\frac{3}{4}$ line; of the wings $1\frac{1}{2}$ line.

Subfam. HYDROMYZIDES, *Haliday*.Gen. EPHYDRA, *Fallen*.

165. EPHYDRA? TACITURNA, n. s. *Fœm.* Atra, nitens, antennis nigris, arista plumosa, abdomine nigro-cupreo, pedibus nigro-piceis, alis nigricantibus, venis nigris.

Female. Deep black, shining. Antennæ black, third joint linear, rather long, arista plumose; legs blackish-piceous; wings blackish; veins black, discal transverse vein straight, parted by a little more than its length from the border. Length of the body $1\frac{1}{2}$ line; of the wings $2\frac{1}{2}$ lines.

Fam. PHORIDÆ, *Haliday*.

Gen. PALLURA, n. g.

Mas. Corpus latiusculum, pubescens. Os retractum. Oculi pubescentes. Antennæ brevissimæ; arista longissima. Scutellum magnum, conicum. Abdomen subellipticum, thorace non longius. Pedes latiusculi, pubescentes, non setosi. Alæ amplæ, venis æqualibus.

Male. Body rather broad, pubescent. Proboscis small, withdrawn; eyes pubescent; antennæ very short, arista very long; scutellum large, conical, very prominent, extending beyond the base of the abdomen; abdomen nearly elliptical, not longer than the thorax; legs rather broad, pubescent, without bristles; wings rather long and broad; veins of equal size, costal vein ending at rather before half the length of the wing, radial ending at somewhat in front of the tip of the wing, cubital ending at hardly in front of the tip, præbrachial ending at a little behind the tip, pabrachial ending on the hind border at half the length of the wing, discal transverse vein straight, parted by more than twice its length from the border and from the præbrachial transverse.

166. PALLURA INVARIATA. *Mas.* Lutea, immaculata, alis cinereis basi luteis, apice nigricantibus, venis nigris robustis.

Male. Luteous, of one colour. Wings grey, luteous at the base, blackish towards the tips; veins black, robust. Length of the body 3 lines; of the wings 6 lines.

Fam. HIPPOBOSCIDÆ, *Leach*.Gen. ORNITHOMYIA, *Leach*.

167. Ornithomyia parva?, *Macq. Hist. Nat. Dipt.* 11. 2. 279. 3.

KEY ISLAND.

Fam. ASILIDÆ, *Leach*.Subfam. LAPHRITES, *Walk*.Gen. LAPHRIA, *Fabr*.

1. *LAPHRIA PARADISIACA*, n. s. *Mas*. Cuprea, aureo pilosa, capite pectoreque argenteis albo pilosis, mystace subaurato setis nonnullis nigris, abdomine apice purpureo subtus albido piloso, pedibus cyaneo-purpureis albido pilosis, femoribus cyaneo-viridibus, alis nigricantibus basi cinereis, halteribus albidis nigro notatis.

Male. Cupreous, with gilded hairs. Head and pectus silvery, with white hairs; mystax slightly gilded, with a few long black bristles; antennæ and mouth black; abdomen purple at the tip, underside clothed with long whitish hairs, silvery white at the base, the following segments bordered with silvery white; legs blue and purple, thickly clothed with long whitish hairs, femora bluish-green, fore tibiæ with pale gilded down beneath, hind tibiæ with a black bristly apical tuft beneath; wings blackish, grey towards the base; halteres whitish, marked with black. Length of the body 11 lines; of the wings 20 lines.

2. *LAPHRIA PLACENS*, n. s. *Mas*. Cyanea, capite aurato, mystace setis paucis longis nigris; antennis nigris, articulo tertio fusiformi; pectore albido, abdomine angusto, femoribus intus tibiisque purpureis; alis nigricantibus basi cinereis, halteribus piceis.

Male. Blue. Head gilded in front, whitish behind; mystax with a few long black bristles; proboscis and antennæ black, third joint of the latter fusiform; pectus whitish; abdomen cylindrical, much narrower than the thorax, and about twice its length; femora on the inner side and tibiæ purple, tarsi black; wings blackish, cinereous towards the base; halteres piceous. Length of the body $4\frac{1}{2}$ lines; of the wings 8 lines.

Subfam. ASILITES, *Walk*.Gen. ASILUS, *Linn*.

3. *ASILUS SUPERVENIENS*, n. s. *Mas*. Cinereus, capite subaurato, mystace aurato setis paucis nigris, thorace vittis tribus latissimis nigris, abdomine fulvescenti-cinereo, pedibus rufescentibus, femoribus nigro vittatis, tarsis nigris, alis cinereis apice nigricantibus, halteribus testaceis.

Male. Cinereous. Head slightly gilded, pale cinereous, and clothed with pale hairs behind; mystax composed of gilded bristles, above which there are a few shorter black bristles; antennæ black, third joint elongate-fusiform, arista much longer than the third joint; thorax with three very broad hardly divided black stripes; abdomen

with a slight fawn-coloured tinge, tip black, sexualia very small; legs reddish, femora striped above with black, tarsi black, reddish at the base; wings cinereous, blackish towards the tips; halteres testaceous. Length of the body 8 lines; of the wings 14 lines.

Gen. OMMATIUS, *Illiger*.

4. *Ommatius noctifer*, *Walk*. See page 88.

Fam. EMPIDÆ, *Leach*.

Gen. HYBOS, *Fabr*.

5. *HYBOS DEFICIENS*, n. s. *Mas*. Niger, thorace fulvo globoso macula dorsali nigra, abdomine basi fulvo, pedibus anterioribus testaceis, femoribus posticis subtus spinosis, alis cinereis apice obscurioribus, stigmatibus venisque nigris, halteribus testaceis, apice piceis.

Male. Black. Thorax and pectus tawny, the former globose, with a black dorsal spot; abdomen tawny at the base; anterior legs testaceous, hind femora spinose beneath; wings grey, darker at the tips; stigma and veins black; halteres testaceous, with piceous tips. Length of the body 2 lines; of the wings 4 lines.

Fam. SYRPHIDÆ, *Leach*.

Gen. ERISTALIS, *Latr*.

6. *Eristalis resolutus*, *Walk*. See p. 95.

Gen. BACCHA, *Fabr*.

7. *BACCHA PURPURICOLA*, n. s. *Fem*. Purpureo-fulva; capite chalybeo; antennis rufis; pedibus fulvis; tibiis posticis apice tarsisque posticis basi piceis; alis nigricantibus, apud costam obscurioribus, spatium apicali subcostali cinereo; halteribus testaceis.

Female. Tawny, tinged with purple. Head chalybeous; antennæ red; legs tawny, hind tibiæ piceous towards the tips, hind tarsi piceous towards the base; wings blackish, darker along the costa, cinereous towards the tips with the exception of the costa; halteres testaceous. Length of the body $5\frac{1}{2}$ lines; of the wings 9 lines.

Fam. MUSCIDÆ, *Latr*.

Subfam. SARCOPHAGIDES, *Walk*.

Gen. SARCOPHAGA, *Meigen*.

8. *SARCOPHAGA BASALIS*, n. s. *Mas*. Nigra, subaureo tomentosa; capite aurato; thorace vittis tribus nigris; abdomine albido tessellato; alis cinereis; venis lurido marginatis; alulis testaceis.

Male. Black, with slightly gilded tomentum. Head gilded; frontalia deep black, hardly widening in front; thorax with three black stripes, an indistinct blackish line on each side of the middle stripe; abdomen tessellated with white; wings grey; veins bordered with a lurid hue, especially towards the costa; præbrachial vein forming a slightly acute angle at its flexure, near which it is much curved inward, and is thence straight to its tip; discal transverse vein slightly curved inward near its hind end, parted by a little more than half its length from the border and from the præbrachial transverse; alulæ testaceous. Length of the body $5\frac{1}{2}$ lines; of the wings 9 lines.

Subfam. MUSCIDES, *Walk.*

Gen. IDIA, *Meigen.*

9. *Idia xanthogaster*, *Wied. Auss. Zweifl.* 11. 349. 2.
Inhabits also Hindostan and Java.
10. *Idia testacea*, *Macq. Hist. Nat. Dipt.* 77. 246. 3.
Inhabits also Mauritius.

Gen. MUSCA, *Linn.*

11. *Musca obtrusa*, *Walk.* See p. 105.

Subfam. ANTHOMYIDES, *Walk.*

Gen. ARICIA, *Macq.*

12. *ARICIA VICARIA*, n. s. *Fœm.* Fulva, subtus testacea; capite nigro, apud oculos albo; antennis testaceis; alis cinereis, apud costam luridis.
Female. Tawny, testaceous beneath. Head black, white about the eyes; antennæ testaceous; abdomen clothed with short black bristles; legs testaceous, tarsi piceous; wings grey, with a lurid tinge towards the costa; veins black, discal transverse vein nearly straight, parted by about its length from the border, and by a little more than its length from the præbrachial transverse; alulæ slightly testaceous; halteres testaceous. Length of the body $3\frac{1}{2}$ lines; of the wings 6 lines.
13. *ARICIA SQUALENS*, n. s. *Fœm.* Nigra, cinereo tomentosa; facie argentea; antennis testaceis; thorace vittis nigris vittisque duabus lateralibus latis testaceis; abdomine obscure testaceo; pedibus piceis; femoribus nigris; tibiis anticis testaceis; alis cinereis; apud costam subluridis; venis halteribusque testaceis.
Female. Black, with cinereous tomentum. Face silvery white; antennæ pale testaceous, third joint long, linear, extending to the epistoma; thorax with black stripes, and on each side with a broad testaceous stripe; abdomen dull testaceous; legs piceous; femora black, fore tibiæ testaceous; wings grey, with a lurid tinge towards

the costa ; veins testaceous, discal transverse vein very slightly curved inward, parted by much less than its length from the border, and by a little more than its length from the præbrachial transverse ; alulæ whitish ; halteres testaceous. Length of the body 3 lines ; of the wings 6 lines.

Subfam. ORTALIDES, *Haliday*.

Gen. LAMPROGASTER, *Macq.*

14. LAMPROGASTER VENTRALIS, n. s. *Fæm.* Testaceo-cinerea ; capite apud oculos albo, vertice luteo, facie pallide fulva ; thorace lineis septem indistinctis nigricantibus ; abdomine fusco maculis dorsalibus canis, subtus cavo lateribus ferrugineis ; pedibus nigris, tibiis ferrugineo fasciatis ; alis limpidis basi subtestaceis, fasciis incompletis guttisque fuscis apud costam nigricantibus.

Female. Cinereous, with a testaceous tinge. Head white about the eyes, vertex luteous ; face pale tawny, with white grooves for the antennæ ; antennæ tawny, small ; arista slightly plumose at the base ; thorax with seven indistinct blackish lines ; abdomen brown, with dorsal hoary nearly triangular spots, under side marsupial-like or with a pouch, ferruginous on each side ; legs black, each tibia with a ferruginous band ; wings limpid, slightly testaceous at the base, with brown dots and bands, the latter abbreviated hindward, blackish towards the costa ; veins black, testaceous towards the base ; discal transverse vein straight, parted by about one-third of its length from the border and by much more than its length from the præbrachial transverse ; alulæ cinereous ; halteres testaceous. Length of the body 5 lines ; of the wings 10 lines.

Gen. TRYPETA, *Meigen*.

15. TRYPETA RORIPENNIS, n. s. *Fæm.* Fusca ; capite nigro, facie alba ; antennis nigris rufo-fasciatis ; thorace vittis quatuor canis ; abdominis segmentis testaceo marginatis ; pedibus nigris, tarsis halteribusque testaceis ; alis nigris, punctis plurimis albis.

Female. Brown. Head black ; face white ; antennæ black, third joint red, linear, rather long, black towards the tip ; arista plumose ; thorax with four hoary stripes ; abdominal segments with testaceous hind borders ; legs black, tarsi testaceous ; wings black, with very numerous white points, a few of which are rather larger than the others ; discal transverse vein straight, parted by less than its length from the border, and by more than twice its length from the præbrachial transverse ; halteres testaceous. Length of the body 2 lines ; of the wings 4 lines.

Catalogue of Hymenopterous Insects collected by Mr. A. R. WALLACE at the Islands of Aru and Key. By FREDERICK SMITH, Esq., Assistant in the Zoological Department, British Museum. Communicated by W. W. SAUNDERS, Esq., F.R.S., V.P.L.S.

[Read December 3rd, 1858.]

THIS Collection of Hymenoptera is the most important contribution which has been made to the Aculeata through the exertions of Mr. Wallace; in point of geographical distribution, it adds much to our knowledge. In the Aru, Key, and neighbouring islands, we meet with the extreme range of the Australian insect-fauna; and as might be expected, it is found amongst the Vespidioid Group, and in one or two instances in the Formicidæ. The latter, being frequently conveyed from one island to another, can perhaps scarcely be considered indicative of natural geographical distribution. Of the forty-six species of the Formicidoid Group, only six were previously known to science. Of the genus *Podomyrma* here established, one species only, from Adelaide, was previously known; it is one of the most distinct and remarkable genera in the family. The *Pompilidæ* are species of great beauty, some closely resembling those of Australia in the banding and maculation of their wings; amongst the *Vespidæ* will be found some of the most elegant and beautiful forms in the whole of that protean family of Hymenoptera.

Fam. ANDRENIDÆ.

Gen. PROSOPIS.

1. PROSOPIS MALACHISIS. *P. nigro-cæruleo-viridis, nitida et delicatè punctata; alis hyalinis.*

Female. Length $4\frac{1}{2}$ lines. Deep blue-green, with tints of purple in certain lights, particularly on the head, the clypeus with a central longitudinal ridge, its anterior margin slightly emarginate; the flagellum rufo-piceous beneath, the ocelli white. Thorax: the wings hyaline and brilliantly iridescent; the legs dark rufo-piceous with a bright purple tinge. Abdomen delicately punctured, the head and thorax more strongly so; the latter with a semicircular enclosed space at its base, which is smooth and shining.

Hab. Key Island.

Gen. NOMIA.

1. NOMIA CINCTA. *N. nigra, capite thoraceque punctatis, pedibus ferrugineis; segmentis abdominis apice fulvo-testaceo late fasciatis.*

Female. Length 5 lines. Black: the two basal joints of the flagellum,

the apical margin of the clypeus, the labrum, mandibles, and legs ferruginous; the wings fulvo-hyaline, the nervures ferruginous, the tegulæ more or less rufo-testaceous; the sides of the metathorax with tufts of pale fulvous pubescence and the floccus on the posterior femora of the same colour, the tibiæ and tarsi with short ferruginous pubescence. Abdomen shining, the apical margins of the segments broadly fulvo-testaceous, very bright, having a golden lustre.

Hab. Key Island.

2. *NOMIA LONGICORNIS*. *N. nigra*, lucida et delicatè punctata, facie pube brevi griseâ tectâ, femorum posticorum flocco pallido, tibiis externè fusco-pubescentibus; maris antennis, capite thoraceque longioribus.

Male. Length 4 lines. Brassy, with tints of green on the clypeus, metathorax, and thorax beneath; the head and thorax very closely and finely punctured; the clypeus produced and highly polished; the mandibles rufo-testaceous, the antennæ as long as the head and thorax. Thorax: the wings hyaline and splendidly iridescent, the tegulæ and the tarsi rufo-testaceous. Abdomen closely punctured, the apical margins of the segments smooth and shining; the head and thorax above with a pale fulvous pubescence, that on the sides of the metathorax and legs pale and glittering; the abdomen has a pale scattered glittering pubescence.

Hab. Aru.

3. *NOMIA DENTATA*. *N. nigra* et punctata, facie metathoracisque lateribus cinereo-pubescentibus, postscutello medio unidentato. *Mas.* antennis filiformibus longitudine thoracis.

Female. Length 5 lines. Black; head and thorax rather finely punctured; the face covered with short cinereous pubescence; the clypeus naked and much produced, the anterior margin and the tips of the mandibles ferruginous; the cheek with long whitish pubescence. Thorax: the sides of the metathorax, the floccus on the posterior femora and the postscutellum with whitish pubescence, the latter produced in the middle into a blunt tooth; the legs fusco-ferruginous, with the anterior tibiæ and apical joints of the tarsi brighter; wings hyaline and iridescent. Abdomen shining and punctured, the apical margins of the two basal segments broadly depressed, and more finely and closely punctured than the rest; the apical margins of the second, third, and fourth segments pale testaceous; the apical margins of the two basal segments narrowly fringed with white pubescence, usually more or less interrupted in the middle.

Male. Resembles the female very closely, but has the face much more pubescent; the antennæ filiform and longer than the head and thorax; the scutellum armed at its posterior lateral angles with an acute tooth; the metathorax truncate and slightly concave, its base with short longitudinal grooves, the lateral margins fringed with long pubescence.

Hab. Aru.

Subfam. DASYGASTRÆ.

Gen. MEGACHILE, *Latr.*

1. MEGACHILE LATERITIA. *M. nigra*, abdomine pube ferrugineâ vestito, alis fuscis.

Female. Length 8 lines. Black; head and thorax very closely and finely punctured; the mandibles with a single blunt tooth at their apex; the anterior margin of the clypeus transverse. Thorax: the wings brown, the posterior pair palest, their base subhyaline. Abdomen clothed with bright brick-red pubescence above and beneath; the basal segment with bright yellow pubescence above.

Hab. Aru.

2. MEGACHILE SCABROSA. *M. nigra*, metathorace anticè rudè scabrato, abdomine subtùs nigro-pubescente.

Female. Length $5\frac{1}{2}$ lines. Black; the clypeus, mesothorax anteriorly, and the posterior tibiæ outside coarsely rugose, the roughness on the thorax consisting of transverse little elevated points; the face with a thin griseous pubescence; the anterior margin of the clypeus fringed with fulvous hairs; the cheeks have a long pale fulvous pubescence. Thorax: the wings hyaline, the nervures black. Abdomen smooth and shining, with black pubescence beneath; beneath, the apical margins of the segments with a fringe of very short white pubescence.

Hab. Aru.

3. MEGACHILE INSULARIS. *M. nigra*, nitida, delicatulè punctata, facie pube pallidè fulvâ vestitâ, abdomine subtùs pube lætè ferrugineâ vestito, alis hyalinis.

Female. Length $5\frac{1}{2}$ lines. Black; the head and thorax finely and closely punctured, the abdomen delicately so; the face clothed with pale fulvous pubescence, the mandibles with two blunt teeth at their apex; the clypeus shining and strongly punctured. Thorax: the wings subhyaline with a slight cloud at their apex; the basal joint of the posterior tarsi with a dense dark ferruginous pubescence within. Abdomen: the four basal segments with transverse impressed lines in the middle; beneath, clothed with bright ferruginous pubescence; the abdomen has an obscure æneous tinge above.

Hab. Aru.

Gen. CROCISA, *Jurine.*

1. *Crocisa nitidula*, *Fabr. Syst. Piez.* p. 386. 2.

Hab. Aru; Key Island; Australia; Amboyna.

Gen. ALLODAPE, *St.-Farg.*

1. ALLODAPE NITIDA. *A. nitida nigra*, clypeo flavo, alis hyalinis, abdomine ad apicem punctato.

Female. Length 3 lines. Black and shining; the clypeus yellow, pro-

duced in front; the sides of the face depressed; the ocelli prominent and reddish. Thorax very smooth and shining; the wings colourless and iridescent, their extreme base yellowish, the nervures and stigma brown, the tegulæ pale testaceous-yellow; the posterior tibiæ with a scopa of glittering white hairs, the tarsi ferruginous and with glittering hairs. Abdomen, from the third segment to the apex, gradually more and more strongly and closely punctured.

Hab. Aru.

Gen. XYLOCOPA, *Latr.*

1. *Xylocopa æstuans*, *Linn. Syst. Nat.* i. p. 961. 53 ♀; *St.-Farg. Hym.* ii. p. 193. 36 ♂ ♀.

Hab. Aru; India; Singapore; Celebes.

Gen. SAROPODA, *Latr.*

1. *Saropoda bombiformis*, *Smith, Cat. Hym. Ins.* pt. 2. p. 318. 6.

Hab. Aru; Australia (Richmond River).

Gen. ANTHOPHORA, *Latr.*

1. *Anthophora zonata*, *Linn. Syst. Nat.*

Hab. Aru Island; Celebes; Ceylon; India; Borneo; Hong-Kong; Shanghai; Philippine Islands.

2. ANTHOPHORA ELEGANS. *A. nigra*, pube capitis thoracisque nigrâ, abdomine fasciis quatuor lætè cæruleis ornato; tibiis posticis ferrugineo-pubescentibus.

Female. Length 6 lines. Black; the labrum, a narrow line down the middle and another on each side of the clypeus, a minute spot above it, and the scape in front testaceous yellow, the base of the mandibles of a paler colour; the flagellum fulvous beneath. Thorax: the pubescence black; wings subhyaline, the nervures dark rufous, tegulæ obscurely testaceous. Abdomen with four fasciæ of brilliant blue, which is changeable, with pearly tints in different lights; the posterior tibiæ densely clothed outside with fulvo-ferruginous pubescence; the pubescence inside is black.

Hab. Key Island.

Gen. TRIGONA, *Jurine.*

1. *Trigona læviceps*, *Smith, Cat. Hym. Ins., Journ. Proc. Linn. Soc.* ii. p. 51. 8.

Hab. Aru; Singapore; India.

Fam. FORMICIDÆ.

Gen. FORMICA.

1. *Formica virescens*, *Fabr. Ent. Syst.* ii. p. 355. 23 ♂ ♀ ♂.—*Lasius virescens*, *Fabr. Syst. Piez.* p. 417. 8.

2. *Formica gracilipes*, *Smith, Cat. Hym. Ins., Journ. Proc. Linn. Soc.* ii. p. 55. 13 ♀.

3. *FORMICA FRAGILIS*. *F. pallidè testacea, elongata et gracilis, capite posticè angustato; thorace medio compresso, pedibus elongatis; squamâ incrassatâ triangulatâ.*

Worker. Length $3\frac{1}{2}$ lines. Pale rufo-testaceous, smooth and slightly shining; antennæ elongate, longer than the body, the flagellum slender and filiform, the scape nearly as long as the head and thorax; head oblong, narrowed behind the eyes into a kind of neck, the sides parallel before the eyes, which are black and round, the clypeus slightly emarginate anteriorly, the mandibles finely serrated on their inner margin and terminating in a bent acute tooth. Thorax elongate, narrowest in the middle, the prothorax forming a neck anteriorly; legs elongate and very slender. Abdomen ovate, the node of the petiole incrassate, and viewed sideways is triangular or wedge-shaped.

Hab. Aru.

This is one of those remarkable forms which recede so greatly from the normal type of *Formica* as apparently to indicate a generic distinction; but in those exotic species of which we have obtained all the forms, we find many which approach closely to the present insect, which is probably only the small worker of some already described species. No one would venture, without the authority of the personal observation of some competent naturalist, to unite all the forms of any exotic species of *Formica*.

4. *FORMICA FLAVITARSUS*. *F. nigra, elongata et gracilis; thorace posticè compresso, pedibus elongatis, tarsi flavis.*

Worker. Length 4 lines. Black and sub-opaque; head elongate, narrowed behind, the clypeus truncate anteriorly, the mandibles pale ferruginous; antennæ elongate and slender, the flagellum filiform and pale rufo-testaceous; the thorax and legs elongate, the latter slender with their tarsi pale rufo-testaceous. Abdomen ovate, the scale of the petiole incrassate and slightly notched above.

Hab. Aru.

5. *FORMICA COXALIS*. *F. nigra, nitida; flagello, coxis et abdomine subtùs pallidè testaceis.*

Worker major. Length 5 lines. Black and very delicately roughened with a fine transverse waved striation only perceptible under a good magnifying power. Head large, much wider than the thorax, oblong-ovate with a deep emargination behind; the clypeus slightly produced and truncate anteriorly, the angles of the truncation rounded, and with a central shining carina; the flagellum, except the tarsal joint, pale rufo-testaceous. Thorax elongate, compressed behind, the coxæ pale rufo-testaceous. Abdomen ovate, the scale of the petiole incrassate, somewhat wedge-shaped when viewed sideways, the abdomen sparingly sprinkled with long pale hairs.

6. *FORMICA CORDATA*. *F. pallidè rufa*; abdomine fusco, capite cordato.

Worker. Length 2 lines. Pale rufo-testaceous; the head heart-shaped; the eyes black, the flagellum fusco-ferruginous with the basal joints pale; the mandibles ferruginous. Thorax narrow, deeply strangulated at the base of the metathorax. Abdomen more or less fuscous, the node of the petiole narrow and pointed above; the entire insect is smooth and shining.

Hab. Aru.

The *worker minor* is rather smaller and has the abdomen darker, in all the specimens received, but in other respects agrees with the above.

7. *FORMICA OCLATA*. *F. pallidè ferruginea*; capite oblongo, oculis magnis, thorace compresso.

Worker. Length $2\frac{1}{2}$ lines. Pale ferruginous, with the vertex and apex of the abdomen black; the head oblong, the sides nearly parallel, with the anterior margin truncate; the mandibles with fine acute teeth on their inner margin; the antennæ inserted wide apart about the middle of the head; the eyes very large and ovate, placed backwards on the sides of the head, reaching to the posterior margin of the vertex, forming as it were its posterior lateral angles. The thorax narrow and compressed behind; abdomen ovate, entirely smooth and shining.

Hab. Aru.

8. *FORMICA MUTILATA*. *F. nigra*; capite oblongo, truncato anticè et sanguineo, antennis tarsisque rufo-testaceis.

Worker. Length $2\frac{3}{4}$ lines. Black and shining; the head truncate anteriorly, the antennæ inserted wide apart, about the middle, the face blood-red before their insertion and deeply striated longitudinally, behind the antennæ the head is black, smooth, and shining; the eyes ovate and placed backwards on the sides of the head. Thorax rounded in front and strangulated between the meso- and metathorax, the latter obliquely truncate; legs rather short and stout, the femora compressed, the anterior pair broadly dilated, the base and apex of the femora, the tibiæ, and tarsi rufo-testaceous, the tibiæ with a darker stain behind. Abdomen oblong-ovate, the apical margins of the segments narrowly pale testaceous; the scale of the petiole compressed, with its superior margin rounded.

Hab. Aru.

This is a very singular insect in many respects, and closely resembles in form the *Formica truncata* of Spinola.

9. *FORMICA QUADRICEPS*. *F. nigra, nitida*; capite anticè obliquè truncato, thorace posticè compresso.

Worker. Length $3\frac{1}{2}$ lines. Shining black; head oblong-quadrate, slightly narrowed anteriorly, with the sides nearly straight, the posterior angles rounded, and very slightly emarginate behind; the head obliquely truncate from the base of the clypeus; the truncation as

well as the mandibles obscurely ferruginous; the apex of the flagellum and the apical joints of the tarsi pale rufo-testaceous. Thorax rounded anteriorly, compressed behind, with the metathorax abruptly truncate. The scale of the petiole narrow, incrassate, its anterior margin slightly curved, its posterior margin straight; the abdomen ovate.

Worker minor. About 3 lines long, very like the larger *worker*, the head being truncate in front; but it is, in proportion to the thorax, narrower; the latter is compressed and abruptly truncate; in other respects it agrees with the *worker major*.

Hab. Aru.

10. *FORMICA LÆVISSIMA.* *F. nigra nitida lævissima*, sparsè pilosa; squamâ oblongâ subdepressâ.

Worker. Length 4 lines. Jet-black, very smooth and shining; head wider than the thorax, slightly emarginate behind, the sides slightly rounded; the anterior margin of the clypeus rounded, the mandibles striated and obscurely ferruginous; the scape with a few glittering silvery-white hairs. Thorax not quite so wide as the head anteriorly, narrowed behind, with the disk somewhat flattened, slightly convex, a deep strangulation between the meso- and metathorax, the latter obliquely rounded; the legs and abdomen sprinkled with glittering white hairs. The node of the petiole incrassate, very slightly elevated; viewed sideways, broadly wedge-shaped; the abdomen ovate.

Hab. Aru.

11. *FORMICA NITIDA.* *F. capite abdomineque nigris*, antennis thoraceque pedibusque rufo-testaceis lævissimis et lucidis.

Worker. Length 4 lines. Head and abdomen shining black; the flagellum, thorax, legs, and scale of the petiole rufo-testaceous; the legs palest; the scape fuscous, with its base pale; the head large, wider than the abdomen, and emarginate behind; the clypeus and mandibles obscurely ferruginous. Thorax compressed, not strangulated in the middle. The scale of the petiole narrow, with its margin rounded above; abdomen ovate, and sprinkled with a few erect pale hairs.

Hab. Aru.

12. *FORMICA SCRUTATOR.* *F. nigerrima*, mandibulis tarsorumque articulo apicali pallidè ferrugineis, thorace medio profundè coarctato.

Worker. Length $1\frac{1}{2}$ -2 lines. Shining black; the mandibles pale, ferruginous, with their inner margins finely denticulate; the eyes placed rather forwards on the sides of the head, the latter emarginate behind. Thorax deeply strangulated in the middle; the metathorax elevated and obliquely truncate behind. Abdomen ovate; the scale of the petiole sub-incrassate, with its margin rounded above; the insect very thinly covered with a fine cinereous pile.

Hab. Aru.

13. *FORMICA ANGULATA*. *F. nigra nitida*; flagello capite anticè pedibusque obscurè ferrugineis, metathorace angulato.

Worker. Length 3 lines. Shining black; head of moderate size; the clypeus and mandibles obscure ferruginous; the flagellum fusco-ferruginous, with the tip pale testaceous. Thorax rounded anteriorly and compressed behind; the scutellum prominent, forming a small tubercle; the metathorax obliquely truncate, the margin of the truncation elevated, so that when viewed sideways the metathorax forms an obtuse angular shape. Abdomen ovate, the node of the peduncle elevated, incrassate, rounded anteriorly, and flat behind.

Hab. Aru.

GEN. POLYRHACHIS, *Smith*.

1. *Formica sericata*, *Guér. Voy. Coq. Zool.* ii. 203; *Atlas Ins.* pl. 8. f. 2, 2 a, b, c, d, ♀. (*Polyrhachis sericata*, *Smith, Append. Cat. Form.* p. 200.)

Hab. Aru; New Hebrides.

2. *Formica sexspinoso*, *Latr. Hist. Nat. Fourm.* p. 126, pl. iv. f. 21 ♀. (*Polyrhachis sexspinoso*, *Smith, Cat. Form.* p. 56. 3.)

Hab. Aru; India; Philippine Islands.

3. *POLYRHACHIS MARGINATUS*. *P. niger*; antennis, palpis pedibusque ferrugineis; thoracis marginibus recurvis, metathorace petiolique squamulâ bidentatis.

Worker. Length $2\frac{1}{2}$ lines. Black; the antennæ and legs ferruginous; the head and thorax rugose; the prothorax transverse, its anterior margin slightly curved, with the lateral angles produced forwards and very acute; the thorax narrowed to the metathorax, which is armed with two divergent acute spines. Abdomen velvety black and globose; the scale of the petiole produced laterally into long, bent, acute spines, which curve backwards to the shape of the abdomen.

Hab. Aru.

4. *POLYRHACHIS HOSTILIS*. *P. niger*, longitudinaliter striatus, thoracis marginibus expansis, metathorace squamulâque petioli spinis duabus crassis acutis curvatis.

Worker. Length 3 lines. Black; the head and thorax longitudinally striated, the abdomen very finely and evenly so; the prothorax transverse, wider than the head, the anterior and lateral margins recurved, the latter acute at their anterior angles, and rounded at the posterior ones; the lateral margins of the mesothorax recurved, a deep notch between the meso- and metathorax; the latter with a long, stout, curved, acute spine on each side. The scale of the petiole produced above on each side, into a long, curved, stout, acute spine, which curves backwards round the sides of the abdomen.

Hab. Aru.

5. *POLYRHACHIS LONGIPES*. *P. niger*; flagelli dimidio apicali tibiisque anticis pallidè ferrugineis, prothorace petiolique squamulâ bidentatis.

Worker. Length 3 lines. Black; the head and thorax finely rugose; the antennæ elongate, longer than the insect; the apical half of the flagellum pale ferruginous. Thorax rounded above, the sides not margined; two spines on the thorax anteriorly, two on the metathorax, and two on the scale of the petiole; the legs elongate, with the anterior tibiæ ferruginous. Abdomen globose, sometimes rufous, or the base obscurely rufous.

Hab. Aru.

6. *POLYRHACHIS SERRATUS*. *P. niger*; capite thoraceque rugosis, abdomine densè punctato, squamâ petioli transversâ, margine superno serratâ.

Worker. Length 2 lines. Black, with the antennæ and legs ferruginous. Thorax oblong-quadrate or very slightly narrowed towards the metathorax, slightly convex above, not margined at the sides, the divisions not perceptible; the head and thorax rugose and pubescent. Abdomen globose, shining, and closely punctured; the scale of the petiole transverse above, produced into an acute spine on each side, the upper margin finely serrated, the lateral margins narrowed to their base, and having two or three small sharp spines.

Hab. Aru.

7. *POLYRHACHIS SCUTULATUS*. *P. niger*, fortiter politus et lucidus, metathorace petiolique squamulâ dente longo curvato acuto in latere utroque, pedibus nigro-ferrugineis.

Worker. Length $2\frac{3}{4}$ lines. Black and very smooth and shining; the legs dark ferruginous. Thorax: the disk expanded, slightly convex above, with the margins acute and curving upwards; the anterior margin transverse, rather wider than the head, with the lateral angles slightly curved forwards, and very acute; the lateral margins of the prothorax curved backwards and inwards; the margins of the mesothorax are rounded; the pro- and mesothorax highly polished above, forming an escutcheon-shaped disk; the metathorax opaque, and sprinkled with a few short glittering hairs, armed posteriorly with two long very acute spines, divergent and directed backwards. Abdomen globose; the scale of the petiole with two long curved acute spines, directed backwards to the curve of the abdomen.

Hab. Aru.

8. *POLYRHACHIS MUCRONATUS*. *P. lævis*, nitidus, niger; thorace spinis duabus crassis compressis acutis posticè armato.

Worker. Length $2\frac{1}{2}$ lines. Black, smooth, and shining, very delicately and indistinctly aciculate; the antennæ beneath and the tibiæ and femora obscurely ferruginous, the anterior and intermediate tibiæ brightest; the apex of the mandibles ferruginous. Thorax transverse

in front, or very slightly curved, with the lateral angles acute; the thorax is rounded above, and not margined at the sides; the metathorax armed with two long, stout, acute compressed spines; the spines divergent, as well as two on the scale of the petiole, which are long and very acute. Abdomen globose.

Hab. Aru.

9. *POLYRHACHIS GEOMETRICUS*. *P. niger*; antennarum apice, tibiis tarsorumque apice ferrugineis, thorace circulariter striato.

Worker. Length 2 lines. Black; the apical joints of the flagellum, the anterior legs, the anterior and intermediate tibiæ, and the apical joints of the tarsi pale ferruginous; the extreme base of the anterior tarsi black. Thorax rounded above, not margined, gradually narrowed posteriorly; the prothorax of the same width as the head, its lateral angles toothed; the disk with a circular striation. Abdomen globose and pubescent; the scale of the petiole compressed, its superior margin rounded, and with four minute teeth.

Hab. Aru.

10. *POLYRHACHIS IRRITABILIS*. *P. niger*, pube pallidè aureâ vestitus; thorace quadridentato, petioli squamulâ bidentatâ.

Female. Length $6\frac{1}{2}$ lines. Black, and densely clothed with short pale golden pubescence; all parts of the insect sprinkled with erect cinereous hairs; the mandibles shining black, the palpi pale testaceous; the head elongate, the eyes placed high on the sides of the head, ferruginous and very prominent. Thorax elongate-ovate; the prothorax with a short, stout, acute tooth on each side, slightly curved and directed forwards; the metathorax with a similar tooth on each side directed backwards; the wings subhyaline, the nervures fuscous; the legs fusco-ferruginous, the femora and coxæ brightest. Abdomen ovate; the scale incrassate, armed above with two stout acute teeth.

Hab. Aru.

This is probably the female of *P. sexspinosus*.

11. *POLYRHACHIS LÆVISSIMUS*. *P. niger*, lævis nitidusque; metathorace bispinoso, petioli squamulâ quadrispinosâ, pedibus ferrugineis.

Worker. Length $2\frac{3}{4}$ lines. Black, very smooth and shining; the legs ferruginous, with the coxæ, articulations, and the tarsi black. The thorax not flattened above, or margined at the sides; the division between the pro- and mesothorax distinct, that between the meso- and metathorax not discernible, the latter with two erect acute spines; the scale of the petiole with four short acute spines. Abdomen globose.

Hab. Aru.

This species is very like *P. mucronatus*; on close examination, however, it is seen to be very distinct: it may be at once distinguished by its larger head, which is wider than the thorax, rounded behind the eyes, and widely emarginate behind.

12. *POLYRHACHIS BELLICOSUS*. *P. capite abdomineque nigris, thorace femoribusque rufis, thorace quadrispinoso, petioli squamulâ bihamatâ.*

Worker. Length $3\frac{1}{2}$ lines. Black, with the scale of the petiole, thorax, coxæ, and femora blood-red. Thorax: the lateral margins raised above, with two slightly curved divergent spines in front, and two stout, acute, long curved spines in the middle, directed backwards; the scale of the petiole forming a long erect pedestal, which terminates above in two much bent acute hooks, directed backwards, and being as high as the basal segment of the abdomen; the spines and hooks black at the apex. Abdomen ovate.

Hab. Aru.

13. *POLYRHACHIS HECTOR*. *P. niger et vestitus pube pallidè aureâ; prothorace petiolique squamulâ bispinosis, pedibus ferrugineis.*

Worker. Length 3 lines. Black; the apex of the scape and the legs ferruginous; the extreme base of the tibiæ and the tarsi black; a stout acute spine on each side of the prothorax, directed forwards; the thorax flattened above, its lateral margins raised; the divisions of the segments very distinctly impressed; the pale golden pubescence on the abdomen thinner than on the head and thorax. The scale of the petiole angled at the sides towards its summit, the angles dentate, the upper margin straight, and at each lateral angle an acute spine, directed backwards, and curved to the shape of the abdomen; the spines parallel.

Hab. Aru.

14. *POLYRHACHIS RUFOFEMORATUS*. *P. niger, lævis, nitidus; femoribus abdominisque squamulâ ferrugineis.*

Worker. Length $3\frac{1}{2}$ lines. Black; head oblong; the eyes placed high at the sides near the vertex, the front very prominent, with two elevated carinæ in the middle, at the outside of which the antennæ are inserted. Thorax: the divisions strongly marked, flattened above with the sides elevated; the prothorax with an acute spine on each side anteriorly; the coxæ and femora ferruginous, with the apex of the latter more or less fuscous. Abdomen: the base and the scale ferruginous, the latter angled at the sides and emarginate above.

Hab. Aru.

Gen. PONERA, *Latr.*

1. *PONERA RUGOSA*, *Smith, Cat. Hym. Ins. Proc. Linn. Soc. ii. 66. 5.*

Hab. Aru. Borneo.

2. *PONERA SCULPTURATA*. *P. nitida nigra; capite, thorace abdominisque segmentis primo et secundo profundè striatis, nodo spinis duabus acutis armato; pedibus abdomineque apice ferrugineis.*

Worker. Length 5 lines. Black and shiny, the legs obscurely ferru-

ginous as well as the mandibles; the head strongly and evenly striated longitudinally. The prothorax with a circular striation above; behind, the thorax is compressed, the sides being obliquely striated, the striae uniting and crossing the central ridge of the thorax. The node of the petiole and basal segment of the abdomen with a curved striation, the second segment longitudinally striated and depressed at its base, which is smooth and shining; the basal half of the third segment is longitudinally striated.

Hab. Aru.

This species is at first sight very like the *P. geometrica* from Singapore; but the striation of the abdomen alone will serve to distinguish it.

3. *PONERA PARALLELA*. *P. nigra*, opaca; antennis, mandibulis, pedibus abdominisque apice ferrugineis.

Worker. Length $3\frac{1}{4}$ lines. Opaque black; the antennæ thick and scarcely as long as the thorax, their apex and the mandibles bright ferruginous; the legs somewhat obscure ferruginous, with the articulations much brighter; the head a little wider than the thorax and subovate; the thorax, node of the petiole, and the abdomen of nearly equal width, the abdomen being slightly the widest; the node of the petiole nearly quadrate; the apical margin of the first segment and base of the second slightly depressed.

Hab. Aru.

4. *PONERA QUADRIDENTATA*. *P. atro-fusca*; antennis, facie anticè, antennis, mandibulis, tibiis tarsisque ferrugineis; alis subhyalinis.

Female. Length $3\frac{1}{2}$ lines. Nigro-fuscous; the antennæ with a carina between their base, the face anteriorly, the mandibles, the legs, and the abdomen at its apex and beneath, ferruginous; the femora and coxæ above, fuscous; the head subquadrate with the angles rounded; the eyes small and placed forwards on the sides of the head towards the base of the mandibles, the latter with four strong teeth on their inner margin. Thorax oblong-ovate with the metathorax truncate; the wings fusco-hyaline, the stigma large and black. Abdomen: the second segment slightly narrowed at its base, the node of the petiole incrassate and compressed, its upper margin rounded. The insect entirely covered with a short downy cinereous pile, the abdomen having also a number of scattered erect glittering hairs.

Hab. Aru.

Gen. ECTATOMMA, *Smith*.

1. *ECTATOMMA RUGOSA*. *E. fusco-brunnea*; capite, thorace, nodoque rugosis; abdomine delicatulè aciculato.

Worker. Length 4 lines. Obscure fusco-ferruginous, the antennæ and legs bright ferruginous; the head, thorax, and node of the petiole coarsely rugose; the eyes very prominent and glassy; the mandibles

longitudinally but very delicately striated, their inner margin edentate; the thorax slightly narrowed behind. Abdomen very delicately aciculate.

Male. Length $3\frac{1}{2}$ lines. Of the same colour, and sculptured like the worker; the head rounded behind the eyes and narrowed before them; the eyes very large, prominent and ovate; the ocelli very bright and prominent; antennæ elongate and slender, the scape short, not longer than the second joint of the flagellum. Thorax: the scutellum prominent, forming a rounded tubercle, the metathorax elongate and oblique. Abdomen aciculate as in the worker, but much more deeply strangulated between the first and second segments; the petiole rugose and clavate.

Hab. Aru.

Gen. ODONTOMACHUS, *Latr.*

1. *Odontomachus simillimus*, *Smith, Cat. Form.* p. 80. 11 ♀.

Hab. Aru. Ceylon.

2. ODONTOMACHUS TYRANNICUS. *O. capite thoraceque nigris, antennis abdomineque ferrugineis, margine interno mandibulorum serratulo.*

Worker. Length 7 lines. Head oblong, narrowed behind, posteriorly deeply emarginate; the mandibles rufo-piceous, brightest at their apex, which is armed with two long teeth which are bent abruptly inwards, their tips black; the anterior portion of the head striated obliquely from the centre; the head, behind the anterior sulcation, very smooth and shining and having a deep longitudinal central depression. Thorax transversely striated, the articulations of the legs and the tarsi ferruginous. Abdomen smooth, shining, and ferruginous; the node of the petiole incrassate, cylindric, and tapering upwards into a very acute spine.

Hab. Aru.

3. ODONTOMACHUS MALIGNUS. *O. ferrugineus; capite supra obliquè striato; margine interno mandibulorum confertim serrato; metathorace transversim striato; squamâ unispinosâ; abdomine lævissimo.*

Worker. Length 7 lines. Ferruginous; the flagellum and legs palest; head much narrowed behind, the posterior margin deeply emarginate; mandibles smooth and shining, their inner margin strongly serrated, their apex abruptly bent or elbowed, and armed with two stout teeth; the face anteriorly evenly striated obliquely; the head behind the anterior sulcation very delicately striated obliquely. The prothorax smooth and shining, the meso- and metathorax transversely striated. Abdomen very smooth and shining; the node of the petiole incrassate and tapering upwards into an acute spine.

Hab. Aru.

This species most closely resembles *O. maxillaris* from Brazil; but its

smooth polished prothorax alone would distinguish it; its head is much broader anteriorly, and less elongate.

Gen. PSEUDOMYRMA, Guér.

1. PSEUDOMYRMA LÆVICEPS. *P. nigra*, lævis et nitida; antennis, mandibulis, tibiis anterioribus, tarsisque rufo-fulvis.

Worker. Length $2\frac{1}{4}$ lines. Black and shining; head very smooth and slightly emarginate behind, the eyes large and ovate; the mandibles and antennæ rufo-fulvous. Thorax with the sides flattened, the disk slightly convex; a deep strangulation between the meso- and meta-thorax, the latter rounded above and oblique behind; the trochanters, articulations of the legs, and the tarsi rufo-fulvous. Abdomen thinly covered with a fine cinereous pile; the first node of the petiole somewhat oblong-ovate, the second subglobose, the petiole of the first node short.

Hab. Aru.

Gen. PODOMYRMA, Smith.

Head oblong in the *female*, rather wider than the thorax; in the *worker* subovate and much wider; *eyes* small, ovate and placed about the middle at the sides of the head; *antennæ* geniculated, the scape about two thirds of the length of the flagellum which is clavate, the club three-jointed; the *mandibles* stout and dentate; the *labial palpi* 3-jointed; the *maxillary palpi* 4-jointed. *Thorax*, oblong-ovate in the *female*, in the *worker* transverse in front and narrowed behind with the metathorax bidentate; the anterior wings with one elongate marginal cell and two submarginal cells, the second extending to the apex of the wing; the legs stout, the femora incrassate; abdomen ovate, the peduncle with two nodes.

The insects included in this genus are undoubtedly most nearly allied to those belonging to the genus *Myrmecina*; but, excepting that they agree in having the same number of joints in the palpi, they have little resemblance to each other. With the exception of the genus *Myrmecia*, these are the largest insects in the subfamily Myrmicidæ; and all the species are distinguished by their remarkably thickened femora and margined thorax: we are unacquainted with the males.

1. PODOMYRMA FEMORATA. *P. ferruginea*; capite oblongo, obliquè striato, thorace abdomineque lævibus nitidis; alis subhyalinis fusconebulosis; femoribus valdè incrassatis, basi tenuissimis, femoribus posticis infrà compressis.

Female. Length 8 lines. Rufo-testaceous; the mandibles and anterior margin of the face black, the inner margin of the mandibles rufo-piceous and armed with six short stout teeth, the apical tooth largest. The head oblong, slightly narrowed posteriorly and emarginate be-

hind, longitudinally striated, the striæ diverging from the centre at the anterior ocellus; at half the distance between the posterior ocelli and the margin of the vertex the striæ are transverse. Thorax smooth and shining, with scattered fulvous hairs; the wings fusco-hyaline, with a dark fuscous stain occupying the marginal cell and traversing the course of all the nervures; the legs with the femora much incrassated, the posterior pair compressed beneath into a flattened process or keel. Abdomen ovate, smooth, shining, and with a scattered fulvous pubescence; the first node of the petiole rounded in front, narrowed and truncate behind, with a large compressed tooth beneath; the second node subglobose.

Worker major. Length 4 lines. Ferruginous, entirely smooth and shining; the thorax, legs, and abdomen more or less obscure, the femora being usually rufo-piceous; the mandibles striated with their margins black. Thorax nearly flat above, very slightly convex with the sides margined, the anterior margin slightly rounded, the lateral angles produced into small acute spines; a deep strangulation at the base of the metathorax, a little before which the lateral margins are produced into an angular tooth, the metathorax with two short acute spines; the femora thickly incrassate. Abdomen ovate.

Hab. Aru.

2. *PODOMYRMA STRIATA.* *P. ferruginea*; capite thoraceque longitudinaliter striatis, femoribus valdè incrassatis, basi tenuissimis.

Worker. Length 3 lines. Rufo-ferruginous with the abdomen obscure, becoming blackish at the apex, the head coarsely striated, with a central portion from the insertion of the antennæ to the hinder margin of the vertex delicately so; the mandibles striated, with the teeth on their inner margin black. Thorax rugose-striate, the anterior lateral angles dentate, the metathorax without spines; the femora thickly incrassate and greatly attenuated at their base. Abdomen ovate, smooth and shining; the nodes of the petiole rugose.

Hab. Aru.

This species resembles *P. femorata*, but is easily distinguished by its striated head and thorax; the latter is similarly flattened above and margined at the sides; the femora are also thickened precisely as in that species.

3. *PODOMYRMA LÆVIFRONS.* *P. obscurè ferruginea*; capite abdomineque lævissimis lucisque; thorace longitudinaliter striato; femoribus medio valdè incrassatis, basi tenuissimis.

Worker. Length $2\frac{1}{2}$ lines. Head and abdomen smooth, shining black, in some examples fusco-ferruginous; the antennæ, legs, and thorax ferruginous, the latter longitudinally striated; the thorax margined at the sides, the disk slightly convex, the anterior margin slightly rounded, with the lateral angles armed with short acute spines, the

thorax deeply strangulated posteriorly, the metathorax not spined; the femora thickly swollen in the middle and very slender at their base and apex. Abdomen ovate, the first node of the petiole oblong, the second globose.

Hab. Aru.

There is considerable variation in intensity of colouring in examples of this species, the thorax and legs being sometimes pale ferruginous; in the specimen described they are dark; every shade of gradation occurs in different individuals.

4. *PODOMYRMA BASALIS*. *P. fusco-ferruginea*; abdominis basi pallidè testacea; femoribus medio incrassatis, basi tenuibus.

Worker. Length 3 lines. Obscurely ferruginous, the scape of the antennæ, the base of the femora and the tibiæ pale ferruginous; the base of the abdomen pale testaceous; the head and thorax with deep coarse longitudinal furrows; the flagellum blackish-brown towards its apex, with the extreme tip pale. Thorax: the anterior margin slightly rounded with the lateral angles very acute; the femora very thickly incrassate in the middle; the apex of the tibiæ ferruginous. Abdomen smooth and shining; the basal half pale testaceous, the apical half and the following segments black; the nodes of the petiole rugose; the first node elongate, with a short acute tooth at the base above, and a blunt one beneath.

Hab. Aru.

Gen. MYRMICA, Latr.

1. *MYRMICA PARALLELA*. *M. rufo-fulva*; antennis pedibusque pallidè testaceis; abdomine fusco-ferrugineo; capite thoraceque longitudinaliter striatis.

Worker. Length 1 line. Head and thorax ferruginous and longitudinally and evenly striated; antennæ and legs pale rufo-testaceous. Thorax margined at the sides, the disk slightly convex, the anterior margin transverse, the lateral angles acute; the metathorax with two short spines; abdomen dark fusco-ferruginous, the nodes of the petiole subrugose; club of the antennæ 3-jointed.

Hab. Aru.

2. *MYRMICA SCABROSA*. *M. nigra*; capite thoraceque scabrosis, metathorace bispinoso, abdomine ovato lævi.

Worker. Length 1 line. Black; the head, thorax, and nodes of the petiole roughened; the mandibles, flagellum and tarsi rufo-testaceous; the lateral angles of the prothorax acute, the sides narrowed slightly to the base of the metathorax, the spines on the latter acute; nodes of the petiole globose. Abdomen ovate, smooth and shining; club of the antennæ 3-jointed.

Hab. Aru.

3. *MYRMICA THORACICA*. *M.* capite abdomineque nigris; antennis, mandibulis thorace pedibusque flavis.

Worker. Length $\frac{3}{4}$ line. Head and abdomen jet-black; the antennæ, thorax, and legs of a clear honey-yellow; the mandibles of a more obscure yellow; the anterior margin of the thorax transverse, the lateral angles acute, narrowed from thence to the base of the mesothorax, the disk anteriorly slightly convex; the metathorax armed with two acute spines. Abdomen nearly round, and very smooth and shining; the first node of the petiole vertical anteriorly, and gradually rounded behind, the second node transverse, its anterior margin straight, the angles rounded, the sides narrowed towards the abdomen; the club of the antennæ 3-jointed.

Hab. Aru.

The singular form of the thorax of this species, as well as the construction of the nodes of the petiole, appear to indicate an uncharacterized division of the genus *Myrmica*.

4. *MYRMICA SUSPICIOSA*. *M.* rufo-testacea, lævis, tota nitidissima nuda; mandibulis, antennis, pedum articulationibus tarsisque pallescentibus; metathoracis spinis minutissimis.

Worker. Length 1 line. Rufo-testaceous and very smooth and shining; the antennæ as long as the insect; the flagellum, mandibles, tarsi, and articulations of the legs pale testaceous. The thorax narrowed anteriorly into a short neck, behind which it is dilated, the sides being rounded, the meso- and metathorax narrower and of nearly equal width, the spines of the metathorax minute and slender. The first node of the petiole somewhat wedge-shaped, the second globose, the abdomen very smooth and shining; club of the antennæ 3-jointed.

Hab. Aru.

I can detect no specific difference between this and *Myrmica lævigata*, taken by myself in the neighbourhood of London; but it is not uncommonly met with in hotheouses, near to which I captured my specimen. I believe *M. lævigata* is identical with *Æcophthora pusilla*, the House-Ant of Madeira.

5. *MYRMICA MELLEA*. *M.* capite thoraceque flavis; abdomine pallidè fusco.

Worker. Length $1\frac{3}{4}$ line. Head, antennæ, thorax, and legs honey-yellow and very smooth and shining; thorax strangulated at the base of the metathorax, which is not spined; the first node of the abdomen is oblique anteriorly, and vertical behind, the second node subglobose. Abdomen: the base honey-yellow, the apical margin of the first segment, and the following segments entirely, pale fuscous; the club of the antennæ 2-jointed.

Hab. Aru.

6. *MYRMICA CARINATA*. *M.* obscurè fusco-ferruginea; thorace rufo-

fulvo; capite thoraceque carinis irregularibus; metathorace spinis duabus longis armato.

Worker. Length $1\frac{1}{4}$ lines. Head and abdomen black, with more or less of an obscure ferruginous tinge, particularly at the vertex and base of the abdomen; the thorax and nodes of the petiole ferruginous; the legs rufo-piceous, with the tarsi and articulations ferruginous, the antennæ and mandibles ferruginous; the head and thorax with irregular distant longitudinal carinæ; the sides of the thorax rugose; the spines on the metathorax long and acute; the abdomen very smooth and shining; the club of the antennæ 3-jointed.

Hab. Aru.

Gen. CREMATOGASTER, *Lund.*

1. *CreMATogaster obscura*, *Smith, Cat. Hym. Ins., Journ. Proc. Linn. Soc.* ii. 76. 4 ♀.

Hab. Aru; Borneo.

2. CREMATOGASTER ELEGANS. *C. pallidè rufo-testaceus; abdomine nigerrimo nitido; thorace bispinoso.*

Worker. Length $\frac{3}{4}$ line. Entirely pale rufo-testaceous, excepting the eyes and abdomen which are jet black; the nodes of the petiole pale, smooth, and shining. Head about the same width as the abdomen. The lateral angles of the anterior margin of the prothorax acute, the metathorax armed with two long acute spines. Abdomen heart-shaped, its apex acute.

Hab. Aru.

3. CREMATOGASTER INSULARIS. *C. niger, lævis et nitidus; antennis tarsisque pallidè testaceis; thorace spinis duabus acutis armato.*

Worker. Length $1\frac{1}{4}$ line. Black, smooth and shining; the vertex, thorax and nodes of the peduncle with an obscure ferruginous tinge; the antennæ, tarsi, and articulations of the legs pale rufo-testaceous; the spines which arm the metathorax stout, elongate, and acute, with their apex pale testaceous. Abdomen heart-shaped and very acute at the apex.

Hab. Aru.

Gen. SOLENOPSIS, *Westw.*

1. SOLENOPSIS CEPHALOTES. *S. pallidè ferruginea; capite maximè in medio sulcato, abdomine apice fusco.*

Worker major. Length $2\frac{1}{2}$ lines. Pale ferruginous, with the anterior part of the face darker, the mandibles incrassate and very dark fusco-ferruginous; head very large and divided by a deep longitudinal channel, emarginate behind, nearly quadrate; the eyes small and placed forwards on the sides of the head. The metathorax truncate, not spined. Abdomen ovate, truncate at the base, its apex fuscous; the first node of the petiole compressed, its margin rounded above,

the second node incrassate and subglobose; club of the antennæ 2-jointed.

Worker minor. Length $1\frac{1}{2}$ line. Of the same colour as the *worker major*, but with the head of the ordinary size and slightly narrowed behind, the mandibles of the same colour as the head; the legs and antennæ longer, as well as the petiole of the abdomen; the body is very smooth and shining, the club of the antennæ 2-jointed.

Hab. Aru.

Subfam. CRYPTOCERIDÆ, *Smith.*

Gen. MERANOPLUS, *Smith.*

1. MERANOPLUS SPINOSUS. *M. castaneo-rufus*; abdomine nigro, thorace sexspinoso; abdomine ovato.

Worker. Length $1\frac{1}{2}$ line. Head and thorax rugose; the antennæ and tarsi rufo-testaceous; the eyes rather prominent, the groove above them at the sides of the head extending backwards to the vertex. Thorax: the anterior margin curved forwards, the lateral angles produced into a bifurcate process on each side, behind the processes, slightly narrowed to the base of a long curved tooth; the posterior margin emarginate with a long sharp spine at each angle of the emargination; the node of the petiole globose. Abdomen black, smooth and shining.

Hab. Aru.

Fam. MUTILLIDÆ, *Leach.*

Gen. MUTILLA, *Linn.*

1. Mutilla Sibylla, *Smith, Proc. Linn. Soc. ii. 86. 11 ♀.*

Hab. Aru; Borneo; Celebes.

2. MUTILLA MANIFESTA. *M. capite abdomineque nigris, thorace sanguineo-rubro, maris alis nigro-fuscis.*

Female. Length $4\frac{3}{4}$ lines. Head black and rugose. The thorax blood-red and coarsely rugose, its anterior margin widest and straight, the sides gradually narrowed to the apex in a slight curve; the lateral margins have two teeth not wide apart. Abdomen black, rugose, and slightly shining, with black pubescence above; on the under surface it is glittering silvery-white; the legs and sides of the thorax have a similar pubescence.

Male. The same size as the female, and the same colour; the eyes notched. The thorax oblong-quadrate, the posterior lateral angles acute; the tegulæ large and red; the wings dark brown, with their extreme base hyaline. Abdomen shining black, the first and second segments strongly punctured, the rest much more finely and not very closely so.

Hab. Aru.

3. MUTILLA CARINATA. *M. capite thoraceque metallico-purpureis*

viridi tinctis, pedibus ferrugineis, abdomine nigro, basi pallido fasciatâ, segmento secundo ad apicem fasciâ bilobatâ ornato.

Female. Length $4\frac{1}{4}$ lines. The head and thorax of a metallic purple tint with shades of green and copper; the scape of the antennæ, the mandibles, palpi, and legs ferruginous; the head and thorax closely and strongly punctured. The abdomen velvety black; the base truncate, the truncation smooth and shining; its margin carinate; the upper surface of the basal segment yellowish-white, a broad bilobed fascia of the same colour at the apical margin of the second segment; the apex ferruginous. *Male.* The head and thorax metallic green, strongly and closely punctured; abdomen black and shining, much more finely punctured than the thorax; wings light brown, with their base and extreme apex hyaline; the legs ferruginous.

Hab. Aru.

4. *MUTILLA NIGRA.* *M. nigra et punctata*, abdomine lævi et nitido, delicatulè punctato, alis fuscis, basi hyalinis.

Male. Length $6\frac{1}{2}$ lines. Black; head and thorax closely and strongly punctured; the eyes slightly notched; the face with silvery-white pubescence, the mandibles shining, the palpi black. Thorax: the metathorax densely clothed with yellowish-white pubescence; the legs with glittering white hairs, the calcaria white; wings brown with their base hyaline. Abdomen smooth and shining, delicately and sparingly punctured, with a few silvery hairs at the sides.

Hab. Aru.

5. *MUTILLA EXILIS.* *M. nigra et punctata*; abdomine lævigato, nitido; alis subhyalinis; facie et metathorace pube argentatâ vestitis.

Male. Length $6\frac{1}{2}$ lines. Black; head and thorax strongly punctured; the eyes emarginate, the face with glittering silvery-white pubescence, the cheek thinly sprinkled with silvery hairs; the palpi testaceous. Thorax: the metathorax densely clothed with silvery pubescence, beneath, at the sides, and also the legs with scattered silvery hairs, the calcaria white; the tegulæ shining; the wings subhyaline with the nervures dark fuscous. Abdomen shining black, smooth, and very delicately and sparingly punctured, the apical margins of the segments very thinly fringed with glittering silvery hairs.

Hab. Aru.

Tribe FOSSORES, *Latr.*

Fam. SCOLIADÆ, *Leach.*

Gen. MYZINE.

1. *MYZINE TENUICORNIS.* *M. nigra*, alis hyalinis, abdomine nitido flavoque variegato.

Male. Length 7 lines. Black; the head and thorax very closely punctured, thinly clothed with griseous pubescence, that on the face, thorax

beneath, and on the coxæ most dense and glittering; antennæ more slender than is usual in this genus, and tapering to their apex, the joints slightly subarcuate; the mandibles bidentate at their apex and with a yellow spot at their base. Thorax: the posterior margin of the prothorax, a spot beneath the wings, the tegulæ, and the post-scutellum yellow; the anterior and intermediate tibiæ ferruginous and more or less dusky above, the posterior pair ferruginous beneath. Abdomen shining, the margins of the segments deeply depressed; a small ovate spot on each side of the first segment, the second and three following segments with a narrow stripe on each side in the middle, yellow; the yellow markings obscure; the apical segment coarsely rugose; beneath, the segments are closely and strongly punctured.

Hab. Aru.

Gen. SCOLIA, *Fabr.*

Division I. The anterior wings with two submarginal cells and two recurrent nervures.

1. *Scolia grossa*, *Burm. Abh. Nat. Ges. Halle*, i. p. 23. (*Tiphia grossa*, *Fabr. Syst. Piez.* p. 232. 4.)

Hab. Aru; Java.

The specimens of this species received from Aru are only 9 lines in length; I have examined others from Celebes, Borneo, India, and Java, showing every difference between 9 lines and 18 lines.

Division II. Anterior wings with two submarginal cells and one recurrent nervure.

2. SCOLIA NITIDA. *S. nitida*, *aterrima*; *alis æneo et violaceo splendide micantibus.*

Female. Length 11 lines. Shining jet-black, the abdomen with prismatic tints. The flagellum fusco-ferruginous beneath, the mandibles ferruginous at their apex; the wings dark brown with a splendid lustre of coppery and golden tints mixed with shades of violet. The head with a few punctures behind the ocelli; the thorax with scattered punctures; the metathorax finely but not closely punctured; the disk of the mesothorax impunctate; the abdomen with fine scattered punctures; the apical segment opaque, rugose, and with its apical margin pale testaceous; the abdomen beneath with strong distant punctures.

Hab. Aru.

3. SCOLIA FULGIDIPENNIS. *S. nitida*, *nigra*; *abdomine prismatico, alis fuscis viride et violaceo micantibus.*

Female. Length 12-13 lines. Jet-black, shining; head very smooth, the hinder margin of the vertex finely punctured, the face with a few fine scattered punctures; the flagellum obscurely rufo-fuscous. Thorax finely punctured, the disk of the mesothorax impunctate; wings dark brown with a splendid green iridescence, with violet tints to-

wards their base; the legs thickly spinose and pubescent; the calcaria simple. Abdomen with scattered fine punctures; the apical segment densely clothed with black pubescence; beneath, with strong scattered punctures.

Male. Rather smaller than the female, much more closely punctured, and not so shining and smooth; the face with a transverse arched carina above the insertion of the antennæ, which enters the emargination of the eyes; the clypeus strongly punctured; in other respects resembling the female.

Hab. Aru.

This species belongs to Guérin's division Liacos, of which *S. dimidiata* is the type; the third discoidal cell is petiolated, the petiole entering the second submarginal about the middle.

4. *SCOLIA INSULARIS*. *S. nitida nigra*; abdomine prismatico, alis obscure fuscis cupreo submicantibus.

Male. Length 7-9 lines. Shining black; head punctured, the vertex most finely and distinctly so. Thorax punctured, the disk of the mesothorax impunctate, the punctures wide apart on the scutellum and metathorax; the wings dark brown with a coppery iridescence, which has a remarkable dimness as if breathed upon. The basal segment of the abdomen strongly and closely punctured; the following segments more finely and distantly punctured, particularly the second and third segments.

Hab. Key Island.

5. *SCOLIA QUADRICEPS*. *S. nitida nigra*; fœminæ capite magno subquadrato, alis fuscis cupreo iridescentibus.

Female. Length 6-8 lines. Black and shining; head subquadrate, smooth and shining, as wide as the thorax, with a few punctures at the sides of the face and between the antennæ. Thorax finely punctured, with the disk of the mesothorax impunctate; wings dark brown with a rich coppery iridescence. Abdomen with a fine prismatic lustre, closely and strongly punctured towards the apex and at the extreme base, the second segment and the middle of the third with only a few very fine scattered punctures.

Hab. Aru.

This species also belongs to the division Liacos; the petiolated cell is small and oblong-quadrate; the male exactly resembles the female, except that its head is smaller and narrower than the thorax; the abdomen is rather more strongly punctured.

Gen. POMPILUS, *Fabr.*

1. *POMPILUS DUBIUS*. *P. niger*, pilis mutabili-sericeis tectus; alis subhyalinis, apice nebuloso.

Female. Length $4\frac{1}{2}$ lines. Black and covered with a thin changeable silvery pile, which is most dense on the sides of the metathorax and base of the segments of the abdomen. The vertex emarginate behind, the eyes very large, their inner orbits emarginate, reaching high on

the sides of the head nearly to the margin of the vertex; the clypeus emarginate in front, the labrum produced. Thorax: the prothorax subelongate, narrowed anteriorly; the wings subhyaline, their apex clouded; the intermediate and posterior tibiæ with a double row of spines; all the tarsi simple; the calcaria stout and elongate. Abdomen shining, with the margins of the segments slightly depressed.

Hab. Aru.

Subgen. AGENIA, *Schiödte*.

1. *Agenia blanda*, *Guér. Voy. Coq. Zool.* pt. 2. ii. p. 260.

Hab. Celebes; India; Singapore; Malacca; Borneo; Key Island.

2. AGENIA CALLISTO. *A. nigra*, pilis sericeis vestita; facie thoraceque subtùs pube argentato-albâ densè vestitis; alis fasciis duabus angustis.

Female. Length 8 lines. Black; the face, clypeus, and cheeks with a dense silvery-white pile; the tips of the mandibles obscurely ferruginous, the palpi black. Thorax with a brilliant silvery-white pile on the sides, beneath, and on the coxæ; the metathorax transversely rugose; the wings hyaline; the anterior pair with a narrow fuscous fascia at the apex of the externo-medial cell, and a second rather broader at the base of the marginal cell, which does not quite cross the wing; the apex of the wing fuscous. Abdomen petiolated, smooth and shining, with a beautiful glossy pile, which is most dense at the sides; the apical segment longitudinally subcarinated in the middle above.

Hab. Aru.

3. AGENIA JUCUNDA. *A. nitida nigra*; facie metathorace abdomineque pube sericeâ vestitis; antennis, pedibus, abdominisque marginibus apicalibus ferrugineis; alis hyalinis.

Female. Length $5\frac{1}{2}$ lines. Black; head, pro- and mesothorax, as well as the scutellum, glassy-smooth and shining; the face covered with silvery-white pile; the antennæ, tips of the mandibles, and the legs ferruginous; the palpi elongate and pale rufo-testaceous. Thorax: the wings hyaline and iridescent, the nervures very slender and pale rufo-testaceous, the stigma fuscous; the metathorax rounded behind, transversely rugose, and covered with silvery-white pile. Abdomen petiolated; the apical margins of the second and following segments ferruginous, the apical segment entirely so; the ferruginous band on each segment produced in the middle into an angular shape; on the abdomen beneath they are similarly produced; the basal segment entirely ferruginous, with a black spot on each side.

Hab. Aru.

4. AGENIA ALTHEA. *A. nigra*; facie pube argentato-albâ vestitâ, thoracæ abdomineque sericeo pubescentibus; alis hyalinis, venis nigris.

Female. Length 5 lines. Black; the face silvery; the anterior margin of the clypeus rounded and narrowly smooth and shining; tips of the mandibles ferruginous; the mandibles elongate and pale rufo-testaceous. Thorax: the metathorax finely transversely rugose, the sides with bright silvery-white pubescence; the coxæ, the thorax beneath and on the sides, with fine silky sericeous pile; the anterior tibiæ and tarsi, and all the femora at their apex beneath, ferruginous; wings hyaline and iridescent, nervures black; the outer margin of the tegulæ testaceous. Abdomen shining, and with a fine silvery sericeous pile; the apical margins of the segments narrowly rufo-piceous; the terminal segment with an elongate, smooth, shining space, which extends to the apex, which is testaceous.

Hab. Aru.

5. *AGENIA ALCYONE.* *A. nigra*, pilis sericeis cinereis vestita; antennis pedibusque ferrugineis, alis hyalinis; abdomine petiolato; marginibus apicalibus segmentorum flavis.

Male. Length 7 lines. Black; the antennæ, tips of the mandibles, and the legs ferruginous; the scape in front, a narrow line on the inner orbit of the eyes, and the anterior portion of the clypeus yellow; the antennæ fuscous above towards their base. Thorax: the femora beneath towards their base, the trochanters and coxæ, except their apex, black; the apical joints of the intermediate and posterior tarsi fuscous; wings hyaline, the nervures fusco-ferruginous, the tegulæ reddish-yellow. Abdomen petiolated; the apical margins of the segments with reddish-yellow fasciæ; beneath, the margins of the segments are rufo-piceous, not fasciated.

Hab. Aru.

6. *AGENIA AMALTHEA.* *A. nigra*, pilis tenuibus cinereis sericeis vestita; antennis anticè pedibusque anticis et intermediis anticè ferrugineis; abdomine petiolato; alis hyalinis bifasciatis.

Female. Length 6 lines. Black; the face densely covered with silvery pile; the antennæ in front, the anterior margin of the clypeus and the tips of the mandibles ferruginous; palpi elongate and pale rufo-testaceous. Thorax: the posterior margin of the prothorax narrowly, the tegulæ, the anterior and intermediate femora in front, the posterior pair towards their apex beneath, the anterior tibiæ and tarsi, the intermediate and posterior tibiæ more or less beneath, and their tarsi, ferruginous; the tarsi sometimes dusky above; the wings hyaline, a narrow fuscous fascia at the apex of the externo-medial cell, and a broad one crossing at, and being the width of, the second and third submarginal cells; tips of the wings milky-white; the metathorax rounded posteriorly, transversely finely rugose and densely covered with short silvery-white pubescence at the sides and apex. Abdomen petiolated, smooth and shining, with the apex and the margins of the segments narrowly rufo-piceous.

Hab. Aru.

Gen. *PRIOCNEMIS*, *Schiödte*.

1. *PRIOCNEMIS PULCHERRIMUS*. *P. lætè ruber*; alis flavo-hyalinis, apice latè fusco, abdominis lateribus nigris.

Female. Length $7\frac{1}{2}$ lines. Bright red; the anterior margin of the clypeus with a minute tooth in the centre; the tips of the mandibles fuscous. The metathorax slightly striated transversely, and with a central as well as a lateral longitudinal groove; the wings flavo-hyaline, their apex with a fuscous cloud, which commences at the base of the first discoidal cell, the extreme tips pale; the tibiæ and tarsi with short slender spines; the extreme apex of the joints of the posterior tarsi black. Abdomen: the short petiole of the basal segment, and the sides of the second, third, and fourth segments black, leaving a red line down the middle of each; beneath, the second, third, and base of the fourth segments black.

Hab. Aru.

2. *PRIOCNEMIS FERVIDUS*. *P. capite, antennis, thorace pedibusque ferrugineis*; abdomine nigro; alis fuscis basi subhyalinis.

Female. Length 9 lines. Ferruginous, with the abdomen black; the anterior margin of the clypeus rounded. The metathorax transversely rugose; the pectus, and coxæ at their base within, black; wings brown, with a violet iridescence, their base rufo-hyaline; the intermediate and posterior tibiæ with a double row of spines, all the tarsi spinose. Abdomen shining black, with the extreme apex slightly ferruginous.

Hab. Aru.

Gen. *MACROMERIS*, *St.-Farg.*

1. *MACROMERIS IRIDIPENNIS*. *M. cæruleo-nigra*; abdomine iridescente, alis cæruleo-violaceoque splendè micantibus; pedibus muticis, simplicibus.

Female. Length 12 lines. Blue-black; abdomen with a changeable iridescent pile; head and thorax with a black velvety pubescence; the metathorax very finely rugose and opaque; the legs simple; the posterior tibiæ villose within; the wings very dark brown, with a splendid violet and blue iridescence.

Male. Very closely resembling the female, but rather smaller; the anterior and intermediate femora more incrassate, and all the femora with a simple row of teeth or serrations on their inferior margins.

Hab. Aru.

Although this species of *Macromeris* is very similar in colour to the *M. violacea* of St.-Fargeau, the femora are not so thick as in that species, not in fact much more so than in the female; and the row of teeth beneath is a strong specific character.

Gen. *SALIUS*, *Fabr.*

1. *SALIUS MALIGNUS*. *S. niger*, pube cinereâ sericeâ vestitus; alis fuscis, albo fasciatis.

Female. Length 9 lines. Black, and covered with a fine thin ashy pile; the scape in front, and the anterior margin of the clypeus narrowly, obscure yellow; the mandibles ferruginous at their apex, which has a single notch; the palpi pale rufo-testaceous. Thorax: the prothorax with a slightly interrupted narrow fascia a little before its posterior margin, and the scutellum, yellow; the anterior femora broadly dilated, and, as well as the anterior tibiæ, ferruginous within; the intermediate tibiæ ferruginous at their apex in front, and the posterior pair with a yellowish-white spot at their base outside; the calcaria pale testaceous, the claws ferruginous, the anterior tarsi entirely so, but more or less obscure; the posterior tibiæ slightly spinose; the anterior wings brown, with a white fascia crossing at the first discoidal cell, and a second at the apex of the third submarginal, the extreme base and the anterior margin of the externo-medial cell hyaline. Abdomen: the apical margins of the segments with a little bright silvery pile.

Hab. Aru.

Gen. *MYGNIMIA*, *Smith.*

1. *MYGNIMIA ASPASIA*. *M. cæruleo-nigra*; capite thoraceque pube holosericeâ vestitis; alis fulvo-hyalinis; abdomine pilis iridescentibus vestito.

Female. Length 14 lines. Black, with shades of blue in certain lights; the abdomen with bright tints of blue and violet, caused by fine iridescent changeable pile; the legs have a similar pile, very bright on the femora within; the head and thorax with a short black velvety pubescence; the wings flavo-hyaline; the nervures pale ferruginous; the extreme base of the wings blackish, their apical margins with a narrow fuscous border. The legs spinose; the posterior tibiæ with a double row of strong serrations.

Hab. Aru. *N. Gouanæ*.

Gen. *SPHEX*, *Fabr.*

1. *SPHEX ARGENTATA*, *Dahlb. Hym. Eur. i. 25. 1.*

Hab. Aru; Celebes; Sumatra; India; Greece; Africa; East Florida.

2. *SPHEX SERICEA*, *Fabr. Syst. Piez. 211. 19.*

Hab. Aru; Malacca; Borneo; Java; Philippine Islands.

3. *SPHEX AURIFRONS*. *S. niger*; facie pube aureâ vestitâ, alis flavo-hyalinis apice fuscis, abdomine pilis sericeo-aureis vestito.

Female. Black; the face densely clothed with golden pubescence, the head having a number of scattered long golden-yellow hairs. Thorax

thinly covered with long yellow pubescence, which is most dense at the sides of the metathorax; the tibiæ, tarsi, and posterior femora ferruginous; the claw-joint of the tarsi black; the tibiæ and tarsi with black spines; the wings fulvo-hyaline, their apex with a narrow fuscous border, the nervures ferruginous. Abdomen covered with a fine, thin, golden-reflecting pile; the apical margins of the segments rufo-testaceous, the testaceous margin produced in the middle into a triangular shape, most conspicuously so on the segments beneath.

Hab. Aru.

4. *SPHEX NITDIVENTRIS*. *S. niger*; abdomine nigro-cæruleo, lævigato, nitido; alis fuscis.

Female. Length 12 lines. Black; the face with silvery pubescence, and thinly covered with long black hairs; the clypeus with a central longitudinal carina at the base, which terminates at the middle, from whence to the anterior margin is a broad, smooth, shining space. Thorax shining and finely punctured; the metathorax opaque and covered with long, loose, black pubescence; the legs shining, the posterior tibiæ with shining grey pile within; wings brown, darkest at their base. Abdomen blue, and very smooth and shining, oblong-ovate; the apical segment vertical.

Hab. Aru.

5. *SPHEX SEPICOLA*. *S. niger*; facie pube aureâ vestitâ; alis subhyalinis apice fuscis; abdomine nitido.

Female. Length 9 lines. Black; the face densely clothed with golden pubescence, the cheeks with iridescent pile, with a long, loose, scattered pale yellow pubescence on the head and thorax; the mandibles smooth, shining black. The disk of the thorax with an obscure chalybeous tint, shining and finely punctured; the metathorax opaque and finely rugose; the wings subhyaline, their apical margins fuscous, the nervures fusco-ferruginous. Abdomen with a slender subelongate petiole, and with a thin, silky, grey pile; the apical margins of the segments narrowly and obscurely rufo-piceous.

Male. Rather smaller than the female, more slender and more pubescent, the pubescence on the face paler.

Hab. Aru.

6. *SPHEX GRATIOSA*. *S. capite thoraceque nigris, abdomine cæruleo, alis fusco-hyalinis.*

Male. Length 10 lines. Head and thorax black; the face densely clothed with pale golden pubescence; the labrum and mandibles highly polished, very smooth and shining; a thin pale pubescence is scattered over the head, pro- and mesothorax, the latter obscurely chalybeous above, shining, and finely and closely punctured, with an abbreviated, deeply impressed line in the middle anteriorly; the posterior margin of the prothorax covered with shining silvery pubescence; the

metathorax opaque, and clothed with black pubescence; wings fuscohyaline, the anterior pair darkest towards their base, the nervures dark fusco-ferruginous, nearly black. Abdomen smooth, shining dark blue; beneath, the margins of the segments have a bright, glittering, pale-golden pile.

Gen. PELOPÆUS, *Latr.*

1. PELOPÆUS LABORIOSUS. *P. niger*; scapo anticè, pedibus petioloque rufescenti-flavis, alis hyalinis fulvo tinctis.

Female. Length 12 lines. Black, with black pubescence on the head and thorax; the face with a fine cinereous pile; the scape yellow in front; the mandibles smooth and shining. Thorax: the legs pale ferruginous, the posterior femora darkest; the coxæ, the anterior and intermediate trochanters, and base of the femora black; wings fulvohyaline, the nervures ferruginous; the metathorax obliquely striated. Abdomen slightly shining at the base, with the petiole reddish-yellow.

Hab. Aru.

Gen. LARRADA, *Smith.*

1. LARRADA MODESTA. *L. nigra*; abdomine pilis argentatis fasciato; alis hyalinis.

Female. Length $6\frac{1}{2}$ lines. Black; the face covered with silvery down; the mandibles smooth, shining, black, and fringed beneath with fulvous hairs, the cheeks silvery. Thorax slightly shining, closely and delicately punctured; the metathorax opaque and transversely striated; wings subhyaline, with a fuscous border at their apex, the nervures black. Abdomen slightly shining; the apical margins of the first, second, and third segments with fascia of silvery pile, which is very brilliant in certain lights.

Male closely resembles the female, but has an additional fascia on the abdomen.

Hab. Aru.

Gen. LARRA, *Fabr.*

1. LARRA SIMILLIMA. *L. nigra*, pulchre prismatica, maculis fascisque variis flavis ornata.

Female. Length $6\frac{1}{2}$ lines. Black; the abdomen with tints of blue violet; the thorax slightly prismatic; the labrum, clypeus, an angular scape above, an abbreviated line on the inner orbits of the eyes, the scape in front, and the antennæ beneath, yellow; the cheeks with a silvery reflexion. The thorax beneath, and the metathorax, with a shining white silvery pile; the anterior and intermediate femora and tibiæ beneath yellow; the tarsi pale ferruginous, and more or less fuscous above; wings subhyaline, the nervures fuscous; a spot on the lateral posterior angles of the metathorax, two ovate spots on the scutellum, and a line on the postscutellum yellow. Abdomen: the basal segment with a broadly interrupted fascia a little before its

apical margin; the second and fourth segments with a narrow yellow fascia at their apical margins, which is widened laterally; beneath, the second and third segments with a yellow spot on each side.

The *Male* differs from the female in having a large quadrate black spot on the clypeus, and a spot at the base of the labrum; there is also a narrow yellow line on the posterior margin of the prothorax; and the third segment of the abdomen has a yellow fascia: it is also rather smaller.

Hab. Aru.

This insect very closely resembles *Larra prismatica*, from Borneo, Malacca, and Celebes, of which it may be a variety.

Gen. BEMBEX, *Fabr.*

1. *Bembex melancholica*, *Smith, Cat. Hym.* pt. iv. p. 328; *Proc. Linn. Soc.* ii. p. 105.

Hab. Aru; Sumatra; Borneo.

Many of the specimens from Aru are less highly coloured than those of Sumatra or Borneo: the yellow markings on the abdomen are frequently much obliterated in the females; others are as highly coloured as any examples I have seen. *

Gen. PISON, *Spin.*

1. *Pison nitidus*. *P. nitidus*, *niger*, *distinctè punctatus*; *alis subhyalinis*, *venis fuscis*; *segmentis abdominalibus apice depressis*.

Female. Length 5 lines. Black and shining; the head and thorax strongly punctured; the face beneath the antennæ, the clypeus, cheeks, and the sides of the segments of the abdomen covered with a silvery down; the palpi pale testaceous; the mandibles obscurely ferruginous at their apex. The metathorax transversely striated behind, with a central longitudinal impressed line above, which is transversely striated, and terminates in a deep fovea just beyond the verge of the posterior inclined truncation; the wings subhyaline; the nervures dark fuscous; the first recurrent nervure received at the apex of the first submarginal cell, and the second at the base of the third submarginal. Abdomen shining, and more delicately punctured than the thorax; the margins of the segments deeply depressed.

Hab. Aru, Key Island.

Gen. GORYTES, *Latr.*

1. *Gorytes constrictus*. *G. niger*; *clypei lateribus flavis*; *collari, tuberculis postscutelloque flavis*; *segmentorum abdominis marginibus apicalibus flavis constrictis, pedibusque flavo variegatis*.

Female. Length 6 lines. Black; the head and thorax very closely punctured and opaque, the head slightly shining on the vertex; the antennæ beneath and the apical half of the mandibles ferruginous, the latter black at their tips; the clypeus yellow at the sides, and coarsely rugose in front. Thorax: the metathorax coarsely longitudinally

rugose, with cinereous pubescence at the sides; the antennæ and intermediate tibiæ, the tarsi, and articulations of the legs reddish-yellow; wings subhyaline, with a fuscous cloud in the marginal cell, which passes beyond to the apex of the wings; the nervures fusco-ferruginous; the tegulæ ferruginous. Abdomen shining, covered with a thin, fine, cinereous pile, and with the margins of the segments constricted; the apical margins of the segments with narrow yellow fasciæ, that on the fourth abbreviated on each side, on the fifth it is obsolete; beneath, the second segment is opaque, finely punctured, and pilose; the following segments smooth, shining, and with five scattered punctures.

The *Male* strongly resembles the female, but is smaller and less variegated with yellow; the face covered with silvery down; the scape and base of the flagellum ferruginous beneath; the clypeus yellow, except its extreme base. The thorax black, with the legs rufo-piceous; the tibiæ and tarsi pale ferruginous, variegated with yellow; the sides of the thorax beneath the wings longitudinally striated in both sexes, most conspicuously so in the male. The abdomen with three narrow interrupted fasciæ.

Hab. Aru.

2. *GORYTES VAGUS*. *G. niger*; clypeo maculis duabus flavis notato; postscutello et segmentis primo et secundo fasciâ apicali flavis, fasciâ in segmento primo subinterrupto.

Female. Length 6 lines. Black; the head finely punctured and shining; the anterior margin of the clypeus emarginate in the middle, and more deeply so on each side; on each side of the clypeus, at its base, is an oblique yellow spot, and anteriorly it is roughly punctured; the mandibles roughened at their base, their apical half smooth, shining, and ferruginous, with their apex black. Thorax subopaque, very closely punctured, and slightly shining; the metathorax coarsely longitudinally rugose-striate; the postscutellum yellow; wings subhyaline and iridescent, the nervures fusco-ferruginous; a dark fuscous cloud occupies the marginal cell. Abdomen smooth and shining, with a slightly interrupted fascia a little before the apical margin of the basal segment; the second segment has a fascia at its apical margin; both are yellowish white; the first is gradually widened towards the sides of the segment, the second abruptly widened, with the angle of the widened portion pointed inwards; beneath the abdomen is glossy, with the basal segment closely punctured and subopaque; the margins of abdominal segments slightly constricted.

Hab. Key Island.

Gen. TRYPOXYLON, *Latr.*

1. *TRYPOXYLON EXIMIUM*. *T. nigrum*; clypeo argentato-pubescente; abdominis segmentis secundo tertio quartoque basi rubris; alis hyalinis.

Female. Length $8\frac{1}{2}$ lines. Black, smooth, and shining; the head and thorax very delicately punctured; the face and clypeus below the insertion of the antennæ densely covered with silvery-white pubescence; the anterior margin of the clypeus rounded and much produced, with a slight curving upwards at its margin; the mandibles yellow, with their apex ferruginous; the palpi pale testaceous; the inner orbits of the eyes very deeply notched. Thorax: the metathorax, the sides, and beneath with a thin silvery-white pubescence, most dense on the former; the metathorax not distinctly enclosed at its base, but with two shallow impressed lines, which mark the form of the usual enclosed space; a central longitudinal channel extends from its base to the apex, slightly sub-interrupted in the middle; the wings hyaline and iridescent, the nervures dark fuscous; the anterior and intermediate tibiæ in front, their tarsi, the apical joints of the posterior pair, and the base of the tibiæ very pale ferruginous; the claw-joint of the intermediate and posterior tarsi fuscous above; the calcaria pale testaceous. Abdomen, the second, third, and base of the fourth segment more or less ferruginous; the apex of the basal petiolated joint ferruginous beneath.

Hab. Aru and Key Island.

Gen. CRABRO, *Fabr.*

1. CRABRO SOLITARIUS. *C. niger*; abdomine petiolato; scapo flagellique articulo ultimo, collari, tuberculis, postscutelli maculis duabus flavis; pedibus petioloque basi ferrugineis.

Female. Length 5 lines. Black and opaque; the head large, quadrate, and wider than the thorax; the ocelli in a curve on the vertex; the clypeus covered with silvery pubescence, carinated in the middle, and slightly produced; the scape and basal joint of the flagellum pale yellow. Thorax: an interrupted line on the collar, the tubercles, a spot beneath the wings, and two minute ones on the postscutellum yellow; the disk of the thorax longitudinally delicately rugose; the metathorax obliquely striated, with an enclosed space at its base, and having a central longitudinal channel, the sides covered with thin silvery pubescence; the wings hyaline and iridescent, the nervures fuscous; the legs ferruginous, variegated with yellow. Abdomen: the basal petiolated segment ferruginous, with its apical half black above; the apical segment with an angular shape at its base, which is smooth and shining, with its lateral margins carinate, the extreme apex ferruginous; beneath smooth and shining, with the apical margins rufo-piceous.

Hab. Aru.

This species would, according to the views of some Hymenopterists, belong to the genus *Rhopalum* of Kirby.

Group SOLITARY WASPS.

Fam. EUMENIDÆ, *Westw.*Gen. EUMENES, *Latr.*1. *Eumenes arcuata*, *Fabr. Syst. Piez.* 287. 11.*Hab.* Key Island; coast of New Guinea (Triton Bay); Australia.Gen. PACHYMENES, *Sauss.*1. PACHYMENES VIRIDIS. *P. lætè viridis*; facie pube argentato-albâ tectâ; alis hyalinis.*Female.* Length 8 lines. Bright green; the head, thorax, and basal segment of the abdomen rugose, the rest of the abdomen finely and very closely punctured; the clypeus thinly covered with a fine silvery-white pubescence, its apex produced and truncate. Thorax: the metathorax rounded behind, a deep longitudinal impressed line in the middle, and with fine silvery down at the sides and behind; the wings subhyaline, with a fuscous stain along the anterior margin of the superior pair; the legs rufo-piceous; the coxæ, femora, and tibiæ more or less tinged with green.*Hab.* Aru.Gen. RHYNCHIUM, *Spin.*1. *Rhynchium mirabile*, *Sauss. Mon. Guêpes Sol.* 106. 6, t. 14. f. 5 ♀.*Hab.* Aru; Tasmania.

The *Male* of this fine species closely resembles the female; it is black, with a transverse spot above the insertion of the antennæ, an abbreviated narrow line behind the eyes, another on the lower margin of their emargination; the scape in front and the clypeus yellow, the latter notched at its apex; a minute yellow spot at the base of the mandibles; the antennæ, tibiæ, apex of the femora, and the tarsi ferruginous; the basal joint of the intermediate and posterior tarsi dusky; the intermediate femora deeply excavated or hollowed beneath; the prothorax yellow above; the metathorax truncate, transversely striated with several minute teeth on the lateral margins; the wings hyaline, tinted with yellow, their apical margins slightly clouded; the apical margins of all the segments of the abdomen bordered with yellow, that on the first segment narrowest. The only particulars in which the female apparently differs from Saussure's description, is that the second fascia on the abdomen is *widest at the sides*, and there are *three little teeth* on each side of the margins of the metathorax.

The *Female* is also in the Paris Museum.2. *Rhynchium superbum*, *Sauss. Mon. Guêpes Sol.* p. 113. 18.*Hab.* Aru; New Holland.

Our example of this species slightly differs in coloration from the description of Saussure. He says, "black, with the vertex, the front, the prothorax, and the border of all the segments of the abdomen, except the first, yellow; the wings yellow;" in the Aru specimen, the sinus of the eyes, a spot above the clypeus, a reversed crescent-shaped spot crossing the ocelli, two oblique spots behind them, and a broad elongate stripe behind the eyes yellow. These slight differences cannot characterize more than a variety; in every other particular they exactly correspond.

Gen. ODYNERUS, *Latr.*

1. ODYNERUS PETIOLATUS. *O. niger*; clypeo apiculato; capite, thorace abdomineque flavo variis; abdomine petiolato; alis subhyalinis.

Female. Length $7\frac{1}{2}$ lines. Black; head and thorax strongly punctured; two confluent spots between the antennæ, a line on the inner orbits of the eyes, terminating in their emargination, an oblong spot behind them, a spot at the base of the mandibles, the scape in front, and the clypeus yellow; the latter with a large black spot in the middle, and with its anterior margin prolonged into an acute point; the mandibles ferruginous, with their base and margins black; the flagellum fulvous beneath. Thorax: an interrupted line on the collar, a spot beneath the wings, the outer margin of the tegulæ, two spots on the scutellum, two longitudinal curved lines on the metathorax, extending from the base to the apex, yellow; the yellow lines on the metathorax curving inwards. The tibiæ, tarsi, and apex of the femora ferruginous; the intermediate and posterior tibiæ with a fuscous line outside, a spot on the coxæ outside, a stripe at the apex of the anterior femora beneath, another on the intermediate pair, and a line on the anterior tibiæ, behind, yellow; wings subhyaline, their margins fuscous. Abdomen petiolated; a fascia on the apical margins of all the segments, and the petiole, yellow; the third and following fasciæ narrowest; all the fasciæ continued beneath the abdomen.

Hab. Aru.

2. ODYNERUS AGILIS. *O. niger*; capite thoraceque distinctè, abdomine delicatè punctatis; pedibus ferrugineis; abdominis segmentis duobus basalibus flavo fasciatis; alis subhyalinis.

Male. Length 6 lines. Black; the scape in front, a line on the inner margin of the eyes, terminating in their emargination, an abbreviated line behind them, and the clypeus yellow; the latter deeply emarginate, forming two teeth. Thorax: a line in the middle of the anterior margin of the prothorax, two spots on the verge of the emargination of the metathorax, and a fascia on the apical margins of the first and second segments of the abdomen yellow; the legs ferruginous; the wings subhyaline, the anterior margin of the superior pair fuscous; the outer margin of the tegulæ yellowish.

Hab. Aru.

3. *ODYNERUS MULTIPICTUS*. *O. niger*, flavo maculatus et punctatus; pedibus flavis, alis hyalinis.

Female. Length 4 lines. Black; the head and thorax strongly punctured, the abdomen finely and distantly so; the clypeus, a spot above it, the inner and outer orbits of the eyes, and the scape in front yellow; the clypeus deeply emarginate in front; the mandibles ferruginous, with a yellow spot at their base. Thorax: the prothorax in front, the tegulæ and two spots beneath the wings, the scutellum, and sides of the metathorax yellow; the legs yellow, with ferruginous stains; the femora with a black or dark stain above; wings hyaline, with a fuscous stain along the anterior border of the superior pair. Abdomen: a yellow fascia on the apical margins of the two basal segments; the three following segments with very narrow yellow borders, and the apical segment entirely reddish-yellow.

Hab. Aru.

4. *ODYNERUS MODESTUS*. *O. niger*; abdominis segmentis duobus basalibus flavo fasciatis; tibiis tarsisque ferrugineis; alis hyalinis; abdominis segmento primo basi transversim bicarinato.

Female. Length 4 lines. Black; head and thorax coarsely punctured; the vertex swollen; the scape of the antennæ, a spot between them, and the clypeus yellow; the latter with a transverse black spot in the middle, deeply notched in front, and having a carina on each side, in a line with the angle or tooth of the emargination; the flagellum ferruginous towards the apex beneath; wings hyaline, with a fuscous cloud in the marginal cell; the tibiæ and tarsi ferruginous. Abdomen: the base truncate, with an oblique space above the truncation, the margin of both defined by an elevated ridge or carina; a narrow fascia on the apical margin of the basal segment, and a broader one on the second; the latter continued beneath the abdomen.

Hab. Aru.

This species is undoubtedly allied to *O. Sichellii* of Saussure; but, beside differing in the colour of its legs, and of the bands of the abdomen, it wants the strong tubercle at the base of the second segment of the latter.

Gen. ALASTOR, *St.-Farg.*

1. *ALASTOR UNIFASCIATUS*. *A. niger*; maculâ inter antennas, abdominisque margine apicali et segmento secundo flavis; alis fuscis.

Female. Length $6\frac{1}{2}$ lines. Black; the head and thorax strongly punctured; the face, sides of the clypeus, cheeks, and base of the mandibles with a fine silky silvery-white pubescence; the clypeus convex, its anterior margin emarginate; from each angle of the emargination a shining carina runs more than halfway up the clypeus; a minute spot between the antennæ, and two on the anterior margin of the prothorax, yellow; the wings fuscous, palest at their posterior mar-

gins. Abdomen finely and closely punctured; the third segment strongly so; a broad yellow fascia on the apical margin of the second segment.

Hab. Aru.

2. *ALASTOR APICATUS*. *A. niger*; abdominis segmentis primo et secundo aurantiaco-rubris; alis fuscis.

Male. Length $5\frac{1}{2}$ lines. Black; the head and thorax strongly punctured; a spot between the antennæ, the scape in front, and the clypeus yellow; the latter with a large black spot at its base, anteriorly deeply emarginate; wings fuscous; the tegulæ with a rufo-testaceous spot at their outer margins; the tarsi and articulations of the legs ferruginous. Abdomen bright orange-red, with the third and following segments black; the base rugose, the second segment finely punctured, the rest much more strongly so.

Hab. Aru.

Group SOCIAL WASPS.

Fam. VESPIDÆ, *Steph.*

1. *ISCHNOGASTER IRIDIPENNIS*. *I. rufescenti-fuscus flavo varius*; vertice et metathorace nigris, alis subhyalinis et pulcherrimè iridescentibus.

Male. Length $7\frac{1}{4}$ lines. Head yellow, above the insertion of the antennæ black; antennæ black, with the scape, basal joint of the antennæ, and the mandibles ferruginous; the flagellum obscurely ferruginous beneath; the clypeus produced at the apex into an acute tooth. Thorax pale ferruginous; the metathorax black, with a ferruginous spot on each side in front; the scutellum with a reddish-brown spot in the middle, the postscutellum yellow and subinterrupted in the middle; the sides of the thorax yellow anteriorly, the yellow portion with two black spots; the legs slightly variegated with yellow; wings subhyaline and brilliantly iridescent, the marginal cell with a fuscous cloud. Abdomen brown; the petiole pale testaceous at its apex and ferruginous beneath, longer than the head and thorax; the second segment has a yellow macula on each side, and, beneath, a smaller spot on each side in a line with the side spots; the first segment has its basal portion yellow beneath, and a blackish spot in the centre rather behind the middle.

Hab. Aru.

This species in many particulars agrees with the *I. nitidipennis* of Saussure, but differs in too many, I think, to be considered the same species; the second recurrent nervure is straight at the upper extremity, then curved towards the margin of the wing, and again straight at its lower extremity; the third submarginal cell is much wider than the fourth.

Gen. ICARIA, *Sauss.*

1. *Icaria maculiventris*, *Sauss. Mon. Guêpes Soc.* p. 23. 1.—*Rhopalidia maculiventris*, *Guér. Voy. Coq. Zool.* ii. pt. 2. *Ins.* p. 267, pl. 9. fig. 8.
Hab. Aru; New Guinea.

2. **ICARIA NIGRA.** *I. nigra*; clypeo anticè angulato; metathorace concavo et transversim striato; alis hyalinis.

Female. Length 6 lines. Black, punctured and opaque; the clypeus terminating in a sharp-pointed angle; the base and apex of the mandibles rufo-piceous; the scape ferruginous in front; the face with a thin, fine, griseous pubescence. Thorax slightly margined in front; an obscure testaceous spot on each side of the postscutellum, the metathorax concave and transversely striated; wings hyaline. Abdomen with a short petiole to the basal segment, which is very short and campanulate; at its posterior margin are two minute, obscure, pale spots; beneath, the margins of the apical segments are rufo-piceous.

Hab. Aru.

3. **ICARIA FASCIATA.** *I. nigra*; clypei margine antico, maculis duabus postscutelli flavis; segmentis abdominis ad apicem flavo angustè fasciatis.

Female. Length 5 lines. Black; the clypeus angular in front, its anterior margin and a spot on the mandibles yellow; the antennæ rufo-testaceous beneath. Thorax: the anterior margin of the prothorax slightly rebordered; the anterior coxæ with a spot in front and two spots on the postscutellum yellow; the anterior and intermediate tibiæ beneath, the tarsi beneath and the claw-joint entirely, ferruginous; wings hyaline with a fuscous stain along the anterior margin of the superior pair; the metathorax oblique and slightly concave, with an acute stout tooth on each side. Abdomen: the basal segment campanulate, the petiole short; a narrow yellow fascia on the apical margin of all the segments.

Hab. Aru.

4. **ICARIA BRUNNEA.** *I. rufescenti-fusca*; coxis femoribusque obscuris; alis hyalinis.

Female. Length $3\frac{1}{2}$ lines. Reddish-brown; head and thorax punctured, the abdomen finely rugose; the clypeus and mandibles pale ferruginous, the former with a darker spot in the middle, the anterior margin angular. The anterior margin of the prothorax slightly rebordered; the wings hyaline and iridescent, with a fuscous stain along the anterior margin of the superior pair; the metathorax abruptly truncate. Abdomen: the basal margin of the third and following segments black.

Hab. Aru.

5. **ICARIA GRACILIS.** *I. nigra* flavo variegata; abdominis segmento basali elongato, gracili et petiolato; alis hyalinis.

Female. Length 7 lines. Black; the scape in front, the sides and apical margin of the clypeus, and a spot at the base of the mandibles yellow; the cheeks reddish-yellow; the antennæ ferruginous; the head covered with short griseous pubescence. Thorax with obscure ferruginous tints and a short griseous pubescence, most dense on the sides and beneath; the anterior margin of the prothorax, the tegulæ, scutellum and postscutellum, a broad stripe on each side of the metathorax, the coxæ, and the anterior and intermediate femora, at their apex beneath, yellow; the scutellum with a ferruginous stain in the middle, the postscutellum with a black stain, the coxæ ferruginous above, the tibiæ and tarsi ferruginous beneath; wings hyaline, with a fuscous stain along the anterior margin of the superior pair. Abdomen: a yellow fascia on the apical margin of the first and second segments; that on the following segments rufo-testaceous.

Hab. Aru.

6. *ICARIA UNICOLOR.* *I. rufescenti-fusca, tenuiter cinereo-pubescentis.*

Female. Length 5 lines. Reddish-brown, covered with a thin cinereous pubescence; the clypeus acutely angular anteriorly; the metathorax oblique and delicately striated transversely; wings fusco-hyaline; the petiole of the abdomen long, the segment campanulated and narrow.

Hab. Key Island.

Gen. *POLISTES*, *Latr.*

1. *Polistes tepidus*, *Fabr. Syst. Piez.* p. 271. 7.

Hab. Aru; Key Island; Solomon Islands; New Guinea; Australia.

2. *Polistes diabolicus*, *Sauss. Mon. Guêpes Soc.* 68. 26, t. 6. f. 7.

Hab. Aru; Java; Timor.

3. *Polistes stigma*, *Fabr. Syst. Piez.* p. 261. 41.

Hab. Aru; Celebes; Ceram; India.

Var. The specimens from Aru differ from the typical ones in wanting the two longitudinal yellow lines on the metathorax, which is entirely black. Saussure has a variety with the metathorax black between the lines; of two examples from Celebes, one has the yellow lines entire, the other has them abbreviated at half their length.

4. *POLISTES NIGRIFRONS.* *P. capite thoraceque nigris, flavo et ferrugineo variegatis; abdomine ferrugineo, segmentis basi nigris, marginibus apicalibus flavis.*

Female. Length 8 lines. Head and thorax black; the anterior margin of the clypeus angular and narrowly rufo-testaceous; the mandibles, palpi, and antennæ ferruginous; the scape, and flagellum above, except the basal joint, fuscous; the outer orbits of the eyes with a narrow yellow line. The anterior margin of the prothorax slightly rebordered, the posterior margin ferruginous; the outer margin of the tegulæ reddish-yellow; wings subhyaline with a fusco-ferruginous stain along the anterior margins of the superior pair; the metathorax

finely striated transversely, and with two yellow stripes running upwards halfway from the base, the posterior margin of the pectus, tips of the coxæ, the femora at their base and apex, the tibiæ and tarsi beneath, ferruginous; tips of the femora, and tibiæ above, yellowish. Abdomen ferruginous, with the base of the second and following segments black; the first and three following segments with a yellow fascia on their apical margins; beneath, the two basal segments entirely ferruginous.

Hab. Aru.

This species is closely allied to the *P. fastidiosus* of Saussure, and, notwithstanding the difference in colouring, may possibly, I think, be an extreme variety of that species.

5. *POLISTES ELEGANS*. *P. ferrugineus*; capite thoraceque flavo variis; segmentis abdominis flavo marginatis.

Female. Length 8 lines. Ferruginous; the clypeus, mandibles, cheeks, and the face, as high as the middle of the emargination of the eyes, yellow. Thorax: the margins of the prothorax, two longitudinal stripes on the mesothorax, the scutellum, postscutellum, and sides of the metathorax broadly, yellow; the legs beneath, the coxæ and the sides of the thorax spotted with yellow; the intermediate and posterior coxæ spotted with ferruginous or fusco-ferruginous; the metathorax finely striated transversely; the wings hyaline with the nervures ferruginous. Abdomen: the first and three following segments with yellow marginal fasciæ, that on the fourth usually more or less obliterated.

Hab. Aru; Key Island.

Fam. EVANIDÆ, *Leach.*

Gen. FÆNUS, *Fabr.*

gasteroptid.

1. *FÆNUS GRACILIS*. *F. niger*, facie lateribusque thoracis argenteo pilosis; pedibus anticis et intermediis pallidè -rufo-testaceis, tibiis posticis basi tarsisque albis; abdomine subtùs rufo-testaceo.

Female. Length 6 lines. Black; sub-opaque; the face, sides of the thorax and beneath with silvery pubescence; the mandibles, palpi, and scape in front rufo-testaceous. Thorax: the anterior and intermediate legs rufo-testaceous, the femora having a darker stain above; the posterior legs black, with the base of the tibiæ and the tarsi white. Abdomen rufo-testaceous beneath; the ovipositor white at its apex.

Hab. Aru.

Gen. STENOPHASMUS. —

Spathius

Head globose; antennæ longer than the body, and very slender and setaceous; the prothorax forming a slender neck; the anterior wings with one marginal and three submarginal cells; the femora slightly

incrassate, not denticulate; the tarsi 5-jointed. Abdomen petiolated, the petiole as long as the abdomen; the ovipositor as long as the petiole and abdomen united.

This genus is founded on the examination of a single individual, which in general appearance exactly resembles the smaller species of the genus *Megischus*; on examination, however, it will be found that it differs from that genus in the neuration of the anterior wings; its femora are not denticulate, in which character it differs from both *Megischus* and *Stephanus*; with the latter genus it agrees in having 5-jointed tarsi.

1. *STENOPHASMUS RUFICEPS*. *S. niger*; capite et antennarum basi rufis; ovipositore tarsisque pallidè testaceis; petiolo abdominis cylindrico; alis subhyalinis.

Female. Length 5 lines. Black, slightly shining; head globose, red and sprinkled with white hairs, and delicately striated transversely. Thorax sprinkled with white pubescence above, the sides more thickly clothed with the same; above, the thorax is transversely rugose, on the metathorax becoming more regularly striate; the metathorax has a central longitudinal carina and also one on each side; the legs sprinkled with erect white hairs; the tarsi pale rufo-testaceous with the claw-joint black; wings subhyaline, with a broad light-fuscous stain along the centre of the anterior pair; a hyaline streak crosses them at the base of the stigma. Abdomen: the petiole as long as the thorax, narrowest at the base of the abdomen; it is rugose at the base; the ovipositor pale testaceous.

Hab. Aru.

Fam. ICHNEUMONIDÆ, *Leach*.

Gen. ICHNEUMON.

1. *ICHNEUMON INSULARIS*. *I. niger*; capite thoraceque albo variegatis; abdominis segmentorum primo, secundo tertioque albo maculatis.

Length $7\frac{1}{2}$ lines. Black; the orbits of the eyes, the face before the antennæ, the mandibles and palpi yellowish-white; the flagellum with the joints from the 14th to 25th white. Thorax: a line on each side before the tegulæ, a spot beneath the wings, two at the sides of the pectus, the anterior coxæ in front, and a narrow line on each side of the scutellum yellowish-white; the anterior and intermediate legs and a spot beneath the posterior tibiæ rufo-testaceous; the wings hyaline, the nervures black. Abdomen: a minute spot at the lateral apical margins of the three basal segments, and a large central one on the two apical segments, white.

Hab. Key Island.

Gen. CRYPTUS, *Fabr*.

1. *CRYPTUS SCUTELLATUS*. *C. ferrugineus*; tibiis posticis tarsisque albo annulatis; scutello tuberculato.

Female. Length 5 lines. Ferruginous; the face testaceous-yellow, an elongate black spot on the vertex enclosing the ocelli and extending to the insertion of the antennæ; the latter black, with the scape ferruginous in front. Thorax: the scutellum elevated, forming a compressed tubercle, its side view wedge-shaped; the wings hyaline the nervures black, the base of the wings yellowish; the apical joints of the intermediate tarsi, the tips of the posterior femora, the extreme base of the tibiæ, their apical half, and the tarsi black; the intermediate portion of the tibiæ yellow; the apical segment of the abdomen black.

Hab. Aru.

Gen. MESOSTENUS, *Grav.*

1. MESOSTENUS PICTUS. *M. niger*; capite thoraceque flavo striatis et punctatis; pedibus flavis nigro et ferrugineo lavatis; segmentis abdominalibus flavo marginatis; alis hyalinis.

Female. Length 8 lines. Black; a large ovate spot on the cheeks touching the mandibles, the labrum, palpi, inner orbits of the eyes, and from the 7th to the 10th joints of the antennæ yellowish-white. Thorax: an ovate spot in the middle of the disk of the mesothorax, the tegulæ, a spot beneath them, two larger spots beneath the wings, the scutellum, a spot on the postscutellum uniting with another at the base of the metathorax, a trilobed spot at its apex, and a subovate one on each side yellowish-white; the coxæ white with black stains on the intermediate and posterior pairs; the femora white beneath, the anterior and intermediate pairs with a black line above, the posterior pair ferruginous above; the tibiæ and tarsi whitish beneath, stained more or less fusco-ferruginous above; wings hyaline. Abdomen: all the segments with yellowish-white fasciæ on their apical margins, the fasciæ continued beneath; the ovipositor about the length of the abdomen, the valves broadest at their apex.

Hab. Aru.

2. MESOSTENUS AGILIS. *M. niger*; antennis medio albis; thorace pedibusque albo variegatis; abdominis marginibus fasciis albis.

Female. Length 5 lines. Black; the joints of the antennæ, from the 6th to 13th, white, the vertex also white. Thorax: a spot in the middle of the disk of the mesothorax, the scutellum, a spot on the postscutellum, two beneath the wings, the apex of the metathorax, and a spot on each side white; the legs white, the anterior pair slightly fuscous above; the intermediate femora and tibiæ beneath, and the tarsi above, black; the posterior femora above and beneath the tibiæ, except their extreme base and the base and apex of the tarsi, black; wings hyaline, the nervures black. Abdomen: the apical margins of the segments, excepting the fourth and fifth, with white fasciæ, the second and third fasciæ attenuated in the middle.

Hab. Aru.

3. **MESOSTENUS ALBOPICTUS.** *M. niger*, albo varius; alis hyalinis.
Female. Length 7 lines. Black; the clypeus, mandibles, palpi, the joints of the antennæ from the sixth to the thirteenth, and a broad stripe at the inner orbits of the eyes white. Thorax: an ovate spot on each side of the prothorax above, a similar spot in the middle of the mesothorax, the tegulæ, scutellum and postscutellum, a T-shaped spot reversed on the metathorax, a large quadrate one on its sides, three irregular-shaped maculæ beneath the wings, and the anterior and intermediate legs white, the legs with a black line above; the posterior legs have a large spot on the coxæ behind, the trochanters, the tibiæ, and tarsi white, the tibiæ black at their apex, and the femora palish at their base outside; the wings hyaline and iridescent, with the nervures black. The abdomen beneath, and the apical margins of the segments above, white.
Male. Rather smaller than the female, but only differs otherwise in the colour of the legs, the anterior and intermediate pairs being entirely yellowish-white, excepting the intermediate tibiæ and tarsi, which are slightly fuscous above; the posterior femora are ferruginous, the tibiæ and tarsi white, with the base and apex of the two former black as well as the apical joint of the tarsi.
Hab. Key Island.

Gen. **PIMPLA**, *Fabr.*

1. **PIMPLA OCHRACEA.** *P. ochracea*; antennis ferrugineis; facie luteâ; alis hyalinis, apice fuscis.
Female. Length 5 lines. Entirely ochraceous, with the face and scape in front yellow; the body beneath is pale ochraceous; the antennæ ferruginous, above dusky; the eyes emarginate within; the tarsi have the tips of the claws black; the wings flavo-hyaline, with the apex of the anterior pair fuscous, the nervures black, becoming yellow at the base of the wings. The head, thorax, legs, and base of the abdomen smooth and shining; the abdomen, except the base, finely punctured; a transverse impressed row of punctures a little before the apical margin of each segment, and the space between impunctate.
Hab. Aru.
2. **PIMPLA BRACONOIDES.** *P. rufo-flava*; antennis tarsisque et abdominis dimidio posteriori nigris; alis fuscis, dimidio basali flavis.
Female. Length 6 lines. Ferruginous; the posterior tarsi and the fourth and following segments of the abdomen black; the head is reddish yellow, the eyes brown; the scape and two or three of the basal joints of the flagellum ferruginous, the rest fuscous; the basal half of the wings flavo-hyaline, the apical half fuscous; the stigma yellow, with a subhyaline macula beneath, and two other similar irregular-shaped spots. The abdomen with two longitudinal carinæ

on the basal segment, and a transverse curved impressed line on the other segments.

Hab. Key Island.

This species might at first sight be mistaken for a species of the genus *Bracon*. The male only differs from the female in having the abdomen black, with only the basal segment yellow; the wings are only very slightly yellow at their base; it is also rather smaller.

3. *PIMPLA PENETRANS*. *P. flavo-ferruginea*; flagello fusco; alis flavo-hyalinis, apice fuscis.

Female. Length $4\frac{1}{4}$ lines. Reddish yellow, smooth, and shining; the face testaceous, with slight fuscous stains; the scape and two or three of the basal joints of the flagellum yellow in front; the wings hyaline, with a yellowish tinge; the nervures black, except the costal nervure, which is ferruginous towards the base, the apex of the wings slightly clouded; the posterior tibiae fuscous above. Abdomen: the segments with slightly impressed oblique depressions, the ovipositor shorter than the abdomen, and black.

The *Male* only differs in having the abdomen rather more slender.

Hab. Aru.

4. *PIMPLA FERRUGINEA*. *P. flavo-ferruginea*; antennis supra fuscis; alis hyalinis.

Female. Length $5\frac{1}{2}$ lines. Ferruginous, with the head and thorax beneath yellow-testaceous; the coxæ also are of the same colour; the flagellum slightly fuscous above; the wings flavo-hyaline, the nervures black; the two basal segments of the abdomen shining, the third and the following segments subopaque; the ovipositor as long as the abdomen.

Hab. Key Island.

5. *PIMPLA PLAGIATA*. *P. flavo-rufa*; antennis strigisque tribus mesothoracis nigris; alis hyalinis, apice cellulæ marginalis fusco unimaculato.

Female. Length $5\frac{1}{2}$ lines. Yellow, the legs with ferruginous stains; the antennæ black, with the scape yellow in front; the head with a large ovate black spot behind the ocelli. Thorax finely punctured on the disk of metathorax, which has three longitudinal broad black stripes, a narrow black line on the posterior margin of both the scutellum and postscutellum; wings hyaline, the nervures black, with a dark fuscous spot at the apex of the marginal cell. Abdomen reddish-yellow, with the apical margins of the segments yellow; the ovipositor black, and shorter than the abdomen.

Hab. Aru.

Gen. RHYSSA, Grav.

1. *RHYSSA MACULIPENNIS*. *R. rufescenti-flava*; antennis et vertice nigris; alis hyalinis, plaga nigro-fusca.

Male. Length 9 lines. Ferruginous; the head of a yellow testaceous, with the vertex and antennæ black; the scape ferruginous in front; the mandibles black. Thorax: the mesothorax and scutellum transversely rugose, the former with two deeply impressed lines in front, which converge inwards, and meet in the middle of the disk; wings hyaline, with a yellow tinge on the anterior pair, the nervures black; a black stripe crosses the middle of the marginal cell, and terminates at the inferior margin of the discoidal cell; the legs ferruginous, with the posterior tarsi black. Abdomen smooth, shining, ferruginous.

Hab. Aru.

2. *RHYSSA VESTIGATOR.* *R. ferruginea*; antennis, mesothorace, metathoracisque basi nigris; abdomine lineari, nitido et lævi; alis hyalinis, apice subfuscato.

Male. Length 9 lines. Head testaceous-yellow, with the vertex ferruginous; the antennæ fusco-ferruginous. Thorax black, with the prothorax, a large oblique spot beneath the wings, the scutellum, and metathorax yellow, the base of the latter black; the mesothorax and scutellum rugose; the metathorax smooth and shining; the legs ferruginous, with the anterior coxæ in front and the posterior pair behind yellow; the posterior coxæ black beneath; wings hyaline, faintly clouded at their apical margins. Abdomen elongate, linear, glossy, smooth, and shining, ferruginous, with the base and lateral margins blackish.

Hab. Aru.

Gen. BRACON, *Fabr.*

1. *BRACON BASALIS.* *B. capite*, thorace, pedibus anticis et intermediis, femoribus posticis ferrugineis; tibiis tarsisque et abdomine nigris, segmento basali flavo; alis fusco-hyalinis.

Female. Length $4\frac{1}{4}$ lines. The head, scape in front, thorax, anterior and intermediate legs, the posterior coxæ, trochanters, and femora, and the first segment of the abdomen, and a semicircular spot in the middle of the base of the second, yellow-ferruginous; the antennæ, the posterior tibiæ and tarsi, fuscous; abdomen shining black; the thorax smooth and shining; the wings fusco-hyaline. The basal segment of the abdomen with a longitudinal impressed line on each side, the second segment with an oblique depression, the third with an impressed line, curved forwards and extending to the lateral margins; the base of the segment has a row of short, deeply impressed striæ; the ovipositor shorter than the abdomen.

Hab. Aru.

2. *BRACON ALBO-MARGINATUS.* *B. capite*, thorace pedibusque ferrugineis; abdomine nigris annulis albo-marginatis; alis fusco-hyalinis.

Female. Length $4\frac{1}{2}$ lines. Head, thorax, and legs ferruginous, smooth, and shining; antennæ and abdomen black, the latter smooth and

shining, the posterior margins of the third and following segments with a narrow bluish-white fascia; the posterior tarsi slightly fuscous; the wings fusco-hyaline; the ovipositor a little longer than the abdomen.

Hab. Aru.

3. **BRACON NIGRIPENNIS.** *B.* thorace, pedibus anticis et intermediis, femoribusque posticis ferrugineis; tibiis tarsisque posticis et abdomine nigris; alis nigro-fuscis; capite luteo-testaceo.

Female. Length 9 lines. Head testaceous, the antennæ black. Thorax, anterior and intermediate legs, the posterior coxæ, trochanters and femora, the tegulæ, extreme base of the wings, and the base of the stigma ferruginous; the thorax smooth and shining; the wings brown-black, with a small hyaline spot in the first submarginal cell. Abdomen longitudinally aciculate, a central carina at the base of the first segment, the second segment with an oblique impressed line running from the lateral angles of its basal margin, and meeting in the centre of its posterior margin; the margins of all the segments constricted; the ovipositor shorter than the abdomen.

Hab. Aru.

4. **BRACON EXOLETUS.** *B.* niger; capite, thorace, pedibus anterioribus et intermediis ferrugineis; alis subhyalinis.

Female. Length 5 lines. Head, scape of the antennæ, thorax, anterior and intermediate legs, ferruginous; flagellum and tips of the mandibles black. Thorax smooth and shining; wings fusco-hyaline, the nervures dark brown; the posterior legs fusco-ferruginous. Abdomen rugose and subopaque; the basal segment black in the middle, with the base and lateral margins ferruginous, the sides deeply channeled; the second segment with an arrow-headed shining space in the middle of its base; the ovipositor shorter than the abdomen.

Hab. Aru.

5. **BRACON ABDOMINALIS.** *B.* rufo-flavus; antennis fuscis; alis subhyalinis; abdomine ovato.

Female. Length 3 lines. Reddish yellow; head and thorax smooth and shining; the head narrower than the thorax; wings fusco-hyaline; abdomen ovate, broader than the thorax, the first and second segments rugose, with deep sculptured impressions; the second segment has an ovate shining space in the middle at its basal margin; the third segment is deeply depressed and sculptured at the base, leaving a transverse arched space at its apex, the width of the entire segment; the following segments have their margins very deeply depressed.

Hab. Aru.

6. **BRACON NITIDUS.** *B.* niger; capite, thorace pedibusque et abdominis segmento primo ferrugineis, totis nitidissimis.

Female. Length 4 lines. Ferruginous, with the flagellum, second and

following segments shining black; the thorax smooth and shining, with the scutellum prominent; the wings subhyaline, their apical margins clouded, their extreme base yellowish, the nervures dark brown, the stigma black. Abdomen: the second and third segments with deeply impressed oblique lines on each side, and the basal margins of the following segments depressed.

Hab. Aru.

7. *BRACON PALLIFRONS.* *B. niger*; thorace pedibusque anticis et intermediis ferrugineis; alis fuscis.

Female. Length 6 lines. Head obscure, testaceous yellow; the eyes brown; the antennæ black. Thorax and the anterior and intermediate legs ferruginous; an ovate black spot on the metathorax; and the posterior legs black, with the articulations obscurely ferruginous; wings dark fuscous, with the nervures and stigma black, the base of the latter yellowish, and a hyaline streak beneath it, which crosses the first submarginal cell. Abdomen black and shining; the first segment with some coarse striæ at the apex; the second with a central forked carina and an oblique one on each side running inwards to the apex of the segment; between the carinæ are a number of deep grooves; the lateral margins of the three basal segments carinated; the third segment has a row of short deep striæ at its base; the ovipositor longer than the body.

Hab. Aru.

8. *BRACON INTRUDENS.* *B. niger*; thorace, pedibus anticis intermediisque et abdominis segmento basali ferrugineis; alis hyalinis.

Female. Length 5 lines. Black; the thorax, anterior and intermediate legs, the articulations of the posterior pair, and the base of the abdomen ferruginous, entirely smooth and shining; the wings subhyaline, the nervures fusco-ferruginous, an irregular fuscous stain at the base of the first submarginal cell, extending beyond it. Abdomen: the basal segment margined at the sides; the second segment with an oblique deeply impressed line running inwards, not quite meeting or extending to the apical margin.

Hab. Aru.

Gen. AGATHIS, *Latr.*

1. *AGATHIS FUMIPENNIS.* *A. ferruginea*; capite, abdominis apice tarsisque posticis nigris; alis obscurè fuscis.

Female. Length 4 lines. Reddish-yellow; the head, apical joint of the intermediate tarsi, the apex of the posterior tibiæ, and the third and following segments of the abdomen black; the thorax and legs with a thin, short, pale fulvous pubescence; the head and abdomen smooth and shining; the head produced before the eyes into a kind of beak, rufo-piceous anteriorly. Thorax narrowed before the wings, which are dark fuscous, with a hyaline irregular mark below the

stigma, crossing the submarginal cell; the anterior margin of the anterior wings pubescent; the metathorax broad, margined laterally, with a central forked carina, and a crooked one on each side; the posterior legs incrassate. Abdomen with the sides of the upper surface carinated.

Hab. Aru.

Fam. CHRYSIDIDÆ, *Leach.*

Gen. STILBUM, *Spin.*

1. *Stilbum splendidum*, *Fabr. Syst. Piez.* p. 170. 1.

Hab. Aru; Senegal; Java; Bengal.

2. *Stilbum amethystinum*, *Fabr. Syst. Piez.* p. 176. 32.

Hab. Aru; Australia.

Fabricius includes this insect in the genus *Chrysis*; the typical specimen, however, proves that it belongs to the more modern genus *Stilbum*: it is very distinct from *S. splendidum*, being much more strongly and coarsely punctured; and the teeth which arm the apical segment are differently disposed on the margin.

Fam. TENTHREDINIDÆ, *Leach.*

Gen. ORYSSUS, *Fabr.*

1. *ORYSSUS MACULIPENNIS*. *O. niger, punctatus*; pedibus ferrugineis; alis fuscis fasciâ hyalinâ ante cellulam marginalem sitâ.

Female. Length $5\frac{1}{2}$ lines. Black; the head rugose, the front coarsely so, with a row of transverse tubercles running from the vertex along the inner orbits of the eyes, and crossing the front at half their length; the cheeks with a cinereous down, and a line of silvery-white pubescence or down, along the outer orbits of the eyes. Thorax coarsely punctured; the mesothorax with a central longitudinal smooth elevation; wings fuscous, with a broad transverse hyaline fascia before the base of the marginal cell, the tips of the wings hyaline; the legs ferruginous, with the coxæ and trochanters black; the posterior tibiæ with a double row of serrations outside. Abdomen shining and closely punctured; the base and apex coarsely so.

Hab. Aru.

Gen. XYPHIDRIA, *Latr.*

1. *XYPHIDRIA RUFIPES*. *X. nigra*; mandibulis, antennarum scapo, pedibusque ferrugineis; alis hyalinis et iridescentibus.

Female. Length 4 lines. Black and shining; the vertex highly polished; the front from the posterior ocelli forwards closely punctured and opaque; the mandibles, scape, and basal joint of the flagellum ferruginous. The thorax anteriorly punctured and opaque, posteriorly shining, and with a few punctures at the base of the scutellum; wings hyaline and iridescent, the nervures black, the extreme base of the wings and the

tegulae pale testaceous; the legs pale ferruginous, with the claws of the tarsi darker. Abdomen: the base of the segments depressed and very delicately and closely punctured, subopaque; the apical half highly polished and shining; beneath obscurely rufo-piceous.

Hab. Aru.

Gen. TREMEX, *Jurine*.

1. TREMEX INSIGNIS. *T. nigro-purpureus*; abdominis fasciis basalibus albis; alis nigris cupreo nitentibus.

Female. Length 11 lines. Obscure steel-blue, with shades of green, purple, and violet; the head and thorax punctured; the prothorax with an oblique smooth shining space on each side; the wings very dark brown, with a brilliant coppery effulgence. The base of the abdomen opaque, velvety, purple-black; the first segment with a transverse cream-coloured fascia in the middle, the second very slightly whitish at its base; the rest of the abdomen is highly polished, and has a scattered, short, black pubescence.

Hab. Aru.

Note on Two Insect-products from Persia.

By DANIEL HANBURY, Esq., F.L.S.

[Read December 16th, 1858.]

IN the month of June last, my friend Professor Guibourt, of Paris, laid before the Académie des Sciences* some account of a remarkable substance called *Tréhala*, the cocoon of a Curculionidous insect found in Persia, where, as well as in other parts of the East, it enjoys some celebrity as the basis of a mucilaginous drink administered to the sick.

Specimens of this substance, as well as of another insect-product of Persia, together with the insects themselves, were presented a few years ago to the British Museum by W. K. Loftus, Esq., who obtained them while engaged by the British Government on the question of the Turco-Persian boundaries.

The precise determination of the species of these insects being a matter of doubt, they have at my request been lately examined by M. Jekel, of Paris, an entomologist with whom the family of *Curculionidæ* has long been an especial study. One of these insects M. Jekel has identified with a species of wide distribution; the other proving undescribed, he has drawn up a description of it, which, accompanied by a figure, I have the honour to lay before the Linnean Society. To this, I venture to add a few observations upon the productions to which I have alluded.

* Comptes Rendus, 21 Juin, 1858, p. 1213.

The first of these is *Tréhala* or *Tricala*, under which name it formed part of the Collection of *Materia Medica* sent by M. Della Sudda, of Constantinople, to the Paris Exhibition of 1855, and since deposited in the *Ecole de Pharmacie* in Paris.

Tréhala (fig. 2) consists of cocoons of an ovoid or globular form, about $\frac{3}{4}$ of an inch in length; their inner surface is composed of a smooth, hard, dusky layer, external to which is a thick, rough, tuberculated coating of a greyish-white colour and earthy appearance. Some of the cocoons have attached to them the remains of the tomentose stalk of the plant upon which they were formed; others have portions of a tomentose spiny leaf built into them; and, more rarely, one finds portions of the flowering heads of the plant, a species of *Echinops*, similarly enclosed. Many of the cocoons are open at one end and empty; others have a longitudinal aperture, originally closed by the stalk of the plant, and still contain the insect; a few are entirely closed. Specimens of this insect, extracted from the cocoons sent to Paris, were examined in 1856 by my friend Mr. W. Wilson Saunders, who pronounced them to be *Larinus maculatus* of Faldermann,—a determination also arrived at by M. Jekel from specimens presented by Mr. Loftus to the British Museum. Respecting these latter, one of which is represented in fig. 1, M. Jekel makes the following remarks:—

“*LARINUS MACULATUS*, Faldermann, *Faun. Transcauc.* ii. p. 228, 449, tab. 6. f. 10, et iii. p. 198.—Schönh. *Gen. et Sp. Curcul.* iii. p. 112 et vii. 2. p. 7.—Hochhuth, *Bull. Moscou*, 1847, No. 2. p. 538 (var. γ).

“Var. γ . *Larin. Onopordinis*, Sch. *loc. cit.* iii. p. 111 (excl. synonym.).

“Of this species, Mr. Loftus captured several specimens, all of small size: from some of them the pollinosity had been rubbed off, as is represented in the figure by Mr. Ford (*vide* fig. 1), which shows only a part of the inferior layer of tomentum and the greyish ground of the dorsal and lateral maculæ; the latter, being the most densely coloured in fresh specimens, are always the most persistent. These belong to Schönherr's var. γ , which that author formerly regarded as the *Larinus Onopordinis*, Fabr. Others of Mr. Loftus's specimens, which are very fresh, belong to var. β ; none to the typical variety, which is often larger in size.

“This species has a very extended habitat: I have received it from European Turkey (Frivaldski), Beyrouth, Caucasus, Persia (Dupont), &c. &c.; and it is recorded by Schönherr as also found in Barbary and Portugal.

“This is the insect which proceeds from the rough chalky-looking nidus figured by Mr. Ford. (*Vide* fig. 2.)”

The entomological question being so far disposed of, I may be permitted a few remarks upon the properties which have obtained for *Tréhala* a place among drugs and dietetic substances.

The first author who gives any account of the substance is Father Ange, who, in his 'Pharmacopœa Persica*,' describes it in the following terms:—"Est autem istud medicamentum veluti *tragea* ex nucleo pistacii integro confecta; nam revera saccharum istud exterius corrugatum et agglomeratum adhæret cuidam nucleo, in quo non fructus, sed vermiculus quidam nigricans Persice *C-hezoukek* bombycis instar reconditur et moritur."

Father Ange also states that the substance is called in Persian *Schakar tibal* (شکر تیغال), literally *Sugar of nests*; but his Arabic names, *Schakar el ma-ascher* (شکر المعشر) and *Saccar el aschaar*, apply to an entirely different substance, namely to a saccharine matter exuded, after the punctures of an insect, from the stems of *Calotropis procera*, R. Br.†, of which plant he gives a quaint but tolerably characteristic description.

Mr. Loftus, who obtained the specimens which he presented to the British Museum, at Kirrind in Persia, in September, 1851, gives as the Persian name of the cocoons *Shek roukeh*—a term, probably, the same as the "*C-hezoukek*" (a misprint?) of Father Ange, but the signification of which I have not been able to discover.

Another notice of the same substance, with a figure, is briefly given in Dr. Honigberger's 'Thirty-five Years in the East' (Lond. 1852, vol. ii. pp. 305-6), where we read that *Manna teeghul* or *Shukure teeghal*, which are certain insect-nests of a hard texture, rough on the outside, smooth within, about half an inch in length, and of a whitish colour, are imported into Lahore from Hindostan.

M. Bourlier published in 1857 an interesting note on the same substance‡, which has been followed by M. Guibourt's commu-

* Pharmacopœa Persica ex idiomate Persico in Latinum conversa. Lutet. Paris., 1681, p. 361.

† This saccharine substance is noticed by Avicenna as *Zuccarum alhusar* (Lib. ii. Tract. ii. cap. 756, ed. Valgr. Venet. 1564), and also by Matthioli (Comm. in Lib. ii. Diosc. cap. 75). It is likewise referred to by Endlicher (Enchiridion Botanicum, p. 300), Royle (Illustr. of the Bot. of the Himalayan Mountains, vol. i. p. 275), Merat and De Lens (Dict. de Matière Médicale, t. i. p. 467), &c.

‡ Revue Pharmaceutique de 1856, par Dorvault, p. 37.

nication to the Académie des Sciences, and still later by a memoir on the chemical history of Tréhala, by M. Marcellin Berthelot, also presented to the Academy*.

From the investigations of M. Guibourt, it appears that the cocoons are composed of a large proportion of starch (identical with that found in the stem of the *Echinops*, upon which the insect forms its nest), of gum, a peculiar saccharine matter, a bitter principle, besides earthy and alkaline salts.

The saccharine principle, which has been especially examined by M. Berthelot, and named by him *Tréhalose*, is a body analogous to cane-sugar, but possessing distinctive properties, which separate it from that and all other varieties of sugar.

M. Bourlier states that *Tréhala*, which is abundant in the shops of the Jew drug-dealers of Constantinople, is frequently used by the Arab and Turkish physicians in the form of a decoction, which is regarded by them as of peculiar efficacy in diseases of the respiratory organs.

The second insect-product to which I would draw attention, is a saccharine substance resembling dark honey. Mr. Loftus, who obtained it near Kirrind, 13th July, 1851, and whose specimen is in the British Museum, states that it is exuded from a species of thistle when pierced by a Rhynchophorous insect; but he fails to inform us for what purposes it is used by the inhabitants.

Mr. Loftus having also presented the Museum with excellent specimens both of the plant and insect, I am able to state that the former is *Echinops persicus*, Fisch., and the latter a new species of *Larinus*, to which M. Jekel has applied the name *Larinus mellificus*, and of which he has drawn up the following description:—

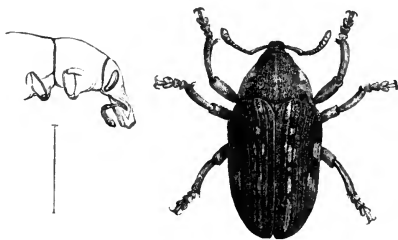
“*LARINUS MELLIFICUS*, *Jekel* (fig. 3). Breviter ovatus, convexus, niger, nitidus; infra subtiliter, lateribus thoracis margineque elytrorum intus medio versus angulariter ampliata, apicem occupante griseo-cinerascenti tomentosus; rostro leviter punctato, basi utrinque bicanaliculato cum elevatione media lata subcariniformi; thorace subconico antice tubulato, supra confertim sat rude punctato, lateribus subrugoso; elytris striato-punctatis, interstitiis latis, planis, transversim subtilissime rugulosis, cum abdomine tenuissime alutaceis, punctis majoribus remotioribus impressis; pectore, lateribus, pedibusque rugoso-punctatis, femoribus infra fortiter oblique costato-rugosis; tibiis intus, anticis fortius crenulatis. Long. (rostr. excl.) 16–18, lat. elytr. 8–9 mill.

* Comptes Rendus, 28 Juin 1858, p. 1276.

“Patria—Persia, prope Kirrind, ubi *Echinopsidis* speciem frequentat, ejus plantæ caules ab hoc insecto puncti materiam quamdam saccharinam sudant.” *W. K. Loftus*, Mus. Brit.

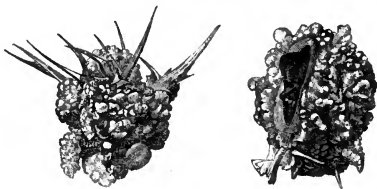
Very similar to *L. Onopordinis*, but proportionably more elongate and less convex; rostrum and thorax longer; pilosity of

Fig. 1.



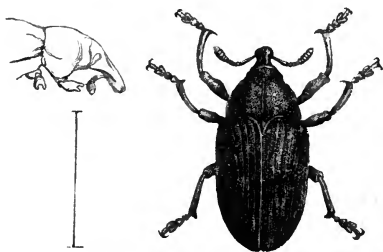
Larinus maculatus, Falderm.

Fig. 2.



The cocoons of *Larinus maculatus*, called in Turkish *Tréhala*.

Fig. 3.



Larinus mellificus, Jekel.

the body underneath much thinner and shorter; thighs thicker, more clavate, the anterior evidently costate-rugose underneath; without whitish marks on the elytra, and without that layer of light-brown earth-like pollinose transudation which is often wanting in rubbed specimens of *Larinus Onopordinis*. The freshest

specimens have the griseous margin of the elytra, which parts from the base under the shoulder, obliquely and angularly ampliate interiorly towards the middle, where it reaches the second stria. This griseous pilosity fills all the tips of the elytra, leaving bare only the sutures, an angular notch behind the middle (which forms with that apical part of the suture a kind of hook on each elytron), and two round spots, one submarginal fronting the tip of the notch, the other larger, discoidal, behind the foot of the notch, much above the tip.

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

[Read Feb. 17, 1859.]

Fam. URANIIDÆ, *Westwood*.

Gen. NYCTALEMON, *Dalman*.

1. *Nyctalemon Hector*, *White, Walk. Cat. Lep. Het.* vii. 1771.

Inhabits also Borneo.

Fam. AGARISTIDÆ, *Swainson*.

Gen. EUSEMIA, *Dalman*.

2. *Eusemia maculatrix*, *Westwood, Cat. Orient. Ent.* 67, pl. 33. f. 1.

Inhabits also Hindostan and Java.

3. *Eusemia mollis*, *Walk. Cat. Lep. Het.* vii. 1774.

Inhabits also Hindostan.

Fam. ZYGÆNIDÆ, *Leach*.

Gen. SYNTOMIS, *Illiger*.

4. *SYNTOMIS ANNOSA*, n. s. *Fæm.* Cinereo-fusca; capite, antennis apice, humeris abdominisque maculis lateralibus albis; alis maculis quatuor vitreis.

Female. Cinereous brown. Head white. Antennæ serrated, white towards the tips. Thorax with a large white spot on each side in front. Abdomen somewhat compressed towards the base, with white spots along each side. Wings long, with the discal areolets from the base to beyond the middle mostly vitreous, but having the veins bordered with brown. Length of the body 9 lines; of the wings 22 lines.

5. *SYNTOMIS CHLOROLEUCA*, n. s. *Fæm.* Nigro-viridis; fronte, antennis apice, humeris abdominisque fasciis duabus dorsalibus fasci-

isque ventralibus albis; alis purpureo-nigris, anticis maculis quatuor vitreis, posticis macula una vitrea.

Female. Blackish-green. Front, antennæ towards the tips, and two humeral spots white. Antennæ simple. Abdomen with a white band at the base, and with another on the fifth segment, and with white ventral bands. Wings purplish-black; fore wings with four vitreous spots; the fore one of the interior pair not one-third of the size of the hind one, which is very long; the fore one of the exterior pair much narrower than the hind one, and accompanied at its inner end by an elongated vitreous point; hind wings with an elongated vitreous spot. Length of the body $4\frac{1}{2}$ lines; of the wings 12 lines.

6. SYNTOMIS XANTHOMELA, n. s. *Mas.* Nigra; fronte, thoracis margine antico abdominisque fasciis ochraceis; antennis apice albis, abdominis fasciculo pallide cinereo; alis anticis maculis quinque vitreis, posticis maculis duabus vitreis.

Male. Black. Front, fore borders of the thorax and hind borders of the abdominal segments ochraceous; dorsal tuft pale cinereous, rather large. Antennæ simple, white towards the tips. Fore wings with five vitreous spots, of which the basal one is small and round, and the other four large and elongated; the exterior pair intersected by the black veins. Hind wings with two vitreous spots, of which one is basal and the other discal. Length of the body 4 lines; of the wings 9 lines.

Fam. LITHOSIIDÆ.

Gen. NYCTEMERA, *Hübner.*

7. NYCTEMERA MUNDIPICTA, n. s. *Mas et Fem.* Fusca; capite thoraceque albo vittatis; abdomine albo guttis dorsalibus fuscis; alis anticis basi albo venosis, fascia exteriori obliqua postice abbreviata alba, posticis albis fusco marginatis. *Fem.* Thorace fascia postica lutea, abdomine fusco fasciis albis; alis anticis fascia latiore vix abbreviata.

Male. Brown. Head and thorax with white lines. Antennæ moderately pectinated. Pectus with black spots, luteous on each side. Abdomen white, with brown dorsal dots; tip luteous. Legs white. Fore wings with white veins towards the base, and with an exterior oblique white band, which is narrower hindward, and ends at some distance from the interior border. Hind wings white, with a broad brown border. *Female?* Larger. Antennæ slightly pectinated. Thorax with a slight luteous band in front, and another hindward. Abdomen brown, with a white band on the hind border of each segment; under side white, with brown spots along each side. Fore wings with the band much broader, hardly straightened hindward, and ending very near the interior border. Length of the body 5-6 lines; of the wings 16-20 lines.

Gen. CYCLOSIA, *Hübner*.

8. *CYCLOSIA SUBMACULANS*, n. s. *Mas.* Nigra, velutina, squamis nonnullis cyaneis, subtus albo cyaneoque fasciata; alis anticis purpureo-nigris, punctis paucis exterioribus, alis posticis fuscis, punctis submarginalibus albis; alis quatuor subtus fuscis, guttis exterioribus et submarginalibus albis.

Male. Black, with a few metallic blue specks, and with metallic bluish-white pectoral spots and ventral bands. Antennæ slightly pectinated. Wings velvety, rather long, brown beneath, with an exterior and a submarginal row of white dots; fore wings purplish-black, with a few exterior and submarginal white points; hind wings brown, with submarginal white points. Length of the body 9 lines; of the wings 28 lines.

9. *CYCLOSIA NIVIPETENS*, n. s. *Mas.* Cinereo-nigra; antennis cyaneo-nigris subpectinatis; alis anticis fascia lata submarginali alba.

Male. Cinereous-black. Antennæ bluish-black. Fore wings with a broad, submarginal, upright, white band, which is much narrower hindward, and is intersected by the black veins. Length of the body 7 lines; of the wings 22 lines.

Gen. PIDORUS, *Walk.*

10. *PIDORUS CONSTRICTUS*, n. s. *Mas.* Cyaneo-niger, subtus testaceus; antennis pectinatis corpore vix brevioribus; thoracis margine antico coccineo; alis angustis, anticis fascia exteriore subrecta subobliqua flavo-alba, posticis cinereo-nigris.

Male. Bluish-black, testaceous beneath. Antennæ moderately pectinated, hardly shorter than the body. Thorax crimson along the fore border. Wings narrow, somewhat testaceous beneath towards the base; fore wings with a slightly oblique, hardly curved, yellowish-white exterior band; hind wings cinereous-black. Length of the body 5 lines; of the wings 16 lines.

Gen. HYPSEA, *Hübner*.

11. *Hypsa silvandra*, *Cram. Pap. Exot.* iv. 155, pl. 369. f. D (Phalæna). Inhabits also Hindostan, China, and Australia.

12. *Hypsa egens*, *Walk. Cat. Lep. Het.* 11. 453. 12. Inhabits also Hindostan and Java.

Gen. SETINA, *Schrank.*

13. *SETINA BIPUNCTATA*, n. s. *Mas.* Flava; alis anticis punctis duobus basalibus guttaque discali nigris.

Male. Yellow, closely allied to *S. apicalis* (*Cat. Lep. Het.* 521). Fore wings black along the costa towards the base, where there are two

black points; a small black dot at the tip of the discal areolet. Hind wings a little paler than the fore wings. Length of the body 3 lines; of the wings 8 lines.

Gen. BIZONE, *Walk.*

14. *Bizone hamata*, *Walk. Cat. Lep. Het.* 88. 5493.

Inhabits also China.

Gen. DEIOPEIA, *Stephens.*

✓15. *DEIOPEIA DETRACTA*, n. s. *Fœm.* Pallide lutea; thorace guttis nigris; alis sat angustis nigro guttatis, fimbria pallida nitente; alis anticis nigro transverse quadririgatis.

Female. Pale luteous. Thorax with six black dots. Wings narrower than in the other species of this genus, with black dots, of which the most part are towards the exterior border, where they form two irregular lines, and are somewhat confluent on the under side; fringe whitish, shining. Fore wings with four short transverse various black streaks, of which the first and the second form an interrupted line. Length of the body 5 lines; of the wings 14 lines.

Gen. DARANTASIA, n. g.

Fœm. *Corpus* sat robustum. *Proboscis* distincta. *Palpi* porrecti, breves, caput non superantes; articulus tertius longiconicus, acutus, secundi dimidio non longior. *Antennæ* setaceæ, simplices, gracillimæ. *Abdomen* subconicum, alas posticas superans; sexualia sat magna. *Pedes* breves, nudi, sat validi, calcaribus robustis sat longis. *Alæ* breviusculæ, sat angustæ; anticæ apud costam convexæ, apice rotundatæ, margine exteriore perobliquo.

Allied to *Lemyra* (*Cat. Lep. Het.* vii. 1690).

Female. Body rather stout. *Proboscis* moderately long. *Palpi* porrect, short, not extending beyond the head; third joint elongate-conical, acute, about half the length of the second. *Antennæ* setaceous, simple, very slender, full half the length of the body. *Abdomen* nearly conical, extending somewhat beyond the hind wings; anal appendages rather large. *Legs* short, bare, rather stout; spurs stout, rather long. *Wings* rather short and narrow; fore wings convex along the costa, rounded at the tips, extremely oblique along the exterior border.

✓16. *DARANTASIA CUNEIPLANA*, n. s. *Mas.* Nigra; corpore subtus, capite, thoracis fasciis duabus anticis maculaque postica abdominisque fasciis posticis luteis; pedibus luteis, tibiis supra nigris; alis anticis luteo octo-strigatis, posticis luteo strigatis.

Male. Black, mostly luteous beneath. Head luteous. Thorax with two luteous bands in front, and with a luteous spot hindward. *Abdomen* with luteous bands hindward. *Legs* luteous; tibiæ black above. Fore wings with eight wedge-shaped luteous streaks, of

which three are near the base, two subcostal, two hindward, and one submarginal and transverse. Hind wings with three luteous streaks, of which the first and second are connected exteriorly, and the third is short, broad, and submarginal. Length of the body $3\frac{1}{2}$ lines; of the wings 8 lines.

Fam. LIPARIDÆ, *Boisduval*.

Gen. ARTAXA, *Walk*.

17. ARTAXA VARIANS, *Walk. Cat. Lep. Het.* iv. 796.

Inhabits also West Africa, Hindostan, and China.

Gen. PANTANA, *Walk*.

18. PANTANA BICOLOR, *Walk. Cat. Lep. Het.* iv. 820.

Note.—*P. dispar*, a native of Hindostan, and *P. ampla*, a native of China, may be varieties of this species.

Fam. NOTODONTIDÆ, *Stephens*.

Gen. DARABITTA, n. g.

Fœm. Corpus vix robustum. Proboscis brevis. Palpi longiusculi, oblique ascendentes, non pilosi. Antennæ validæ, subcompressæ, breviusculæ, simplices. Abdomen conicum, alas posticas non superans. Pedes squamosi, læves, breviusculi, sat graciles, calcaribus longis. Alæ latiusculæ, non longæ; anticæ apud costam rectæ, apice subrotundatæ, margine exteriore vix convexo.

This genus hardly belongs to the *Notodontidæ*; but its precise situation seems to be uncertain. *Female*. Body hardly stout. Proboscis short. Palpi rather long and slender, not pilose, obliquely ascending, rising a little higher than the vertex; third joint elongate-conical, less than half the length of the second. Antennæ stout, bare, slightly compressed, little longer than the thorax; joints few. Abdomen conical, not extending beyond the hind wings. Legs squamous, smooth, rather short and slender; spurs long. Wings rather broad, not long: fore wings straight along the costa, slightly rounded at the tips; exterior border hardly convex, very slightly oblique.

19. DARABITTA STRIGICOSTA, n. s. *Fœm.* Rufa, vix cinerascens; alis anticis linea submarginali e punctis nigris, lineolis tribus costalibus obliquis albis, prima angulata, secunda tertiaque connexis.

Female. Red, with a slight cinereous tinge, more cinereous beneath. Antennæ pale. Fore wings with three white oblique costal streaks; first streak forming an outward angle; second connected in the disk with the third, which is oblique in the contrary direction; a row of submarginal black points. Length of the body 3 lines; of the wings 8 lines.

Fam. LIMACODIDÆ, *Duponchel*.Gen. MIRESA, *Walk*.

20. MIRESA CURVIFERA, n. s. *Mas.* Rufa, crassa, brevis; antennis late pectinatis; alis anticis linea exteriori arcuata nivea, spatio contiguo exteriori obscuriore.

Male. Red, thick, short. Palpi porrect, extending a little beyond the head. Antennæ shorter than the thorax, broadly pectinated except towards the tips. Abdomen short, obtuse, not extending beyond the hind wings. Legs short. Wings not broad. Fore wings straight along the costa, rounded at the tips, darker on the exterior side of a curved transverse bright white line, which is somewhat beyond the middle; exterior border rather oblique. Hind wings a little paler than the fore wings. Length of the body $4\frac{1}{2}$ lines; of the wings 12 lines.

Fam. SATURNIIDÆ, *Walk*.Gen. ATTACUS, *Linn*.

21. ATTACUS ATLAS, *Linn. Syst. Nat.* 808.

Inhabits also Hindostan, Ceylon, China, and Borneo.

Fam. BOMBYCIDÆ.

Gen. BOMBYX, *Linn*.

22. BOMBYX SUBNOTATA. *Mas.* Ferruginea, crassa; antennis late pectinatis; abdominis apice laminis lateralibus fimbriatis; alis anticis margine exteriori subundulato subexciso, macula subtus costali subapicali flava.

Male. Ferruginous, thick, pilose. Mouth obsolete. Antennæ broadly pectinated. Abdomen much more slender than the thorax, not extending beyond the hind wings; anal lateral appendages fringed. Legs short, stout. Fore wings rounded at the tips, extremely oblique along the exterior border, which is slightly angular in the middle and slightly excavated on each side; under side with a yellow costal spot near the tip. Hind wings with the interior border densely fringed towards the tip. Length of the body 7 lines; of the wings 16 lines.

Fam. LEUCANIDÆ, *Guénéé*.Gen. MYTHIMNA, *Hübner*.

23. MYTHIMNA INDUCENS, n. s. *Fæm.* Lateritio-rufa, subtus albida; palporum articulo tertio brevissimo; abdomine rufescenti-cano; alarum anticarum puncto discali nigro, lineis duabus nigricantibus subarcuatis indistinctis, alis posticis rufescenti-canis.

Female. Brick-red colour, mostly whitish beneath. Palpi obliquely ascending, not rising to the height of the vertex; third joint extremely small, less than one-sixth of the length of the second. Abdomen reddish-hoary, extending but little beyond the hind wings. Legs stout, squamous; spurs moderately long. Fore wings very slightly convex along the costa, rectangular at the tips; exterior border slightly oblique, nearly straight; two slender, indistinct, slightly curved, blackish lines, having between them a more distinct black discal point. Hind wings reddish-hoary, the reddish tinge most prevalent towards the exterior border. Length of the body 7 lines; of the wings 18 lines.

Fam. GONOPTERIDÆ, *Guénée*.

Gen. ANOMIS, *Hübner*.

× 24. ANOMIS MUTILATA, n. s. *Mas.* Rufa, robusta, subtus rufescens-cinerea; palpis longis subascendentibus; abdomine latiusculo; alarum anticarum lineis tribus indistinctis angulosis nigricantibus, orbiculari alba punctiformi, margine exteriore postico perobliquo subexcavato.

Male. Red, stout, reddish cinereous beneath. Palpi long, obliquely ascending; third joint slender, linear, obtuse at the tip, a little shorter than the second. Antennæ stout, with extremely short setæ. Abdomen rather broad, extending a little beyond the hind wings. Fore wings with three blackish, indistinct, slightly diffuse, zigzag lines, which are slightly bordered hindward with pale yellow; orbicular mark white, punctiform; exterior border slightly angular, hardly oblique, and slightly truncated on the fore half, extremely oblique and with two slight excavations on the hind half; fringe partly white. Hind wings not paler than the fore wings. Length of the body 7 lines; of the wings 18 lines.

Gen. THALATTA, *Walk*.

25. *Thalatta aurigutta*, *Walk. Cat. Lep. Het. xv. 1793.*

Fam. HYPOGRAMMIDÆ, *Guénée*.

Gen. BRIARDA, *Walk*.

× 26. BRIARDA PLAGIFERA, n. s. *Mas.* Ferrugineo-cinerea; capite thoraceque antico nigricantibus; tibiis ciliatis; alis sat angustis subdenticulatis, anticarum fascia basali, macula discali maculaque costali exteriore nigricantibus, lineis exteriore et submarginali fuscis duplicatis denticulatis subnebulosis; alis posticis pallide cinereis, semi-hyalinis, fusco latissime marginatis.

Male. Cinereous, tinged with ferruginous. Head and fore part of the thorax blackish. Palpi obliquely ascending; third joint linear, conical

at the tip, about half the length of the second. Antennæ hardly setose. Abdomen extending a little beyond the hind wings. Legs rather stout; tibiæ fringed; spurs very long. Wings rather narrow, slightly denticulated. Fore wings slightly rounded at the tips, very oblique along the exterior border; a blackish band near the base, abbreviated hindward; a large blackish spot on the reniform mark, and a diffuse blackish spot near the tip of the costa; exterior and submarginal lines brown, double, denticulated, with the space along their borders somewhat clouded. Hind wings pale cinereous, semi-hyaline, with very broad brown borders. Length of the body 9 lines; of the wings 22 lines.

Fam. CATEPHIDÆ, *Guénée*.

Gen. STEIRIA, *Walk.*

27. STEIRIA PHRYGANEOIDES, n. s. *Mas.* Pallide cinerea, rufescente conspersa; palpis longis vix ascendentibus; alis sat angustis denticulatis; alarum anticarum squamis nonnullis nigris fuscisque, marginibus exteriore et interiore non conspersis, reniformi magna; alis posticis pallide cinereis, fusco late marginatis.

Male. Pale cinereous, thickly speckled with ferruginous red. Palpi long, hardly ascending, almost straight; third joint linear, obtuse at the tip, rather shorter than the second. Antennæ bare. Abdomen conical, extending rather beyond the hind wings; apical tuft small. Legs rather long and slender, almost bare; spurs very long. Wings rather narrow; exterior border denticulated. Fore wings with the speckles mostly confluent in the disk, mostly wanting along the interior and exterior borders; several black and brown speckles, some of which border the large reniform mark. Hind wings pale cinereous, with a broad brown border. Length of the body 8 lines; of the wings 20 lines.

Fam. OPHIDERIDÆ, *Guénée*.

Gen. OPHIDERES, *Boisduval*.

28. *Ophideres Salamina*, *Cram. Pap. Exot.* 71. 117, pl. 174. fig. A. Inhabits also Hindostan, Ceylon, Java, and China.

29. *Ophideres discrepans*, *Walk. Cat. Lep. Het.* xiii. 1227.

30. *Ophideres smaragdipicta*, *Walk. Cat. Lep. Het.* xiii. 1229.

Fam. PHYLLODIDÆ, *Guénée*.

Gen. LYGNIODES, *Guénée*.

31. *Lygniodes endoleuca*, *Guén. Noct.* iii. 124.

Inhabits also Java.

Fam. EREBIDÆ, *Guénée*.Gen. SYPNA, *Guénée*.

- 32.
- Sypna subsignata*
- ,
- Walk. Cat. Lep. Het.*
- xiv. 1261.

Fam. OMMATOPHORIDÆ, *Guénée*.Gen. PATULA, *Guénée*.

- 33.
- Patula macrops*
- ,
- Linn. Syst. Nat.*
- 225 (Noctua).

Inhabits also West and South Africa, Madagascar, Hindostan, and Ceylon.

Gen. ARGIVA, *Hübner*.

- 34.
- Argiva hieroglyphica*
- ,
- Drury, Ins. Exot.*
11. 3, pl. 2. f. 1 (Noctua).

Inhabits also Madagascar, Hindostan, and Ceylon.

Fam. OPHIUSIDÆ, *Guénée*.Gen. CÆCILA, *Walk.*

- 35.
- Cæcila complexa*
- ,
- Walk. Cat. Lep. Het.*
- xv. 1825.

Gen. OPHISMA, *Guénée*.

- 36.
- Ophisma Umminia*
- ,
- Cram. Pap. Exot.*
111. 137, pl. 267. f. 7 (Noctua).

Inhabits also Java and Sumatra.

Gen. ACHÆA, *Hübner*.

- 37.
- Achæa mercatoria*
- ,
- Fabr. Ent. Syst.*
111. 2, 62. 175. (Noctua).

Inhabits also Hindostan and Java.

Fam. THERMESIDÆ, *Guénée*.Gen. THERMESIA, *Hübner*.

- 38.
- THERMESIA? RECUSATA*
- , n. s.
- Mas.*
- Rufescenti-cinerea, robusta, nigricante conspersa, capite thoraceque antico fuscis; palpis longissimis ascendentibus subarcuatis; antennis subsetosis, alis linea exteriore recta obliqua nigricante extus diffusa, linea interiore tenui subarcuata nigricante, linea submarginali e punctis lineaque marginali nigris.

Male. Reddish cinereous, stout, with blackish speckles. Head and fore part of the thorax brown. Frontal tuft acute. Palpi very long, slightly curved, nearly vertical; third joint linear, acute, shorter than the second. Antennæ slightly setose. Abdomen hardly extending

beyond the hind wings. Wings with the speckles here and there confluent; lines blackish; interior line slender, slightly curved; exterior line straight, oblique, diffuse on the outer side, extending almost to the tips of the fore wings; submarginal line represented by points; marginal line slightly undulating. Fore wings rectangular at the tips; exterior border slightly bent; its fore part not oblique; orbicular and reniform marks indistinct. Length of the body 6 lines; of the wings 16 lines.

Gen. *HYPERNARIA*, Guénee.

39. *HYPERNARIA DIFFUNDENS*, n. s. *Fæm.* Cinerea, robusta, fusco conspersa; palporum articulo secundo extus fusco, tertio aciculari longissimo, alarum lineis interiore et exteriori vagis dentatis lineaque media recta sat obliqua squamis fuscis, punctis marginalibus atris, alis anticis acutis, orbiculari punctiformi atra, litura reniformi angusta fusco marginata extus excavata.

Female. Cinereous, stout, speckled with brown. Palpi very slightly curved; second joint brown on the outer side; third acicular, a little shorter than the second. Antennæ minutely setose. Abdomen not extending beyond the hind wings. Wings with the interior and exterior lines angulose, diffuse, composed of brown speckles; middle line more oblique, straight, slender, double, obsolete towards the costa of the fore wings, bordered with diffuse angular streaks of brown speckles; marginal points deep black. Fore wings acute; orbicular mark black, punctiform; reniform narrow, brown, bordered, excavated on the outer side; exterior border slightly convex. Length of the body 10 lines; of the wings 22 lines.

Gen. *UGIA*, Walk.

40. *Ugia disjungens*, Walk. *Cat. Lep. Het.* xv. 1860.

Fam. *PLATYDIDÆ*, Guénee.

Gen. *MASCA*, Walk.

41. *Masca abactalis*, Walk. *Cat. Lep. Het.* xvi. 9.

Fam. *HYPENIDÆ*, Herr.-Schæffer.

Gen. *HYPENA*, Schrank.

42. *Hypena ruralis*, Walk. *Cat. Lep. Het.* xvi. 65.
Inhabits also Ceylon.

Gen. *MACNA*, Walk.

43. *Macna pomalis*, Walk. *Cat. Lep. Het.* xvi. 78.

Fam. MARGARODIDÆ, *Guénée*.Gen. MARGARODES, *Guénée*.

44. *Margarodes Amphitritalis*, *Guén. Delt. et Pylal.* 307, 327.
Inhabits also Hindostan.

Gen. NEURINA, *Guénée*.

45. *Neurina Procopialis*, *Cram. Pap. Exot.* iv. 152, pl. 368. f. E. (*Phalæna Pylalis Procopia*.)
Inhabits also Hindostan and Java.

Fam. ENNOMIDÆ, *Guénée*.

Gen. BULONGA, n. g.

Corpus gracile. *Proboscis* brevissima. *Palpi* breves, porrecti, angulati. *Antennæ* simplices. *Abdomen* conicum. *Pedes* graciles, nudi, calcaribus non longis, tibiis anticis brevissimis. *Alæ* sat latæ; anticæ acutæ, margine exteriore sat obliquo; posticæ abdomen superantes.

Body slender. *Proboscis* very short. *Palpi* as long as the breadth of the head; second joint obliquely ascending; third porrect, rather shorter than the second, with which it forms an obtuse angle. *Antennæ* simply filiform. *Abdomen* conical. *Legs* slender, bare; spurs rather short; fore tibiæ very short. *Wings* rather broad; fore wings rectangular at the tips; costa hardly convex; exterior border rather oblique. *Hind wings* with the interior angle prominent, acute.

46. *BULONGA SCHISTACEARIA*, n. s. *Fœm.* Glauco-cinerea, alis nitentibus, linea marginali nigra fimbria interlineata, anticis fusco quadrilineatis, posticis trilineatis.

Female. Glauco-cinereous, paler beneath. *Head* and *palpi* reddish. *Wings* shining; marginal line black; fringe pale cinereous, including a darker line. *Fore wings* with four straight oblique brown lines; second line broader than the first, apparent also on the hind wings; third narrower and darker than the others, blackish, and still more distinct on the hind wings, where it is bordered with whitish on the outer side; fourth more indistinct than the others, still more indistinct on the hind wings. *Length* of the body 6 lines; of the wings 16 lines.

Fam. AMPHIDASYDÆ, *Guénée*.

Gen. DARISTANE, n. g.

Mas. *Corpus* robustum. *Proboscis* brevissima. *Palpi* validi, breves, obtusi, oblique ascendentes; articulus tertius minimus. *Antennæ* setacæ, simplices. *Abdomen* conicum, alas posticas non superans.

Pedes validi, breviusculi; tibiæ anticæ brevissimæ, posteriores latissimæ, calcaribus longis. *Alæ* breviusculæ, sat latæ; anticæ acutæ.

Male. Body robust. Proboscis very short. Palpi short, stout, obtuse, obliquely ascending; third joint very small. Antennæ setaceous, simple. Abdomen conical, not extending beyond the hind wings. Legs stout, rather short; tibiæ pilose; fore tibiæ very short; posterior tibiæ very broad, especially the middle pair. Wings rather short, moderately broad. Fore wings straight along the costa, acutely rectangular at the tips; exterior border rather oblique.

47. *DARISTANE TIBIARIA*, n. s. *Mas.* Cinerea, nitens, alis nigro conspersis, fascia media rufescente non bene determinata, anticis costa albida nigro punctata.

Form

Male. Cinereous, shining, a little paler beneath. Wings speckled with black; an indistinct oblique reddish middle band; costa of the fore wings whitish, with black points. Length of the body 5 lines; of the wings 12 lines.

Fam. *PALYADÆ*, *Guénée*.

Gen. *EUMELEA*, *Duncan*.

48. *Eumelea Rosaliata*, *Cram. Pap. Exot.* iv. 152, pl. 368. f. F. (*Phalæna Geometra Rosalia*.)

Inhabits also Amboyna.

Fam. *EPHYRIDÆ*, *Guénée*.

Gen. *EPHYRA*, *Duponchel*.

49. *EPHYRA QUADRISTRIARIA*, n. s. *Fæm.* Rufescens, subtus flava, alis flavis rufescente conspersis, fascia exteriori perobliqua rufescente, anticis acutis, lituris duabus costalibus obliquis fuscis.

Female. Reddish, yellow beneath. Proboscis short. Palpi short, slightly ascending; third joint linear, obtuse, a little shorter than the second. Antennæ short, stout, setaceous. Abdomen not extending beyond the hind wings. Legs bare, rather long and slender; spurs long. Wings yellow, with reddish speckles, and with a straight reddish band, which extends from beyond the middle of the interior border of the hind wings to the tips of the fore wings. Fore wings acute, with two oblique brown costal marks; exterior border rather oblique. Length of the body 4 lines; of the wings 12 lines.

Gen. *ANISODES*, *Guénée*.

✓ 50. *ANISODES EXPUNCTARIA*, n. s. *Fæm.* Luteo-cervina, palpis longis angulatis, antennis breviusculis, alis ferrugineo subconsersis. linea media fusca undulata valde indistincta, lineis interiore et exteriori e punctis nigris, punctis marginalibus nigris.

Female. Pale luteous fawn colour. Proboscis short. Palpi long, slightly decumbent; third joint a little shorter than the second, with which it forms an obtuse angle. Antennæ simple, short. Wings minutely and indistinctly sprinkled with ferruginous; a brown, diffuse, undulating, very indistinct middle line, which is obsolete in the hind wings; interior and exterior lines indicated by widely separated black points; marginal points black. Fore wings rectangular at the tips; exterior border slightly oblique. Length of the body 6 lines; of the wings 8 lines.

Fam. ACIDALIDÆ, *Guénée.*

Gen. SYNEGIA, *Guénée.*

51. *Synegia botydaria*, *Guén. Uran. et Phal.* i. 423. 694.
Inhabits also Borneo.

Gen. DRAPETODES, *Guénée.*

52. *Drapetodes mitaria*, *Guén. Uran. et Phal.* i. 424. 695.
Inhabits also Hindostan.

Gen. TIMANDRA, *Duponchel.*

53. *TIMANDRA AJAIA*, n. s. *Mas.* Glaucescenti-cinerea; antennis setosis, alis linea perobliqua fusca antice abbreviata, linea marginali nigra, anticis valde acutis, reniformi tenui fusca.

Male. Cinereous, with a glaucous tinge. Proboscis short. Palpi very short, obliquely ascending; third joint extremely small. Antennæ setose, somewhat shorter than the body. Wings with a straight, very oblique, brown line, which extends from the middle of the interior border of the hind wings towards the tip of the fore wings, on approaching which it is obsolete; marginal line black. Fore wings very acute; exterior border extremely oblique; reniform mark brown, very slender. Hind wings extending beyond the abdomen. Length of the body 6 lines; of the wings 17 lines.

Gen. ZANCLOPTERYX, *Herr.-Schæffer.*

54. *Zanclopteryx saponaria*, *Herr.-Schæffer, Guén. Uran. et Phal.* 11. 16, 915.
Inhabits also Ceylon.

Fam. MICRONIDÆ, *Guénée.*

Gen. MICRONIA, *Guénée.*

55. *Micronia rectinervata*, *Guén. Uran. et Phal.* 11. 27, 933.

Fam. ZERENIDÆ.

Gen. STALAGMIA, *Guénéé*.

56. *Stalagmia guttaria*, *Guér. Icon. Regn. Anim. Ins.* pl. 90 (Phalæna).
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Catalogue of the Heterocerous Lepidopterous Insects collected at Malacca by Mr. A. R. WALLACE, with Descriptions of New Species. By FRANCIS WALKER.

Fam. SPHINGIDÆ, *Leach*.Gen. MACROGLOSSA, *Ochsenheimer*.

1. *Macroglossa Passalus*, *Drury, Exot. Ins.* ii. 52, pl. 29. f. 2 (Sphinx).
Inhabits also Hindostan and Java.
2. *Macroglossa corythus*, *Boisd. MSS.; Walk. Cat. Lep. Het.* viii. 92. 14.
Inhabits also Hindostan, Ceylon, and Java.

Fam. AGARISTIDÆ, *Swainson*.Gen. EUSEMIA, *Dalman*.

3. *Eusemia maculatrix*, *Westw.* (See Singapore Sp. No. 2.)
4. *Eusemia mollis*, *Walk.* (See Singapore Sp. No. 3.)
5. EUSEMIA SUBDIVES, n. s. *Mas.* Atra, antennis subpectinatis, abdomine fasciis luteis, alis anticis fascia exteriora recta non obliqua testacea; posticis ochraceis atro marginatis.
- Male.* Deep black. Antennæ slightly pectinated, slightly hooked at the tips. Abdomen with a luteous band on the hind border of each segment. Fore wings with an upright, straight, testaceous exterior band, which does not extend to the interior border. Hind wings bright ochraceous, with a deep black border, which is irregular on the inner side and is joined in front to a black spot, the latter, on the under side, containing a white curved line. Length of the body 9 lines; of the wings 28 lines.

Fam. LITHOSIIDÆ, *Stephens*.Gen. NYCTEMERA, *Hübner*.

6. *Nyctemera tripunctaria*, *Linn. Syst. Nat.* 864. 226 (Geometra).
Inhabits also Hindostan and China.

Gen. EUSCHEMA, *Hübner*.

7. *Euschema subrepleta*, *Walk. Cat. Lep. Het.* xi. 406. 3.
Inhabits also Ceylon and Borneo.

Fam. LIPARIDÆ, *Boisduval*.

Gen. PANTANA.

- 8.
- Pantana bicolor*
- ,
- Walk.*
- (See Singapore Sp. No. 17.)

Fam. ORTHOSIDÆ, *Guénée*.Gen. CAREA, *Walk.*

- 9.
- Carea varipes*
- ,
- Walk. Cat. Lep. Het. x. 475.*

Fam. HYBLÆIDÆ, *Guénée*.Gen. HYBLÆA, *Fabr.*

- 10.
- Hyblæa tortricoides*
- ,
- Guén. Noct. ii. 391.*

Inhabits also Borneo.

- 11.
- Hyblæa erycinoides*
- ,
- Walk. Cat. Lep. Het. xv. 1792.*

Fam. PHYLLODIDÆ, *Guénée*.Gen. LYGNIODES, *Guénée*.

- 12.
- Lygniodes endoleuca*
- ,
- Guén.*
- (See Singapore Sp. No. 30.)

Fam. OPHIUSIDÆ, *Guénée*.Gen. OPHIUSA, *Ochsenheimer*.

- 13.
- Ophiusa fulvotænia*
- ,
- Guén. Noct. iii. 272. 1710.*

Inhabits also Hindostan, Ceylon, Java, and Sumatra.

Fam. THERMESIDÆ, *Guénée*.Gen. COTUZA, *Walk.*

- 14.
- COTUZA CONFIRMATA*
- , n. s.
- Mas.*
- Cinereo-ferruginea, robusta, dense vestita, subtus alba; palpis latis compressis oblique ascendentibus; articulo tertio minimo, antennis plus dimidio basali subpectinatis, alis linea media recta perobliqua nigro-fusca antice angulosa et retracta, linea exteriori e denticulis nigrofuscis albido terminatis, fimbria apice alba, alis anticis subhamatis, linea interiori nigrofusca undulata orbiculari nigra punctiformi, reniformi et litura costali albis nigro marginatis.

Male. Cinereous-ferruginous, stout, densely pilose, white beneath. Palpi broad, compressed, obliquely ascending, not rising higher than the head; third joint obtuse, extremely short. Antennæ slightly pectinated to nearly two-thirds of the length, bare from thence to the tips. Abdomen not extending beyond the hind wings. Legs white;

tibiæ ferruginous above. Wings ample; a blackish brown, straight, very oblique line, which is zigzag, and retracted towards the costa of the fore wings; exterior line composed of blackish-brown, very acute, whitish-pointed angles; fringe white exteriorly. Fore wings slightly hooked, with an interior undulating blackish-brown line; orbicular mark black, punctiform; reniform white, black-bordered, forming a triangular spot and an anterior point; a small exterior white costa, with mark. Length of the body 11 lines; of the wings 28 lines.

Fam. ACIDALIDÆ, *Guénéé*.

Gen. ZANCLOPTERYX, *Herr.-Schæff.*

15. *Zanclopteryx saponaria*, *Herr.-Schæff.* (See Singapore Species, No. 54.)

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JOURNAL OF THE PROCEEDINGS

OF THE

LINNEAN SOCIETY OF LONDON.

Contributions to the Orchidology of India.—No. II.

By PROFESSOR LINDLEY, F.R.S., F.L.S., &c.

(Continued from vol. i. p. 190.)

[Read March 4th, 1858.]

DENDROBIUM, *Swartz.*

THIS great Indian genus varies extremely in the habit of its numerous species,—some being little larger than the mosses among which they grow, while others are surpassed in stature by few of the Order. Like the *Oncidia* of the New World, there are some species of which the foliage is ancipitous, others having it terete, while in the majority it is in the usual flat condition. A few have no other stem than a wiry creeping rhizome; others have small conical pseudo-bulbs; many form clavate horny stems, leafy only at the summit; but the greater part produce long leafy branches. In the majority the colour of the flowers is some shade of purple; a few are destitute of all colour except green; and a rather considerable group is especially distinguishable by the rich yellow tint of their blossoms. Of such distinctions advantage has been taken in the following sketch of the entire genus, now consisting of more than 200 species, of which I have examined the larger part. In this all the species agree, that there are only four pollen-masses, nearly equal in size, and of uniform breadth at either end. On the contrary, the *Erias*, which in some cases have been mistaken for *Dendrobium*, have the pollen-masses pyriform, so that when, in the

herbarium, a specimen has lost a part of its pollen-masses, as is frequently the case with *E. muscicola*, *Dalzelli*, &c., its true genus may still be determined. It is mainly because *Sarcostoma* has the pyriform pollen-masses of an *Eria*, although their number is that of *Dendrobium*, that I now hesitate to reduce it to the latter genus.

In forming the sections now proposed, it will be seen that a regular sequence of the most nearly allied forms is not wholly obtained. However desirable, indeed, such an arrangement may be in theory, it is certainly unattainable in practice in cases where great numbers of species are brought together; for the points of resemblance and difference are so various and complicated, that, like countries in a geographical map when placed in a continuous series, some must of necessity be dissevered from those to which they are conterminous in nature. Thus the *Bolbodia*, forming a natural group among each other, run into *Stachyobium* as much as into *Eudendrobium*, next which the section is placed; and such species as *D. Dalhousieanum* are much allied to the *Holochrysa*s. It would, moreover, be desirable to collect into one subdivision such species as *D. excisum*, *metachilinum*, *Tmesipteris*, *lycopedioides*, &c., now forming a part of *Eudendrobium*; but I do not at present see what combining characters are available for the purpose.

The following Table brings into one view the distinctions of the groups under which the annexed memoranda are collected:—

Folia verticalia (<i>scalpellifolia</i>)	1. APORUM.
— teretia	2. STRONGYLE.
— horizontalia.	
Caulis nullus, rhizoma tantum	3. RHIZOBIUM.
— apice tantum 1-3-phyllus. Folia coriacea...	4. DENDROCORYNE.
<i>a.</i> labello continuo.	
<i>b.</i> labello in crinibus soluto (<i>Desmotrichum</i>).	
Caulis undique foliatus:	
Flores omnino aurei	5. HOLOCHRYSA.
— rosei aut candidi, labello tantum quandoque luteo.	
Mento nullo.....	6. ACLINIA.
— producto:	
Flores fasciculati aut solitarii:	
<i>a.</i> Caule brevissimo, conico (<i>Bolbodium</i>).	
<i>b.</i> Caule elongato	7. EUDENDROBIUM.
Flores dense racemosi, mento elongato	8. PEDILONUM.
Flores laxe racemosi, mento brevi:	
petalis conformibus	9. STACHYOBIUM.
petalis elongatis spathulatis	10. CERATOBIMUM.

§ I. APORUM, *Blume*.

The ancipitous leaves clearly distinguish this group from all other *Dendrobia*. The genus *Oxystophyllum* differs in nothing except having only two globose pollen-masses instead of four. *D. (Aporum) sinuatum* of the 'Bot. Register, 1841, Misc. No. 3,' which has quite the habit of *Ox. carnosum*, seems to connect the two genera; for although it has four pollen-masses, two are much smaller than the others, as if rudimentary*.

* *Flores terminales et laterales. Caules apice sæpe aphylli.*

72. *D. (A.) micranthum* (*W. Griffith*, in *Calcutta Journal of Natural History*, iv. 376; *Ib.* v. 369).
Java, *T. Lobb*.

His erroneous description of the lip of this plant was corrected by Griffith in a later paper: the specimen in my herbarium which I refer to here differs in the lip being too broad to be called "linear-oblong"; but I have seen nothing else to which Griffith's description will apply.

73. *D. (A.) Serra*, *Lindl. Gen. & Sp. Orch.* No. 5.
Java, *T. Lobb*. in hb. *Hooker*.

A flower in the Hookerian Herbarium shows this to be the *Macrostomium aloifolium*, *Blume*, which is confirmed by one of *Kuhl* and *Hasselt's* unpublished drawings. It is, however, not the *Herba supplex quinta* of *Rumphius*, as I formerly suspected, the figure of that plant certainly representing *D. (A.) subteres*. According to Griffith this is also the *Dend. acinaciforme*, *Roxb.*

74. *D. (A.) LOBBII*: caulibus apice aphyllis, foliis scalpelliformibus duplo longioribus quam latis; floribus minutissimis terminalibus; sepalis recurvis; labello erecto carnosio trilobo; lobis lateralibus brevioribus unguiculato.
Borneo, forests of Labuan, *T. Lobb*.

This looks like a very small state of *D. Serra*; but the leaves are

* Prof. H. G. Reichenbach reduces *Oxystophyllum* to *Dendrobium*. Neither the materials with which he has favoured me nor those in my own herbarium enable me to form a decided opinion on the subject. In fact that whole genus, if it be one, is in inextricable confusion. A fragment of *Blume's Sarcostoma*, and a drawing of the details of its structure, for which I am also indebted to my learned friend, seem to show that that genus should be preserved. The pollen-masses are represented as having long tails, and have no resemblance to *Blume's* figure.

more distant and rather narrower, the sepals are recurved, and the lip quite different in form. The flowers are not larger than those of the smallest *Oberonia*. The whole plant forms a tuft little more than 2 inches high.

75. *D. (A.) anceps*, *Wallich, Catalogue*, No. 2020.

My flowers of this are unexamined. It cannot be the *D. anceps* of Roxburgh, which has lateral flowers only.

76. *D. (A.) LUNATUM*: foliis scalpelliformibus densis obtusiusculis, labello lunato ante unguem canaliculatum crista transversa instructo. Philippines, *Cuming*.

Flowers scarcely larger than in *D. (A.) Lobbi*. The lip is quite unlike that of any other of the section.

76b. *D. parviflorum*, *Rchb. f. MSS.* (*D. Jenkinsi*, *W. Griffith, in Calc. Journ. N. H.* v. 367. t. 25); an Assam plant with large white terminal flowers, I have not seen.

77. *D. (A.) subteres*, *Griffith in Calc. Journ. N. H.* v. 370. (Herba supplex quinta species, *Rumph. Amb.* vi. t. 51. f. 2?) Malacca, *Griffith*.

This is a very distinct plant, with the long slender leafless terminations of its shoots yellow, polished, and remarkably flexuose.

78. *D. (A.) Roxburghii*, *Griffith, l. c.* (Dend. Calceolum, *Roxb. Flor. Ind.* iii. 370. Herba supplex femina, *Rumph. Amb.* vi. t. 51. f. 1.) New Guinea, *Hindes*; Amboynia, *Roxburgh*.

Judging from the account of this plant given by Griffith, it must be a very distinct plant, with "large dull-orange flowers slightly veined with dull red." The lip, he adds, is represented as almost 4-lobed, or 3-lobed with the central lobe emarginate. In my specimen, without flowers, the long leafless branches are straight, not flexuose, and the distant leaves when full-grown are thin, $1\frac{3}{4}$ inch long by $\frac{2}{10}$ of an inch wide. The figure in Rumphius makes them broader.

** *Flores laterales tantum.*

79. *D. (A.) anceps*, *Roxb. Flor. Ind.* 487; *Griffith in Calc. Journ. N. H.* v. 369; *Bot. Mag.* t. 3608; *Bot. Reg.* t. 1239; *Bot. Cab.* t. 1895, not of Wallich's Catalogue.

Sikkim, hot valleys, *J. D. H.* (14).

80. *D. (A.) cuspidatum*, *Wallich in Bot. Reg.* 1841, *Misc.* 7.

Khasija, at 2000 feet, *J. D. H. & T. T.* (14 in part); Moulmein, *T. Lobb*.

Perhaps this is not distinct from *D. anceps*, with which it is mixed in the Khasija specimens; but its long naked terminal shoots, narrower leaves, much smaller flowers, and almost flabeliform lip, seem to be sufficiently different.

81. *D.* (A.) *EULOPHOTUM*: foliis crassis scalpelliformibus obtusiusculis approximatis; labello rotundato crista maxima transversa utrinque acuta.

Mergui, *Griffith*; Java, *T. Lobb* in hb. Hooker.

Of this I have a carefully prepared drawing by Griffith. Its great transverse crest on the lip resembles nothing except what is found in *D. indivisum* of Blume; but that plant, the *Schismoceras distichum* of Presl, has terminal capitate flowers. The Java plant is rather different, the apex of the lip being deeply and widely retuse, while Griffith's plant is, according to his drawing, regularly rounded; but I see no other difference.

§ II. *STRONGYLE*, *Lindl. in Paxt. Fl. Gard.* i. sub t. 27.

Under this are included all the species with terete leaves. Some occur among the collections from continental India. I have one or two to add to those already on record.

82. *D.* *UNCATUM*: foliis rigidis triquetris brevibus distichis retrorsum uncatis acutis; labello obovato bilobo intra sinum obsolete tristiche papilloso.

Java, *T. Lobb* (156).

This differs from *D. subulatum* in its strongly hooked leaves, broader, more emarginate lip, and larger flowers. Nevertheless Prof. Reichenbach, who saw both in my herbarium, does not distinguish it. (See *Bonplandia*, March 1, 1857.) It is not unlike a small form of *D. subteres*.

§ III. *RHIZOBIUM*, *Lindl., l. c.*

Of this there is no Indian species.

§ IV. *DENDROCOBYNE*, *Lindl. in Bot. Reg.* 1844, t. 53; 1847, t. 36. *Paxton, l. c.*

This section must be confined to the species with stems or pseudo-bulbs bearing leaves at the apex only, and always of a thick leathery structure. What I have formerly called *Desmotrichum*, only in part the same as Blume's genus of that name, have for their character the same vegetation, with a lip whose middle lobe is broken up into long threads.

* *Flores terminales. Labellum margine continuum.*

83. *D. Macraei*, *Lindl. Gen. & Sp. Orch.* No. 3. (?*D. nodosum*, *Dalzell in Hook. Journ.* iv. 292.)

Ceylon, *Macrae*; Nilgherries, Madras Herbarium, *J. D. H.* (27)?; Khasia, at the height of 4000 feet, *J. D. H.* (26)?

The flowers of *D. Macraei* were described as having an entire lip, upon the faith of a Cingalese native drawing. It is, however, very doubtful whether such is their structure, and I can hardly doubt that Dalzell's *D. nodosum*, of which I have examined perfect flowers out of the herbarium of my late lamented friend Dr. Stocks (No. 30), is the same plant. Its leaves, indeed, are narrower, and its pseudo-bulbs less unequal-sided, in the specimens before me. Of Dr. Hooker's No. 26, from Khasia, the flowers are unknown, but are said to be solitary and white; the leaves are not half the width of *D. Macraei*, and the pseudo-bulbs are so slender as to be scarcely distinguishable from the main stem. All are nearly allied to *D. flabellum* of Reichenbach.

84. *D. PUMILUM* (*Griff. Notul.* iii. p. 315); pseudobulbis clavatis tetragonis nitidis diphyllis, foliis brevibus ovato-oblongis obtusis, floribus inter squamas subsessilibus, sepalis petalisque acuminatis, mento attenuato incurvo ovario subæquali semifisso, labello unguiculato oblongo nudo dimidia superiore acuminata crispa.

Mergui, on trees, *Griffith* (24 and 1175).

Flowers small, white, sweet-scented, according to Griffith, whose description is, however, not quite exact. In habit it resembles *D. tetragonum*.

85. *D. LABUANUM*; pseudobulbis parvis diphyllis secus caulem arcte adpressis, foliis obtusis anguste ovalibus obtusiusculis, floribus solitariis, labello trilobo intra apicem papilloso axi elevata carnosae abrupta.

Borneo, *T. Lobb*.

This is related to *D. cymbidioides* and its allies, but the flowers are much smaller.

86. *D. BRACHYPETALUM*; pseudobulbis parvis monophyllis secus caulem arcte adpressis, foliis obtusis, floribus geminis subsessilibus, sepalis acuminatis, petalis acutissimis duplo brevioribus, mento brevi, labello brevi oblongo acuto bicarinato.

Java, *T. Lobb* in hb. Hooker.

A small species with flowers not larger than in an *Oberonia*. The short acute petals and lip are unusual,

87. *D. RABANI*; pseudobulbis subcylindræis monophyllis secus caulem imbricatis, folio oblongo obtuso, floribus parvis sessilibus terminalibus, sepalis petalisque acutis æqualibus, mento brevi, columna bicamerata, labello basi excavato lævi lamina intus villosa medio tuberculata. Khasia, in Mr. Raban's garden, at 4000 feet, *J. D. H.* (25).

"Flowers small, white, sweet-scented." I have been unable to ascertain the form of the lip; but the other characters are amply sufficient to distinguish this.

** *Flores laterales. Labellum margine continuum.*

Some of the supposed species of this section are probably founded on insufficient grounds. *D. Farmeri* (*Bot. Mag.* t. 4659), for instance, is scarcely distinct from *D. chrysotoxum* (*Bot. Reg.* 1847, t. 36), although its flowers are tinged with pink, and its lip less abundantly fringed. In like manner my *D. palpebræ* (*Journ. Hort. Soc.* v. 33) may be a white-flowered variety of *D. Griffithianum* (*Bot. Reg.* xxi. 1756). The only species among the collections of Hooker and Thomson is—

88. *D. densiflorum*, *Wallich, Plant. As. rar.* t. 40; *Bot. Mag.* t. 3418. Sikkim, at 1000–5000 feet of elevation, *J. D. H.* (7 and 150); Khasia at 2000–4000 feet, *J. D. H.* & *T. T.* (7).

89. *D. EUPHLEBIUM* (*H. G. Rchb. MSS.*); caule angulato clavato basi angustato, foliis geminis membranaceis ovali-lanceolatis, flore solitario laterali, labello oblongo unguiculato concavo emarginato cordato, venis ab axi carnosio rectangulis divergentibus.

Java, *T. Lobb.*

A very distinct plant, remarkable for its clavate angular stem tapering to the base, and solitary lateral flower.

*** *Labelli lobus medius stuposus* (*Desmotrichum*).

The species hitherto known are wholly insular.

§ V. HOLOCHRYSA.

* *Fasciculata*; floribus solitariis, fasciculatis aut breviter racemosis.

In proposing now, for the first time, to collect into one group all the distichous-leaved yellow species, I have no character to rest upon except the uniformly yellow colour of all parts of the flower, a colour disappearing somewhat in *D. aureum*, whose yellow almost fades into white in the variety called *D. rhombeum*, just as that of *D. Griffithianum* disappears in its variety *Palpebræ*.

* *Flores fasciculati, aut geminati, aut in racemulis 3-4-floris.*

90. *D. HOOKERIANUM*; foliis ovatis acuminatis, pedunculis 3-4-floris, bracteis minutis, sepalis petalisque subæqualibus integris, labello ovato fimbriis crinitis cincto laminæ ipsæ æqualibus, ungue convulso basi retrorsum bidentato.

Sikkim, at 1000-5000 feet, *J. D. H.* (8).

A very striking species, with flowers as large as *Dalhousieanum*, with very long shaggy fringes surrounding the labellum, which has two blood-red spots on each side above the unguis itself, furnished at the base with a double reversed tooth. There is a figure among Mr. Cathcart's drawings.

91. *D. chrysanthum*, *Wallich*, *Cat.* No. 2012; *Bot. Reg.* 1299.

Darjeeling, *Griffith*; Khasija, *Griffith*; at 3000-5000 feet, *J. D. H. & T. T.*

(13); Churra, *J. D. H.*; Sikkim, in hot valleys, at 2000-5000 feet, *J. D. H.* (13).

There is scarcely any variation among the numerous specimens before us. All have the broad rounded sepals and strictly fascioled flowers so characteristic of this beautiful species. *Dendrobium Paxtoni* (*Bot. Reg.* 1839, Misc. 56), of which I have seen no wild specimen, differs in its longer and less rounded petals, which are slightly serrated.

92. *D. ochreatum*, *Lindl. in Wall. Cat.* no. 7410. (*D. Cambridgenum*, *Paxton, Mag. Bot.* vi. 265; *Bot. Mag.* t. 4450.)

Khasija, *Griffith*.

Prof. H. G. Reichenbach informs me that the odd stigma is at the base of the fovea stigmatica, and not at the apex beneath the rostellum as usual,—a circumstance I have not had an opportunity of observing.

Other species of this section are *aureum*, *Lindl.*, or *heterocarpon*, *Wallich*, of which *D. rhombeum*, *Lindl.* is a white variety; *villosulum*, *Wall.*, or *Jerdonianum*, *Wight*; *Ruckeri*, *Lindl.*; *sanguinolentum*, *Id.*; *rugosum* and *salaccense*, *Blume*; and I suppose *intermedium* and *ochroleucum*, *Tijsmann*.

** *Racemosa*; racemis multifloris.

93. *D. moschatum*, *Wall. Pl. As.* ii. p. 83.; *B. M.* t. 3837.

Khasija, at 4000 feet, *J. D. H. & T. T.* (16).

94. *D. FUSCATUM*; foliis oblongo-lanceolatis acutissimis, racemis filiformibus flexuosis, bracteis linearibus herbaceis, petalis sepalisque subæqualibus oblongis rotundatis, labello oblato cucullato retuso denticulato ciliato.

Sikkim, *Cathcart*, in hot valleys, *J. D. H.* (12); Khasija, at 2000-4000 feet, *J. D. H. & T. T.* (12).

This remarkable plant has orange-brown sepals, and in the shape of its parts is like *D. chrysanthum*, but with ten or twelve flowers in a slender raceme. The petals are orange-yellow, as also is the lip, which has two crimson spots on each side. The flowers of the Khasija specimens are smaller than in those from Sikkim.

§ VI. ACLINIA, *Griffith, Not. iii. 320.*

In retaining this supposed genus as a section of *Dendrobium*, I must at the same time observe that the species are probably Pelorias of others, although, with perhaps one exception, their parentage cannot be traced. They are all characterized by a perfect, or nearly perfect, regularity in the inner as well as outer series of floral envelopes, one result of which is the loss of the mentum, which belongs to all the other plants collected under the genus. In the case of *D. normale*, the column seems to be always triandrous; and in *D. Pseudaclinia*, there is sometimes an apparent attempt to gain that structure. It is, however, for Indian botanists to investigate this curious subject, and trace the monsters, if monsters they are, to their origin. Prof. H. G. Reichenbach has discovered that Endlicher's genus THELYCHITON, founded on a terrestrial Norfolk Island plant, is one of these Aclinias. Judging from a tracing from Ferdinand Bauer's drawing in the Vienna Museum, it seems possible, perhaps probable, that this plant (*Dendrobium macropus*, H. G. Rehb.) is a Peloria of *D. elongatum*, A. Cunn. (*D. brisbanense*, H. G. Rehb.). I also much suspect my genus *Paxtonia* to be nothing more than a Peloria of *Spathoglottis spicata*.

95. *D. Aclinia*. (*Aclinia, Griff. Not. iii. 320. t. 351 A. fig. 21.*)
Mergui, *Griffith* (809).

I can have no doubt that this is a Peloria of *D. incurvum* (*infra*, No. 133), which seems to have been gathered by Griffith in the same place on the same day. The flowers are in pedunculate divaricating secund racemes, and appear to have been white, as Griffith describes them.

96. *D. Pseudaclinia*. (*Dend. Aclinia, Rehb. f. in Bonpl. Oct. 15, 1856.*)
Bootan, *Hort. Kew.*

This has flowered with Consul Schiller at Hamburg as well as at Kew; and Prof. Rehb. informs me that it has also been received by the same great cultivator from Manilla. It is a slender erect plant with yellow flowers, springing in pairs or singly from the sides of the stem. I have before me a sketch by Rehb. made at

Hamburg, and another of my own dated Sept. 1854, in both which the stigmatic hollow is concealed by a tooth-like elevation of its lower edge, a structure also occurring in *Thelychiton* and *D. normale*; in the Kew plant there was, moreover, a bristle on one side of this front tooth, and external to it; but Prof. Reichenbach did not find it in many fresh flowers examined by himself, nor does either the bristle or the front tooth occur in the original *Actinia*. The meaning of these malformations opens a curious field of inquiry, to which I hope to address myself on a future occasion.

97. *D. LAWANUM*; caule juniore carnosio ascendente foliis membranaceis lanceolatis acutis, florido aphylo vaginis laxis membranaceis fere abdito, sepalis petalisque ovatis obtusiusculis, labello paulo majore conformi concavo. (*Dendrochilum roseum*, *Dalzell in Hooker's Journal*, iv. 291.)

On trees on the Syhadree range of mountains, *Dalzell in hb. Stocks* (31); *Concan, Law in hb. Hooker* (2).

Mr. Dalzell states that in this plant, "across the front of the column and below the orifice of the stigmatic cavity, there is a small crest terminated on each side by a deeply-coloured horn, two- or three-toothed at the apex." This seems as if we had here also some monstrous structure; but I am unable to refer the plant to any of the *Eudendrobia*, unless indeed *D. transparens* should claim it; and I must add, that there was nothing unusual in the column of the only flower I have had an opportunity of dissecting.

98. *D. TETRODON* (*H. G. Rehb. in litt.*); caulibus floridis tenuibus pendulis aphyllis junioribus foliis anguste lanceolatis membranaceis subobliquis, floribus geminatis, sepalis petalisque lineari-lanceolatis acutissimis, mento obsoleto, labello conformi paulo majore et obtusiore, clinandrio quadridentato.

Java, on trees at the foot of M. Salak, *Zollinger* (11).

Of this I have a good specimen from Prof. Reichenbach. It has the habit of such a plant as *D. transparens*; and there is a slight tendency to the extension of the lateral sepals at the base. Can it be a *Peloria* of *D. macrostachyum*? I find nothing monstrous in the column.

99. *D. normale*, *Falconer in Ann. Nat. Hist.* iii. 196; *Griffith, Not.* iii. 255. t. 284.

Western Himalayas; Mussooree and Landour, *Col. Vicary*; pass near Paoree in Gurwhal, at 4000-6000 feet, *T. Thomson* (17); Saharunpur, *Falconer*.

My examination of this singular plant agrees with Dr. Falconer's description. Although a monster, I am unable to indicate the species to which it may possibly belong. Suspicion points to *D. fimbriatum*; but that species seems to be quite an eastern plant, while *D. normale* has hitherto been seen only in the Western Himalayas. The late Col. Vicary informed me that the specimens which he first found, and from which Dr. Falconer's description was taken, were gathered in 1832, in the vicinity of Mussooree and Landour.

§ VII. EUDENDROBIUM, *Lindley, in Paxton's Fl. Gard. i. sub t. 27.*

I have no other change to make in the limits of this large section than the exclusion of all the species with great yellow flowers, which now stand in the first section of *Holochrysa*.

A. *Caule 0, v. brevissimo carnosio* (Bolbodium, *Lindl. l. c.*).

No species are among the Hookerian collections. The following are new.

100. D. SUBACAULE, *Reinwardt, MSS.*; folio parvo oblongo pedicellis geminatis brevior, sepalis petalisque acuminatis, labello nudo latiori subconformi, mento gracili recto petalis duplo longiore, ovario triptero. Java, on the top of Mount Tidore, *Reinwardt*.

Whole plant, the vermilion flowers included, is little more than an inch high. This is the smallest of the genus.

101. D. PRASINUM; folio ovali obtuso, floribus solitariis, sepalis lanceolatis petalisque ovatis acutissimis, mento brevi obtuso, labello unguiculato auriculato rhombeo acuminato concavo nudo bilineato. Feejee islands, 2000 feet above the sea, *Asa Gray*.

A very distinct plant, of which I only know a drawing by Agati, in the possession of my learned friend Prof. Asa Gray. The flowers are sea-green, nearly two inches in diameter. The sepals about $\frac{3}{8}$ of an inch wide.

102. D. extinctorium, *Lindl. in Bot. Reg. sub t. 1756.*

Moulmein, *Griffith*, on *Careya arborea*, in damp places.

A true *Dendrobium*, as is shown by its pollen-masses. Pseudobulbs depressed. Peduncles filiform, erect, 2 to 3 inches long, one-flowered, with a minute bract about an inch off the ovary.

B. *Caule elongato.*

* Labello integro.

This group consists of numerous species so nearly related to

each other that it is scarcely possible to find good distinctions for them. Even when seen alive in their natural state, the uncertainty is the same. "All the species," says Griffith, "with cochleate labella are nearly akin; they run into each other so much, that distinguishing marks are very difficult." (Itinerary Notes, p. 185, speaking of a form of *Dendrobium nobile* found at Panukka in Bootan.)

103. *D. pulchellum*, *Lindl. Gen. & Sp.* No. 35; *Bot. Cab.* t. 1935. (*D. brevifolium*, *Hort. D. Devonianum*, *Paxton, B.M.* t. 4429. *D. pictum*, *Griffith.*)

Khasija, *J. D. H.* (15); Bootan, *Griffith.*

I have this from Bootan from Griffith, under the name of *D. pictum*, but have failed to discover any trace of it in his Itinerary Notes.

104. *D. Pierardi*, *Roxb. Fl. Ind.* 3. 482.

Valleys of Sikkim, *Cathcart*; *J. D. H.* (5).

105. *D. primulinum*, *Lindl. in Gard. Chron.* 1858, no. 223. (*D. nobile pallidiflorum*, *Bot. Mag.* t. 5003.)

Hot valleys of Sikkim, *J. D. H.* (154).

Possibly this is not distinct from *D. cucullatum*, as is suggested in the work above referred to.

106. *D. transparens*, *Wallich, Cat.* No. 2008. (*D. Henshalli*, *Rchb. f.*; *Bot. Mag.* t. 4663.)

Sikkim, at 2000 feet, *J. D. H.* (153); on rocks towards Chuka, in Bootan, and near Murichom, at 3500 to 4000 feet, *Griffith.*

I am unable to distinguish the Sikkim specimens from this plant, although they are somewhat larger than such as have appeared in our gardens; there can be no doubt that it is the No. 1135 of 'Griffith's Itin. Notes,' p. 198, and Prof. Rchb. has himself pointed out the identity of his *D. Henshalli*.

107. *D. amoenum*, *Wallich, in Lindl. Gen. & Sp. Orch.* p. 78.

Sikkim, *Cathcart (Ic.)*.

This is readily known by its narrow, blunt, nearly equal sepals and petals, each with a purple stain at the point.

108. *D. nobile*, *Lindl. Gen. & Sp. Orch.* 24. (*D. cærulescens*, *Lindl. Sert. Orch.* t. 17.)

Khasija, *Griffith, J. D. H.*; Darjeeling, *Griffith*; Assam, *Id.*

Evidently variable in the size, and probably in the colours, of the flowers. It is the No. 940 of Griffith's Itin. Notes, p. 184.

109. *D. Lindleyanum*, *Griffith*, *Not.* iii. 309.

Hot valleys in Sikkim, at 1000-5000 feet of elevation, *J. D. H.* (6).

This, notwithstanding the size of the flowers, which are twice as large as in *D. nobile*, is probably a mere variety of that species.

110. *D. FURCATUM* (*Reinwardt*); caule gracillimo, foliis linearibus apicem versus angustatis obtusis, sepalis ovatis obtusis, petalis unguiculatis cuneatis retusis latioribus, labello lanceolato acuto nudo intra mentum rectum sepalis longiorem clausum fere abdito.

Celebes, *Reinwardt*.

A remarkable plant, which, because of the sepals almost completely united into a long chin, might be perhaps better referred to *Pedilonum*. I have only seen fragments of a stem and leaves, and a perfect flower. The broad cuneate petals are very characteristic.

111. *D. DISTACHYON*; foliis distichis linearibus oblique bidentatis basi latioribus, floribus solitariis, axillaribus subsessilibus, sepalis petalisque angustioribus acutis, labelli ungue lineari-elongato lamina oblata nuda.

Borneo, *Thomas Lobb*.

This and the two following resemble *D. excisum*, *revolutum*, and *metachilinum* in habit.

112. *D. LYCOPODIODES*; foliis distichis densis linearibus apice obliquis apiculatis, floribus solitariis, bracteis lineari-lanceolatis carinatis pungentibus, sepalis acutissimis lateralibus latis triangularibus, petalis angustioribus minus acutis mento subrotundo, labello sessili obovato concavo apiculato lamellis 2 maximis carnosis.

Borneo; forests of Sarawak, *T. Lobb*.

Very like one of the larger *Lycopodia*. Flowers scarcely more than 2 lines long. Both this and the following are distinguished by two fleshy parallel plates almost as broad as the lip itself on which they lie.

113. *D. TMESIPTERIS*; foliis distichis distantibus linearibus apice obliquis, floribus solitariis, bracteis lineari-lanceolatis carinatis pungentibus, sepalis acutissimis dorsali apice recurvo lateralibus antice arcuatis, petalis angustioribus acutissimis subfalcatis, mento oblongo prominente, labello sessili obovato concavo mucronato margine apicis membranaceo crispulo lamellis 2 maximis carnosis.

Borneo; forests of Sarawak, *T. Lobb*.

Very like a *Tmesipteris*. Differs from the last in the flowers being even smaller, as well as in the points above described.

114. *D. SPINESCENS*; caulibus erectis, foliis distantibus oblongo-lanceolatis, pedunculis oppositifoliis squamosis demum spinescentibus, sepalis labelloque oblongis obtusis, petalis conformibus triplo minoribus. (*Cymbidium spinescens*, Ic. Reinwardt.)

Java? Reinwardt.

Very different, in its flowers having the sepals spreading and $\frac{3}{4}$ of an inch long, from any of the allied species. According to Reinwardt's drawing, the fruit is nearly cylindrical, angular, and surmounted by the sepals, petals, lip, and column, much enlarged and become quite green. There is no specimen in the herbarium of Reinwardt.

** Labello trilobo; calvæ.

115. *D. BREVIFLORUM*; fasciculo florum sessili subgloboso, sepalis petalisque duplo brevioribus carnosissimis, labello oblato nudo lobis lateralibus falcatis auriformibus intermedio truncato plica utrinque sub sinibus.

Singapore? Herb. Loddiges.

I know nothing like this, which flowered in 1844, in the nursery of Messrs. Loddiges. The flowers are white, fleshy, with stripes of crimson spots.

116. *D. stuposum*, Lindl. in Bot. Reg. 1838, misc. 94.

Khasija mountains, at 2000–4000 feet of elevation, J. D. H. & T. T. (11).

The lip is 3-lobed, not entire as is stated in the original definition taken from an imperfect garden specimen, which led Prof. Reichenbach to suppose that his *D. sphegidoglossum* was different, —a mistake the blame for which is mine.

117. *D. Blumei*, Lindl. Gen. & Sp. Orch. No. 65. (*Onychium fimbriatum*, Blume, Bijdr. p. 325. Dend. planibulbe, Lindl. in Bot. Reg. 1843, misc. 70.)

Java, Zollinger; Manilla, Loddiges.

An authentic fragment from Prof. Reichenbach shows that the Manilla plant is identical with that from Java.

118. *D. aqueum*, Lindl. in Bot. Reg. 1843, misc. 6. t. 54; Bot. Mag. t. 4640. (*D. album*, Wight, Ic. t. 1645.)

Khasija hills, T. Lobb.

This is not to be found in the collections of Hooker and Thomson; nor have I seen any wild specimens, except a few flowers sent home by Mr. Thomas Lobb to Messrs. Veitch. These want the long hairs represented by Dr. Wight's artist, but agree perfectly with the figure in the Botanical Magazine. *D. ramosum*, an obscure plant with a slender pendulous branched stem and lan-

ceolate acuminate leaves, is apparently near this; but the fragments of flowers before me afford little information except that the lip is broad with fine hairs on the inside near the edge.

119. *D. SPATHACEUM*; caulibus gracilibus erectis, foliis anguste oblongis apice oblique obtusis, bracteis linearibus membranaceis basi coloratis, sepalis petalisque æqualibus acutis mento brevi rotundato, labelli angusti lanceolati laciniis lateralibus rotundatis medio tuberculatis ad sinus plicatis intermedia duplo longiore acuta.

Sikkim, at the height of 6000 feet, *J. D. H.* (143).

A solitary specimen of this exists in Hooker's herbarium; the stems are about 6 inches long, and the flowers (apparently solitary) the size of those of *D. macrostachyum*.

120. *D. SCABRILINGUE*; foliis oblongis apice obtusis valde obliquis, floribus geminatis, sepalis petalisque ovalibus æqualibus, mento conico, labelli 3-lobi medio pluries canaliculati lobis lateralibus semi-ovatis obtusis intermedio carnosio oblongo scabro multo brevioribus.

Borneo, *T. Lobb*.

A pair of flowers and a single leaf, communicated by Messrs. Veitch, are the materials on which this very distinct species is established. Its structure is, however, so peculiar, that no doubt can exist of its perfect distinctness from any other yet known. The flowers appear to be white. The lateral sepals from the point of the mentum to their own apex are about an inch long.

121. *D. TRUNCATUM*; caulibus gracilibus ramosis basi ramulorum subrotundis incrassatis, foliis linearibus oblique emarginatis, floribus solitariis, sepalis petalisque ovatis acutissimis æqualibus, mento ascendente valde obtuso ovario duplo longiore, labelli laciniis lateralibus semicuneatis intermedia lineari basi unidentata.

Java, *Reinwardt, Lobb*.

I find this among Reinwardt's plants under the name of *Ophrys pubescens* of Blume; probably owing to some error in labelling, for there is no such name known to me, nor has this any structure that can be called pubescent. It is a very small-flowered slender species, closely allied to *D. tetradre*, from which it differs in the labellum, and in the thickened bases of the branches being round or roundish oblong, not at all angular.

122. *D. INVOLUTUM*; caulibus teretibus, foliis ovato-lanceolatis oblique obtusis, gemmis oppositifoliis conicis, sepalis petalisque lineari-lanceolatis æqualibus acuminatis apice incurvis, mento brevi acuto, labelli laciniis lateralibus acutis falcatis intermedia revoluta crispa acuminata brevioribus.

Society Islands, pendulous from the branches of trees, *Mathews*.

Flowers a quarter of an inch long, with the points of all the divisions hooked or rolled downwards.

*** Labello trilobo; *nigro-hirsutæ*.

These species are all distinguished by the presence of short black hairs on the young stems, a peculiarity which separates them from everything except *D. furcatum*.

123. *D. formosum*, *Roxb. Flor. Ind.* iii.; *Wallich, Pl. As.* t. 39; *Bot. Reg.* 1839, t. 64.

Khasija, *J. D. H. & T. T.* (1007); *T. Lobb* (373). Moulmein, *Griffith* (350).

124. *D. INFUNDIBULUM*; foliis lanceolatis angustis acutis, sepalis lineari-oblongis, petalis oblongis obtusis triplo latioribus, mento infundibulari pedicello æquali, labelli lobis lateralibus rotundatis integris intermedio subrotundo plano serrulato emarginato.

Moulmein, at 5000 feet on Thoung-gyun, *T. Lobb, in hb. Hooker*.

A very striking plant, intermediate between *D. formosum* and *longicornu*, having the large flowers of the former and the slender habit and narrow leaves of the latter. The lip with large round lateral lobes also distinguishes it from the former, and the large petals with a circular middle lobe to the lip and short funnel-shaped mentum from the latter.

125. *D. longicornu*, *Lindl. in Wall. Cat.* 1997; *Bot. Reg.* t. 1315. (*D. flexuosum*, *Griffith, Notul.* iii. 317. *D. hirsutum*, *Id.* iii. 318. t. 305.)

Khasija, *T. Lobb, Griffith*; at 4000-6000 feet, *J. D. H. & T. T.* (10); Sikkim, inner valleys at 5000 feet. *J. D. H.* (10); Assam, *Griffith*.

A variable plant as to the form of the middle lobe of the lip, which is broken up into fringes in very unequal degrees, and as to the size of the flowers, which however appear to have always a membranous lip, with strong orange-coloured veins on the lateral lobes.

126. *D. XANTHOPHLEBIUM* (*Lindl. in Gard. Chron.* 1856, no. 196); caule foliisque *D. longicornu*; sepalis petalisque linearibus acutis, mento brevi, labelli carnosii lobis lateralibus triangulis obtusis intermedio ovato dilatato apiculato crispo scabro: axi elevata carnosia.

Moulmein, *T. Lobb* (176, 177).

Flowers much smaller than in the last, with quite a different, fleshy not membranous, lip. Flowers white. Lip yellow with orange-coloured veins and disk. It is cultivated by Messrs. Veitch.

127. *D. ATTENUATUM*; foliis linearibus gramineis patentissimis, floribus solitariis squamulis minutis obtusis, sepalis petalisque obtusiusculis, mento lineari obtuso, labelli elongati spathulati lobis lateralibus dentiformibus intermedio subrotundo margine carnosio medio subaspero tuberculis geminis linearibus.

Borneo, *T. Lobb*.

Flowers small, apparently white. Leaves long, narrow, and grassy. Stems slender, ascending, from 6 to 8 inches high.

*** The only other species of this section are *D. calcaratum* (Bot. Reg. 1840, misc. 218) and *D. nutans* (Gen. & Sp. Orch. No. 73), whose lip is not undivided as it was supposed to be, but lanceolate with short entire lateral lobes and a crisp, almost linear, middle part, as I learn from specimens communicated by my learned correspondent Mr. Thwaites (156).

§ VIII. PEDILONUM, *Blume*.

No continental species of this section have been observed, nor have I found among the collections examined by me anything like Roxburgh's *D. purpureum*, a Molucca plant. The following are new insular species.

128. *D. AUROROSEUM* (*Rchb. f. in litt.*); foliis angustis ovato-lanceolatis acutis, sepalis petalisque æquilongis acutis, mento elongato obtusissimo, labello nudo oblongo apice dilatato retuso utrinque reflexo ungue unituberculato.

Java, *T. Lobb*; *Zollinger* (231).

The oval lip, suddenly expanded into a broad apex reflexed on each side, and the extremely broad mentum, are like nothing elsewhere in this section. The flowers are the size of *D. Pierardi*.

129. *D. BURSIGERUM*; foliis oblongis acutis, spicis cylindræis densifloris, sepalis petalisque acutis, mento arcuato infra apicem ventricosum, labello spathulato acuto cucullato.

Philippines, *Cuming*.

Like *D. secundum*, but flowers are not half the size, and in longer, slenderer, not secund spikes. Lip apparently white with an orange-yellow tip.

130. *D. REINWARDTI*; foliis anguste oblongis obtusis apiculatis, spicis densissimis brevibus, bracteis setaceis divaricatis, sepalis acutis, petalis obtusiusculis, mento duplo longiore apiculato, labello nudo angusto spathulato obtusiusculo.

Banda, *Reinwardt*.

Near *D. viridiroseum* of *Rchb. f.*, from which it differs in its

longer apiculate mentum, and in the blunt lip not at all contracted in the middle.

§ IX. STACHYBIUM, *Lindl. in Paxton, Fl. Gard.* i. sub t. 27.

* *Labello integerrimo.*

131. *D. Dalhousieanum*, *Paxton, Mag. Bot.* xi. t. 145; *Bot. Reg.* 184, t. 10.

Mergui, *Griffith* (Dendr. No. 7, *Notul.* iii. 313).

An authentic specimen from Griffith shows that this fine species was described by him in the place above quoted; and thus its native country is now ascertained.

132. *D. ramosissimum*, *R. Wight, Ic.* 1648.

S. Concan, *Dalzell in hb. Hooker.* (*Stocks*, 52).

This is very near my *D. herbaceum* (*Bot. Reg.* 1840, misc. 153); but the flowers are white with a yellow lip, not white tinged with green; the lip itself is longer and more fleshy, and the flowers are considerably smaller. I have examined fresh specimens out of Mr. Bellenden Ker's garden from Dharwar.

133. *D. INCURVUM*; foliis angustis membranaceis oblique obtusis apiculatis, racemis oppositifoliis rectiusculis brevioribus, bracteis membranaceis uninerviis pedicellis æqualibus, sepalis angustis acutissimis antice cum mento semiaperto acuto arcuatis, petalis angustioribus, labello oblongo venoso antice serrato circa discum 2-denticulato.

Mergui, *Griffith* (808).

This is the *Dendrobium* No. 9 of Griffith's *Notul.* iii. 314, forming the number succeeding to that of his *Aclinia*, and apparently gathered in the same place. It has so entirely the appearance of that plant, that, as has been already observed, it is difficult to doubt that it is not the customary state of the species, notwithstanding the very different structure of the flower.

134. *D. PORPHYROCHILUM*; caulibus brevibus cæspitosis tetraphyllis, foliis angustis membranaceis racemis terminalibus multifloris sæpius æqualibus, bracteis setaceis ovario subæqualibus persistentibus, sepalis lineari-lanceolatis acuminatis, petalis paulo brevioribus, labello brevioribus ovato acuto concavo lineis 3 elevatis, mento brevissimo rotundato.

Assam, *Griffith*; Khasija hills, *T. Lobb*; at 4000–6000 feet, *J. D. H. & T. T.* (28).

“Sepals dirty pale yellow. Petals the same, with small red streaks at the base. Lip purple with a yellow margin.”—*J. D. H.* The whole plant seems thin and membranous, and varies in height from 2 to 5 inches. It approaches the *Bolbodia*.

** *Labello trilobo.*

135. *D. PANDURATUM*; subacaule, foliis membranaceis acutissimis racemis filiformibus erectis brevioribus, bracteis minutis squamiformibus, sepalis petalisque linearibus acuminatis, mento recto conico semiaperto, labello æquilongi pandurato (trilobo lobis lateralibus rotundatis intermedio duplo majore crenulato apiculato).

Ceylon, *hb. Hooker.* (147); *Thwaites* (2353).

A small species almost referable to *Bolbodium*.

136. *D. eriæflorum*, *Griffith, Not.* iii. 316. t. 307.

Khasija, in Myrung Wood, on dry ridges, *Griffith* (1020), on rocks and dry trunks of trees at 2000-5000 feet, *J. D. H. & T. T.* (18).

This forms tufts from 4 to 9 inches high. The stems are covered with great loose sheaths of fallen leaves. The flowers are in dense nodding racemes; according to Cathcart's drawing, greenish yellow with purple mentum. The lip is strongly veined and edged with purple; its side lobes regularly and sharply serrated, its middle lobe small, oblate, apiculate, and entire. It would be a beautiful species in a garden.

137. *D. PYCNOSTACHYUM*; caulibus laxe membranaceo-vaginatibus erectis carnosissimis, foliis, racemis densis cylindraceis, bracteis setaceis rectangularibus persistentibus ovario æqualibus, sepalis linearibus acuminatis, petalis minoribus, mento brevi obtuso incurvo, labelli lobis lateralibus acutis integerrimis intermedio triangulari recurvo crispo parum latioribus axi juxta sinus abrupto elevato.

Moulmein, *T. Lobb.*

Like *D. eriæflorum*, but with smaller and denser flowers and a totally different lip.

138. *D. microbolbon*, *Ach. Richard, Ann. Sc. n. s. xv. t. 8.* (*D. humile*, *R. Wight, Ic.* 1643. *D. crispum*, *Dalzell, in Hooker's Journal*, iv. p. 111.)

Trees in Western India, *Dalzell (Hb. Stocks.* 34).

There is no doubt that all three of the above plants are the same. A. Richard's figure is very formal and uncharacteristic.

139. *D. denudans*, *Don, Prodr.* 34.

Sikkim, in the drier valleys, at 5000 feet, *J. D. H.* (20); E. Nepal, at 4000 feet, *Id.*

This varies in height from 4 to 15 inches. In the Sikkim plant the colours are bright red on a pale yellow ground, according to a drawing by Dr. Hooker; in gardens they are much greener.

140. *D. PEGUANUM*; caulibus ovatis cæspitosis, foliis (linearibus?), racemis erectis densis multifloris, bracteis membranaceis acutissimis

ovario longioribus, petalis linearibus falcatis sepalis multo longioribus, mento elongato, labello longe unguiculato subrotundo cochleato axi abrupta obtusa, lobis lateralibus semicircularibus intermedio parvo triangulari crispo.

Pegu, *M'Lelland in hb. Hooker.*; Borneo, *T. Lobb.*

A very small species with short erect dense racemes. The long falcate petals are very remarkable.

141. *D. SARCANTHUM*; caulibus cæspitosis 3-4-phyllis, foliis angustis racemo paucifloro longioribus, bracteis (testaceis) ovario longioribus, floribus valde carnosus mento horizontali obtuso, labelli 3-partiti sagittati axi elevata truncata lobis subæqualibus lateralibus oblongis intermedio ovato.

Java, *T. Lobb*, 406, *in hb. Hooker.*

It is not certain where this curious little species was found. The whole plant is only 2 inches high with slender 3- or 4-leaved stems. The rachis is very zigzag, the flowers apparently pale yellow. I have only examined a bud, the extreme softness of which rendered it difficult to dissect.

142. *D. chlorops*, *Lindl. in Bot. Reg. 1844, Misc. 54.* (*D. barbatulum*, *Wight, Ic. iii. 909.*)

Concan, *Law in hb. Hooker* (21); common on trees in both Concan, in the cold season, *Stocks, in hb. Hooker.*

Flowers small, yellow tinged with green.

143. *D. barbatulum*, *Lindl. Gen. & Sp. Orch. No. 44; Paxton's Fl. Gard. 502. Ic. Xyl.*

Concan, *Law, in hb. Hooker.* (3); trees in the S. Concan, *Dalzell, in herb. Stocks.* (32).

The woodcut in Paxton's Flower Garden shows how different this species is from the last.

§ X. CERATOBIMUM.

No species of this fine division has been yet seen in continental India. Of one I have a leaf 18 inches long by 14 broad, found in Borneo by Lobb, the flowers of which are unknown; and the following undescribed species occurs among Reinwardt's drawings.

144. *D. BICAUDATUM* (*Reinw. MSS.*); foliis oblongis acutis racemis horizontalibus 4-5-floris subæqualibus, petalis linearibus spathulatis erectis sepalis multo longioribus, labelli trilobi lobis lateralibus incurvis intermedio subrotundo minoribus.

Java, *Reinwardt.*

Flowers yellowish striped with green. Lip delicately marked

with red transverse veins. Apparently the axis is fleshy, elevated, and extended as far as the point of the lip.

Obs.—*Dendr. pumilum*, Roxb. Fl. Ind. 479, is not the plant so called by Griffith, if the statement in the former work can be trusted; but the specific character and description are so much at variance, that some error of the Indian transcriber is to be suspected.

D. crepidatum, Griff. Notul. iii. p. 319, is quite different from the species so named by me. But the printed description is so confused and self-contradictory, that I have not been able to identify the species.

Prof. Reichenbach reduces the genera CADETIA, LATOURIA, and DICHOPUS to the present genus. I have examined no specimens of them.

CRYPTOCHILUS, *Wallich.*

145. *C. SANGUINEA* (*Id.*); calyce oblongo bis longiore quam lato laciniis acuminatis, petalis labelloque obovatis acutis, polliniis viridibus. Khasija, Churra Punjee, *Griffith*, at an elevation of 4000–5000 feet, *J. D. H. & T. T.* (200); Sikkim, *J. D. H., Cathcart.*

Flowers crimson. Capsule pyriform, strongly and equally six-ribbed.

146. *C. LUTEA*; calyce ovato longitudine et latitudine æqualibus laciniis triangularibus, petalis labelloque lanceolatis, polliniis luteis. Mishmee, *Griffith*; Darjeeling, *Id.*; Sikkim, *Cathcart.*

This very distinct species occurs only among my specimens from Griffith and in Cathcart's drawings, according to which the flowers are of one uniform clear-yellow colour. Calyx much contracted at the mouth, and not at all longer than broad; petals linear-lanceolate; lip lanceolate. Pollen-masses yellow, not green as in the last. Capsule obscurely six-ribbed. I can find no trace of this remarkable plant among Griffith's descriptions or notes.

ACANTHOPHIPPIUM, *Blume.*

147. *A. sylhetense*, *Lindl. Gen. & Sp. Orch.* 177. (*A. ringiflorum*, *Griffith*, *Notul.* iii. 347. *Ic.* 325.) Sikkim, *Cathcart*; Khasija, at the elevation of 2000–3000 feet, *J. D. H. & T. T.* (198).

Flowers straw-colour, freckled with red inside.

ANTHOgonium, *Wallich.*

148. *A. gracile*, *Wall. Cat.* 7398; *Rchb. fil. in Allg. Gartenzeit*, July 1856; *Bonplandia*, Oct. 15, 1856; *Griffith, Notul.* iii. 383, *Ic.* 345. (*A. Griffithi*, *Rchb. f. in Bonplandia.*)

Khasija, grassy places, 4000-6000 feet, *J. D. H. & T. T.* (199), *Lobb*; Assam, *Griffith.*

This plant varies in the breadth of the leaves, which are sometimes 9 lines and sometimes only 2 lines wide. I can find no ground for the separation of *A. Griffithi*, whose original specimens are before me.

SPATHOGLOTTIS, *Blume.*

149. *S. ixioides*, *Lindl. Gen. & Sp. Orch.* p. 120.

Sikkim, at an elevation of 8000-10,000 feet, *J. D. H.* (146).

"Flowers yellow." *J. D. H.*

150. *S. pubescens*, *Lindl.* l. c.

Khasija, *Lobb*; grassy hills at 5000-6000 feet, *J. D. H.* (145).

"Flowers yellow," *J. D. H.* I fear my Chinese *Sp. Fortuni* (*Bot. Reg.* 1845, t. 19) is not distinct from this, which varies greatly in the breadth of its leaves and the form of the petals.

151. *S. parvifolia*, *Lindl. in Bot. Reg.* 1845, sub t. 19. (*S. Khasijana*, *Griff. Not.* p. 323, *Ic.* t. 311. 1.

Khasija, on dry rocks near Churru, also in Assam, *Griffith.*

N. B. Spathoglottis? trivalvis of *Wallich's Cat.*, No. 3742, the fruit of which alone is known, *Prof. Reichenbach, jun.* refers, and probably with justice, to *Acriopsis*. *Griffith's Sp. lilacina*, *Not.* p. 325, *Ic.* t. 311. 3, is *Sp. plicata*; the same author's *Sp. plicata* is *Sp. aurea*.

ARUNDINA, *Blume.*

152. *A. bambusifolia*, *Lindl. Gen. & Sp. Orch.* 125.

Khasija, 2000-3000 feet, *J. D. H.* (149); hot valleys, Sikkim, *Id.*

153. *A. affinis*, *Griffith, Notul.* iii. 330.

Khasija, at an elevation of 3000 feet, in shady wet places, on rocks near streams, *J. D. H.* (151); Churra Punjee, *Griffith.*

"Labelium yellow inside." Very like *A. chinensis*, from which it seems to differ in having only two ragged lamellæ on the lip instead of five, the lateral and middle of which are shortest. My specimens are from *Griffith* himself.

154. *A. speciosa*, Blume. (*Cymbidium speciosum*, Hb. Reinwardt.)
Java, Lobb (217); Goorgong, Assam, Griffith; common in rocky places
in wet situations on Mt. Ophir, at the height of 2500 feet, where it is
called Paddam Bhattoo, Id.

This is principally distinguished from *A. bambusifolia* by the
terminal lobes of its lip being parallel and overlapping each other,
while in *A. bambusifolia* they divaricate. *A. affinis* has smaller
flowers and narrower petals. *A. densa* is much more distinct, its
flowers being closely arranged, and the middle lobe of the lip
almost obsolete.

NEPHELAPHYLLUM, Blume.

155. *N. cordifolium*. (*Cytheris cordifolia*, Lindl. Gen. & Sp. p. 128.)
Khasija, at 4000 feet, J. D. H. (147).

"Flowers pale green, striped with pale purple; lip pale purple."
J. D. H. These specimens are much larger than Wallich's from
Silhet. The plant appears to spread and creep among moss, through
which the leaves and flowering stem arise. In *N. tenuiflorum*, Bl.,
which resembles this, the flowers are much smaller as well as more
numerous, and the leaves are frequently almost truncate at the base.
N. pulchrum, Bl., which is the *Limodorum maculatum* of Reinwardt's
unpublished drawings, is much dwarfer, the scape not being longer
than the leaves, which are purple beneath, clouded with varying
tints of green on the upper side, and in form oval-acuminate; the
flowers are straw-coloured with a purple spur and a yellow crest
in the middle of an undivided lip. The genus certainly belongs
to *Epidendrea*, in the neighbourhood of *Bletia*.

EULOPHIA, R. Br.

156. *E. bracteosa*, Lindl. in Wall. Cat. No. 7366. (*E. grandiflora*, Id.
Gen. & Sp. p. 181.)
Khasija, at 2000 feet, J. D. H. & T. T. (222).

Further examination has satisfied me that there is no difference
between the above two supposed species. I even doubt whether
there has not been some error in making *E. grandiflora* a native
of Ceylon.

157. *E. graminea*, Lindl. l. c. No. 13.

Malacca, Cuming; Burma, at Amherst, in woods near the sea, Griffith;
plains of Behar, J. D. H. & T. T. (221).

This must no longer be regarded as a Malay plant, the spe-
cimens from Behar differing in nothing except the flowers being
rather smaller, with the lip less deeply 3-lobed.

158. *E. inconspicua*, *Griffith, Not.* iii. 349. t. 326.

This Malacca plant I have not seen. It seems to differ from the last in little beyond the processes on the labellum.

159. *E. BRACHYPETALA*; foliis oblongo-lanceolatis, scapi vaginis 2 longis membranaceis, racemo raro secundo, sepalis erectis lineari-lanceolatis, petalis conformibus multo brevioribus, labelli trilobi venis crispulis lobis lateralibus acutis intermedio multo longiore oblongo obtuso, calcare subgloboso.

N. W. Himalaya, Gurwhal at 2600–3000 feet, *T. T.* (216).

I have not seen the pollen-masses of this plant, which might be mistaken for *Ania angustifolia*. It must be re-examined with better materials than I possess. Much like *E. Promensis*, but the lip is different.

160. *E. virens*, *R. Brown.*

Courtallum, *J. D. H.* (221).

161. *E. herbacea*, *Lindl.* l. c. (*E. albiflora*, *Edgeworth, MSS.*)

Himalayas, *Edgeworth, in hb. Bentham.*; Concan, *Law, in hb. Hooker.* (220).

The long green narrow sepals, the much broader and shorter petals, and the fringed veins of the lip are peculiar.

162. *E. OCHREATA*; foliis oblongis acutis, scapo laxo trivaginato, bracteis linearibus acuminatis ovarii longioribus, racemo cylindraco, sepalis ovalibus acutis concavis, petalis planis latioribus, labello oblongo serrato venis omnibus fimbriatis, calcare parvo hemisphaerico.

Concan, *Law, in hb. Hooker.*; Canara, *Stocks* (71).

A small-flowered species with a rather dense cylindrical raceme 4 or 5 inches long. All the parts of the flower membranous.

163. *E. bicolor*, *Dalzell, in Hooker's Journ.* iii. 43.

Western Ghauts, *Dalzell, in hb. Stocks.* (23); Concan, *Law, in hb. Hooker.*

Much like *E. herbacea*; but the spike is longer and more slender, and the flowers are not half the size. Moreover the spur is longer, and the middle lobe of the lip obovate with long fringes on the veins.

164. *E. campestris*, *Lindl.* l. c. (*E. ramentacea*, *Wight, Ic.* 666.)

Western India, *Jacquemont* (653 in *Herb. Mus. Par.*); plains of Rohilcund, *T. T.* (218).

Both these, especially *Jacquemont's* plant, are taller and more slender than *Wallich's* Oude specimens, but do not appear to differ otherwise.

165. *E. HEMILEUCA*; aphylla, vaginis 4 apice herbaceis, racemis longis laxis subsecundis, sepalis lineari-lanceolatis herbaceis, petalis latoribus planis, labelli trilobi laciniis lateralibus apice rectangularibus acutis intermedia concava crispa, ramentis venarum paucis sparsis, calcare brevi conico.

Plains of Rohilcund, *T. T.* (219).

Sepals green, petals white. The lip is very membranous, with a very few scattered ramenta on the veins of the middle lobe. Next *E. campestris*.

166. *E. PRATENSIS*; aphylla, vaginis caulis 5 acutissimis, racemo laxo multifloro, sepalis petalisque brevioribus oblongis acutis, labello oblato 3-lobato laciniis lateralibus ovatis obtusis intermedia ovata obtusæ subæqualibus venis tribus cristatis, calcare brevi conico obtuso.

Pasture lands in the Deccan, in the cold season, *Stocks* (22 bis. *E. virens*, in *herb. Hooker.*).

Quite a different plant from *E. virens*, to which *Stocks* referred it, known at sight by its short oblong sepals, still shorter petals, and obtuse 3-lobed 3-crested lip.

167. *E. DENSIFLORA*; aphylla, vaginis pluribus obtusis, racemo denso, bracteis inferioribus herbaceis ovario longioribus, sepalis petalisque lineari-lanceolatis his brevioribus, labelli trilobi calcare conico lobis lateralibus rotundatis intermedio ovato crispo, venis tribus fimbriatis, ovario calcaris longitudine.

Bootan, *Griffith*.

I have this by favour of the East India Company, through the good offices of Dr. Royle. It is much larger in all its parts than any other of the aphyllous section. The ovary is not at all longer than the spur.

168. *E. ramentacea*, *Lindl.* l. c. (not *Wight*).

Bootan, *Griffith*.

169. *E. rupestris*, *Lindl.* l. c.

N. W. Himalayas, *Royle, Jacquemont, Herb. Mus. Par.* (53, 47).

170. *E. HASTATA*; aphylla, racemis gracilibus densis multifloris, bracteis setaceis ovario brevioribus, sepalis petalisque linearibus distantibus acuminatis, labello unguiculato hastato trilobo acuminato lamellis 2 altis integris supra unguem ortis ad sinus evanescentibus, calcare brevi oblongo.

Assam, *Griffith*.

The flowers are smaller than in any other of the aphyllous species. The nearly hastate lip, the side lobes curving forwards, and the two deep lamellæ beginning above the unguis and vanishing into mere lines opposite the re-entering angles, are unlike anything else in the genus.

171. *E. STENOPETALA*; aphylla, scapo gracili 3-4-vaginato, racemo brevi, bracteis ovatis acuminatis incurvis ovario longioribus, sepalis secundis petalisque porrectis linearibus æqualibus, labello infundibulari: limbi trilobi lobis lateralibus rectangulis intermedio subrotundo crispamentis 3 parvis fissis sinibus oppositis, calcare elongato apice inflato, foliis hysteranthis gramineis.

Bootan; Panukka on dry hills, Griffith (847, *Itinerary Notes*, p. 164).

Authentic specimens, sent me by Griffith himself, show this to be a slender plant, with a graceful scape 18 inches high, terminated by from 5 to 8 flowers, with large herbaceous bracts ending in fine points. According to Griffith's *Itinerary*, the flowers are purplish with darker veins; at least such seems to have been written by that lamented botanist, as far as can be judged from the wretched state of the printed text.

CORALLORHIZA, *Haller.*

172. *C. INDICA*: floribus subglobosis, sepalis petalisque oblongis æqualibus secundis obtusis, labello unguiculato concavo reflexo lamina subrotundo-quadrata utrinque medio unidentata intus nuda.

N. W. Himalaya; upper part of Hattee? *T. T.* (no number).

A solitary specimen, found by Dr. Thomson, is before me. It has no root, a stout scape a foot high with two distant close-pressed sheaths, a loose spike of 7 flowers, with linear acuminate spreading bracts, the lower of which are empty. The flowers are about $\frac{3}{4}$ inch in diameter. The only flower I have been able to dissect had lost anther and pollen-masses; but I think the plant must belong to the present genus.

The leafy *Corallorhizas* formerly published by me I have now had better means of examining. *C. foliosa* I have redissected; and a second species, from Dr. Thomson, has proved to be in a good examinable state. In both, the pollen-masses are globular, not at all compressed, and in the latter I have found them attached to a true caudicle with its gland. It is therefore clear that they must be separated from *Corallorhiza* and placed near *Eulophia*, from which their pollen-masses distinguish them. A third species is the Siberian *Corallorhiza patens*. The alpine habits of all lead me to propose the name of *Oreorchis* for this small group.

OREORCHIS, gen. nov.

Tuberosa. *Folia* angusta radicalia plicata. *Scapi* simplices distantes vaginati, apice dense racemosi. *Sepala et petala* subæqualia secunda, lateralibus basi obliqua. *Labellum* unguiculatum

cum columna continuum tripartitum membranaceum intus bicarinatum. *Columna* elongata marginata, stigmatē excavato. *Polinia* 4, globosa, disjuncta, caudicula lineari, glandula carnosā.

173. *O. FOLIOSA*; sepalis petalisque oblongo-linearibus, labelli lobis lateralibus ovatis obtusis medianis, carinulis parallelis membranaceis. —Corallorhiza with leaves, *Lindl. in Royle's Botany of the Himalayas*, p. 362.

Mussooree, *Royle*; Lachen in Sikkim, at 11,000–12,000 feet, *J. D. H.* (213), rare.

Sepals red; labellum white dabbled with red. Tuber roundish, the size of sparrow's egg. Leaves from 5 to 15 inches long. Flowers small, somewhat secund. In my sketch of Dr. Royle's plant the lip has two distinct parallel carinulæ terminating opposite the re-entering angles of the lip: in the only imperfect flower from Sikkim which it has been possible to dissect, the carinulæ are short, broad, and acute; yet the plants are indubitably the same.

174. *O. MICRANTHA*; tubere foliis scapoque præcedentis, labelli lobis lateralibus filiformibus basilaribus intermedio apice lunato crispo basi appendice cochleari carnosā instructo.

N. W. Himalayas, 8000–10,000 feet; Yakul Mountain, Kumaon, *T. T.* (214).

Habit exactly that of the last. Flowers not a quarter the size; petals broader than the sepals. Pollen-masses 4, globular, perfectly distinct, on the end of a spatulate caudicle, connected with an oblong fleshy gland. Capsules pendulous, oval, mucronate, not dehiscent in the plant before me.

175. *O. PATENS*; tuberibus ovatis monophyllis in rhizoma approximatis, folio (latiore), scapi vagina in medio lineari herbacea patente, labelli lobis lateralibus linearibus supra basin enatis carinulis 2 clavatis distantibus.—Corallorhiza patens, *Lindl. Gen. & Sp.* 535.

Siberia, *Prescott*.

Flowers intermediate in size between the two preceding; lateral lobes of the lip springing neither from the base nor above the middle, but below the middle.

CYMBIDIUM, *Swz.*

176. *C. aloifolium*, *Swartz*; *Wight, Ic.* 1687??

Nilgherries, *J. D. H.* (234); Sikkim, 1000–3000 feet, *J. D. H.* (228).

The racemes in the Sikkim plant are short, the flowers are rather more fleshy, and the lip shorter than in the southern form. There is however a drawing in Cathcart's collection representing

a plant with leaves 2 feet long, $1\frac{3}{4}$ broad, and a raceme almost as dense as in *C. elegans*. Wight's figure resembles *C. pendulum*; but that does not seem to be a continental species. *C. erectum* (Wight, Ic. 1753) is very near this; I have not seen it.

177. *C. cyperifolium*, Wallich, Cat. No. 7353. (*Cymbidium viridiflorum*, Griff. Itin. Notes, p. 126, No. 454.)

Khasija, J. D. H. & T. T. (267); Bootan, Griffith.

The long leaves of this resemble those of some *Carex*; its long linear-lanceolate bracts far overtopping the flowers; and the linear distant straight lamellæ are quite peculiar.

178. *C. COCHLEARE*; foliis longissimis angustissimis caricinis, racemo debili multifloro, bracteis obsoletis, sepalis petalisque linearibus acuminatis, labello angusto versus apicem dilatato trilobo lamellis in cochlear semiliberum apice confluentibus.

Sikkim, in hot valleys, J. D. H. (235).

The habit is that of *C. cyperifolium*; but the bracts are almost obsolete, the very narrow sepals, petals, lip, and column are full 2 inches long, and the lamellæ of the perfectly bald lip are united into a spoon-shaped process attached by its middle. The form of the end of the lip is unknown to me.

179. *C. eburneum*, Lindl. in Bot. Reg. 1847, t. 67. (*C. syringodorum*, Griff. Not. iii. 338.)

Khasija mountains, Myrung, Griffith.

180. *C. affine*, Griffith, Not. iii. 336, t. 291.

Khasija hills, Surureem, Griffith.

It is impossible to reconcile the statements made for Griffith by his editor, without assuming that some confusion of papers has taken place. This plant, which I have from himself with his own name, is evidently that to which the second description of his *C. densiflorum* applies, and has nothing to do with the first description, which applies either to a variety of *C. elegans*, or to something very near it. The hairy middle lobe of the lip assists in distinguishing this from *C. elegans*, to which it approaches.

181. *C. elegans*, Lindl. Gen. & Sp. Orch. 163, No. 9, Sertum Orchidaceum, t. 14. (*Cyperorchis elegans*, Blume, Mus. Lugd. Bot. i. 48.

C. densiflorum, Griffith, Not. iii. 337, so far as the first description goes.)

Khasija hills, 5000-6000 feet, J. D. H. & T. T. (231); Myrung, Griffith; Darjeeling, Id.; Sikkim, Cathcart, 5000-8000 feet, J. D. H. (232).

This species varies greatly in the number of orange-yellow flowers

collected in its great oblong nodding racemes. In all states it is to be known by the connivent sepals and petals, and probably also by the presence of a pair of teeth near the base of the two contiguous parallel lamellæ. I must however observe, that I cannot find the latter in my specimens of *C. densiflorum*, from Griffith, although he describes them as being present.

182. *C. longifolium*, *D. Don* ; *Lindl.*, l. c.

Sikkim, *Cathcart* ; Khasija, *J. D. H.* & *T. T.* (230).

Flowers appear, from *Cathcart's* figure, to be olive-brown, with a white lip spotted with crimson. The lip is covered with down in the inside, and the appearance of the species is that of a small *C. giganteum*.

183. *C. giganteum*, *Wall. Cat. No.* 7355 ; *Bot. Mag.* 4844.

Khasija, Nunklow on trees, *Griffith* ; Darjeeling, *Id.* ; Sikkim, 5000-7000 feet, *J. D. H.* (227, 233).

Varies much in the size and colour of the flowers and the breadth of the leaves. Among *Cathcart's* drawings, one represents them as dull red on a greenish ground, with the inside of the lip streaked with red, the whole flower being about 3 inches in diameter ; another, on the contrary, represents them as nearly 5 inches in diameter, with deep bright-green whole-coloured sepals and petals, and a yellowish lip, the inside of which is profusely dotted with crimson.

184. *C. MICROMESON* ; foliis linearibus loratis basi canaliculatis rigidis racemo erecto paucifloro longioribus, perianthio membranaceo patente, labello cuneato glaberrimo basi conspicue saccato laciniis lateralibus rotundatis intermedia unguiculata oblata biloba apiculata multo minore lamellas 2 filiformes crenulatas emittente versus medium labelllum evanescentes.

Khasija, *Griffith*.

For this curious species I am indebted to the East India Company, by whom it was communicated with many other of *Griffith's* plants, through my friend *Dr. Royle*. The great bag formed between the bases of the column, lip, and lateral sepals, the long lip smooth, wedge-shaped, with a very small double purple middle lobe, from which run down two smooth crenated lamellæ, disappearing before they reach the middle of the lip, are like nothing else in this genus.

185. *C. chloranthum*, *Lindl. in Bot. Reg.* 1843, *Misc.* 102. (*C. variciferum*, *Rchb. f. in Bonplandia*, Oct. 15, 1856.)

This is not among the collections before me. I learn from *Prof. Reichenbach* himself that his name has to be cancelled.

186. *C. sinense*, Willd.

Khasija, at 1500 feet, *J. D. H. & T. T.* (226).

This does not seem to differ from the Chinese plant.

187. *C. ERYTHRÆUM*; foliis angustis acutis racemis multifloris brevioribus, bracteis minutis, sepalis lanceolatis, petalis angustioribus patentissimis falcatis, labello convoluto intus tomentoso apice æqualiter trilobo laciniis rotundatis recurvis lateralibus planis intermedia crispa lamellis contiguis rectilineis pilosis apice confluentibus.

Sikkim, in hot valleys, *J. D. H.* (229).

“Panicule varies in length and density, flowers in size and colour. Upper and back part of column grows over stigma, and whole column very much incrassated.” *J. D. H.*—From the sketches of Dr. Hooker I learn that the sepals of this fine species are spreading, oblong-lanceolate, green with dull-red broken streaks; the petals somewhat narrower, rose-coloured, and curved backwards; the lip yellow, with numerous red streaks on the outside and inside. In the dried flowers the sepals are two inches long.

188. *C. lancifolium*, Hooker, *Exot. Fl.* t. 51. (*C. Gibsoni*, Paxton, *Fl. Garden*, No. 618, *Ic. Xyl.* 301?—*C. javanicum*, Blume, *Bijdr.* 380.)

Khasija, at 4000–5000 feet, *J. D. H. & T. T.* (139); Mishmee hills, lower ranges, Griffith; Sikkim, Cathcart; Java, T. Lobb (187), Reinwardt (“*C. vaginatum*”).

This plant has not appeared among the Hindostan collections, but it seems to be common in the North-eastern Provinces, its track then bending downwards into the Indian Archipelago. That it exists in Java is shown by the specimens above-mentioned from T. Lobb and Reinwardt. Of the only other two Javanese Cymbids that I have seen, one is a grassy-leaved plant allied to *C. ensifolium*, the other is possibly Prof. Blume's *C. cuspidatum*; but nothing certain can be said without examining authentic specimens. *C. Gibsoni* is only a half-monstrous state of this.

CREMASTRA, *Lindl. Gen. & Sp.* p. 172.

189. *C. Wallichiana*, *Id.* l. c.

Sikkim, at 7000 feet, *J. D. H.* (242).

Blume's figure of the Japanese *Hyacinthorchis variabilis* (Mus. Lugd. Bot. i. t. 16) differs in no respect whatever from the Indian plant, except in having a short shrivelled appendage of the lip instead of a long cucullate one. If this is really so, the species would seem to be distinct; if not, not.

CYRTOPERA, *Lindl.*

190. *C. bicarinata*, *Lindl. Gen. & Sp. Orch.* 189.

Griffith's *Cymbidium*, Not. iii. 343, No. 9, is certainly this, and it is to that description, not to No. 8, that his figure 319 belongs. The description of No. 8 has nothing to do with any species of *Cymbidium*, *Eulophia*, or *Cyrtopera*.

191. *C. CANDIDA*; foliis oblongis acutis petiolo æqualibus, bracteis subulatis ovario æqualibus, sepalis lineari-lanceolatis, petalis oblongis apiculatis brevioribus duplo latioribus, labelli trilobi lobis lateralibus ovatis obtusis intermedio subrotundo crispo apiculato recurvo multo brevioribus tuberculis 2 rotundis versus basin venisque 3 majoribus carnosis elevatis.

Sikkim, *Cathcart, J. D. H.* (241).

Corm orbicular, covered with coarse shreds. Flowers rather before the leaves, greenish white, except the sepals, which are herbaceous. The base of the column is saccate, but the lip is merely concave. Anther fleshy, triangular, stained with crimson. In a dried state it is much like *C. tricarinata*.

192. *C. fusca*, *Wight, Ic.* t. 1690.

Nilgherries, *J. D. H.* (215).

Wight's figure is a good one, except that the lower half of the veins on the lip is represented as scabrous, like the upper half, while in reality it is perfectly smooth.

193. *C. flava*, *Lindl. l. c.* = *C. Cullenii*, *Wight, Ic.* 1754, no doubt.

194. *C. ensiformis*. (*Eulophia exaltata*, *Rchb. f. in Bonplandia*, Feb. 15, 1857.)

Philippines, *Cuming*.

An authentic specimen, though but a single flower, from Prof. Reichenbach, enables me to identify his *E. exaltata*, which is certainly a genuine *Cyrtopera*. I am unable to find on the lip the elevated keels which my learned friend describes. What I find is a somewhat fleshy middle lobe, hollowed out like a spoon, and compressed between the lateral lobes. This being smaller than some other *Cyrtoperas*, I am obliged to change the specific name; that of *ensiformis* indicates one main feature of the species whose leaves are as long, straight, and narrow as any *Iris* or *Gladiolus*.

195. *C. squalida*, *Rchb. in Bonpl.* Feb. 15, 1857. (*Eulophia squalida*, *Lindl. in Bot. Reg.* 1841, *Misc.* 164.)

Philippines, *Cuming*; Borneo, *T. Lobb*.

I assent to the removal of this from *Eulophia*, although the

short spur may almost as well be referred to the labellum as to the column.

196. *C. MYSORENSIS*; foliis oblongis petiolo longioribus, bracteis subulatis ovario æqualibus, sepalis lineari-lanceolatis carinatis apiculatis, petalis planis minoribus? labello oblongo indiviso crispo apiculato intus nudo.

Mysore, *Law in hb. Stocks.* (56).

A plant with the habit of *C. fusca*, but widely different in the structure of the lip. Owing to the bad state of my specimen, I am uncertain whether the petals are really much shorter than the sepals, or not.

197. *C. SANGUINEA*; aphylla, discolor, tubere crasso oblongo articulato, scapo trivaginato, bracteis lineari-lanceolatis ovario longioribus, sepalis oblongo-lanceolatis, petalis ovatis brevioribus, labello obsolete trilobo apice rotundato recurvo, anthera mucronata.

Sikkim, *Cathcart*; at 4000-5000 feet, *J. D. H.* (223 & 361).

Plant from 1 foot to more than 2 feet high, of one uniform dull-greenish crimson tint, except the lip, which is rose-colour. The petals are not much more than $\frac{2}{3}$ the length of the very acute sepals, which are rather more than 1 inch long. The inside of the lip is free from lamellæ or other processes, but is obscurely papillose on all the veins.

There is a *Cyrtopera* from Sumatra with dense pyramidal racemes of dull-purple flowers among Professor De Vriese's drawings, where it is called *Cymbidium geophilum*; but I have seen no specimen. It seems to be different from this.

SACCOLABIUM, *Blume.*

198. *S. guttatum*, *Lindl. Gen. & Sp. Orch.* 220.

Chittagong, *Col. Fielding*; Kamaon, in the Simai valley, *J. D. H.* (185); Sikkim, in hot valleys, *Id.* (184).

It may be doubted whether either *Saccolabium Blumei* (which is *S. Rheedii* of Wight's Ic.), or *S. macrostachyum* (*Sertum, Orch. t.* 47), are distinct from this common species, notwithstanding the difference in the form of the middle lobe of their lip and some other circumstances. At least I have from Java a plant gathered by Mr. T. Lobb, which combines the præmorse leaves of *S. guttatum* with the short spike and retuse lip of *S. Blumei*.

199. *S. GURWALICUM*; subacaule, radicibus maximis compressis, foliis canaliculatis distichis truncatis spicis simplicibus longioribus, sepalis petalisque obtusis, labelli calcare late conico rotundato compresso

intus hirto lamina carnosa concava unguiculata subtriloba, fructu ovali brevi trialato ligneo.

Gurwhal, N.W. Himalaya, at 3000 feet of elevation, *T. Thomson* (181); Gunai valley, Kamaon, *Id.* (185).

A very distinct plant, nearly allied to *S. guttatum*. The raceme in my specimen is not more than 3 inches long, and very dense; the lateral sepals are considerably larger than the petals and dorsal sepal. The ripe fruit is not above a quarter the size of that of *S. guttatum*, almost exactly oval, and much harder.

200. *S. calceolare*, *Lindl.* l. c.; *Griff. Notul.* iii. 356. t. 334. (*Vanda pulchella*, *Wight, Ic.* t. 1671.)

Base of Khasija, *J. D. H. & T. T.* (187); Sikkim, in hot valleys, *Id.* (187), *Cathcart*; Java, *T. Lobb.* (339.)

A most variable plant, constant in little except the extremely acuminate unequal-sided points of the leaves. The middle lobe of the lip is sometimes a mere ciliated rim, sometimes a deep triangular fringed plate, and occasionally quite entire. The leaves vary in breadth from $\frac{1}{3}$ th of an inch, as in Griffith's figure, to $\frac{4}{5}$ ths, as in Hooker's Khasija specimens. The Java plant has the leaves less unequal at the end, and acuminate, and appears to be smaller than the Indian forms, one of my specimens not being more than $\frac{1}{4}$ inch high. In all cases the flowers would seem to be spotted, with the sepals and petals fleshy and oblong.

201. *S. obliquum*, *Lindl.* l. c.

Khasija, *J. D. H. & T. T.* (189).

A careful examination of flowers in spirits does not enable me to point out any important distinction between this and *S. calceolare*; so that the broad leaves with very blunt ends afford the only available specific character. Dr. Hooker writes on his label, "flowers exactly as in 188 (*S. calceolare*), but larger and whiter." The sepals and petals appear to be also narrower.

202. *S. intermedium*, *Griff.* MSS. (Sacc. no. 4, *Griff. Not.* iii. 357).

Khasija hills: Moosmai, Oct. 1835, *Griffith*.

I have this from the author. It is much like *S. calceolare*, but is more caulescent and more fleshy, with scarcely any appearance of a second lobe on the thin extremely acuminate end. The flowers are not half the size, with much narrower sepals and petals. The lip is, moreover, almost exactly hemispherical. It seems distinct.

203. *S. acutifolium*, *Lindl.* l. c. (*S. denticulatum*, *Paxton, Mag. Bot.* vii. 145; *Bot. Mag.* t. 4772.—*Saccolabium*, *Griff. Itin. Not.* p. 46, no. 713; *Notul.* iii. t. 333.)

Sikkim, *Cathcart*; at 5000 feet, *J. D. H.* (367); Khasija, *Griffith*.

This has numerous flowers on long stalks at the end of a stout peduncle; and the very fleshy leaves are convex and acute. It is also quite different from *S. calceolare* in its decidedly caulescent habit. The flowers are whole-coloured, yellowish-brown, unspotted, with the lamina of the lip broad, triangular, and marked with a circular collection of crimson spots in the very disk. Griffith's plant is a narrow-leaved small state, as compared with the Sikkim form, which has twenty flowers at the end of a stout peduncle $2\frac{1}{2}$ inches long. I have seen no specimen; and the Indian drawing, after which the definition in the Gen. & Sp. was prepared, seems to have been misunderstood.

No Indian collection yet examined by me has contained a plant that answers to the account of *S. dasypogon*.

204. *S. micranthum*, Lindl. l. c.

Bootan, Griffith; Mergui, Id.

205. *S. niveum*, Lindl. l. c.

Ceylon, Thwaites, in the Hewahette district.

206. *S. gemmatum*, Lindl. in Bot. Reg. 1838, misc. 88; Rchb. fl. in Bonplandia, Oct. 15, 1856.

Sikkim, at 4000-6000 feet, J. D. H. (209); Ceylon, Gardner, in hb. Hooker. (872).

This has much the appearance of the last; but the petals are short and obtuse, the leaves much broader, the racemes longer, and the flowers blood-red, except the lamina of the lip, which is white, with the two lateral short lobes greenish, succulent, and resembling oblong glands. The flowers are scentless (J. D. H.). I have it from Griffith without locality.

207. *S. PACHYGLOSSUM*; foliis semiteretibus spicis paniculatis subæqualibus, sepalis carinatis oblongo-linearibus apice secundis, petalis linearibus, labelli calcare oblongo leviter arcuato limbo carnoso unguiculato apice dilatato plano-subrotundo dorso convexo.

Borneo, T. Lobb.

Flowers not half as large as in the two last, which it much resembles. Sepals remarkably fleshy, narrow, with their points recurved, while from between the laterals projects the lamina of the labellum in the form of a minute spoon.

208. *S. RAMULOSUM*; caulescens ramosum, foliis semiteretibus angustissimis recurvis, floribus (minutis) paniculatis clausis carnosis, sepalis oblongis carinatis, petalis brevioribus retusis, labello apice plano-convexo calcare oblongo.—*Schænorchis paniculata*, Blume, Bijdr. 362.

Java, De Vriese.

This wants the peculiar column of *Schœnorchis*, and is in no respect distinguishable from *Saccolabium*. The leaves seem to vary much in size.

209. *S. CHIONANTHUM*; foliis teretibus recurvis spicis simplicibus æqualibus, floribus (minutis) carnosis, sepalis obtuse carinatis petalisque minoribus apiculatis, labello apice appendice plano-convexa triangulari instructo calcare horizontali oblongo, anthera apice lineari elongata erecta.—*Schœnorchis micrantha*, Blume, *l. c.*

Java, *Reinwardt*.

Like the last, this is quite without the essential character of *Schœnorchis*. The whole plant is only 4 or 5 inches long, with minute snow-white flowers.

210. *S. ampullaceum*, *Lindl. in Sert. Orch. t. 17.* (*S. rubrum*, *Id. Gen. & Sp. no. 11.*—*Aerides ampullaceum*, *Roxb. Fl. Ind. iii. 476.*)

Sikkim, in hot valleys, *J. D. H.* (196).

The flowers are rather larger than in Wallich's specimens. *S. miniatum* (*Bot. Reg. 1848, t. 58*) differs in little except colour, varying greatly in the size of its flowers.

211. *S. brevifolium*, *Lindl. l. c. no. 27.*

Ceylon, *Thwaites* (488.—*S. virescens*, *Gardner MSS.*), *Gardner* (871).

The form sent from Ceylon by Thwaites appears to be identical with the original plant, except in having the flowers green instead of red.

212. *S. gracile*, *Lindl. l. c.*

Ceylon, *Gardner* (869); Hautane, *Champion*.

213. *S. PALLENS* (*Cathcart, MSS.*); caulibus longis pendulis ramosis radicantibus, foliis carnosis loratis oblique obtusis, racemis axillaribus laxis flexuosis foliis brevioribus, sepalis petalisque oblongis æqualibus, calcare cornuto duplo longiore, limbi 3-lobi laciniis parvis subæqualibus lateralibus rotundatis intermedia acuta.

Sikkim, *Cathcart*.

I have seen no specimen of what seems a very distinct and handsome species; the above description is taken from a figure of Mr. Cathcart. The plant is represented as having branches 9 inches long, protruding strong free flexible roots as long or longer than themselves, leaves 8 inches, and loose zigzag racemes 4-5 inches. The flowers are whitish, with a pink line in the middle of each sepal and petal, and on the outside of the long curved spur. It is very near the next species; but the flowers are much larger, and the middle lobe of the lip, instead of being as long as the spur, is merely a triangular point.

214. *S. Wightianum*, *Lindl. l. c.*; *Wight, Ic. t. 917.* (*Aerides radicosum*, *A. Rich. in Ann. Sc. 2 ser. xv. p. 65, t. 1. fig. C.*
Courtallum, *Wight (907)*; *Nilgherries*, *Perrottet (75 Herb. Mus. Par.)*;
Khasija, *T. Lobb.*

Like the last, except in the circumstances already mentioned. In my specimen the lip has sharp lateral triangular lobes, and a middle one acute, rather fleshy towards the base, but thin and slightly crenulate above the middle. A. Richard's plant, which came from the neighbourhood of Ootacamund, is certainly to be referred here.

215. *S. DISTICHUM*; caulibus elongatis filiformibus, foliis lanceolatis setaceo-acuminatis distichis, pedunculis paucifloris terminalibus et axillaribus, sepalis petalisque oblongis carnosissimis, labello calceolari lobo medio semicirculari membranaceo acuto disco didymo carnosio.
Sikkim, 6000–8000 feet, *J. D. H. (206)*; *Khasija*, 5000–6000 feet, *Id. (83).*

A very peculiar species, probably most nearly allied to *S. acutifolium*, and remarkable for its long weak stems and fleshy distichous leaves about an inch long. The middle lobe of the lip is not exterior to the two others, and it has a remarkable glandular convex double disk.

216. *S. ringens*, *Lindl. l. c.*, is *S. rubrum*, *Wight, Ic. t. 1673*, a good figure, but not the plant of the Genera and Species Orch.

217. *S. VIRIDIFLORUM*; acaule, foliis (2) oblongis planis obtusis emarginatis, pedunculo laterali bivaginato paucifloro foliis multo brevioribus, sepalis petalisque unguiculatis obtusis, labello ovali nudo calcare infundibulari incurvo æquali. *Micropera viridiflora*, *Dalzell, in Hooker's Journal*, iii. 282.

Western India, *Dalzell, in hb. Hooker.*

Very near *Æceoclades pusilla*, but with much shorter spikes, and fleshy, not membranous, flowers. This *Æ. pusilla*, with *flexuosa*, *paniculata* (*Sacc. parvulum*, m.), and perhaps *tenera*, are *Saccolabia*, while others are certainly *Angræca*; and it is probable that *Æ. maculata* is the only plant to which the generic name will attach.

Note.—The *Sarcanthus roseus*, *Wight, Ic. 1685*, and *filiformis*, *Ic. 1684*, are certainly species of this genus, and perhaps not distinct from each other. I have seen no specimens.

Saccolabium papillosum of the same author, *Ic. 1672*, is not *Acampe papillosa*, nor do I recognize it.

PODOCHILUS, *Blume.*

218. *P. densiflorus*, *Bl. Rumphia*, iv. p. 43.
Borneo, *T. Lobb.*

219. *P. lucescens*, *Blume, Bijdr.* 295, t. 12.

Borneo, in Sarawak, *T. Lobb*.

The unguiculate labellum, with a pair of appendages at its base, and the absence of all cohesion between the labellum and lateral sepals, are characters at variance with the usual structure of this genus; and yet it is the original typical species.

220. *P. cultratus*, *Lindl. Gen. & Sp.* p. 234.

Sikkim, in hot valleys, *J. D. H.* (1); Assam, *Griffith, Masters*.

It is remarkable that all the specimens examined by me continue to be without flowers.

221. *P. microphyllus*, *Lindl. l. c.*

Khasija, at 3000 feet, *J. D. H.* (84); Penang, *Gaudichaud*.

Blume's *P. scalpellifolius*, which I have not seen, if accurately dissected by his artist, differs in the lip being linear, not broad at the base, and cordate; and in the sepals being almost wholly united, like some species of *Tæniophyllum*. In general appearance it is undistinguishable from this.

Note.—Blume's *Cryptoglottis serpyllifolia*, which I have from *T. Lobb*, gathered in Borneo, is only a *Podochilus* with an excessive development of the lateral sepals into a long spur: the basal processes of the lip are analogous to those of *Podochilus lucescens*.

CAMAROTIS, *Lindl. Gen. & Sp.* p. 219.

222. *C. purpurea*, *Lindl. l. c.* Sertum Orch. t. 19.

E. Bengal, Chittagong, and base of Khasija, *J. D. H. & T. T.* (186).

223. *C. pallida*. (*Micropera pallida*, *Lindl. l. c.*)

This is not among the collections recently placed in my hands. It is undoubtedly nothing more than a *Camarotis*.

224. *C. PHILIPPINENSIS*; folio oblongo oblique obtuso, racemis arcuatis multifloris, sepalis lateralibus liberis labello suppositis, labello subtriangulâri saccato-cucullato apice carnosâ tridentato incurvo.

Philippines, *Cuming*.

Flowers larger than in either of the former, somewhat triangular in the bud, apparently fleshy. There is no adhesion between the sepals and labellum, as in *C. purpurea* and *pallida*, on which account the generic character requires to be modified; and the same is the case in my *Saccolabium fasciculatum*, as Prof. Reichenbach has suggested, if indeed the leaves and loose flowers of that species really belong to the same plant.

MICROPERA, *Dalzell*.

225. *M. maculata*, *Dalzell*, in *Hooker's Journal*, iii. 282.

On trees near Tulkut, in the Western Ghauts, in lat. 16° N., *Dalzell*, in *hb. Stocks*. (25).

I have already stated that my genus *Micropera* must be reduced to *Camarotis*. The present plant, which seems not to be referable to any known genus, may as well, however, retain the name. Mr. *Dalzell's* account of it is good as far as it goes, describing correctly the very curious lip, which looks like a side saddle with two horns instead of one,—the pouch, into which there is an opening only between the horns, being almost concealed by the lamina; which hangs down in the manner of saddle-flaps. The column, which Mr. *Dalzell* does not mention, falls back, is small, short, semiterete, with a vertical rostellum pointing downwards, and dividing into a pair of broad scissor-like blades. Upon this lies a great oblong gland, to which is attached an obovate channeled membranous caudicula.

N.B. *Micropera viridiflora*, *Dalzell*, is *Saccolabium viridiflorum*, No. 217.

STEREOCHILUS, n. gen.

Acaulis. *Folia* lorata, apice obliqua. *Racemi* laterales, laxi, flexuosi, pauciflori (hirti). *Sepala* et *petala* subæqualia patentissima, lateralibus labello leviter adnatis. *Labellum* solidum, carnosum, sacciforme, facie superiore concava basi bicorni. *Columna* recta, teres, basi haud producta, rostello horizontali subulato. *Pollinia* 4, oblonga, omnino distincta, caudicula setacea, glandula minutissima.

This genus is near *Camarotis*, from which it differs in its solid bag-shaped lip with a pair of horns at the base, in its setaceous caudicula, and in the 4 oblong pollen-masses being perfectly distinct from each other.

226. *S. hirtus*.

Khasija, at 5000 feet, *J. D. H. & T. T.* (177).

Leaves narrow, rather more than 4 inches long by $\frac{3}{8}$ ths wide. Racemes 7–8-flowered. Flowers less than $\frac{1}{2}$ an inch in diameter, free from the coarse short hairs that clothe the ovary and pedicels.

SCHENORCHIS, *Blume*.

227. *S. juncifolia*, *Blume*,

Seems to be the only species, if the genus is characterized by the two long erect filiform processes of the column. Otherwise there is nothing sufficient to distinguish the genus from *Sacco-*

labium, to which *Schænorchis paniculata* and *S. micrantha* certainly belong.

SARCANTHUS, *Lindley*.

228. *S. peninsularis*, *Dalzell*, in *Hook. Journ.* iii. 343. (*S. pauciflorus*, *Wight, Ic.* 1747).

Western India, *Dalzell*; Malabar, on trees, *Jerdon (Wight)*.

Specimens of this from *Dalzell* occur in Stocks's Herbarium now at Kew; and I also have it in a very young state from Dr. *Wight*, whose figure is by no means so good as usual. (*Wight's* three other *Sarcanthi* belong to *Saccolabium*.) *Griffith's Sarcanthus secundus*, *Not.* iii. 363, t. 336, from Suddyah in the Mishmee hills, seems to be this, which, if so, will no longer be merely a western plant.

229. *S. pallidus*, *Lindl. Bot. Reg.* 1840, *misc.* 185. (*S. tricolor*, *Rchb. f. in Bonplandia*.—*Saccolabium racemiferum*, *Lindl. Gen. & Sp. Orch.* 224, no. 24.)

Khasija, at 4000 feet, *J. D. H. & T. T.* (178), also found in Mr. *Raban's* garden, E. Nepal, *J. D. H. (id.)*.

This differs in no respect whatever from the garden plant. *Prof. Reichenbach's* synonym is derived from a communication from that learned Orchidologist.

COTTONIA, *R. Wight, Ic.* no. 1755.

230. *C. macrostachya*, *Wight*, l. c. (*Vanda peduncularis*, *Lindl. Gen. & Sp.* p. 216.)

S. Concan, *Dalzell*, in *hb. Stocks.* (4).

231. *C. Championi*, *Lindl. in Hook. Journal*, vii. p. 35.

Khasija, at 3000–4000 feet, *J. D. H. & T. T.* (190).

This seems to be in no respect different from the plant found by *Champion* on *Victoria Peak* in *Hong Kong*, and thus affords another remarkable instance of epiphytal Orchids occurring in stations widely remote, without, as far as we at present know, any intervening locality.

UNCIFERA, gen. nov.

Caulescens. *Folia* disticha, subcarnosa. *Racemi* densi, oppositifolii. *Sepala* libera, erecta, obtuse carinata, æqualia. *Petala* paulo minora, retusa. *Labellum* infundibulare, in calcar retrorsum uncatum vacuum productum, membranaceum leviter trilobum, apice carnosum. *Columna* teres, decurva, apice dilatata, biauris, area stigmatica horizontali prona. *Anthera* apice membranacea, elongata, bidentata. *Caudicula* maxima, cartilaginea deorsum canaliculata supra medium dilatata, apice in falcem obtusam contracta cujus acies labellum respicit. *Pol-*

linia 4, arctissime geminata, æqualia, aciei falcis per ligulas 2 elasticas adnata. *Glandula* longissima, cartilaginea, sagittata.

232. *U. OBTUSIFOLIA*; foliis latis loratis obtusis oblique bilobis, petalis 3-veniis, labelli margine utrinque 1-dentato apice retrorsum bidentato, calcare apice inflato.

Base of Khasija, *J. D. H. & T. T.* (194).

Flowers twice as large as in the following.

233. *U. ACUMINATA*; foliis lanceolatis oblique acuminatis obtusis petalorum venis 3 cis apicem evanescentibus, labelli 3-lobi lobis lateralibus rotundatis intermedio brevi tereti carnosio obtuso, calcare acuminato.

Assam and Khasija, *Griffith*; base of Khasija, *J. D. H. & T. T.* (193).

Flowers much smaller than in the last. Spur of lip tapering to the point. Petals 3-veined, as in *U. obtusifolia*; but the veins stop short of the blunt end, instead of running out.

Of this very curious genus the two species exactly agree in their column and its parts, although so different in the details of the petals and lip. I know of no parallel to the terete column, bent down till the stigma is brought into a horizontal position, looking down as it were into the spur; or to the singular caudicle, which after expanding laterally from its narrow point, and bending down its sides so as to form an arch over the anther-bed, which is here the apparent back of the column, suddenly contracts into a process like a billhook, the edge of which faces the front and bears the pollen-masses. The abruptly hooked lip, which has suggested the name, is itself unlike anything among Indian Orchids.

ANGRÆCUM, *Thouars.*

The only Indian species that I have seen of this African genus is the following:—

234. *A. ZEYLANICUM*; subacaule, foliis lanceolato-loratis lobo altero apicis elongato subfalcato, racemis filiformibus paucifloris duplo longioribus, sepalis petalisque acuminatis æqualibus, labello cochleato acuminato calcare horizontali clavato.

Ceylon, at Narawelle, *Champion.*

Very like *A. caulescens*; but the leaves are broad, 10 inches long, with one of the terminal lobes much longer than the other, and the spur not inflated at the point. I have not seen the column in an examinable state.

AERIDES, *Loureiro.*

235. *A. Wightianum*, *Lindl. Gen. & Sp.* p. 238. (*A. testaceum*, *Id.* —*Vanda parviflora*, *Lindl. in Bot. Reg.* 1844, *misc.* 57.)

Ceylon, Tangalle, *Champion*; Concan, *Law*, in *hb. Hooker.* (183).

236. *A. cylindricum*, *Lindl.* l. c.; *Wight, Ic.* 1744; *Bot. Mag.* 4982. Nilgherries, *J. D. H.* (210); Sikkim, at 5000 feet, *Id.* (210).

237. *A. tæniale*, *Lindl.* l. c. (*Aerides carnosum*, *Griff. Not.* t. 338 A.) Bootan, *Griffith*; Khasija mountains, up to 3000 feet, *J. D. H. & T. T.* (191).

“Flowers pale lilac,” *J. D. H.* In the Khasija specimens the leaves are from 4 to 5 inches long, and 1 to 1½ inch broad.

238. *A. affine*, *Wallich, Cat.* no. 7316; *Sertum Orch.* t. 15; *Bot. Mag.* t. 4049, bad. (*A. roseum*, *Loddiges*; *Paxton, Fl. Gard.* t. 60.—*A. trigonum*, *Klotzsch, fide Rehb. f.*)

Plains of E. Bengal and Assam, *J. D. H. & T. T.* (185); Assam and Bootan, *Griffith*.

Among the many specimens I have seen, flowers have occurred in drooping and upright racemes, deep crimson and pale rose, with the lip and other parts acute or obtuse, all which are therefore marks of one and the same variable species.

239. *A. odoratum*, *Loureiro*.

Base of Khasija, up to 2000 feet, *J. D. H. & T. T.* (182); Garden of Saharunpore, *Id.*; Sikkim, in low valleys, *J. D. H.*

240. *A. crispum*, *Lindl. Gen. & Sp. Orch.* p. 239; *Bot. Reg.* 1842, t. 55; *Bot. Mag.* t. 4427. (*A. Brookei*, *Bateman, in B. R.* 1841, *misc.* 116.—*Saccolabium speciosum*, *Wight, Ic.* t. 1674.)

Concan, *Law, in hb. Hooker.* (268); *Dalzell, in hb. Stocks.* (75).

Several varieties of this beautiful plant are in our gardens. The flowers in *A. Brookei* are rather smaller than usual.

241. *A. Lindleyanum*, *Wight, Ic.* t. 1677.

“On clefts of rocks bordering the Kartairy falls below Kaitie; also on rocky clefts on a high hill over Coonoor, flowering nearly the whole year,” *R. Wight*; Nilgherries, *T. T.* (208).

One of the finest of its order, the flowers being larger than in either *A. crispum* or *falcatum*, and in larger more branching panicles. For this reason the localities given by Wight are stated exactly, in the hope that some collector may send it home. In front of the opening into the spur stands a pair of large curved tubercles, which have not been observed in *A. crispum*.

242. *A. difforme*, *Wallich, in Lindl. Gen. & Sp.* 242.

Khasija, at 3000–4000 feet, *J. D. H. & T. T.* (204), *Griffith*.

This, which is the plant that Wallich had before him, seems to differ from the following in having smaller flowers, with the middle lobe of the lip only 2-lobed, the basal ones longer and a little undulated, and the leaves more tapering to the base. This I learn in part from careful dissection, and in part from one of

Dr. Hooker's admirable sketches. The Sikkim plant may therefore be defined thus :—

243. *A. HYSTRIX*; foliis oblongis, petalis linearibus, labelli lobis lateralibus planis intermedio trilobo fimbriato apice recurvo brevioribus. Sikkim, at 4000–5000 feet elevation, *J. D. H.* (204).

The flowers are yellow with crimson streaks along the sepals and petals; the middle lobe of the lip, which is deeply fringed and crimson, consists of two lateral lobes diverging at the base, and converging upwards over a circular recurved middle lobe.

244. *A. decumbens*, *Griff. Not.* iii. t. 320, a Burmese plant, seems to be a true *Aerides*; but I have seen no specimen.

VANDA, *R. Brown.*

To the species described in '*Folia orchidacea*,' the following fine addition to the section *FIELDIA* has to be added :—

245. *V. UNDULATA*; foliis distichis obtusis bilobis pedunculo apice paucifloro triplo brevioribus, sepalis petalisque recurvis membranaceis lineari-lanceolatis undulatis, labello brevioris carnosio cochleato in laminam linearem acutam sub apice tuberculatam producto.

Sikkim, *Cathcart, Ic.*

The whole habit is that of *V. spathulata* and *cærulescens*. The flowers are fully two inches in diameter, with thin white sepals and petals tinged with pink, and a yellow fleshy lip fasciated internally with red lines. I have only seen a drawing prepared by Mr. Cathcart's artists.

TÆNIOPHYLLUM, *Blume.*

246. *T. ALWISII*; minutissimum, spica pauciflora erecta, bracteis carinatis triangulis, perianthii laciniis omnibus connatis acutis conformibus, calcare hemisphærico, polliniis pyriformibus in glandulam sessilibus.

On the branch of a *Symplocos*, Ceylon, *De Alwiz*.

The smallest Orchid I know, the flat roots not being more than $1\frac{1}{2}$ inch long, and the stem, including flowers, $\frac{1}{4}$ inch. The whole plant is pale green, even the flowers having no other colour. Mr. Thwaites, who sent me a drawing of it (and I have seen nothing more), proposed to call it *Alwisia minuta*, after his excellent native draughtsman, who was the first to discover it; and if the figures in Blume and the *Xenia* represent the invariable characters of *Tæniophyllum*, this and *Dendrobium algosum* of Reinwardt's MSS. ought to be distinguished; but Prof. Reichenbach, jun., who has had the opportunity of examining *Tæniophylla*, assures me that this is one, and I possess no materials on which to form an opinion for myself.

CHILOSCHISTA, *Lindl. Gen. & Sp. p.* 219.

247. *C. usneoides*, *Id.*; *Wight, Ic.* 1741.
Sikkim, at 4000 feet, *J. D. H.* (192).

According to Cathcart's drawings, the caudicula is short and broad, with a large semicircular gland, not subulate with a minute gland, as represented by both Wallich's and Wight's artists. The plant seems to be constantly leafless.

ACERAS, *R. Br.*

248. *A. angustifolia*, *Lindl. Gen. & Sp. Orch. p.* 282.
Khasija, 5000–6000 feet, *J. D. H. & T. T.* (280); N.W. Himalaya, 5000–8000 feet, *T. T.*; Sikkim, in hot valleys, *J. D. H.*
Flowers green, in a very long slender spike.

HERMINIUM, *R. Br.*

249. *H. monorchis*, *Id.*
N.W. Himalaya, 8000–12,000 feet, *T. T.* (263); Nutra, W. Thibet, 11,000 feet, *Id.*
250. *H. congestum*, *Lindl. Gen. & Sp. Orch. p.* 305. (*H. unalaschense*, *Rchb. f. Orch. Fl. Germ. p.* 107, t. 65, excluding the syn. of *Platanthera Schischmareffiana.*)
Sikkim, 11,000–12,000 feet, *J. D. H.* (265).

Differs from *H. monorchis* in its erect blunt obovate-lanceolate leaves and entire lip.

SATYRIUM, *Swartz.*

The first knowledge we had of the existence in India of this African genus was derived from the collections of Buchanan Hamilton, from which, in the year 1824, David Don published his *Satyrium nepalense*. In 1838 I became aware of the existence of two others, and described them under the names of *S. Wightianum* and *ciliatum*. Three years later Achille Richard described three others from the Nilgherry collections of Perrottet,—*Perrottetianum*, *albiflorum*, and *pallidum*. Authentic specimens of all these are before me, together with a considerable number from various parts of India, among which is a fine series from Drs. Hooker and Thomson. These materials show, not only that the genus *Satyrium* abounds in individuals, but that it is subject to very great differences of stature, foliage, and inflorescence. I think, however, the three species admitted in 1838 are to be distinctly recognized; but the Nilgherry plants of Achille Richard are not distinguishable from *S. nepalense*, not even his *S. pallidum*, said to have yellow flowers, which is probably a mistake.

The original *S. nepalense* is distinctly known by its somewhat lax inflorescence, large coloured bracts, and spurs as long as the ovary, or longer. The two others have very short spurs. Of these, *S. ciliatum* has a thin inflorescence like that of *S. nepalense* itself; *S. Wightianum* has a very dense inflorescence; both are much dwarfer than *S. nepalense*. The specimens under my examination may be arranged thus:—

251. *S. Nepalense*. *D. Don, Prodr. Fl. Nep.* 26; *Wight, Ic.* 929. (*S. Perrottetianum, Ach. Rich. Ann. Sc. ser. 2. xv.* 76; *Wight, Ic.* 1716. —*S. albiflorum, A. Rich. l. c.*; *Wight, Ic.* 1717. *S. pallidum, A. Rich. l. c.*).

Sikkim, 7000–12,000 feet, stout, like *Gymnadenia*, *J. D. H.* (259); Ceylon, *Macrae* (9); Nilgherries, *Wight, Perrottet* (193, *hb. Mus. Par.*); Mysore, *Stocks* (53); Khasija, *Griffith, Lobb*, 4000–6000 feet, *J. D. H. & T. T.* (259); N. W. Himalayas, *T. T.*

S. Perrottetianum is merely a gigantic state of the species, while *S. pallidum* is its starved form; not, however, the most so, for the old specimens sent from Nepal by Wallich among his earliest collections are still more attenuated.

252. *S. Wightianum, Lindl. Gen. & Sp. Orch.* p. 340; *Wight, Ic.* 1718. Nilgherries, *Perrottet* (191 & 850 in *hb. Mus. Par.*), *Wight*; Khasija, *Lobb*.

A much dwarfer plant than the preceding, with two broad radical leaves suddenly changing to about two great inflated herbaceous sheaths, and an extremely dense blunt spike. Flowers “rubri aut coccinei” according to *Perrottet*, pink according to *Wight*, and smaller than in *S. nepalense*.

253. *S. ciliatum, Lindl. l. c.*

Sikkim, 7000–12,000 feet, *J. D. H.* (259); Bootan, grassy sward above Tongsa, 10,000 feet, *Griffith*.

The very short spurs of this are so different from the long attenuated ones of *S. nepalense*, that I think it must be distinct. Moreover it is a smaller plant with 2–3 spreading herbaceous distant sheaths, but little inflated. In the original specimen the bracts are large and herbaceous, in those from Bootan much smaller and deflexed, the plant varying like *S. nepalense* in that respect.

DIPLOMERIS, *D. Don.*

254. *D. pulchella, Id.*

Khasija, *Griffith*, 2000–4000 feet, *J. D. H. & T. T.* (256).

Flowers pale straw-colour or nearly white, variable in size. Spur green.

POGONIA, *Jussieu*.

255. *P. flabelliformis*, *Lindl. Gen. & Sp. Orch.* 415.

Concan, *Law, in hb. Hooker.* (350); near Dharwar, *Stocks, in hb. Hooker.* (68); Mysore, *Id.* (54).

It is probable that Blume's *Rophostemon concolor* should be referred to this species.

256. *P. carinata*, *Lindl. l. c.*; *Wight, Ic. t. 1720.* (*Pogonia 2, Griffith, Notul. iii. 377, Ic. 345.*)

I have never seen this plant, which appears to be perfectly distinguished by its stout habit, very large tubers, and lip acute and shaggy within, instead of being nearly naked and rounded at the point. Griffith's *Pogonia* No. 2 is evidently the same; of his *Pogonia* No. 1, which seems to be near *P. Juliana*, but distinct, I have seen no specimen.

ERIA, *Lindley, in Bot. Reg.* 904.

This genus, like *Dendrobium*, consists of species extremely dissimilar in habit, and must now receive several supposed genera, created by different authors before the limits could be definitely settled. These are *Conchidium* and *Xiphosium* of Griffith, *Tylostylis*, *Mycarantes*, *Cylindrolobus*, and *Trichotosia* of Blume, and my own *Bryobium* and *Trichosma*. But although no longer admissible as genera, the species collected under these names are for the most part convenient sections.

The careful study of a very large quantity of materials leads me to propose the following classification. In the first place, the species of Griffith's CONCHIDIUM, analogous to the small *Stachyobia* in *Dendrobium*, are readily known by their thin leaves, almost stemless habit, and smooth flowers; such stem as they form is merely a depressed pseudobulb covered by the bases of the leaves. Then follow the species with true fleshy pseudobulbs and nothing more, separable into large-flowered woolly species (DENDROLIRIUM), large-flowered naked species (XIPHOSIUM), large-flowered woolly species with an unguiculate flat roundish lip (TYLOSTYLIS), and small-flowered woolly species (MYCARANTHES), in which the fleshy pseudobulb is sometimes exchanged for a slender cylindrical stem like that of *Trichosma*. Next to these stands TRICHOSMA itself, with its long slender 2-leaved stems, large smooth flowers, and fleshy anther. Another group, HYMENERIA, includes the species with thin sepals and petals, which are usually naked, and short fleshy stems having a few leaves towards the top. The remainder are truly caulescent; among these, four well-marked

subdivisions may be formed: viz. *ERIURA*, remarkable for a tuft or two of wool on the axis of the lip, *TRICHOTOSIA* with coarse shaggy racemes, *CYLINDROLOBUS*, with 1- or 2-flowered peduncles clothed with smooth coloured membranous bracts below the flowers, and finally *UROSTACHYA*, which includes the species that will go into none of the preceding sections.

§ I. CONCHIDIUM, *Griffith.*

This group bears the closest analogy to the second section of *Stachyobium* among *Dendrobia*, like it, consisting of small stemless species, with round or depressed pseudo-bulbs, membranous leaves, and flowers solitary or in few-flowered racemes, for the most part very minute. To this last, however, *E. braccata* and *Lichenora* are exceptions. In *E. pusilla*, *microchilos*, and others, four of the pollen-masses are rudimentary and easily overlooked: in *musciola* and *microchilos*, indeed, I have only succeeded in finding four; but their form, tapering downwards into a point, seems to be a safe mark to separate them from the minute *Dendrobia*.

257. *E. braccata*. (*Dendrobium braccatum*, *L. O.* p. 75.—*Eria reticosa*, *Wight, Ic.* 1637.—*Eria uniflora*, *Dalzell in Hooker's Journal*, iv. 111.) Ceylon, *Macrae, Gardner* (859), *Thwaites* (2356); Horton plains, *Champion* (*Eria velifera*, *R. W.*); Nilgherries, *Wight*; common on trees in the Western Ghauts, in the rainy season, *Stocks* (24).

When this was first published I had been unable to examine the pollen-masses. It varies in the size of the flowers; those from the Western Ghauts, preserved among *Stocks's* plants, are four times as large as the Cingalese, with much more acuminate sepals and petals.

258. *E. Lichenora*. (*Lichenora Jerdoniana*, *Wight, Ic.* 1738.) Malabar mountains, *Wight*.

This remarkable plant is certainly not different from *Eria*.

259. *E. nana*, *Ach. Rich. in Ann. Sc. Nat.* ser. ii. xv. 19. Nilgherries, *A. Richard, Wight* (171, 172).

My authentic specimens from *A. Richard* are identical with *Wight's* 171. His 172 is somewhat different, with flowers as large as those in *Richard's* very bad figure of his *Dendrobium microbolbon*, which looks as if it had been made up from the leaves and flowers of *E. nana*, while the dissections belonged to another plant. The thin broad obovate leaves of this have, however, no resemblance to *Richard's* figure.

260. *E. MUSCICOLA*; foliis binis lanceolatis basi angustatis scapo apice bifloro æqualibus, bracteis cucullatis membranaceis cuspidate herbaceo flore brevioribus, sepalis petalisque lineari-lanceolatis æqualibus ascendentibus, labello lanceolato canaliculato dorso pubescente.

Dendrobium muscicola, *Lindl. Gen. & Sp.* 75.

Ceylon, *Champion, Gardner* (853).

I can only find 4 pyriform pollen-masses in the single flower at my disposal. The whole plant not more than 2 inches high. Flowers resemble those of *Eria nana* on a very small scale. Since it has never been found among collections from the N. of India, it is probable that the old locality "Nepal," was erroneous.

261. *E. microchilos*. (*Dendrobium microchilos*, *Dalzell, in Hooker's Journ.* iii. 345.)

On Mango trees in Western Bengal, *Dalzell, Stocks* (28).

I have this as *D. fimbriatum* of Dalzell, out of Stocks's herbarium; it is certainly distinct from that plant, although very much like it. The flowers are smaller, more fleshy; and the lip is slightly unguiculate, then irregularly widened and thick-edged, after which it contracts into a thin-edged acute apex. Only two pairs of pollen-masses could be found in the flowers I dissected. The tubercles at the base of the lip, spoken of by Mr. Dalzell, I have not succeeded in finding.

262. *E. Dalzelli*. (*Dendrobium Dalzelli*, *Hooker, Journ. Bot.* iv. 292.

Dendr. fimbriatum, *Dalzell*, l. c.—*Dendr. filiforme*, *Wight, Ic.* 1642.)

Western Ghauts, on trees, *Dalzell*; hollow trees in the ruins, *Stocks* (27); Concan, *Law (hb. Hooker.* 166, 91); Bombay Presidency, *Dalzell (hb. Hooker.* 167).

I am not surprised at Mr. Dalzell's having taken this for *E. microchilos*, as he tells us was the case; for the two are exceedingly similar, as is indeed shown by so accurate an observer as Stocks having given the name of *microchilos* to specimens now before me. The flowers are, however, rather larger and less fleshy; the lip is membranous, ovate-lanceolate, and distinctly serrulate towards the point. As to the marginal glands of the sepals, which gave rise to the name *fimbriatum*, they are very evanescent, and I suspect sometimes altogether absent. They are hardly discoverable in Mr. Law's Concan specimens. Imperfect specimens from Ceylon (2353 Hb. Hooker.) probably belong here. Of the eight pollen-masses, four are quite rudimentary.

263. *E. ARTICULATA*; pseudobulbis oblongis in catenæ speciem articulatis, foliis, scapo setaceo flexuoso 5-7-floro, bracteis ovatis cucullatis, petalis acutis multo brevioribus.

Ceylon, *Mrs. General Walker (hb. Hooker.)*; *Gardner*.

Of this singular plant I have a fragment from Gardner, and several are preserved in the Hookerian herbarium, but all without leaves. The pseudobulbs are oblong shrivelled bodies, jointed into a sort of chain or necklace. The flowers are very small and with no elongation of the sepals. Neither lip nor pollen-masses are known to me.

264. *E. pusilla*. (*Conchidium pusillum*, *Griffith*, *Not.* 321. t. cccx.—*Phreatia uniflora*, *Wight*, *Ic.* t. 1734.)

Khasija, *Griffith*; Churra Punjee, *Id.* (666).

This, the original *Conchidium*, has not eight equal pollen-masses, as is represented in the figure of Wight's artist, but they are even more unequal in size than is shown in Griffith's plate. It is not in the Khasija collections formed by Hooker and Thomson.

265. *E. sinica*. (*Conchidium sinicum*, *Lindl.* in *Hooker's Journ.*)
Hong Kong, *Champion* (278).

Differs from the last in the sepals and petals not being acuminate, in the lip being serrated; the scape is both 1-flowered and 2-flowered. I fear, not distinct from the Khasija species.

§ II. DENDROLIRIUM, *Blume*.

If we collect into one group all the large-flowered woolly species with pseudobulbs only, an assemblage will be formed both natural and obvious, to which Blume's happy name of *Dendrolirium* may be applied. Some terete-leaved plants can hardly indeed be said to form pseudobulbs; but their leaves fall eventually from the summit of very short stems altogether analogous to pseudobulbs, although unlike in form. Two divisions are effected by taking into account the form of the leaves.

A. *Leaves flat and broad.*

266. *E. ornata*, *Lindl. Gen. & Sp.* p. 66. (*E. armeniaca*, *Id. Bot. Reg.* 1841, t. 42.)

Moulmein, *Griffith*; Khasija, at 2000 feet, *J. D. H.* (66); Java, *T. Lobb* (219); Philippines, *Cuming*.

267. *E. AERIDOSTACHYA* (*Rehb. f. in litt.*); folio lanceolato-oblongo coriaceo, racemo cylindraco multifloro ferrugineo-tomentoso, bracteis minutis, mento elongato obtuso rectiusculo, labello lanceolato acuto nudo medio involuto basi concavo.

Batavia, *Loddiges*, in hort.

I learn from Prof. Reichenbach that this is among Zollinger's unpublished Java plants. It resembles what I suppose to be the *Dendrolirium sulcatum* of Blume, but is very much more densely tomentose.

268. *E. flava*, *Lindl. in Wall. Cat.* 1973.

Sikkim, hot valleys, 1000-2000 feet, *J. D. H.* (63).

β . RUBIDA; floribus minoribus, petalis virescentibus, labelli lobis lateralibus rotundatis.

Sikkim, *Catcart*.

The type of this plant is the *Dendrobium pubescens* of Sir W. Hooker, well figured and described in the 'Exotic Flora,' t. 124. It is important to observe this, if we are to determine to which of the other nearly-allied woolly species the name belongs. In that plant the lip has scarcely any hairs on the inner surface, and the lateral lobes are extremely short, which is the case with the plants above quoted. The variety β is only known from a native figure; and the account given of it must be judged of accordingly. It looks different, especially as the pollen-masses seem to be long and tapering, not roundish, and plano-convex.

269. *E. ELONGATA*; pseudobulbis ovalibus, foliis lato-lanceolatis coriaceis acuminatis basi angustatis, racemo niveo lanato elongato distantifloro, bracteis ovatis acutis lævibus dorso lanatis, petalis ovalibus subtrinerviis, labelli lobis lateralibus scabro-tomentosis intermedio subcuneato multo brevioribus rotundatis, clinandrio alte marginato.—(*E. flava*, *Griffith, Not.* iii. 301.)

Burma; Moulmein, on trees in damp woods, *Griffith* (346); in woods at Zimjaik, *Id.* (347); Moulmein, *T. Lobb*.

As in *E. flava*, the clinandrium is surrounded by a membrane, which in this species is remarkably deep; the lip has rounded lobes, clothed inside with coarse, scattered felt, and the middle lobe has two obscure raised lines as well as a distinct middle line. That it is perfectly distinct from the last is certain; but it varies in the form of its lip, the 346 of Griffith having the lateral lobes rather acute and falcate instead of rounded, and the middle lobe larger, with a more distinct superficial lamella in the middle.

270. *E. lanata*, *Griffith, Not.* iii. 301.

Mergui, *Griffith* (810).

So much is this in habit like the Sikkim *Eria flava*, that it may be easily mistaken for it; but its petals are linear lanceolate-acuminate, and the long narrow lip has a quadrate cuspidate middle lobe, a long isthmus, and a narrowly wedge-shaped hypochilium with small rounded lobes and three distinct elevated distant ribs. The pseudobulbs are ovate, not oval.

B. *Leaves terete or very narrow.*

271. *E. pannea*, *Lindl. Bot. Reg.* 1842, *misc.* 79. (*E. teretifolia*, *Griff. Not.* iii. 298, t. 300. fig. 2; *Itinerary*, 202, no. 1185.)

Bootan, at 3600 feet, on *Gordonia*, *Griffith*; Khasija, at 2000 feet, and Sikkim, on rocks in hot valleys, *J. D. H.* (62); *T. Lobb*.

A long creeping slender rhizome bears, at intervals of 2 to 4 inches, very short woolly stems, each furnished with from one to four terete fleshy leaves, varying in length from 1 to 6 inches and more, the longest belonging to the Khasija plant. *Griffith's* figure is thus far bad, that I do not find in his own specimens the lip anything like so wavy as he represents it. I have a very similar plant collected in Borneo? by *T. Lobb*, with very short one-leaved pseudobulbs that touch each other, and leaves more linear; but my solitary flower does not bear examination.

272. *E. SICARIA*; pseudobulbis oblongis 1-2-phyllis, foliis linearibus carnosis acutissimis semiteretibus, racemis lanatis lateralibus multifloris folio multo brevioribus, bracteis ovatis patentibus intus glabris, floribus albo lanatis, labello apice convexo apiculato.

Mergui; Tharapown, in woods, *Griffith*.

"*Folia* carnosa, linearia. *Sepala* extus albovelutina, intus cum petalis viridescencia, lateralia maxima purpureo lineata et notata. *Labellum* albofuscum, intus brunneum disco calloso." *Griffith, MSS.*

Very like a narrow-leaved *Eria flava*. Leaves about 6 inches long, resembling slender stiletos, but tapering at the base into a furrowed petiole. My flowers give no more information.

§ III. XIPHOSIUM, *Griff.*

Although this supposed genus is undoubtedly an *Eria*, it may form a section sufficiently distinguished by its large smooth flowers and distinctly-formed pseudo-bulbs. It only differs from *Dendroliria* in the flowers not being woolly.

273. *E. rosea*, *Lindl. in Bot. Reg.* t. 978.

Hong Kong, *Champion* (275).

This certainly differs from the next, with which I formerly confounded it, in its broad blunt lip with the lower half much wider than the upper.

274. *E. carinata*, *Gibson, in Calc. Journ. Nat. Hist.* v. 365. (*Xiphosium acuminatum*, *Griffith*, l. c. c. ic.; *Itin. Not.* 78, no. 1153; *Notul.* iii. 332, t. 316.—*E. rosea*, *Wall. Cat.* 7409.)

Khasija, *Griffith*; Sylhet, *Wallich*.

Differs from the last in having the sepals, petals, and lip acuminate, the middle lobe of the latter being as wide as the hypochil,

which has two continuous, not interrupted, rugose elevated lines. Not among the collections of Hooker and Thomson.

275. *E. SCABRILINGUIS*; pseudobulbis ovatis sulcatis, foliis binis oblongo-lanceolatis trinerviis, racemo oblongo erecto densifloro, labelli trilobi aspero-cristati lobis lateralibus brevibus acutis intermedio rotundato.

Sikkim, *ic. Cathcart.*

Flowers pale green. Lip deep violet. I have seen no specimen of either this or the next.

276. *E. VITTATA*; pseudobulbis oblongis, foliis binis oblongo-lanceolatis 5-nerviis, racemo oblongo elongato pendulo densifloro, labello oblongo costis 3 elevatis marginibusque crispis.

Sikkim, *ic. Cathcart.*

Flowers larger than in the last, pale green with crimson stripes; lip the same colour, but paler.

§ IV. *TYLOSTYLIS*, *Blume, Fl. Jav. p. vi.* (*Callostylis, Id. Bijdr. 340.*)

The long slender curved column and unguiculate roundish undivided lip of these plants make it convenient to place them in a section by themselves, especially considering their peculiar inflorescence, consisting of flat round woolly horizontal bracts.

277. *E. pulchella*, *Lindl. in Wall. Cat. no. 7407; Bot. Reg. 1841. misc. 106.*

Malacca, *Cuming.*

This is possibly the *Callostylis rigida* of Blume's Tabellen, 74; but if so, the figure is a bad one.

278. *E. DISCOLOR*; pseudobulbo in caulem subarticulatum extenso, labello oblongo subcordato acuto glabro concolore.

Sikkim; Glen Cathcart, 3000-4000 feet, *J. D. H. (168).*

I have seen no flower of this, and therefore trust to one of Mr. Cathcart's drawings, and a solitary specimen of the stem and leaves. It is much like the last; but the lip appears to be longer than broad, as well as whole-coloured and smooth, while in *E. pulchella* it is broader than long, yellow with a small purple disk, and conspicuously tomentose.

§ V. *MYCARANTHES*, *Blume.*

The only species figured by Blume, *M. latifolia*, is an *Eriura*. Whether his *M. obliterated* and *lobata* belong to the same section is uncertain, nothing being known about them. With me, the

species are only the following, easily known by their dense spikes of small woolly flowers, the lateral sepals of which have scarcely any obliquity.

279. *E. stricta*, *Lindl. Coll. Bot.* t. 41 B. (*E. secundiflora*, *W. Griff. Not.* iii. 302. t. 301.—*Mycaranthes stricta*, *Lo.* 63; *Wight, Ic.* 1733.)

On the Naga hills, on a species of *Gordonia* at the elevation of 3500 feet, *W. Griffith*; Darjeeling, *Id.*; Malacca, *Id.* fide cl. *Wight*; Sikkim, at 3000 feet, and Khasija, at 4000 feet, *J. D. H.* (59).

280. *E. retusa*, *Rchb. f. in Bonplandia*, March 1, 1857. (*Phreatia retusa*, *Lindl. Orch.* p. 64.—*Dendrolirium retusum*, *Blume, Bijdr.* 351.

—*Bryobium pubescens*, *Lindl. in Bot. Reg.* 1838, misc. no. 145.)

Java, *Zollinger*.

The extrication of this synonymy is due to Prof. *Rchb.* fil.

281. *E. MERGUENSIS*; caulibus cæspitosis carnosis clavatis, foliis pyræceis oblongis basi angustatis apice obliquis uncinulatis, spicis lateralibus elongatis griseo-tomentosis pedunculo evaginulato, floribus (minimis) pilosis, labello trilobo infra isthmum transverse lamellato.

Mergui, *Griffith* (1034); Moulmein, *Lobb*.

Something like a small specimen of *E. stricta*; but the stems are fleshy and clavate, the flowers much smaller and not secund, and the lip quite different.

§ VI. TRICHOSMA, *Lindl. in Bot. Reg.* 1842, t. 21.

Now that the limits of the genus *Eria* begin to be understood, I must admit that Prof. Reichenbach is right in reducing to its ranks my genus *Trichosma*, notwithstanding its very peculiar habit. It will now, therefore, stand as a section, distinguished by its great fleshy anther and long slender 2-leaved stems, resembling those of a gigantic *Pleurothallis*.

282. *E. suavis*. (*Trichosma suavis*, *Lindl.* l. c.—*Eria cylindripoda*, *Griff. Notul.* iii. 299.)

Khasija, *Griffith* (1013, 1258); *J. D. H. & T. T.* (144); Sikkim at 5000-6000 feet, *J. D. H.* (144).

§ VII. HYMENERIA.

This name is proposed for all those species which, to a fleshy somewhat shapeless stem with a few thin leaves, add a many-flowered inflorescence that is smooth or nearly so. Possibly it might be subdivided into those with a dense inflorescence like *E. convallarioides* and *pumila*, and such as have the thin racemes of *E. bractescens*.

283. *E. convallarioides*, *Lindl. Gen. & Sp. Orch.* p. 70; *Bot. Reg.* 1841. t. 62, 1847, t. 63.

Khasija, *Griffith*; at 4000–6000 feet, *J. D. H.* (60); Sikkim, at 5000 feet, *Id.*, valleys 3000–4000 feet, *Id.*

Varies in the colour of the flowers, and in their size.

284. *E. excavata*, *Lindl. Gen. & Sp.* p. 67.

This differs from *E. alba* chiefly in having the middle lobe of the lip cordate, acute, ribbed, and much smaller than the middle lobes which are broad, falcate, and acute.

285. *E. alba*, *Lindl. l. c.* p. 67.

a. Lip white.

Sikkim; Darjeeling, in valleys at 3000–4000 feet, *J. D. H.* (142).

β. Lip yellow.

Sikkim, 4000–5000 feet, *J. D. H.* (68); Mussooree, *Edgeworth.*

In *β* the lateral lobes of the lip are shorter and blunter than in *a*, and the leaves are thinner and more acuminate.

286. *E. LINEATA*; foliis oblongis subcoriaceis acutis, racemis multifloris, bracteis ovalibus membranaceis reflexis, ovario tomentoso, sepalis ovatis subsecundis, labelli lobo medio subrotundo retuso plano lateralibus obtusis minoribus, axi lineis 3 crassis elevatis ad isthmum evanescentibus.

Java, *hort.* (*Veitch*); Continent of India, *hort.*

This is very like *E. alba a*, and may be a variety; but the flowers are dirty yellow with distinct purple stripes, not white, and are much smaller, the leaves are twice as broad and more coriaceous, and the dull purple blunt lateral lobes of the lip are not wider than the yellow almost 3-toothed middle lobe. It is a garden plant of doubtful origin.

287. *E. obesa*, *Lindl. Gen. & Sp.* p. 68. (*Eria Lindleyana*, *Griff. Not.* iii. 300.)

Moulmein and Mergui, *Griffith.*

I have no doubt about the correctness of this identification, notwithstanding that in Griffith's *Notulæ* it is said to be 554 of his Mergui herbarium, for I have from himself a drawing, made in Moulmein in February 1834, and a specimen from Mergui numbered 374, which agree with his description. Neither Wallich's bad old specimens, nor that from Griffith, have any leaves. He states them to be "lanceolata v. ovato-lanceolata integerrima glabra venosa apice recta v. torta." By a typographical error in the *Botanical Register*, the stems are said to be 27 instead of $2\frac{1}{2}$ inches long. There is a variety with larger flowers and the lower half of the lip very gradually passing into the upper, formerly

named by me *E. trilophota*, which has been found in Moulmein by Lobb as well as by Griffith (no. 370), and is now in cultivation as a Java and even Borneo species, but probably without foundation. The flowers are pure white with a lemon-coloured lip, marked by three longitudinal purple elevated lines.

288. *E. affinis*, *Griff. Not.* iii. 297.

Burma, *Griffith* (1074).

This is remarkable for a very long narrow cuneate lip, with two small acute teeth (or lobes) at the base of a roundish ovate acute terminal lobe; it has also two converging principal veins slightly raised above the surface into a thin narrow edge, interrupted in the middle. The mentum is long, narrow, and obscurely 2-lobed.

289. *E. pulchella*, *Griff. Not.* iii. 297.

Mergui (1055), and on trees in Moulmein (345), *Griffith*.

Resembles *E. bractescens*; but the stems are 3 or 4 inches long and cylindrical, the flowers are yellow, and the lip has three continuous elevated lines, of which the two lateral are shorter and clavate.

290. *E. pubescens*, *Wight. Ic.* t. 1634.

Khasija, *Lobb*.

The lateral veins of the lip rise into short vertical plates near both the points and the base.

291. *E. MYSORENSIS*; foliis oblongo-lanceolatis conduplicatis nervosis racemis paulo longioribus, ovario pubescente, bracteis ovalibus acutis reflexis glabris, sepalis petalisque acuminatis, labello unguiculato subcordato oblongo acuto juxta basin dilatatam pandurato omnino lævi.

Mysore, *Law.* (Cœlogyne, *Hb. Stocks.* 70.)

292. *E. GRAMINIFOLIA*; caule elongato vaginis membranaceis laxè vaginato, foliis lineari-lanceolatis gramineis nervosis, racemis tomentosissimis multo brevioribus, bracteis ovatis reflexis glabris, sepalis ovatis acutis mento brevi, petalis linearibus, labello hastato lobis lateralibus truncatis brevioribus intermedio subrotundo acuto, lamellis 2 oblique transversis bidentatis infra isthmum, ungue lato canaliculato.

Darjeeling, *Griffith*.

293. *E. SPHÆROCHILA*; caulibus brevibus imbricatis ovatis, foliis lato-lanceolatis membranaceis undulatis racemis tomentosissimis longioribus, bracteis linearibus acutis erectis, sepalis tomentosissimis ovatis subæqualibus acutis, petalis conformibus, labelli sessilis lobo intermedio subrepando rotundato venis varicosis lateralibus auriculiformibus.

Khasija, 4000–6000 feet, *J. D. H.* (68).

Like *E. alba* in general appearance, but wholly different in the details of its flowers.

There is also, under the number 68 in Hooker and Thomson's Herbarium, a plant from Gurwhal and Khasija, which is quite different from this, and which may be my *E. acervata*, notwithstanding some discrepancies.

294. *E. Dillwynii*, *Bot. Mag.* t. 4163, is certainly *E. bractescens* in a state of great vigour.

295. *E. ringens*, *Rehb. f. in Bonplandia*, is *E. ovata*, *Bot. Reg.* 1844, sub t. 29.

§ VIII. ERIURA.

Under this name may be collected the species having small flowers more or less woolly, very large lateral sepals, and a lip flat at the base, furfuraceous in the axis, with a woolly tubercle at the apex and base, or at least at the apex. *E. javensis*, *abbreviata*, and *Sonkaris*, *Rehb. f.*, together with the following, are all at present known with certainty.

296. *E. paniculata*, *Lindl. in Wall. Pl. as Rar.* i. 32. t. 36.

Sikkim, 10,000 feet, *J. D. H.* (67); rocks near Sarapanee, *Griffith* (1152).

297. *E. obliqua*. (*Mycaranthes obliqua*, *Lindl. in Bot. Reg.* 1840, *misc.* 184.)

Singapore, *Cuming, in hort.*

This differs from *E. bifalcis* in the form of the lip and in the presence of a large tumour at the base of the furfuraceous axis.

298. *E. MONOSTACHYA*; foliis longissimis coriaceis gramineis canaliculatis, racemis longis cylindraceis tomentosis, labelli quadrilobi laciniis triangularibus acutis apicalibus minoribus, lamellis 2 triangularibus aristatis infra isthmum, tuberculis axeos 3 quorum tertium ultra apicem protrusum.

Mount Gembolo, in the east of Java, *Zollinger* (53).

I have this from Prof. *Rehb.* as *Eria paniculata*, from which it differs in its long cylindrical racemes, and the presence of two sharp-pointed triangular plates below the lateral incisions of the lip, as well as in the other characters above described.

299. *E. REINWARDTII*; foliis distichis linearibus rigidis apice obliquis acutis, racemo solitario tenui sessili multifloro, labelli quadrilobi basi et apice tuberculati laciniis lateralibus obtusis planis terminalibus subcrispis minoribus.

Java, *hb. Reinwardt. (Cymbidium parviflorum)*.

Leaves 5 or 6 inches long, somewhat distichous. Spike 4 inches long, terminal, sessile, with small reflexed bracts nearly as long as the ovary.

300. *E. BIFALCIS*; foliis linearibus coriaceis obtusis apice valde obliquis, spica araneosa dissitiflora simplici terminali, floribus albo-tomentosis, labello cuneato 3-lobo laciniis lateralibus falcatis intermedia oblata tridentata, tuberculo apicis maximo inflexo baseos obsoleto.

Borneo, *T. Lobb*.

In habit much like *E. Reinwardtii*, but not more than 5 or 6 inches high. Flowers the size of *E. obliqua*.

301. *E. SCLEROPHYLLA*; foliis patentibus duris lanceolatis distichis apice acutissimis obliquis, racemis pluribus elongatis terminalibus albo-tomentosis, labelli cuneati lobis lateralibus acutissimis intermedio a lata basi lineari apice dilatato cuspidato, tuberculo apicis maximo baseos erecto foveato, lamella lineari a quoque isthmo decurrente apice libera.

Java, *Junghuhn* (279).

Much like *E. paniculata*; but the leaves are shorter, broader, and more spreading, and the lip wholly different. No. 300 of *Junghuhn* seems to be the same, but is only in fruit.

Mycaranthes latifolia, *Blume*, may also belong to this section.

§ IX. TRICHOTOSIA, *Blume*.

This supposed genus differs in nothing whatever from *Eria*. It may only stand as a section, with a caulescent habit and flowers covered with coarse ferruginous hairs. The surface and degree of division of the lip offer no available mark of recognition. All the species are conspicuous for the long brown hair that clothes the stem and leaves.

302. *E. biflora*. (*Trichotosia biflora*, *Griffith*, *Not.* iii. 331. t. 315.)

Malacca; on rocks and trees, Goondong Toondook, Mount Ophir, *Griffith*.

Near *E. annulata*, *Bl.*, from which its excessively shaggy lip distinguishes it, as well as the want of the long glabrous recurved bracts of that species.

303. *E. PULVINATA*; villosissima, caulibus brevibus ascendentibus, foliis ovatis, pedunculis unifloris, sepalis hirsutis in cornu obtusum basi productis ovario æquale, petalis linearibus sepalo dorsali æqualibus, labello obovato emarginato intus piloso infra apicem pulvinato.

Mergui, *Griffith*, no. 2, Aug. 17, 1834.

I only know this from a drawing by *Griffith*, who represents it as having whitish solitary flowers, with an obcordate-spathulate lip, hairy and speckled with red inside, and a tuft of longer hairs below the apex. The clinandrium is also shown to be 4-lobed. It is probably the same as one of *T. Lobb*'s plants distributed as coming from Borneo, but I suspect from Moulmein, of which

I have an imperfect specimen. In that plant the petals are acute, spatulate, and bordered with brown near the points, and the leaves are linear lanceolate, and much less hairy.

304. *E. LEIOPHYLLA*; caule ferrugineo tomentoso apice glabro diphylo vaginis 2 membranaceis oppositis in medio, foliis oblongo-lanceolatis glabris, spica brevissima uniflora (?) arcte tomentosa, bracteis truncatis, labello rhombico carnosio glabro obtuso basi convexo.

Borneo; on trees, Sarawak, at the height of 2700 feet, *T. Lobb*.

My specimen is nearly glabrous except the inflorescence. The stem is terete, 2-leaved, with a long brown sheath at the base, and a pair of smaller opposite membranous ones in the middle. The lip seems to be deep crimson.

305. *E. annulata*, *Bl. Mus. Lugd.* ii. 184.

A unique specimen from Sikkim comes near this species; but the flowers are very old. The leaves are broad and hairy, and filled with large masses of calcareous concretions.

306. *E. ferruginea*, *Lindl. in Bot. Reg.* 1839, t. 35.

E. Bengal; Jyntea mountains, at the height of 4000 feet, *J. D. H.* (65); Khasija, *Griffith*.

307. *E. VULPINA* (*Rchb. f.*); molliter ferrugineo-villosa, foliis oblongo-lanceolatis papyraceis obsolete nervosis, spica multiflora recta lanata, bracteis ovatis recurvis, floribus distantibus mento rotundato, petalis linearibus brevioribus ciliatis, labello carnosio glabro laciniis lateralibus dentiformibus intermedia rotundata.

Philippines, *Cuming*.

This is the plant hastily referred to in the Botanical Register (1845, t. 2) under *E. vestita*; but a more careful examination shows it to be quite distinct in its straight, not flexuose rachis, ovate not acuminate bracts, round, not elongated chin, short ciliated, not long smooth petals, and in the whole superficies of the lip, which appears to want the hairs and lamellæ of *E. vestita*. I have not been able to observe the tubercle seen at the base of the limb by my learned friend *Rchb. f.*; but the lip is so fleshy and compressed when dry, that I may have missed it.

308. *E. CAPITELLATA*; caulibus ad insertionem foliorum juniorum ferrugineo-hirtis, foliis carnosis anguste lanceolatis acuminatis glabriusculis, spicis brevibus densifloris, sepalis lateralibus ovatis, labello concavo carnosio ovato apice decurvo sub lente tomentoso infra apicem convexo.

Java, *T. Lobb* (253).

Until I received a specimen of the real *E. annulata*, I mistook

this for it. There are, however, these differences: the leaves are twice as broad and much less acuminate; the spikes are so dense as to be almost ovate; the lateral sepals are not acuminate; the lip is more rounded at the point and without the raised median line, instead of which there is only a slight convexity above with a corresponding concavity below. The *linea verruculosa*, ascribed by Blume to his *E. annulata*, does not exist in Zollinger's no. 15 of his second collection, which I take for that species; but there is a distinct elevated even midrib, with a slightly raised line on either side.

§ X. CYLINDROLOBUS, *Blume, Fl. Jav. præf.* vi. (Ceratium, *Id. Bijdr.* 341.)

There is nothing in the structure of the plants of this section, as far as I am acquainted with them, that corresponds with the character proposed by Prof. Blume in his *Mus. Lugd. Bat.* ii. 182. Undoubtedly a protuberance at the foot of the column does sometimes occur, but it affords no sectional mark; for if it exists in *E. nutans*, it is not to be found in *E. Khasiana*, which is only distinguishable upon careful examination; and it is a mere rudiment in *E. bicolor*, another very closely allied species. The siliquose fruit is of as little importance. I think, however, that the section may be conveniently adopted for all the caulescent species whose flowers, whether lateral or terminal, are solitary or in pairs, and arise from among empty coloured bracts. Such is the principle upon which the following have been collected.

A. *Flowers terminal.*

309. *E. TRUNCATA*; foliis 3 lanceolatis terminalibus apice subæqualibus, floribus geminis ovario tomentoso, sepalis oblongis obtusis, petalis subæqualibus antrorsum arcuatis, labello carnosio truncato linea media tenui elevata infra apicem triplici.

Moulmein, on Shoung-gyen at the height of 5000 feet, *T. Lobb*.

"Flowers white." The lip has two small ovate lateral lobes; but the middle lobe is obsolete, appearing only in the form of a broad line lying between the side lobes.

310. *E. pauciflora*, *Wight. Ic.* t. 1636.

Khasija hills, *T. Lobb*; Nilgherries, *Wight*.

Wight's figure of this is unusually good. The withered reflexed sheath at the base of the last joint of the stem seems to be characteristic of the species.

311. *E. bicolor*. (*Dendrobium bicolor*, *Lindl. Gen. & Sp.* p. 90.)
Ceylon, *Thwaites* (2761).

I have been favoured by Mr. Thwaites with a sketch of this, showing it to be a true *Eria*. The pollen-masses were previously unknown to me. A re-examination of the old fragments in my herbarium has shown the lip to be much like that of *Eria pauciflora*, as represented in Wight's plate, but with a shorter middle lobe. There is a small orange-coloured process at the base of the column. The surface of the middle lobe of the lip is rather pulverulent.

312. *E. nutans*. *Lindl. Bot. Reg.* 1840, *misc.* 196.

Singapore, *Cuming in hort. Loddiges*.

In this plant there is a large tubercle on the foot of the column, which is very short.

313. *E. KHASIANA*; foliis binis (?) lanceolatis acutis, floribus geminis glabris, sepalis petalisque subæqualibus, labello obovato laciniis lateralibus membranaceis obtusis subfalcatis incurvis intermedia oblata carnosa lamella tomentosa in medio lineisque 2 truncatis secus axin pulverulentum, columnæ pede omnino nudo.

Khasija, *Griffith*.

Much like *E. nutans* and *pauciflora*, but entirely different in the form of the lip.

B. *Flowers lateral.*

314. *E. clavicaulis*, *Lindl. in Bot. Reg.* 1840, *misc.* 219.

Khasija, at 4000-5000 feet, *J. D. H. & T. T.* (9).

The specimens in hb. Hooker. are not in flower, so that some uncertainty attends this species. It approaches the last section in having the leaves at the end only of the stem; and the flowers are almost terminal.

315. *E. mucronata*, *Lindl. in Bot. Reg.* 1842, *misc.* 27.

Philippines, *Cuming*.

Blume's *E. elongata* seems to be near this; but in my plant the little tuft of hairs at the base of the lip cannot be called "tuberculum dilatatum dense glanduloso-fimbriatum." Among De Vriese's Sumatra drawings is a "*Dendrobium macranthum*," with large solitary white flowers, very short lower sepals, and violet spreading bracts, which may be this *Eria elongata*. What appears to be the same plant exists in the Hookerian herbarium, collected in Tobie Island by Barclay.

316. *E. brachystachya*, *Rchb. f. in Bonplandia*.

Philippines, *Cuming*.

In this, which is perhaps a variety of the last, there is a small truncated tubercle on the foot of the column.

317. *E. VALIDA*; foliis oblongo-lanceolatis coriaceis apice valde obliquis obtusis, pedunculis bifloris bracteis ovatis erectis papyraceis cucullatis, floribus glabris, sepalis lateralibus ovatis dorsali petalisque 3-nerviis oblongo-linearibus, labelli lobo intermedio oblongo rotundato margine papilloso lateralibus duplo brevioribus acutis sinibus rotundatis apertis, lineis tribus clavatis apice divergentibus infra isthmum. Java, *T. Lobb* (205).

A stout erect plant, with a stem half an inch in diameter, and leaves 6 inches long. I can find no tubercle on the foot of the column; nor can I identify it with any of Blume's plants.

318. *E. APOROIDES*; foliis brevibus obtusis acinaciformibus equitantibus, pedunculis unifloris, bracteis linearibus obtusis carnosis, floribus glabris, sepalis petalisque ovatis obtusis, labello acute 3-lobo, lobo intermedio majore carnosio.

Philippines, *Cuming*.

This has very much the appearance of the plant figured by Adolphe Brongniart as *Aporum incrassatum* (Duperrey, t. 42 B); but the lip is 3-lobed, not entire.

§ XI. UROSTACHYA.

The caulescent species with numerous leaves, and long racemes or panicles of flowers, without the woolly lip-appendages of § ERIURA, form a natural group which may be conveniently placed apart from others. The flowers, with the exception of *E. bambusifolia*, are very small and densely arranged.

319. *E. floribunda*, *Lindl. in Bot. Reg.* 1844, t. 20.

Java, *hb. Junghuhn* (307); Mergui, *Griffith*.

Of this *E. leucostachya* of the Hort. Soc. Journ. III. xv. and xvi. is, as was then suggested, a mere variety.

320. *E. micrantha*, *Lindl. Gen. and Sp. Orch.* p. 68.

Java, *Lobb* (314).

The *Octomeria racemosa* of Kuhl and Hasselt seems, from a tracing sent me by Prof. Reichenbach, to be this plant, which is very like *E. floribunda*, but with smaller flowers, and with the lip-auricles perfectly lateral and not intralabellar.

321. *E. PACHYSTACHYA*; foliis oblongo-lanceolatis nervosis, spicis densissimis elongatis glabris, bracteis squamiformibus reflexis, floribus (minutis) tomentosis mento elongato incurvo, petalis glabris linearibus obtusis falcatis sepalis brevioribus, labello sessili oblongo acuto lævi.

Java, *Junghuhn* (298).

322. *E. RETROFLEXA*; foliis anguste oblongis spicis tenuibus duplo

longioribus, bracteis oblongis glabris retroflexis, floribus glabris, sepalis petalis labelloque subæqualibus ovatis acutis.

Philippines, *Cuming*.

The lateral sepals are very little oblique, and the lip is scarcely distinguishable except in being more fleshy; it is quite destitute of all superficial processes.

323. *E. BAMBUSIFOLIA*; foliis oblongis acuminatis nervosis paniculis terminalibus laxis tomentosis multifloris subæqualibus, sepalis ovatis obtusis tomentosis, petalis obovatis acutis, labello ovato plano glabro inappendiculato apice dilatato.

Khasija, *Griffith*; at 2000 feet, *Mr. Simons, in hb. Hooker*. (64).

I have no species very nearly allied to this, whose great leaves resembling a Bamboo, and loose tomentose terminal panicles as much as 10 inches long, are very peculiar.

PHREATIA, Lindl. Gen. & Sp. p. 63.

Prof. Reichenbach has detected the identity of *Plexaure*, *Endlicher*, with this well-marked genus. But he has referred it to *Eria*, to which I must withhold assent. The bifid somewhat cartilaginous rostellum, which led *Endlicher* to refer the genus to *Neottieæ*, appears to afford an absolute mark of distinction, especially when accompanied, as in this case, by a very peculiar and scarcely mistakeable habit. *Blume* refers *Phreatia elegans* to *Thelasis* (*Mus. Lugd. Bat. ii. p. 187*), for reasons which I am unable to appreciate. No two genera can be more wholly distinct. In *Hooker and Thomson's herbarium* one species only occurs; but a few may be added from other sources, in addition to those described by *Prof. Reichenbach*.

324. *Phreatia elegans, Lindl. l. c. (Thelasis elegans, Blume, Mus. Lugd. ii. 187.)*

Khasija, 4000 feet, *J. D. H. & T. T.* (93).

325. *PH. MYOSURUS*; foliis membranaceis late loratis planis apice obliquis cuspidatis basi equitantibus, spicis elongatis folio multo longioribus, floribus subverticillatis, bracteis fuscis acuminatis floribus longioribus, labello cuneato juxta apicem buplicato quasi trilobo. (*Eria* [*Phreatia*] *myosurus, Rchb. f. in Bonplandia, March 1, 1857.*)

Java, *Lobb* (166 in *hb. Hooker*).

The largest of the genus except *A. Richard's* two "*Oberonias*," *gladiata* and *micrantha*, which *Professor Reichenbach* has pointed out to be *Phreatias*. *O. micrantha* especially seems very near this; but the bracts are represented as being much shorter than even the pedicels. Flowers very small, hardly longer than the cinnamon-brown bracts, and arranged in a somewhat verticillate

manner. The lip is so dilated and folded near the end as to seem to be 3-lobed.—Possibly A. Brongniart's *Oxyanthera micrantha* may be this; but if so, the inflorescence is taken from another plant, perhaps the *Thelasis*, which furnished his magnified dissections (as Prof. Reichenbach has pointed out to me in conversation). My learned friend's definition of his *Eria myosurus* appears to have been taken from an incomplete specimen, for which reason the above specific character is now proposed.

326. PH. MINUTIFLORA; foliis linearibus coriaceis recurvis equitantibus obtusis spicis tenuibus æqualibus, bracteis triangulo-setaceis, labello obovato concavo.

Borneo, *Lobb.*

Leaves about 2 inches long. Flowers the smallest in the genus, in an erect very slender spike. Bracts brown, setaceous, broad at the base.

327. PH. MICROTIDIS; foliis linearibus coriaceis equitantibus apice acutis recurvis spicis densis angulatis æqualibus, bracteis floribus brevioribus, labello orbiculari concavo basi pandurato.

Java, *Lobb.*

Much like a pigmy *Microtis*, the whole plant not exceeding 2 inches in height. Blume's *Dendrolirium pusillum*, formerly referred by me to *Phreatia* (Gen. & Sp. p. 64), seems to be rather an *Appendicula*, and can have nothing to do with the present species.

328. PH. TAHITENSIS; folio oblongo coriaceo plano oblique bilobo spicæ densæ multifloræ æquali, scapo trivaginato, mento oblongo obtuso, labelli acuti rhombeï longe unguiculati angulis lateralibus runcinatis, bracteis oblongis herbaceis acutis canaliculatis florum longitudine.

Tahiti, *Bidwill.*

Plant between 3 and 4 inches high, of which $1\frac{1}{2}$ inch is occupied by a dense spike whose flowers are the largest in the genus, measuring in their dried state nearly $\frac{1}{4}$ th of an inch in length. The lateral sepals are extended into a long blunt chin, which probably led M. Reichenbach to remark, that "here the genera *Phreatia* and *Eria* run together." But the cartilaginous bifid rostellum of the former genus is perhaps more strongly marked in this than in any other species.

THELASIS, *Blume.*

The extremely short characters assigned by Prof. Blume, both in his 'Bijdragen,' and in his recent 'Museum Lugd. Bat.,' to the species of this curious genus, render all attempts at identifying his plants almost hopeless—especially since, in the latter work,

he has referred to the genus so wholly different a plant as *Phreatia elegans*. The only species known at present on the continent of India itself, furnishes some addition to the perplexity that surrounds the genus.

329. *Th. pygmæa*. (*Euproboscis pygmæa*, Griffith, in *Calcutta Journal of Nat. Hist.* v. 372. t. 26; *Wight. Ic.* t. 1732, not 1733.)

Khasija hills, Griffith, Lobb; at 2000-4000 feet elevation, flowers white, *J. D. H. & T. T.* (29).

Griffith's figure of his *Euproboscis pygmæa*, in the *Calcutta Journal*, is sufficient for the identification of this plant, which seems to be common on the Khasija mountains. In that work the name *E. Griffithii*, quoted by Prof. Reichenbach (*Bonplandia*, Feb. 15, 1857), does not occur. Prof. Blume refers it to his *Th. capitata* which differs in having a "spica densa ovoidea deinde cylindrica," and an ovate obtuse lip, a description that in no way applies to this. Dr. Wight's figure is a good one, but from a small specimen whose flowers are in a state of Peloria. The name *pygmæa* is objectionable, for there are specimens before me as much as 8 inches high; it must however stand. A *Thelasis* from Hong Kong, sent by Dr. Hance (287), appears to be either this or *Th. triptera*; but my specimens are not good enough for positive determination.

330. *TH. OCHREATA*; folio coriaceo lorato obtuso canaliculato basi squama maxima laxa truncata stipato, scapo foliis duplo brevior vaginis maximis laxis truncatis baseos binis medii solitaria, spica densissima bracteis reflexis acutis amplexicaulibus duris concavis, ovario obovato, sepalis alte carinatis supremo galeato, labello ovato obtuso.

Borneo; low forests of Sarawak, *T. Lobb*.

I should have thought that this might have been Blume's *Th. capitata*, judging from his latest definition; but Prof. Reichenbach, who has carefully examined that plant, describes the leaves as cuneate and equally 2-lobed, and the sepals entirely without carinæ. The leaves are a foot long when full-grown.

I have two or three more species of the genus, but until some authentic evidence concerning Blume's plants reaches me, I cannot venture to name them.

A Note upon PSEUDOCENTRUM, a New Genus of *Orchidaceæ*.

By Prof. LINDLEY, F.R.S.

[Read March 4th, 1858.]

AMONG the numerous collections of Peruvian Orchids which have been communicated to me from time to time by my excellent corre-

spondent Professor Jameson, there is one possessing so very extraordinary a structure that it seems worthy of being brought separately under the notice of the Society, although nothing more is known of it than that it is a terrestrial plant from the valley of Lloa, a couple of spikes of flowers having alone reached me.

These spikes are dense, erect, cylindrical, 10 inches long, and very slightly coated with minute distant hairs. A thin lanceolate three-veined bract supports each flower, reaching beyond the summit of the ovary. The flowers themselves are not unlike, in general appearance, those of a minute *Aconitum lycoctonum*, being furnished with what seems at first sight to be a slender curved galea many times longer than the limb; but upon dissection this galea proves to consist of the two lateral sepals excessively produced at their base and forming a sheath, within which the labellum lies concealed. Thus far there is nothing in the structure to which a parallel may not be found elsewhere, as in *Dendrobium*, *Bifrenaria*, *Compartmentia*, and especially in *Pelexia*, a genus to which the plant before us is nearly allied. But when the labellum is examined, it is found to be extended within the fold of the lateral sepals, not in the form of a spur arising from its base, but in that of a long slender channeled body proceeding from its point, the base of the labellum being acutely hastate. In other words, the labellum is sessile, hastate, 3-lobed, with the middle lobe extremely long, linear, channeled, and directed upwards between the sepals which conceal it. In this manner the appearance of a spur is produced without recourse being had to the arrangement which occurs in every other genus of this large order, hitherto described; for which reason I propose the name *PSEUDOCENTRUM*, to which the following technical character may be added:—

PSEUDOCENTRUM (Genus *Neottiarum* *Pelexiæ* affine). Herba terrestris; *Spica* elongata, densa, striata, cylindræa. *Ovarium* rectum. *Sepalum* anticum parvum, lanceolatum, patens; lateralia dorsalia, multo majora, triangularia, basi in canalem longum ascendentem arcuatam obtusam producta. *Petalum* lineari-lanceolatum, apice recurvum, sepalo antico breviora. *Labellum* membranaceum, sessile, trilobum; lobis lateralibus acutis hastam referentibus, intermedio lineari, canaliculato, intra canalem sepalinum incluso eique æquali. *Columna* nana, semiteres; stigmatibus depressis marginatis, rostello acuminato. *Anthera* dorsalis apiculata, bilocularis (?); *pollinia* 4, pulveræa, lateralia majora glandula parva oblonga.

Sp. 1. *Pseudocentrum macrostachyum*. Peru, Jameson.

Synopsis of *Legnotideæ*, a tribe of *Rhizophoraceæ*.

By GEORGE BENTHAM, Esq., F.L.S.

[Read March 4th, 1858.]

AMONG the plants of the great East Indian collection distributed by the late Dr. Wallich, is one from Heyne's Peninsular Herbarium, entered in the catalogue under the number 6320 as *Blepharistemma corymbosum*, Benth. I have no recollection nor any record of having ever given it that name, and I feel certain that I never examined it. The specimen which I received from Dr. Wallich in 1832 has remained ever since unnamed in my herbarium, but meeting with it accidentally a short time since, and ascertaining that it bore a name supposed to have been given by myself, I have been led to examine it in detail, and to pass in review the allied genera forming the small but interesting group of *Legnotideæ*, a tribe of *Rhizophoraceæ*. Although most of these genera have been well described by Arnott, Blume, Korthals, Asa Gray and others, yet as they have not all been brought together in a comparative form, I am induced to lay before the Linnean Society a short synopsis of the tribe.

The *Legnotideæ* agree with the true *Rhizophoreæ* in their opposite undivided leaves with interpetiolar stipules, their axillary inflorescence, valvately lobed calyx, perigynous petals often fringed or divided at the top and folded over the anthers in the bud, their perigynous definite stamens with versatile 2-celled anthers, their several-celled ovary with two or more collateral or clustered pendulous ovules in each cell (rarely one-celled by the disappearance of the dissepiments between the placentas), and in their simple style with a capitate or discoid stigma, either entire or radiating into as many lobes as placentas. The chief difference consists in the seed, which in the true *Rhizophoreæ* is exalbuminous, the embryo germinating and forcing its radicle through the pericarp whilst still adherent to the tree; whereas in the *Legnotideæ* the embryo is imbedded in a fleshy albumen. In the true *Rhizophoreæ* the seed-bearing part of the ovary is inferior or adnate to the base of the calyx; in the *Legnotideæ* it is either inferior, or superior and free with the exception of the broad base.

With regard to the affinities of *Legnotideæ* as illustrating those of *Rhizophoraceæ*, there is little to add to those suggested by R. Brown in the Appendix to Tuckey's 'Congo,' p. 437, and confirmed by subsequent observers,—a general affinity with *Cunoniaceæ* and with *Lythraceæ*. With the former, *Legnotideæ* agree in their

opposite leaves with interpetiolar stipules, their valvate calyx, and in many respects in the general arrangement of the parts of the flower; but differ in inflorescence, in the æstivation of the petals, in the more complete consolidation of the styles (although in the latter respect they agree with *Broussaisia*), and in the pendulous collateral or clustered ovules. With *Lythraceæ* they agree more generally in habit and inflorescence, in the æstivation of the calyx, and completely consolidated styles; and where the ovary is free, it is often enclosed in the base of the calyx, as in *Lythraceæ*; they differ, however, in their dotted leaves, interpetiolar stipules, in the æstivation of the petals and insertion of the ovules, and in their albuminous seeds. The arrangement of the petals and stamens is also somewhat different, even in the genera which have the ovary free, as in *Lythraceæ*. In the latter order, the disk which bears the petals and stamens is so completely combined with the calyx-tube as scarcely to thicken it, or form any perceptible border at its edge, where the petals are inserted close among the calyx-teeth, and the stamens are usually inserted more or less irregularly lower down on the inner face of the disk. In *Legnotideæ*, the disk, whether very short in the base of the calyx-tube, or lining the tube up to the teeth or lobes, is always very perceptible, and sometimes thick and fleshy; its margin is usually more or less prominent, either as an entire or crenate ring, or as a short cup-shaped tube round the ovary; the stamens are usually inserted either on the margin, or more frequently just below the margin on the outside, and the petals outside the stamens at the base of the disk, that is, in the angle which the free part of the disk makes with the calyx-tube. It is probably this disk which induced Dr. Wallich originally to consider the *Gynotroches* as a species of *Microtropis* among *Celastrineæ*.

The fringed and folded petals of most *Legnotideæ* have perhaps some analogy to the crumpled petals of *Lythraceæ*; the manner in which they are folded over the larger stamens, or over all the anthers, has some analogy to the hooded petals of *Rhamnaceæ*, which enclose the anthers in the bud; but there is very little other affinity with that order. So the opposite dotted leaves or the inflorescence give a general resemblance, without much affinity, to *Myrtaceæ* and *Mecycyleæ*.

The fringed petals of Gardner's *Anstrutheria* had induced him to refer that plant to *Elæocarpeæ*; but that and the valvate calyx are almost the only characters in which the *Legnotideæ* coincide with that tribe; still less can I see any affinity between *Legnotideæ*

and *Loganiaceæ*, near which Lindley places them in his 'Vegetable Kingdom.' The free petals and their æstivation, the stamens inserted on a perigynous disk, not in the tube of an essentially gamopetalous corolla, the placentation and other points, appear to me to remove them far away from any of the orders between which the *Loganiaceæ* form the connecting link.

The number of genera of *Legnotideæ* now known is nine; but as they most of them consist of only one or two species, and some are but imperfectly known, it is probable that a better acquaintance with the flora of their chief geographical area—across tropical Africa, through the Mascarene Islands, Ceylon and the Indian Archipelago to tropical Australia,—may enable their future consolidation into natural groups. Of these genera, three, *Carallia*, *Pellacalyx* and *Haplopetalum*, have the seed-bearing part of the ovary and fruit completely adnate or inferior; three, *Gynotroches*, *Crossostyles* and *Anstrutheria*, have the ovary superior, but attached by a broad base to the broadly turbinate calyx-tube; and the remaining three, *Blepharistemma*, *Dactylopetalum* and *Cassipourea*, have the ovary much less dilated at the base, quite free within a campanulate or ovoid calyx, as in *Lythraceæ*.

CARALLIA.

This genus, originally established by Roxburgh, has been more accurately described in detail by Blume, Mus. Bot. vol. i. p. 128. He shows that although the fruit is often by abortion one-celled and one-seeded, the ovary is divided into 4 or rarely 3 or 5 cells with 2 pendulous ovules in each; not one-celled, as stated in Arnott's observations, 'Ann. Nat. Hist.' i. p. 371, in consequence probably of Roxburgh's having so described one of his species. Blume also first described the albuminous seeds of *Carallia* with a curved embryo, which I have verified in different specimens of *C. integerrima*, and in the *C. lanceæfolia* also, as far as I could tell in a not quite ripe fruit.

With regard to the species of *Carallia*, they have evidently been much multiplied. There is one very common one, extending from Ceylon and the Indian Peninsula to Khasiya, China, the Indian Archipelago and north-west Australia. The leaves in the Cingalese specimens are often all obovate and very obtuse; in some Chinese and Philippine Island ones, narrow-oblong and acuminate; in the majority of specimens from the greater part of the area, oval-elliptical, with or without a short acumen; but in each district these forms appear to pass gradually one into the other,

and sometimes on the same specimen. The leaves are generally quite entire; occasionally some may be found with a few very small teeth towards the extremity, but never toothed all round, as in the *C. lanceæfolia*. I have therefore no hesitation in considering this as the *C. integerrima*, DC., to which I would refer the *C. zeylanica*, *corymbosa* and *sinensis* of Arnott, *C. timorensis*, Bl., *C. octopetala*, F. Muell. (the parts of the flower are often in eights in the Indian specimens), and *Pootia cereopsifolia*, Miq.

C. lanceæfolia, Roxb., is only known to me from specimens from the Calcutta Garden and one or two from Sylhet. It appears well distinguished by the leaves being regularly serrulate all round, and, as far as I have seen, by a more pear-shaped fruit, which appears to ripen generally more than one seed. The leaves are usually considerably broader than those figured by Wight from Roxburgh's drawing. The *C. confinis*, Bl., is evidently closely allied to this species, if not identical with it. *C. symmetria*, Bl., appears to be a form of *C. integerrima* with the leaves slightly toothed at the top.

C. lucida, Roxb., appears to me to be in some respects a made-up species, resulting perhaps in a confusion between *C. integerrima* and *C. lanceæfolia*. The specimens originally sent from the Calcutta Garden as *C. lucida* belong to the broader-leaved forms of *C. lanceæfolia*, although I have not seen any quite so broad as those figured in Roxburgh's 'Coromandel Plants' and in Wight's 'Icones.' Both these figures are taken from Roxburgh's drawings, the work probably of a native artist; and, as is so frequently the case, more or less made up, as is evidenced by the venation of the leaves, so different from that of any *Carallia*. I should therefore be disposed either entirely to reject *C. lucida*, or to consider it merely as an ill-represented variety of *C. lanceæfolia*.

C. celebica, Bl., judging from Borneo specimens which agree with his description, is a distinct species with looser inflorescence, much larger flowers, &c.

C. cuspidata, Bl., and *C. multiflora*, Bl., both from Borneo, but unknown to me, appear from his description to be both of them good species.

Baraldeia, Dup. Thou., is considered by R. Brown, and after him by other botanists, as a species of *Carallia*. It is unknown to me: the Hookerian herbarium, although now rich in Madagascar plants, contains, as far as I can find, no Legnotideous species from that island.

PELLACALYX.

Of the single species known of this genus, *P. axillaris*, Korth., I have seen specimens from Penang, from Phillips's Collection, formerly in the Horticultural Society's herbarium, and among Griffith's Malacca plants. To Korthals's detailed and accurate description I have only to add that the seed, as in *Gynotroches*, is small, ovoid, with a crustaceous testa, and a straight cylindrical embryo in the centre of the albumen. The genus is quite distinct both from *Carallia* and *Haplopetalum* in the form of the calyx and the clustered ovules, as well as in habit and other characters.

HAPLOPETALUM.

I have seen no specimens of this plant; but A. Gray's elaborate description and beautiful plate in the 'Botany of the American Exploring Expedition' are sufficient to characterize it in every respect, excepting the fruit, which is unknown. The habit, inflorescence and flowers are those of *Gynotroches*, except that the petals are sessile and entire, the ovary inferior with a central axis, but not divided into cells, probably from the disappearance of the dissepiments after a very early stage, and that there are but two collateral ovules to each cell.

GYNOTROCHES.

This genus was originally established by Blume in his 'Bijdragen,' but having been referred to *Guttiferae*, it was very naturally overlooked by Arnott, when describing his *Dryptopetalum*. Blume has subsequently, in his 'Museum Botanicum,' established the generic identity of these two plants, which indeed are probably but one species, not uncommon in the Indian Archipelago. The length of the pedicels and number of parts of the ovary and stigmata vary equally in the Javanese, the Penang, and the Malacca specimens. Blume's third species, however, with minute, almost sessile flowers, from Borneo and Sumatra, is probably distinct. As a genus they differ from *Cassipourea* (of which they have the inflorescence and most of the characters) by the small deeply-cleft calyx, the ovules 4, not 2 only, to each cell of the capsule, and by the terete embryo. As in *Blepharistemma*, the flowers of the common species are to a certain degree diœcious; in some specimens the ovary is slender and empty, whilst the petals and stamens are very fully developed; in others the ovaries are complete and the petals and stamens more or less reduced. This gives to different specimens a very different aspect, and may explain the differences which induced A. Gray to describe as distinct his *G. reticulata* from

Singapore, where, amongst other places, Dr. Wallich gathered the original species.

There are some slight inaccuracies in Blume's dissections of *Gynotroches*. The disk is very incorrectly represented, and in fig. N+, one stamen is inserted outside, and another inside of it; in fact, the filaments are united at their very base into a narrow ring just outside the crenulated margin of the very short disk, whilst the petals are inserted outside the staminal ring. In figs. I+ and N+, the seeds are shown as attached by their lower instead of their upper end. So in fig. O+, the hilum should be represented as near the upper broad extremity, and the upper slender end of the embryo should be the entire radicle, the lower and thicker end being split into the two cotyledons.

CROSSOSTYLES.

Forster's detailed description of his *Crossostyles biflora*, published by Guillemain in his 'Zephyritis Taitensis' (Ann. Sc. Nat. Par. sér. 2. vii. p. 353), enabled Asa Gray to recognize it in the plant which he has figured and described in detail in the 'Botany of the American Exploring Expedition.' Unfortunately these specimens were in some respects imperfect, and the seed has not yet been described. I have, however, little hesitation in referring to the same genus, as a second species, some fruiting specimens collected on the Feejee Islands by Dr. Harvey, differing from the *C. biflora* chiefly in the smaller narrow leaves and in the reduced number of parts of the pistil. The remains of the stamens show that their insertion and numbers were about the same as in *C. biflora*; but there is nothing to indicate the presence or absence of the *nectaries* of Foster, or *sterile stamens* of A. Gray, so peculiarly characteristic of this genus. It is not stated by either, whether they are precisely in the same ring as the stamens, or a little withinside of them. If the latter supposition be correct, they probably represent, not sterile stamens, but the teeth of the disk, which are more or less prominent within the stamens in several *Legnotideæ*. If really alternating with the stamens in the same verticil, there is nothing in the slightest degree analogous to them in any other genus. The seed of *Crossostyles Harveyi* has an embryo much nearer to that of *Cassipourea* than that of *Gynotroches*.

ANSTRUTHERIA.

This genus was originally proposed by Dupetit Thouars in his 'Genera Nova Madagascariensia,' under the name of *Richæia*. It

has since, however, at the suggestion of R. Brown (in the Appendix to Tuckey's 'Congo'), been reduced by DeCandolle in his 'Prodromus' to *Cassipourea*; and I described as such, in the 'Niger Flora,' a West African species, which, as I there mentioned, may not improbably be the Congo *Cassipourea* referred to by R. Brown. In the mean time Gardner met with a plant in Ceylon, which he did not immediately recognize as belonging to this group, but conceived to be allied in its fimbriate petals to *Elæocarpeæ*. He accordingly described and figured it in the 'Calcutta Journal' as a new genus of that order, under the name of *Anstrutheria*. Subsequently Major Champion, in a note addressed to Dr. Gardner in 1849, pointed out its relation to *Cassipourea*, and in the Hookerian herbarium it is identified generically with *Richæia* both by Sir W. Hooker and by Planchon. Under these circumstances, the genus, if maintained as distinct from *Cassipourea*, should have retained Dupetit Thouars' name of *Richæia*, were it not that it may be considered as too close, both in sound and derivation, to the previously published *Richea* in *Epacrideæ*. Its union with *Cassipourea* can only be effected with propriety, in the present state of our acquaintance with these plants, by uniting into one genus all the *Legnotideæ* with a free or superior ovarium, from *Gynotroches* to *Cassipourea*. If that view be adopted, the six genera here characterized may be considered as so many sections, and *Anstrutheria* will still be the name to be preferred, whether for a section or a genus. The three species it comprises are evidently closely allied to each other. I have seen abundance of good specimens of the Ceylonese one, which varies with broadly ovate, almost membranous leaves, or much narrower and more coriaceous ones. From the latter form, the West African specimens, which I have in fruit only, and in very young bud, appear scarcely to differ, except in the size of the flowers, which appear to have been considerably smaller; and I have seen no specimen of the Madagascar one. I am therefore quite unable to give at present any distinctive diagnosis of the three species, if such they be.

BLEPHARISTEMMA.

The history of the name and original specimen of the only species constituting this genus has been already given. It was also collected in the Indian Peninsula by Hochstetter, and has been distributed with his Canara plants under the name of *Drypetalum membranaceum*, Miq. It is, however, much nearer related to *Cassipourea* than to *Gynotroches*; it scarcely differs indeed

from the American *Cassipoureas* except in habit and inflorescence, in its almost dicecious flowers, and in the rather more dilated stigma. Still the habit is so distinct, that it cannot be joined with *Cassipourea*, unless, as before mentioned, the whole six genera are united into one. The leaves appear to be deciduous, and have none of the coriaceous texture which all other *Rhizophoreæ* acquire, at least when full-grown; the loose cymes are like those of several *Lytharieæ*. The perigynous disk is cupular, as in *Cassipourea*, but much more developed.

DACTYLOPETALUM.

This genus is founded on a single specimen gathered on the island of Nossi-bé, off the north-west coast of Madagascar, by Boivin. With the habit, inflorescence, and most of the characters of the American *Cassipoureas*, I could not include it in that genus on account of the structure of the ovary, which has no dissepiments and only two pairs of pendulous ovules round the central axis, and the stamens are only twice the number of the petals. The fruit is unknown.

CASSIPOUREA.

This genus must remain restricted to the three tropical American species enumerated in DeCandolle's 'Prodromus.' Additional specimens have proved to me that the *C. serrata* I described among Schomburgk's plants was founded on a specimen of *C. macrophylla* with remarkably toothed leaves, and the *C. quadrilocularis* of Spruce's plants belongs also to the same species, which, as well as the two others, occurs occasionally with four instead of three cells to the ovary. The number of stamens varies in all the species, either four times or five times that of the petals; and in one specimen only of the *C. elliptica*, the one figured in Hooker's 'Icones,' vol. iii. t. 280, does it appear to be generally (but not always?) three times that of the petals.

The genus *Anisophyllum*, Don, or *Tetracarpæa* of Gardner, which I had formerly considered rather as an anomalous *Rhizophoracea* than as a *Hamamelidea*, certainly differs essentially from the former in its alternate leaves, its inflorescence, and more divided styles. Its immediate affinities must, however, remain uncertain until the whole group of small orders clustered round the *Saxifragaceæ* shall have been more carefully reviewed.

The following is the more technical synopsis of the genera and species:—

RHIZOPHORACEARUM tribus 2^a LEGNOTIDEÆ.

Semina albuminosa ante germinationem caduca. Flores quam in *Rhizophoreis* veris vulgo minores. Inflorescentia axillaris, floribus nunc fasciculatis sessilibus v. breviter pedicellatis, nunc in cymas pedunculatas di-tri-chotomas dispositis. Bracteæ ad ramificationes v. ad basin pedicellorum parvæ concavæ, juniores sæpe in cupulam connatæ, per anthesin persistentes v. caducæ. Stamina quæ sepalis opposita in alabastro cum petalis alternant; cætera æstivatione petalis involuta, 1, 2, 3 v. 4 intra quodque petalum. Stigma plus minus peltato-dilatatum (nisi in *Cassipoureis* nonnullis) integrum crenatum v. radiato-lobatum, crenis v. lobis tot quot ovarii loculis.

§ 1. *Ovarii parte ovulifera adnata.*

1. CARALLIA. Calyx supra ovarium campanulatus, lobis brevibus. Stamina numero petalorum dupla. Ovula gemina. Inflorescentia cymosa.

2. PELLACALYX. Calyx supra ovarium campanulatus, lobis brevibus. Stamina numero petalorum dupla. Ovula fasciculata. Pedicelli fasciculati.

3. HAPLOPETALUM. Calyx usque ad ovarium partitus. Stamina numero petalorum quadrupla (v. quintupla?). Ovula gemina. Pedicelli fasciculati.

§ 2. *Ovarium liberum, lata basi calycis tubo turbinato impositum.*

4. GYNOTROCHES. Stamina numero petalorum dupla. Ovula quaterna. Pedicelli fasciculati.

5. CROSSOSTYLES. Stamina numero petalorum quadrupla (v. quintupla?). Ovula gemina. Pedunculi subcymoso-pauciflori. (Discus perigynus lobatus?)

6. ANSTRUTHERIA. Stamina numero petalorum quadrupla (v. quintupla?). Ovula gemina. Pedicelli subfasciculati. Discus perigynus integer v. crenulatus.

§ 3. *Ovarium basi minus dilatatum, in fundo calycis campanulati liberum.*

7. BLEPHARISTEMMA. Stamina numero petalorum dupla. Ovula in ovarii loculis gemina. Inflorescentia cymosa.

8. DACTYLOPETALUM. Stamina numero petalorum dupla. Ovula in placentis ovarii non septati gemina. Pedicelli (brevis-simi) fasciculati.

9. CASSIPOUREA. Stamina numero petalorum quadrupla v. quintupla (rarius tripla). Ovula in ovarii loculis gemina. Pedicelli brevissimi fasciculati.

I. CARALLIA, Roxb.

Calycis tubus supra ovarium campanulatus, lobis 5-8 brevibus. Discus staminifer usque ad apicem tubi adnatus. Petala tot quot calycis lobi, unguiculata, orbiculata, subserrata v. apice lacera. Stamina numero petalorum dupla, circa disci marginem crenulatum inserta. Ovarii pars ovulifera calyci adnata, 4- (rarius 3- v. 5-) locularis. Ovula in loculis gemina. Fructus abortu sæpius unilocularis, 1-oligospermus. Semen globosoreniforme, ad hilum impressum. Embryo intra albumen copiosum teres curvatus.—Cymæ pedunculatæ sæpius trichotomæ.

1. *C. INTEGERRIMA* (DC. *Prod.* iii. p. 33); foliis integerrimis v. versus apicem rarius serrulatis, obovatis ellipticis v. oblongis, floribus 6-8-meris ad ramulos cymarum capitato-sessilibus.—*C. ceylanica*, *corymbosa* et *sinensis*, Arn. in *Tayl. Ann. Nat. Hist.* vol. i. p. 371. *C. timorensis*, Bl. *Mus. Bot.* vol. i. p. 128, ex. char. *C. octopetala*, F. Muell. *Pl. Austr. Trop. Occid.* *Pootia cereopsifolia*, Miq. *Pl. Hochst.*

Hab. in Indiæ orientalis sylvis frequens. In ins. Ceylon, *Walker, Gardner*, n. 278; *Kelaart, Thwaites*, n. 1963 et 1964; in Peninsula circa Quilon, *Wight*, n. 2447; in Concan, *Law*; prope Bombay, *Dalzell*; in Terra Canara, *Hochstetter*, n. 307 et 307a; in Khasiya, *Griffith*; Silet, *Hooker et Thomson, Wallich Cat.* n. 4880; Sikhim, *Hooker*; in China australi, in ins. Hong Kong, *Champion*; in ins. Philippinis, *Cuming*, n. 1066 et 1027; Mergui et Moolmeyn, *Griffith*; Rangoon, *Maclellan*; (Java et Timor?); in Australia tropica ad Brunswick Bay et York Sound, *Cunningham*; Macadam's Range et Upper Roper River, *F. Mueller*.

Magnopere variat foliorum forma, in speciminibus plerisque Ceylonensibus obovata sunt v. obovali-oblonga obtusissima v. retusa, nonnunquam tamen Indicis omnino similia v. intermedia; in his sæpius ampliora ovali-elliptica obtusa v. plus minus obtuse acuminata, rarius late obovata, v. anguste oblonga; in Sinensibus et præsertim in Philippinensibus pleraque angustiora et longius acuminata, sed in his etiam occurrunt folia Indicis similia; specimina Orientalia et Australasica omnino Indicis similia. Flores etiam magnitudine variant (interdum abortu semidioici?). Calyx vulgo circa 2 lin. longus. Cymæ subcorymbosæ ramis brevibus crassis, floribus densius laxiusve depresso-capitatis. Bacca vulgo globosa monosperma, rarius dispermam vidi. Specimina tamen fructifera hæud multa vidi.

C. symmetria, Bl. *Mus. Bot.* vol. i. p. 130, e Java, ex descriptione non differre videtur a speciminibus *C. integerrimæ* foliis apice dentatis.

2. *C. CUSPIDATA*, *Bl. l. c.* p. 129, e Borneo, ex caractere suo affinis videtur formis angustifoliis *C. integerrimæ*, sed diversa floribus minoribus.
3. *C. LANCEÆFOLIA* (*Roxb. Fl. Ind.* vol. ii. p. 481; *Wight, Ic.* vol. iii. t. 604); foliis ellipticis oblongisve regulariter serrulatis, floribus 6-8-meris ad ramulos cymarum subcapitato-sessilibus, petalis reniformibus crenulatis.—*C. confinis*, *Bl. Mus. Bot.* vol. i. p. 129?
Hab. In Sumatra, *Roxburgh*. Specimina quæ vidi omnia ex horto botanico Calcuttensi.
- A *C. integerrima* differt imprimis foliis a basi ad apicem regulariter crenulato-serrulatis. Bacca etiam major videtur, turbinato-globosa, 2-3-sperma. Flores iis *C. integerrimæ* similes, minus tamen conferti.
- C. lucida*, *Roxb. Pl. Corom.* vol. iii. t. 211, et in *Wight, Icon.* vol. iii. t. 605 (cujus specimina sicca vidi e horto Calcuttensi) videtur *C. lanceæfoliæ* forma latifolia male depicta.
4. *C. CELEBICA* (*Bl. Mus. Bot.* vol. i. p. 131, ex charact.); foliis ellipticis oblongisve serrulatis, floribus in cymis trichotomis subpedicellatis, petalis late cordatis fimbriatis.
Hab. (In ins. Celebes, *Blume*), in Labuan, ins. Borneo, *Motley*.
 Species bene distincta. Flores 3 lin. longi. Calycis lobi latiusculi tubo breviores. Pedicelli breves et crassi, sed sæpius distincti. Fructus non vidi.
5. *C. CALYCINA*; foliis ovatis ellipticisve integerrimis, pedunculis longiuscule dichotomis, petalis late cordatis fimbriatis.
Hab. in ins. Ceylon, *Thwaites*, n. 3458.
 Ramus adest dichotomus, ad nodos leviter incrassatus. Folia pleraque bipollicaria, breviter acuminata, coriacea. Cymæ quam in *C. celebica* magis elongatæ, pedunculo bis terve bifido, floribus alaribus nullis. Flores fere 4 lin. longi, angustiores quam in *C. celebica*; calycis laciniæ 4, lanceolatæ, crassæ, tubo turbinato sublongiores. Discus parti tubi liberæ brevissime adnatus. Petala lata subreniformia, insigniter fimbriata. Ovarium 4-loculare. Stigma 4-crenatum.—Specimen unicum vidi, floribus paucis, quorum unicum tantum examinavi.
6. *C. MULTIFLORA*, *Bl. l. c.* p. 131, e Borneo, a me non visa, differre dicitur a *C. celebica* corymbis magis ramosis multifloris, floribus minoribus.
7. *C. BARALDEIA*, *Arn. in Ann. Nat. Hist.* vol. i. p. 371. Baraldeia, *Dup. Thou. Gen. Nov. Madag.* p. 24, e Madagascaria, quam non vidi, distinguitur imprimis floribus 5-meris, nec ut in præcedentibus 6-8-meris.
Diatoma brachiata, *Lour. Fl. Cochinch.* p. 296, ab auctoribus verosimiliter haud immerito ad *Caralliam* relata, a *C. integerrima* differre videtur petalis ut in *C. celebica* fimbriatis. Specimina nulla vidi.

II. PELLACALYX, *Korth*.

Calycis tubus supra ovarium campanulatus, lobis 5-6 brevibus. Discus staminifer usque ad apicem tubi adnatus. Petala tot quot calycis lobi, apice lacera. Stamina numero petalorum

dupla, circa disci marginem crenulatum inserta. Ovarii pars ovulifera calyci adnata, 5- (rarius 6-?) locularis. Ovula in loculis plurima (8-12) fasciculata. Fructus subglobosus, carnosus, calycis limbo coronatus. Semina parva ovoidea. Embryo in albuminis axi rectus teres, cotyledonibus vix radícula latioribus.—Pedicelli axillares fasciculati.

Species unica.

P. AXILLARIS, *Korth. in Van der Hoeven et De Vriese, Tijdschr.* vol. iii. p. 20. t. 2.

Hab. in ins. Penang, *Phillipps*; in Malacca, *Griffith*.

Folia oblonga acuminata 4-5-pollicaria supra scabriuscula subtus pubes stellata rufescentia. Bacca 3-4 lin. diametro, tubo calycis $2\frac{1}{2}$ lin. longo coronata. Dentes breves reflexo-patentes. Semina iis *Gynotrochis* similia v. paullo majora.

III. HAPLOPETALUM, *A. Gray.*

Calyx fere ad ovarium 4-partitus. Petala 4 subsessilia integerrima. Stamina numero petalorum 4-pla (v. 5-pla?) ad marginem disci brevissimi inserta. Ovarii pars ovulifera calyci adnata, 1-locularis. Ovula 8-10 e columna centrali geminatim appensa. Fructus ignotus.—Pedicelli axillares fasciculati.

Species unica.

H. RICHI, *A. Gray, Bot. Amer. Explor. Exped.* vol. i. p. 608. t. 76.

Hab. in insulis Feejee.

Habitus folia et flores parvi *Gynotrochis axillaris*.

IV. GYNOTROCHES, *Bl.*

Calycis tubus brevissime turbinatus limbus 4-5-partitus. Petala tot quot calycis laciniae unguiculata apice lacera. Stamina numero petalorum dupla, disco brevissimo crenulato inserta. Ovarium superum, lata basi calyci impositum, 4-6-loculare. Ovula in loculis 4, fasciculata. Bacca ovoideo-globosa, indehiscens. Semina parva, ovoidea. Embryo in albuminis axi rectus teres, cotyledonibus vix radícula latioribus.—Pedicelli ad axillas fasciculati.

1. G. AXILLARIS (*Bl. Mus. Bot.* vol. i. p. 127. t. xxxi.); pedicellis calyce longioribus. *Dryptopetalum coriaceum*, Arn. in *Ann. Nat. Hist.* vol. i. p. 372. *Microtropis coriacea*, Wall. *Cat.* n. 4338. *Gynotroches Dryptopetalum*, *Bl. Mus. Bot.* vol. i. p. 127. *G. reticulata*, *A. Gray, Bot. Amer. Explor. Exped.* vol. i. p. 607, ex descr.

Hab. in sylvis montanis Archipelagi Indici, *Blume, Seemann*; in ins. Penang et Singapore, *Wall. Cat.* n. 4338 et 8457; in Malacca, *Griffith, Cuming*, n. 2367; ad Moulmeyn, *Lobb*.

Folia oblonga v. elliptica acuminata, 2-5 poll. longa coriacea reticulato-venosa. Flores in axillis numerosi parvi, brevius longiusve pedicellati, calyce circa 1 lin. longo, abortu subdioici; masculi staminibus petalisque perfectis, ovario sæpius tenui vacuo, stigmatē haud dilatato; foemineo-hermaphroditi longius pedicellati, petalis staminibusque sæpe minoribus his interdum effoetis, stigmatē radiato-lobato. Bacca $1\frac{1}{2}$ -2 lin. diametro pleiosperma.

2. *G. MICRANTHA*, *Bl. Mus. Bot.* vol. i. p. 128, a me non visa, a præcedente differre dicitur floribus minutissimis subsessilibus.

Hab. in Borneo et Sumatra (*Blume*).

V. CROSSOSTYLES, *Forst.*

Calycis tubus brevissime turbinatus, limbus 4-5-partitus. Petala tot quot calycis lacinie unguiculata, apice lacera. Stamina numero petalorum quadrupla (v. quintupla?) disco brevissimo inserta; filamenta brevia totidem cum staminibus alternantia (an disci lacinie? an stamina sterilia?). Ovarium superum basi latissima calyci impositum, 5-12-loculare. Ovula in loculis gemina. Fructus carnosus subglobosus in valvulas septicide tardius dehiscens. Semina ovoidea. Embryo in albuminis axi rectus, radícula tereti, cotyledonibus anguste ovatis.—Pedunculi axillares bi-pluri-flori, floribus pedicellatis.

Petala et filamenta sterilia in sola *C. biflora* observata. Semina in *C. Harveyi*.

1. *C. BIFLORA* (*Forst.*; *Guillem. Zeph. Tait. in Ann. Sc. Nat. Par.* ser. 2. vol. vii. p. 354; *A. Gray, Bot. Amer. Explor. Exped.* vol. i. p. 610. t. 77); foliis amplis obovatis, gynæcio sub-12-mero.

Hab. in insula Societatis Raietea (*Forster*); in Tutuila insularum Samoa (*Amer. Explor. Exped.*).

Folia 4-7 poll. longa, 2-3 poll. lata. Pedunculi 3-4 lin. longi, pedicellis 2-3 (rarius 4) unifloris v. rarius 3-floris.

2. *C. HARVEYI*; foliis ovali- v. oblongo-ellipticis, gynæcio 5-7-mero.

Hab. in insulis Feejee, *Harvey*.

Arbor? glabra, ramulis ad nodos incrassatis. Folia petiolata, obtusa, coriacea, 2-2 $\frac{1}{2}$ -pollicaria. Pedunculi 2-3 lin. longi petiolo subbreviores, sæpius ad axillas solitarii biflori. Pedicelli pedunculo subæquales. Bracteæ caducæ. Calycis fructiferi tubus late et brevissime turbinatus, lacinii crassis reflexis 2 lin. longis. Discus in calyce fructifero fere oblitteratus. Staminum vestigia supersunt numero laciniarum quadrupla, filamentis brevi, antheris oblongis. Capsula bæccans circa 4 lin. diametro 5-7-locularis, stylo brevi stigmatē 5-7-radiato coronata, maturitate valvulis 5-7 crasso-carnosis dehiscens. Semina axi persistenti appensa, ovoidea, duplo fere majora quam in *Gynotrochi*.

VI. ANSTRUTHERIA, *Gardn.*

Calycis tubus brevissime turbinatus, limbus 4-5-partitus. Petala tot quot calycis lacinie unguiculata apice lacera. Stamina numero petalorum quadrupla (v. quintupla?) disco brevissimo inserta; filamentis nullis interjectis. Ovarium superum basi lata calyci impositum, 3- (rarius 4-) locale. Ovula in loculis gemina. Fructus carnosus subglobosus in valvulas crassas demum septicide dehiscens. Semina ovoidea. Embryo in albuminis axi rectus, cotyledonibus late ovatis.—Pedicelli axillares solitarii v. pauci. Bractee quam in *Cassipourea* crassiores, juniores in cupulam connatae calycem basi amplectentes, demum apertae v. caducae.

Species v. formae tres, patria diversa inter se tamen valde affines, et specimina ad diagnoses conficiendas adhuc non sufficiunt.

1. A. CEYLANICA, *Arn. in Calc. Journ. Nat. Hist.* vol. vi. p. 344. t. 4.

Hab. in ins. Ceylon, *Klein, Walker, Gardner, Champion, Thwaites, &c.*

Folia variant nunc late ovata tenuiora, nunc ovali-elliptica magis coriacea.

2. A. AFRICANA. *Cassipourea africana*, *Benth. in Hook. Fl. Nig.* p. 341.

C. congoensis, *Br. ex DC. Prod.* vol. iii. p. 34?.

Hab. in Africa tropica occidentali, *Vogel.*

Specimina fructifera tantum vidi cum alabastris junioribus; simillima sunt iis e Ceylonensium foliis angustis coriaceis donatis, flores tamen multo minores videntur.

3. A. MADAGASCARIENSIS. *Cassipourea madagascariensis*, *DC. Prod.* vol. iii. p. 34. *Richæia*, *Dup. Thou. Gen. Nov. Madag.* p. 25.

Hab. in Madagascaria, *Dupetit Thouars.*

Species a me non visa.

VII. BLEPHARISTEMMA, *Wall.*

Calyx ovoideus, breviter 4-lobus. Petala in fundo calycis circa discum inserta, unguiculata, apice lacera. Stamina numero petalorum dupla, disco cupulato apice crenato inserta. Ovarium in fundo calycis liberum obovoideum 3-locale, ovulis in quoque loculo geminis. Fructus ignotus.—Cymae pedunculatae axillares corymboso-multiflorae. Flores abortu subdioici.

Species unica.

B. CORYMBOSUM, *Wall. Cat.* n. 6320. *Dryptopetalum membranaceum*, *Miq. in Pl. Hohenack.* n. 713.

Hab. In Indiae Orientalis Peninsula, *Herb. Heyne*; in Terra Canara prope Pellitschery, *Hohenacker.*

Frutex?, excepta inflorescentia gemmisve novellis glaber. Folia opposita, petiolata, ovali-elliptica v. oblonga acuminata, irregulariter sinuato-

crenata, basi acuta v. rotundata, 4-5 poll. longa, $1\frac{1}{2}$ - $2\frac{1}{2}$ poll. lata, membranacea, penninervia. Stipulæ interpetiolares lanceolatæ membranaceæ pubescentes, 2-3 lin. longæ, caducissimæ. Cymæ ad axillas v. ad basin innovationum oppositæ, pedunculo semipollicari fultæ, 2-3-chotomæ, floribus 20-30 et ultra. Pedicelli circa lineam longi. Calyx ovoideo-campanulatus, $1\frac{1}{2}$ lin. longus, crassiusculus, superne extus minute hirtellus, lobis vix ad tertiam partem attingentibus. Petala marium calyce duplo longiora. Stamina paullo breviora uti petalorum ungues ciliata. Discus $\frac{3}{4}$ lin. longus, a calyce fere omnino liber, apice 8-dentatus. Ovarium angustum vacuum stylo brevi. Petala in floribus fœmineis breviora. Stamina minora antheris parvis (effoetis?). Discus minor, sæpe fissus. Ovarium obtuse subtrigonum. Stylus calyce longior, stigmate obsolete trilobo.

VIII. DACTYLOPETALUM, *Benth.*

Calyx campanulatus breviter 5-lobus. Petala in fundo calycis circa discum inserta, unguiculata, apice lacera. Stamina numero petalorum dupla disco cupulato leviter crenato inserta. Ovarium in fundo calycis liberum uniloculare, ovulis 4, per paria circa axin pendulis. Fructus ignotus.—Flores in axillis glomerati subsessiles.

Species unica.

DACTYLOPETALUM SESSILIFLORUM.

Hab. In ins. Nossi-bé, *Boivin.*

Arbor? glabra. Stipulæ breves, caducæ. Folia petiolata oblongo-elliptica, breviter acuminata, integerrima, 3-4-pollicaria, coriacea. Flores ad axillas conferti subsessiles, ut videtur ebracteati. Calyx vix 2 lin. longus, lobis obtusis. Petala paullo longiora, uti stamina glabra, apice in lobos circa 5 digitatim fissa. Discus quam in *Blepharistemma* brevior. Stigma vix dilatatum.

IX. CASSIPOUREA, *Aubl.*

Calyx campanulatus, breviter 4-5-lobus. Petala in fundo calycis circa discum inserta, unguiculata, apice profunde fimbriato-lacera. Stamina numero petalorum 4-5-pla (rarius tripla), disco cupulato apice vix crenulato inserta. Ovarium in fundo calycis liberum ovoideum v. globosum 3-loculare (rarius 4-loculare), ovulis in quoque loculo geminis. Stigma vix dilatatum. Fructus carnosulus ovoideus in valvas carnosulas septicide subdehiscens.—Flores in axillis glomerati, sessiles v. breviter pedicellati. Species tres, omnes Americanæ, in Prodromo Candollii enumeratæ, inter se valde affines sunt.

1. *C. ELLIPTICA* (*Poir. Dict. Suppl.* vol. ii. p. 131; *Hook. Ic.* vol. iii. t. 280); foliis ovatis ellipticisve integerrimis, floribus distincte pedicellatis.

Hab. in insulis Americæ æquinoctialis; in ins. Jamaica, *Purdie*; Dominica,

- Imray*; Stⁱ Vincentii, *Anderson, Guilding*; et in America centrali prope Chagres, *Fendler*, n. 191; in ins. Coyba Novæ Grenadæ, *Seemann*.
Folia vulgo basi magis angustata quam in sequentibus. Calyx 2 lin. longus.
2. *C. GUIANENSIS* (*Aubl. Pl. Gui.* vol. i. p. 529. t. 211); foliis ovatis ellipticisve integerrimis, floribus subsessilibus.
Hab. in Guiana Anglica, *Hancock, Rob. Schomburgk*, coll. ii. n. 84 et 853; *Rich. Schomburgk*, n. 32 et 1473; in Cayenne, *Martin*; in Surinamo, *Hostmann*, n. 1170.
Folia basi sæpius obtusa, rarius acuta, petiolo brevi nunc brevissimo. Calyx circa 1½ lin. longus.
3. *C. MACROPHYLLA* (*DC. Prod.* vol. iii. p. 34); foliis ellipticis oblongisve superne hinc inde repando-dentatis, floribus subsessilibus. *C. serrata*, Benth. in *Hook. Journ.* vol. ii. p. 223, et *C. quadricocularis*, Benth. in *Spruce, Pl. Exs.*
Hab. in Guiana Anglica ad flumina Essequibo et Rupununy, *Rob. Schomburgk*, coll. i. n. 527; in Brasilia boreali ad flumina Amazonum et Rio Negro, *Martius, Spruce*.
Folia vulgo 4–6-pollicaria, hinc inde tamen iis *C. guianensis* similia. Flores quam in præcedentibus majores. Calyx 2½ lin. longus.

Notice of the Re-discovery of the Genus *Asteranthos*, Desf., by
Mr. Spruce. By GEORGE BENTHAM, Esq., F.L.S.

[Read April 1st, 1858.]

THE plant, of which I here exhibit a specimen, has excited much interest, as well from its close relationship to the African *Napoleona*, as from the uncertainty of the origin of the only specimen hitherto known. This specimen, or rather fragment, was part of a herbarium brought from Portugal to the Museum of the Jardin des Plantes of Paris in the commencement of the present century, and which contained, together with several plants from the Brazilian provinces of Pernambuco and Rio Negro, others from Angola in Africa. From this fragment, consisting of a branch with two leaves and a few loose flowers, Turpin made up the figure in the 'Annales du Muséum,' and Desfontaines drew up his description. Adrien de Jussieu afterwards dissected one of the loose buds, and as the result showed a great affinity to the *Napoleona* and to no other plant known, it was supposed that the *Asteranthos* also was probably African, but had been misplaced into the Brazilian portion of the above-mentioned herbarium, by some confusion in sorting it, either in Portugal or on its arrival in Paris. Mr. Spruce, however, has now proved that its Brazilian origin was perfectly correct. He found it in great abundance on the banks

of the Guainia, the name given to the Guainiu above its confluence with the Casiquiare, and also on the Atabapo, an affluent of the Orenoco below its junction with the Casiquiare. He describes it as a tree of 30 or 40 feet in height, with slender branches, and handsome, very highly scented, yellow flowers. He found the number of folds of the corolla to vary from 22 to 26; I have counted 28 in some flowers; and in a loose corolla which he found floating very far down the Rio Negro there are 35.

Adrien de Jussieu (Ann. Sc. Nat. iii. 2. p. 227) states that, in the bud he examined, he found a 5-celled ovary with three or four pendulous ovules in each. In the flowers I have examined I find six cells, corresponding to the six raised ribs of the base of the style described by Desfontaines. The four pendulous ovules in each cell are precisely as in *Napoleona*.

There being no fruit with these specimens, they add but little to what was already known as bearing on the much-disputed question of the affinities of these plants. I cannot enter into Jussieu's views of their proximity to *Sapotaceæ*; but it appears to me that everything confirms Lindley's views of their affinity with *Myrtaceæ*. Indeed if we include in that family the *Barringtoniæ* and *Lecythideæ*, we can scarcely exclude *Asteranthos*. The tendency to the union of the petals and stamens in concentric rings may be traced in several plants of the group.

Monograph of the *Eucalypti* of Tropical Australia; with an Arrangement for the use of Colonists according to the Structure of the Bark*. By Dr. FERDINAND MUELLER, Government Botanist, Victoria, Australia. Communicated by Dr. J. D. HOOKER, V.P.R.S., F.L.S.

[Read February 18, 1858.]

CONSPECTUS EUCALYPTORUM AUSTRALIE INTERTROPICÆ ET
SUBTROPICÆ.

I. *Folia alterna, latitudine conspicue longiora.*

§ 1. *Valvæ prorsus exsertæ.*

1. *E. tereticornis.* Operculum conico-subulatum.
2. *E. rostrata.* Operculum hemisphæricum, rostratum.
3. *E. brevifolia.* Operculum hemisphæricum, muticum.

* The accompanying MS. has been compared with the specimens from Dr. Mueller and A. Cunningham in the Hookerian Herbarium, by Mr. Allan Black, Curator of the Herbarium, who has added some habitats and notes.—J. D. H.

4. *E. patellaris*. Operculum patellare, umbonatum.

5. *E. exserta*. Operculum conicum, obtusum.

§ 2. *Valvæ semiexsertæ*.

6. *E. signata*. Operculum hemisphæricum; fructus semiglobosus.

7. *E. hemilampira*. Operculum elongato-conicum; fructus turbinatus.

8. *E. semicorticata*. Operculum acuminatum; fructus semiglobosus.

9. *E. leptophleba*. Operculum ; fructus semiovatus.

10. *E. microtheca*. Operculum ; fructus minutus, semiovatus.

11. *E. fibrosa*. Operculum tenui-conicum; fructus semiglobosus.

12. *E. crebra*. Operculum semiovatum; fructus semiovatus.

§ 3. *Valvæ omnino inclusæ*.

13. *E. variegata*. Operculum hemisphæricum; fructus semiovatus.

14. *E. tessellaris*. Operculum patellare; fructus semiovatus.

15. *E. polycarpa*. Operculum ; fructus oblongo-ovatus.

16. *E. terminalis*. Operculum ; fructus subcampanulatus.

17. *E. dichromophloia*. Operculum semiovatum; fructus urceolatus.

18. *E. trachyphloia*. Operculum ; fructus semiovatus.

19. *E. bicolor*. Operculum hemisphæricum, ecostatum; fructus semiovatus.

20. *E. ptychocarpa*. Operculum hemisphæricum, costatum; fructus subcampanulatus.

21. *E. aurantiaca*. Operculum hemisphæricum, costatum; fructus urceolari-campanulatus.

22. *E. phænicea*. Operculum ; fructus urceolaris, ecostatus.

§ 4. *Species fructu ignoto*.

23. *E. citriodora*. Operculum hemisphæricum?

24. *E. tectifca*. Operculum acuminatum.

II. *Folia alterna, latitudine vix aut paulo longiora*.

25. *E. populnea*.

III. *Folia opposita vel subopposita, latitudine vix aut paulo longiora*.

§ 1. *Valvæ prorsus exsertæ*.

26. *E. platyphylla*.

§ 2. *Valvæ semiexsertæ*.

27. *E. melanophloia*.

§ 3. *Valvæ omnino inclusæ*.

28. *E. latifolia*. Operculum ; fructus subcampanulatus.

29. *E. aspera*. Operculum ; fructus minuti, subcampanulati.

30. *E. ferruginea*. Operculum ; fructus globoso-ovati.

31. *E. melissiodora*. Operculum conico-hemisphæricum; fructus campanulati.

§ 4. *Species fructu incognito.*

32. *E. bigalerita.* Operculum duplex.
 33. *E. floribunda.* Operculum patellare.

IV. *Folia opposita, latitudine conspicue longiora.*

34. *E. tetradonta.*

V. *Sectio dubia.*

35. *E. brachyandra.*
 36. *E. clavigera,* A. Cunn.
 37. *E. odontocarpa.*
 38. *E. pachyphylla.*

I. *Folia alterna, latitudine conspicue longiora.*§ 1. *Valvæ prorsus exsertæ.*

1. EUCALYPTUS TERETICORNIS (*Smith in Trans. Linn. Soc.* iii. 284).
E. subulata (*All. Cunn, ex Schauer in Walp. Rep. Bot. Syst.* ii. 924).
 Excelsa, ramulis tenuibus teretiusculis, foliis alternis longiuscule petiolatis elongato-lanceolatis subfalcatis concoloribus vix nitidulis pellucide punctatis penniveniis, vena longitudinali a margine remota, umbellis 4-6-floris, pedunculis axillaribus lateralibusque solitariis pedicellos longitudine excedentibus angulosis, calycis ecostati operculo conico-subulato subcurvato tubi hemisphærici longitudinem pluries excedente, capsulæ semisuperæ subglobosæ quadriloculatæ valvis alte exsertis deltoideis, seminibus apteris.

Hab. In montosis planitiibusque Australiæ orientalis usque ad flumen Burdekin. Anth. vere. (Brisbane River, *Frazer*, in hb. Hook.)

Arbor trunco ut plurimum recto, cortice undique cinereo lævi in stratis tenuibus fusciscentibus secedente. *Folia* longitudine inter 3 et 7" varia, inferne 6-10" lata, in apicem longe sensim angustata, breviter in petiolum decurrentia. *Calycis* tubus 1" parum excedens. *Filamenta* albida. *Operculum* pallidum circiter semunciale. *Capsula* ad $\frac{3}{4}$ exserta, fere 3" metiens.

Huic *E. rostrata*, Schlecht. et *E. acuminata*, Hook. proximæ, et forsánonnisi varietatis valore diversæ.

2. EUCALYPTUS ROSTRATA (*Schlechtendal! in Linnæa*, xx. p. 655. *E. acuminata*, Hook. *! in Mitchell, Trop. Austral.* p. 390). Arborea, ramulis tenuibus apice angulatis, foliis alternis modice petiolatis elongato-vel falcato-lanceolatis opacis prominenter penniveniis pellucide punctatis, vena peripherica a margine remota, umbellis axillaribus solitariis 5-7-floris, pedicellis calycis tubo subduplo longioribus pedunculo conspicue brevioribus quocum tenuibus angulatis, calycis tubo hemisphærico ecostato, operculo semigloboso conico-vel subulato-acuminato, fructibus quadriloculatis, valvis omnino exsertis, seminibus apteris.

Hab. In Australia tropica et subtropica secus rivulos, circum paludes lacusque, nec minus in pratis tempore pluviali inundatis fere ubique abunde occurrens. Anth. æstate.

Arbor mediocris vel gigantea, ramulis pendulis. *Cortex* præter trunci basin cæsi- vel albido-cinereus lævis rudimentis strati superi fuscescentis secedentis tenuibus interdum parce obtectus. *Folia* tenuicoriacea, pleraque 5-8" longa, inferne 6-10" lata, in apicem longe angustata. *Calycis* tubus sesquilinearis. *Operculi* acumen longitudine et forma varians sed potius subito quam (in *E. tereticorni*) sensim protrudens. *Stamina* albida. *Capsula* circiter 3" metiens.

Anot. Operculi acumen nonnunquam rudimento operculi alteri inclusum.

"Yarra-tree," *Mitch. Trop. Austr.* passim. "Flooded Gum-tree," *Leichhardt's Overland Exp.* et colonorum passim. "Red Gum-tree" inhabitantium coloniae South Australia.

3. *EUCALYPTUS BREVIFOLIA*. Arborea v. fruticosa, ramulis teretiusculis, foliis alternis angusto- vel ovato-lanceolatis parum curvatis acutis vel sensim acuminatis modice petiolatis subtiliter penniveniis epunctatis, vena peripherica a margine vix remota, umbellis axillaribus paucifloris, pedunculis petiolo brevioribus obscure angulatis, calycis tubo semiovato vel hemisphærico lævi pedicellum duplo excedente operculi semiglobosi mutici longitudinem vix superante, *capsula semi-exserta* 3- raro 4-loculata vertice hemisphærica stylo mucronata, valvis paulo infra marginem insertis, seminibus clathratis apteris.

Hab. In eremis terræ tabularis ad flumina Victoria et Sturt's Creek, in plaga Arnheim's Land et circum sinum Carpentaria. Anth. vere.

Frutex elatior vel arbor minor rarius mediocris, cortice lævi albido-cinerascenti. *Ramuli* fulvi. *Folia* pleraque 2-3" longa, $\frac{1}{2}$ -1" lata. *Pedunculi* 3-4" longi. *Calycis* tubus longitudine $1\frac{1}{2}$ -3" varians, fructifer hemisphæricus. *Semina* $\frac{2}{3}$ -1" longa ovata concavo-convexa fusca.

Variat floribus duplo minoribus.

4. *EUCALYPTUS PATELLARIS*. Arborea, ramulis teretiusculis apice vix angulatis, foliis alternis modice petiolatis angusto-lanceolatis subfalcatis longe acutatis parce pellucide punctatis nitidulis subtiliter venosis, vena peripherica margini subcontigua, umbellis terminalibus axillaribusque 3-7-floris geminis vel pluribus paniculatis, pedunculo teretiusculo pedicellis angulatis paulo vel duplo longiore, *calycis tubo campanulato* pedicellum longitudine æquante *operculum patellare umbonutum* duplo excedente, capsulæ quadriloculatae *valvis prorsus exsertis*.

Hab. Ad rivulos exsiccantes fluvii Roper. Anth. æstate.

Arbor elatior, habitu *E. microthecæ*. *Cortex* sordide canus rugosus et rimulosus in trunco ramisque persistens. *Folia* 3-6" longa, $\frac{1}{2}$ -1" lata. *Pedunculi* unciales vel breviores. *Calycis* tubus circiter 4"

longus viridulus. *Operculum* fuscescens coriaceum. *Valvæ* margini calycis adnatæ.

5. *EUCALYPTUS EXSERTA*. Arborea, ramulis tenuibus angulatis, foliis alternis angusto-lanceolatis elongatis leniter curvatis modice petiolatis acuminatis opacis pellucide punctatis subtilissime penniveniis, vena peripherica a margine remota, umbellis axillaribus lateralibusque solitariis 3-7-floris, petiolo pedunculum angulatum superante, calyce breviter pedicellato, *operculo conico* obtusiusculo calycis tubum hemisphæricum indistincte costatum duplo excedente, *capsula globosa* 3-5-loculata *semisupera*, *valvis alte exsertis*, seminibus apteris.

Hab. In pratis minus fertilibus ad fluvium Burnett. Anth. Jan., Febr. *Arbor* mediocris vel minor, cortice in trunco ramisque persistente cinereo-fusco rugoso et rimoso, extus frustuloso, intus subfibroso. *Folia* 3-6" longa, 4-8" lata. *Pedunculi* 3-5" longi. *Capsula* circiter 3" metiens, valvis brevibus deltoideis supra calycis marginem orientibus. *Fructus* igitur non dissimilis ei *E. rostrata*. *Semina* angulata subtilissime rugulosa fertilia nigrescentia.

Quoad corticis structuram inter arbores Eucalyptorum "Bloodwood-" et "Stringy-bark-trees" vocatas quasi medium tenet, notis specificis ad *E. fibrosam* approximans.

§ 2. *Valvæ semixsertæ*.

6. *EUCALYPTUS SIGNATA*. Arborea, ramulis apice angulatis, foliis alternis elongato-lanceolatis falcatis modice petiolatis longe acuminatis opacis prominenter venosis pellucide punctatis, *venis erecto-patentibus*: peripherica a margine remota, umbellis axillaribus et lateralibus 6-10-floris, pedicellis angulatis pedunculo compresso bis terve brevioribus calycem ecostatum vix excedentibus, calycis tubo operculum hemisphæricum apiculatum longitudine duplo superante turbinato, *fructibus parvis hemisphæricis* quadriloculatis vertice planis, valvis vix exsertis, seminibus apteris.

Hab. In collibus et montibus graminosis sylvaticis ad flumen Brisbane. (*Macarthur*, Sydney Woods, Paris Exhib. No. 163, in hb. Hook.) Anth. Nov., Dec.

Arbor elata, "Spotted Gum-tree" in plagis ad Moreton Bay vocata, *trunco* cum ramis lævi e cæsiō et albedo vel livido *variegato* lineisque flexuosis signato. *Folia* 3-6" longa, $\frac{2}{3}$ -1 $\frac{1}{3}$ " lata venis angulo acutiore patentibus percursa. *Pedunculi* 5-9" longi. *Stamina* albida ad 2" longa. *Operculum* circiter 1" altum, interdum obtusum raro acuminatum. *Fructus* circiter 2 $\frac{1}{2}$ " longi.

7. *EUCALYPTUS HEMILAMPRA*. Arborea, ramulis compresso-tetragonis, foliis alternis modice petiolatis curvato-lanceolatis sensim acuminatis pellucide punctatis subtilissime venosis *supra nitentibus*, *subtus pallidioribus opacis*, vena longitudinali a margine remotiuscula, umbellis 5-7-floris axillaribus lateralibusque solitariis, pedunculo compresso petiolum æquante pedicellis angulosis longiore, calycis

tubo late obconico paucicostato, *operculo elongato-conico acuto recto* tubi longitudinem ter quaterve excedente ecostato, fructibus subturbinatis quinqueloculatis vertice convexis, valvis semiexsertis, seminibus apteris.

Hab. Ad rivulos torrentesque sylvaticos secus partes fluvii Brisbane superiores. Anth. Dec., Jan.

Arbor procera, trunco ramisque cinereis lævibus. *Folia* 4-5 poll. longa, inferne $\frac{3}{4}$ - $1\frac{1}{3}$ " lata. *Pedunculi* $\frac{1}{2}$ -1" longi. *Pedicelli* calycis tubo modo longiores modo breviores. *Operculum* semunciale sordide flavidum. *Filamenta* albida ad $\frac{1}{2}$ " longa. *Fructus* vix 3" longi apice non contracti.

E. tereticorni similis, foliis quoque *E. citriodoræ*.

8. **EUCALYPTUS SEMICORTICATA.** Arborea, ramulis angulatis, foliis alternis lanceolatis subfalcatis modice petiolatis sensim acuminatis opacis subtilissime venosis imperforatis, vena peripherica a margine remota, umbellis axillaribus et lateralibus solitariis 5-8-floris, pedicellis angulatis pedunculo compresso bis terve brevioribus calycis tubo vix longioribus, operculo acuminato calycis tubum semiovatum ecostatum æquante, fructibus hemisphæricis 3-4-loculatis vertice planis, valvis brevissime exsertis, seminibus apteris.

Hab. In nemoribus montium fertiliorem ad flumen Brisbane. (Illawarra, *Macarthur*, Sydney Woods, in Paris Exhib. No. 88, hb. Hook.) Anth. æstate.

Arbor procera, "Blackbut" colonorum. *Cortice trunci* extus nigro-cinereo intus fusco fibroso, ramis denudatis albidis lævibus. *Folia* $2\frac{1}{2}$ -4" longa, 7-10" lata. *Pedunculi* 6-10" longi. *Operculum* 2" longum semiovatum subrostratum. *Fructus* 3-4" longi. *Semina* fusca 1" longa angulata subtilissime punctulato-rugulosa.

E. persicifolia, Lodd. non Schl., huc forsitan pertinet ex nomine vernaculari "Blackbut" ad hanc a Cunninghamio citato.

9. **EUCALYPTUS LEPTOPHLEBA.** Arborea, ramulis inferne teretiusculis superne angulatis lævibus, foliis alternis modice petiolatis falcato-lanceolatis epunctatis subtilissime venosis, vena peripherica a margine parum remota, umbellis axillaribus terminalibusque 3-5-floris geminis ternis vel paniculatis, pedunculis angulatis; generali cæteris longiore, pedicellis calycis tubo semiovato brevioribus, *fructibus semiovatis ecostatis* 4-5-loculatis, *valvis subinclusis* deltoideis acuminatis infra marginem insertis.

Hab. In pratis ad flumen Gilbert. Anth. æstate.

Arbor mediocris vel major, cortice sordide cano rugoso et rimuloso in trunco ramisque persistente. *Folia* pleraque 3-5" longa, ad 1" lata. *Pedunculi* primarii petiolos æquantes vel superantes. *Pedicelli* calycis tubo varie breviores. *Fructus* 3-4" longi ore non contracti. *Valvæ* non nisi apice exsertæ.

E. patellari approximanda.

10. *EUCALYPTUS MICROTHECA*. Arborea, ramulis tenuibus teretiusculis, foliis alternis breviuscule petiolatis lineari-lanceolatis subfalcatis acutiusculis opacis imperforatis subtilissime venosis, vena longitudinali margini subcontigua, umbellis axillaribus solitariis vel paniculatis paucifloris, pedunculis angulatis, fructibus parvis semiovatis ecostatis breviter pedicellatis 3-4-ocularibus, valvis infra marginem insertis vix emergentibus, seminibus fertilibus nigrescentibus lævibus apteris.

Hab. In Nova Hollandia tropica non rara, planities fertiliores inhabitans. Anth. vere.

Arbor mediocris, cortice sordide fusco-cano rugoso et rimoso in trunco persistente, ramis superne decorticantibus cinereis lævibus. Folia satis tenuia 2-5" longa, 4-8" lata. Paniculae simpliciusculæ foliis breviores. Pedunculi longitudine variantes. Fructus 1½-2" longi. Semina fere ⅔" longa peltato- vel truncato-ovata.

11. *EUCALYPTUS FIBROSA*. Arborea, ramulis compresso-tetragonis, foliis alternis modice petiolatis lanceolato-falcatis acuminatis indistincte vel subtile venosis opacis imperforatis, vena peripherica a margine remota, umbellis axillaribus solitariis geminisque vel terminalibus paniculatis 5-6-floris, pedunculo anguloso petiolum vix æquante, pedicellis calycis tubo semiovato æquilongis, operculo tenui-conico obtusiusculo quam tubus angustiore et duplo longiore, fructibus hemisphæricis 3-4-loculatis ecostatis, valvis infra marginem affixis breviter exsertis, seminibus apteris.

Hab. In montibus nemorosis ad flumen Brisbane. Anth. æstate.

Arbor magna, suo tractu "Stringy-bark-tree" colonis vocata, trunco recto cum ramis corticem extus rugosum nigrescenti-cinereum intus fibrosum gerente. Folia 3-5" longa, ½-1" lata. Calyx in pedicellum angulatum desinens. Operculum 3" longum. Fructus lignosi 3-4" longi.

12. *EUCALYPTUS CREBRA*. Arborea, ramulis teretiusculis apice angulatis, foliis alternis modice petiolatis lanceolato-falcatis acuminatis tenuissime vel indistincte penniveniis imperforatis opacis, vena peripherica a margine remotiuscula, umbellis axillaribus solitariis et terminalibus subpaniculatis 3-6-floris, pedunculis petiolum subæquantibus vel eodem brevioribus pedicellisque angulatis, calycis tubo semiovato ecostato pedicellum longitudine subæquante, operculo (juvenili) semiovato mutico tubo vix æquilongo angustiore, fructibus parvis semiovatis 3-4-loculatis, valvis parum convexis paulo infra marginem insertis breviter emergentibus, seminibus apteris.

Hab. A montibus Newcastle-Range usque ad sinum Moreton Bay tam in solo fertiliore quam steriliore præcipue autem montano vel collino sylvas vastas apertas constituens. Anth. æstate.

Arbor minor vel mediocris, cortice undique persistente rugoso nigrito. Folia 2-5" longa, 6-9" lata, in petiolum ½-1" longum angustata. Fructus 2-2½" longi, orificio non contracti.

"Moreton Bay Ironbark-tree" apud colonos nuncupata.

§ 3. *Valvæ omnino inclusæ.*

13. *EUCALYPTUS VARIEGATA.* Arborea, ramulis angulatis, foliis alternis modice petiolatis lanceolato-linearibus vel angusto-lanceolatis falcatis elongatis longe acutatis nitidulis crebre penniveniis pellucide punctatis, vena peripherica margini valde approximata, *umbellis paniculatis trifloris*, calycis tubo semiovato operculi hemisphærici longitudinem duplo excedente quocum ecostato, fructibus truncato-ovatis trilocolatis pedicello bis-quater longioribus ecostatis vertice planis, valvis inclusis, seminibus apteris.

Hab. In collibus graminosis ad flumen Burnett. Anth. æstate.

Arbor altior, trunco lævi cinereo-albido rudimentis strati extimi corticis cæsiis vel sordide rufescentibus variegato. *Folia* pleraque 4-7" longa et totidem lineas lata. *Pedunculi* partiales 2-3" longi angulati. *Alabastra* ovata. *Fructus* 5-6" longi apice sensim contracti.

"Spotted Gum-tree" quorundam colonorum. Habitu vix differt ab *E. tereticorni* et *E. rostrata* nisi trunco stratis extimis corticis basi tenus denudato, nec ad basin stratis corticis vetustis lignescentibus rugosis rimosisque obducto.

14. *EUCALYPTUS TESSELLARIS.* Arborea, ramulis inferne teretiusculis superne angulatis lævibus, foliis alternis breviuscule petiolatis angustolanceolatis subfalcatis subtiliter penniveniis imperforatis, umbellis axillaribus et terminalibus geminis pluribusve paniculatis 2-4-floris, pedunculis angulatis; generali cæteris longiore, alabastris ovatis pedicello fere duplo longioribus, operculo patellari obtuso, tubo operculi latitudinem paulo et longitudinem multo excedente, fructibus truncato-ovatis ecostatis, valvis inclusis.

Hab. In graminosis tam collium quam planitierum præsertim arenoso-argillaceorum a parte austro-orientali sinus Carpentaria usque ad sinum Moreton Bay. Anth. Nov., Dec.

Arbor mediocris vel major, cortice in parte inferiore trunci tantum persistente solido squalide cinereo rimis longitudinalibus transversisque numerosis inæqualiter *subtessellato* frustula separabilia formante. Pars trunci superior cum ramis albida lævis. *Ramuli* cum foliis ut in plerisque speciebus penduli. *Folia* pleraque 3-4" longa, $\frac{1}{2}$ - $\frac{3}{4}$ " lata acuminata. *Pedunculi* primarii petiolo parum vel duplo breviores. *Fructus* 4-5" longi, apicem versus leniter contracti.

"Moreton Bay Ash," *Leichhardt's Overland Expedition* passim et colonorum.

15. *EUCALYPTUS POLYCARPA.* Arborea, ramulis teretiusculis rigidulis, foliis alternis vel suboppositis breviuscule petiolatis elongato-vel falcato-lanceolatis longe in apicem acutatis nitidulis imperforatis creberrime et subtilissime penniveniis subtus parum pallidioribus, vena peripherica margini subcontigua, *umbellis* terminalibus ample *paniculatis* 4-6-floris, pedunculis partialibus pedicellorum longitudinem parum vel duplo excedentibus quibuscum teretibus, fructibus oblongo-ovatis

truncatis exangulatis ecostatis antice sensim contractis basi obtusis 3-4-loculatis pedicello aliquoties longioribus, *valvis profunde inclusis, seminibus antice longe alatis.*

Hab. In locis apricis Novæ Hollandiæ intratropicæ passim. Anth. vere. *Arbor* mediocris, cortice ubique persistente, extus sordide cano rugoso et rimoso, intus fuscescente, in frustulis separabili. *Folia* 3-5" longa, inferne 7-9" lata crassiuscule coriacea basi in petiolum semuncialem vel breviora acutata, apice sæpe in acumen angustum producta. *Pedunculi* generales crassi. *Fructus* cano-viriduli opaci non lævigati, 6-8" longi, interdum unciales, ore vix dilatati. *Valvæ* deltoideæ acuminatæ.

E. terminali habitu et cortice persimilis, sed fructibus parum vel duplo minoribus et notis expositis diversa.

16. **EUCALYPTUS TERMINALIS.** Arborea, ramulis teretiusculis rigidis, foliis alternis crassiusculis falcato-lanceolatis acuminatis opacis subtilissime penniveniis imperforatis concoloribus modice petiolatis, vena peripherica margini contigua obscura, *umbellis* 3-6-floris in *paniculas amplas terminales congestis*, pedunculis partialibus pedicellos longitudine parum excedentibus quibuscum teretibus, fructibus magnis truncato-ovatis subcampanulatis exangulatis ecostatis quadriloculatis vertice planis pedicello fere duplo longioribus, valvis marginem subattingentibus, *seminibus antice longe alatis.*

Hab. In pratis et planitiebus siccis fertilioribus Australiæ intratropicæ non rara. Anth. æstate.

Arbor mediocris vel magna, cortice sordide fusco persistente rugoso rimosoque intus fulvo vel ferrugineo in frustulis irregularibus vix parce secedente. *Folia* ut plurimum 5-7" longa, inferne circiter pollicaria vel paulo angustiora. *Fructus* unciam paulo excedentes antice vix contracti.

17. **EUCALYPTUS DICHROMOPHLOIA.** Arborea, ramulis subteretibus, foliis alternis modice petiolatis crassiusculis falcato-vel elongato-lanceolatis in acumen longe acutatis vix nitidulis subtilissime venosis imperforatis, *umbellis* paniculatis 5-7-floris, vena peripherica margini contigua, pedunculis partialibus angulatis pedicello longioribus, alabastris ovatis pedicello æquilongis, tubo operculi mutici hemisphærici longitudinem paulo excedente, *fructibus urceolato-ovatis* vel subglobois ecostatis quadriloculatis, valvis profunde inclusis deltoideis, *seminibus fertilibus apice alatis.*

Hab. In locis minus fertilibus sterilibusve Australiæ intratropicæ passim. Anth. Apr., Mai.

Arbor mediocris vel major. *Corticis stratum superum subpapyraceum læve cinereum* rumpens et tarde secedens ab interiore rufo. *Folia* 3-8" longa, 6-12" lata. *Pedunculi* 4-8" longi. *Pedicelli* angulati. *Flores* nondum aperti 3" longi. *Fructus* 4-6" longi antice leniter contracti; *capsula* a calyce demum secedens.

18. *EUCALYPTUS TRACHYPHLOIA*. Arborea, ramulis angulatis, foliis alternis modice petiolatis angusto-lanceolatis subfalcatis in acumen tenue angustatis opacis subtilissime venosis pellucide punctatis, vena longitudinali margini subcontigua, umbellis paniculatis 3-5-floris, pedicellis pedunculo brevioribus fructu æquilongis angulatis, fructibus parvis ecostatis *truncato-ovatis 3-loculatis, valvis deltoideis profunde inclusis*, seminibus apteris.

Hab. In collibus ad flumen Burnett. Anth. Sept., Oct.

Arbor mediocris, cortice in trunco ramisque persistente cinereo-fusco frustuloso rugoso. *Folia* 3-5" longa, 5-8" lata, in petiolum 6-9" longum paulo angustata, subtus parum pallidiora. *Fructus* circiter 3" metientes apice sensim contracti.

19. *EUCALYPTUS BICOLOR* (*A. Cunn. in Mitchell, Trop. Austr.* p. 390. *E. parviflora, Muell. MSS.*). Fruticosa vel arborea, ramulis teretiusculis, foliis alternis lanceolato-linearibus v. lanceolatis leniter curvatis vel falcatis sensim acutatis subtiliter penniveniis nitidulis pellucide punctatis, vena peripherica a margine parum remota, umbellis axillaribus terminalibusque solitariis v. paniculatis 5-7-floris, pedunculis partialibus petiolo vix æquilongis, pedicellis calycis tubo semiovato ecostato æquilongis vel brevioribus, operculo hemisphærico v. semiovato mutico tubo perparum brevior, *capsulis minutis semiovatis obscure bicostatis apice vix contractis 3-4-loculatis vertice planiusculis, valvis infra marginem insertis inclusis, seminibus apteris.*

Hab. In planitiibus collibusque sterilibus a sinu Carpentaria usque ad regiones orientales Australiæ extratropicas. Anth. autumnno.

Frutex vel *arbor* minor, cortice sordide cano rugoso in trunco ramisque vestitus. *Folia* petiolo semunciali vel paulo longiore prædita, ut plurimum 2½-4½" longa, 3-6 lineas lata basi acuta. *Calycis* tubus sesquilinearis. *Filamenta* alba ad 1½" longa. *Antheræ* subglobosæ. *Stylus* staminibus paulo brevior. *Stigma* hemisphæricum. *Capsula* 2-2½" metiens. *Semina* fertilia ½-⅔" longa nigrescentia angulato-ovata subtilissime rugulosa.

"Scrub Box-tree" peregrinatorum, locos minus fertiles quam *E. microtheca* occupans, absque foliis nitentibus et ramis omnino corticatis jam ex longinquo distinguenda. Arctius ad *E. populneam* approximat. Anth. autumnno.

Huic quoque *E. gracilis* et *E. Hookeri* (*E. viminalis*, Hook. in Mitch. Trop. Austr., non Labill.) affines*.

20. *EUCALYPTUS PTYCHOCARPA*. Arborea, ramulis angulatis, foliis *magnis* crassis alternis oblique lanceolatis tenui-acuminatis modice

* Major Mitchell's specimens have black bark, and rather large pedicelled flowers. Mueller's, from Burdekin River, have also black bark and small sessile flowers; those from Carpentaria have pale yellow bark, very narrow leaves, and pedicelled capsules.—(A. B.)

petiolatis supra subnitentibus *subtus pallidioribus* penniveniis marginatis imperforatis, vena peripherica margini contigua, umbellis terminalibus paniculatis pauci-septemfloris, pedunculis partialibus pedicellos angulatos duplo triplove excedentibus, *calyce alte octocostato*, operculo hemisphærico tubo bis terve brevior, capsulis magnis ovato-campanulatis alte octocostatis quadriloculatis, valvis profunde inclusis, seminibus fertilibus superne longe alatis.

Hab. Ad rivulos rupestres necnon secus amnes exsiccantes versus originem fluviorum Wentworth, Wickham et Limmen Bight River. Anth. Mart., April.

Arbor media vel major, cortice squalide cano rugoso intus paulo fibroso, undique persistente. *Folia* 5-7" longa, 1½-2" lata. *Capsula* 1-1½" longa antice paululum contracta, valvis brevibus. *Semina* 2" longa (*i. e.* fertilia) alam membranaceam obovatam 3" longam gerentia; sterilia numerosa diminuta angusto-alata.

Stirps corticis structura medium tenet inter species vernacule "Stringy-bark-trees" et "Box-trees" vocatas.

21. *EUCALYPTUS AURANTIACA*. Arborea, *ramulis teretiusculis* cum umbellis *pruinoso-albicantibus*, foliis alternis oblique lanceolatis vel subfalcatis opacis modice petiolatis subtiliter venulosis parce pellucide punctatis, vena peripherica margini subcontigua, umbellis axillaribus lateralibusque solitariis 6-7-floris, *pedunculo* petiolum superante *crasso* subcompresso vel teretiusculo, calycibus sessilibus costatis: tubo turbinato operculi semiglobosi longitudinem dimidio excedente, *fructibus magnis ovato-urceolatis alte octocostatis* inter costas plicatis vel costa tenuiore præditis tri-quadri-loculatis, valvis inclusis brevibus.

Hab. In planitiibus arenosis sicuti in plagis elevatioribus petraeis circum sinum Carpentaria, ubi vegetationis ornamentum. Anth. Mai.-Aug.

Arbor major vel mediocris. *Cortex* extus sordide fulvido-canus, *fribilis* facile separandus, *lamellaris*, fibris lignescentibus copiosius intertextus, in trunco tantum persistens. *Rami* validi decorticatione albentes. *Folia* 3-4" longa, ¾-1" lata. *Calycis* tubus circiter semuncialis. *Staminum filamenta* ad ½" longa *aurantiaca!* *Antheræ* flavæ ovales. *Stylus* viridis stamina æquans. *Capsula* uncialis vel paulo longior sub ore leniter contracta.

Species pulcherrima *E. phæniceæ* cognata, cujus altitudinem sæpe excedit.

22. *EUCALYPTUS PHÆNICEA*. Arborea, *ramulis fulvescentibus* apice angulatis, foliis alternis breviuscule petiolatis tenui-coriaceis oblique lineari-lanceolatis vel subfalcatis opacis parce pellucide punctatis, vena peripherica margini fere contigua, *umbellis* axillaribus et lateralibus pluri-*multifloris*, pedunculo valido pedicellis pluries longiore teretiusculo, calycis tubo fere obconico ecostato, *fructibus* majusculis vix lignescentibus ovato- vel ellipsoideo-*urceolatis* nervosis sub limbo constrictis pedicello pluries longioribus, valvis profunde inclusis.

Hab. In planitiibus elevatioribus collibusque saxosis vel arenosis a fluvio Victoria per terram Arnheim circum sinum Carpentaria. Anth. Jun.—Sept.

Arbor minor vel mediocris. *Cortex* in trunco ramisque persistens, tarde a ramorum parte superiore secedens, extus squalide fulvus, *lamellaris*, fibris lignosis parcius intertextus, *friabilis* et facile separabilis. *Folia* subchartacea $2\frac{1}{2}$ —4" longa, inferne 5—9" lata in acumen tenue elongatum terminata. *Stamina* *phœnicea* vel aurantiaca. *Fructus* uncialis vel paulo longior.

Species formosa *E. miniatæ* affinis cum *E. aurantiaca* et *E. melissiodora* ob corticem micaceo-lamellosum in genere paradoxa.

§ 4. *Species fructu ignoto.*

23. *EUCALYPTUS CITRIODORA* (*Hook. in Mitch. Trop. Austr.* p. 235).

Arborea, ramulis apice angulatis, foliis alternis modice petiolatis elongato-lanceolatis leviter curvatis sensim longe acutatis subopacis pellucide punctatis tenuissime penniveniis, vena peripherica a margine paulo remota, *umbellis* terminalibus et axillaribus mox lateralibus simpliciter *paniculatis trifloris*, pedunculis angulatis, alabastris late ovatis apiculatis, tubo operculi longitudinem saltem duplo excedente,

Hab. In vicinia portus Curtis, *C. Moore*. Anth. autumnus.

Arbor elatior, cortice cinereo lævi. *Ramuli* sordide rubelli. *Petioli* compressi obscure canaliculati vix 1" longi. *Folia* 3—8" longa, $\frac{2}{3}$ —1 $\frac{1}{2}$ " lata tenui-coriacea in petiolum paulo decurrentia saturatius quam plurimorum congenerum viridia concoloria, *odore insigni citreo!* *Panicula* foliis breviores ex *umbellis* paucis constantes. *Bractee* et *bracteolæ* valde caducæ; illæ ad basin pedunculorum partialium solitariæ ovato-cymbiformes acutæ 1 $\frac{1}{2}$ " longæ; hæ vix 1" longæ ovals concavæ acutæ.

24. *EUCALYPTUS TECTIFICA*. Arborea, ramulis tenuibus teretiusculis, foliis alternis tenui-coriaceis breviuscule petiolatis ovato- vel angustolanceolatis antice longe acutatis tenui-venosis opacis imperforatis, vena longitudinali ad marginem valde approximata, *umbellis* axillaribus solitariis vel terminalibus subpaniculatis, pedicellis angulatis calycis tubum æquantibus pedunculo brevioribus, operculo conico acuminato tuboque semiovato æquilongis,

Hab. In vallibus graminosis fluminis M'Arthur originem versus. (N. Holl. Sub-Trop., *Mitchell*, in hb. Hook.) Anth. Aug., Sept.

Arbor excelsior, *cortice dilute cinereo rugoso* in trunco ramisque *persistente*. *Folia* semipedalia vel paulo breviora, inferne $\frac{3}{4}$ —1 $\frac{1}{2}$ poll. lata, venis primariis patentibus, secundariis reticulato-anastomosantibus. *Flores* in specimine collecto nondum bene evoluti. *Pedunculi* tenues 2—3" longi. *Alabastra* 2" longa, postea forsitan aucta. *Fructus* desunt.

Nativis cortex adhibetur ad habitatiunculas perrudes construendas.

II. *Folia alterna, latitudine vix aut paulo longiora.*

25. EUCALYPTUS POPULNEA (E. populifolia, Hook. in Mitch. Trop. Austral. p. 204, non Desfont.). Arborea, ramulis tenuibus teretiusculis lævibus, foliis alternis longe petiolatis ovato- vel rhombico-orbicularibus apice obtusis vel emarginatis basi acutiusculis utrinque nitentibus concoloribus pellucide punctatis subtiliter venosis, umbellis 3-7-floris axillaribus vel lateralibus solitariis vel simpliciter paniculatis, pedunculis calycem vix excedentibus, alabastris clavato-ovatis, calycis minuti tubo ecostato in pedicellum brevissimum attenuato operculi hemisphærici mutici longitudinem duplo excedente, fructibus parvis turbinato-obconicis, valvis inclusis, seminibus

Hab. In tractu orientali Novæ Hollandiæ subtropicæ passim sylvas constituens præsertim in collibus fertilibus. Anth. Oct.-Dec.

Arbor mediocris, cortice sordide fusco-cinereo in trunco ramisque persistente rugoso et rimuloso. *Petioli* tenues teretiusculi sæpe 1" longi. *Folia* 1½-3" longa, 1-3" lata, nonnunquam longitudine latiora. *Pedunculi* partiales 2-4" longi. *Calycis* tubus circiter 1½" metiens. *Stamina* albida 1" vix longiora. *Fructus* maturus deest.

III. *Folia opposita vel subopposita, latitudine vix aut paulo longiora.*§ 1. *Valvæ prorsus exsertæ.*

26. EUCALYPTUS PLATYPHYLLA. Arborea, ramulis teretiusculis, foliis alternis vel suboppositis longe petiolatis ovato- vel cordato-orbicularibus nunc subrhombicis raro ovato-lanceolatis opacis prominetè penniveniis pellucide punctatis, vena peripherica a margine remota, umbellis axillaribus vel lateralibus 3-7-floris, pedunculis angulatis calyci æquilongis vel eo longioribus, calycis breviter v. brevissime pedicellati tubo hemisphærico ecostato operculum semiglobosum muticum læve longitudine æquante, fructibus turbinato-hemisphæricis 3-4-loculatis vertice leniter convexis, valvis margini affixis exsertis, seminibus apteris.

Hab. In pascuis fertilibus ad flumen Burdekin. (Ora orient. trop., A. Cunningham, hb. Hook.) Anth. Sept.-Nov.

Arbor mediocris vel major, cortice trunci ramorumque lævi mox albedo, secedentibus stratis extimis tenuibus fusciscentibus. *Petioli* semiteretes 1-1½" longi. *Folia* tenui-coriacea ut plurimum 2-3" longa sæpe in petiolum breviter decurrentia. *Calycis* tubus 1½-2" metiens. *Operculum* pallidius simplex (qua nota a simili *E. bigalerita* præsertim dignoscitur). *Stamina* ad 3" longa albida. *Capsula* 2" longa.

E. bigalerita proxima.

§ 2. *Valvæ semiexsertæ.*

27. EUCALYPTUS MELANOPHLOIA. Arborea, ramulis apice tetragonis, foliis glaucis raro viridibus fere semper pruinosis oppositis sessilibus

e basi amplexante cordato-ovatis tenuiter penniveniis et reticulato-venulosis vix pellucide punctatis, vena marginali oblitterata, umbellis paniculatis vel axillaribus solitariis 3-6-floris, calycis tubo pedunculo angulato bis terve brevioris pedicelli longitudinem parum vel pluries excedente semiovato-tetragono operculum late conicum acutum longitudine parum superante, fructibus semiovatis vel subpyriformibus 2-4-costatis ore parum contractis 4-5-loculatis, valvis infra marginem insertis subinclusis parum convexis, seminibus apteris.

Hab. A tractu montano Newcastle Range usque ad sinum Moreton Bay *Eucalypto crebræ* abunde associata, solum sterilius indicans. (N. Holl. Sub-Trop., *Mitchell*. Moreton Bay, *Moore*. Sydney Woods, Paris Exhib. No. 66, in hb. Hook.) Anth. vere exeunte.

Arbor minor, trunco irregulari, *cortice* persistente crasso profunde *sulcato rugoso nigrescente*. *Folia* $1\frac{1}{2}$ -3" longa, 1-2" lata, obtusa vel cuspidato-acuminata interdum cordato-lanceolata vel rite cordata. *Pedunculi* speciales pollicares. *Alabastra* circiter 4" longa. *Capsula* breviter vel brevissime pedicellatæ $2\frac{1}{2}$ -4" longæ vertice convexæ, raro 6-loculatæ. *Semina* fertilia angulato-ovata fusco-nigrita lævia 1" breviora.

Arbuscula "Silver-leaved Iron-bark" colonis designata, ex habitu proprio perfacile recognoscenda, sed characteribus floris fructusque sæpe variantibus ægre botanico describenda. Infelicissimus Leichhardt in opere suo (Overland Expedition, &c.) præter normalem etiam alteram speciem huic persimilem sed cortice squalide cano recedentem circum sinum Carpentaria et in Australia boreali-occidentali valde frequentem appellatione supra memorata comprehendit.

E. pruinosa Schauer (non Turcz.) affinis.

§ 3. *Valvæ omnino inclusæ.*

28. *EUCALYPTUS LATIFOLIA*. Arborea, ramulis teretiusculis, *foliis* suboppositis sparsive longiuscule petiolatis lato-vel orbiculari-ovatis obtusis glaucescentibus opacis imperforatis tenui-penniveniis, vena longitudinali margini prorsus contigua, umbellis terminalibus paniculatis paucifloris, pedunculis pedicellisque angulosis, illis duplo longioribus, *fructibus subcampanulatis ecostatis* 3-4-loculatis vertice planis, valvis ad marginem attingentibus.

Hab. In planitiebus ripariis ad partes superiores fluvii Roper, 8 Jul. 1856. Anth. æstate.

Arbor minor vel mediocris. *Cortex* post tardum delapsum strati cinerascens supremi fulvescens lævis. *Folia* 2-3 raro 4" longa, sæpe 2" lata, petiolo fere pollicari prædita, crebrius et subtilius quam ea *E. bigaleritæ* pennivenia. *Umbellæ* simpliciter et composite paniculatæ. *Fructus* circiter 3" longi, summo margine leniter reflexi. *Valvæ* inclusæ. *Flores* non reperi.

Habitu *E. bigaleritam* simulans, characteribus potius *E. dichromophloia* accedens.

29. *EUCALYPTUS ASPERA*. Arborea, ramulis teretiusculis hispidulis, foliis parvis oppositis chartaceis oblongo-ovatis obtusis basi cordata sessilibus glaucis opacis scabridis penniveniis subtus reticulato-venulosis vix pellucide punctatis ad nervum asperis, vena longitudinali a margine remota, umbellis axillaribus sessilibus [brevis-pedunculatis pedunculis hispidis, R. K.] bi-paucifloris, pedicellis [glaberrimis, R. K.] fructu subcampanulato ecostato parum longioribus, valvis inclusis.

Hab. In planitiis arenoso-rupestribus (Sandstone table-land) plus minus elevatis ad flumina Victoria et Sturt's Creek, in terra Arnheim's Land necnon prope sinum Carpentaria satis vulgaris. Anth. vere.

Arbor minor, cortice lævi cinereo-albido. *Folia* pleraque 1-2" longa, 8-12" lata. *Fructus* fere 3" longi.

E. setosæ Schauer affinis.

30. *EUCALYPTUS FERRUGINEA** (*Schauer in Walp. Rep. Syst.* ii. p. 296).

Arborea, ramulis validis teretibus foliisque puberulo-scabris glabrescentibus, foliis oppositis crassiusculis ovato-oblongis basi cordata subsessilibus repandis undulatis obtusis vel acuminatis opacis imperforatis prominenter et remote penniveniis obscure reticulato-venulosis, vena peripherica imperfecta a margine remota, fructibus magnis globoso-ovatis ecostatis antice contractis et loculatis, capsulis demum a calyce solutis, valvis deltoideis inclusis, seminibus antice longe alatis.

Hab. In plagis elevatis rupestribus (Sandstone table-land) non rara per Australiam borealem et boreali-occidentalem. Anth. vere.

Arbor mediocris, cortice ubique persistente rugoso sordide cano. *Folia* ut plurimum 3-4" longa, inferne circiter 1½" lata, nervis flavidis percurta et punctis elevatis scabriuscula. *Fructus* circiter 1" longi, ad ¾" lati, vertice plani. *Valvæ* solutæ marginem calycis vix attingentes. *Semina* omnia alata; fertiliū ala ovata vel deltoidea, sæpe 3" longa. *Cotyledones* foliaceæ convolutæ. *Albumen* nullum. *Radícula* brevis cylindracea infera.

Species ad *E. ferrugineam* et *floribundam* appropinquans.

31. *EUCALYPTUS MELISSIODORA* (*Lindley in Mitch. Trop. Austr.* p. 235). Arborea, ramulis compresso-tetragonis asperis, foliis oppositis vel suboppositis ovatis vel subcordatis raro oblongo-lanceolatis supra basin rotundatam subinflexam petiolatis scabris opacis translucenti-punctatis penniveniis reticulato-venulosis, vena peripherica a margine inæqualiter remota, umbellis paniculatis 6-7-floris, pedunculis scabris: partialibus calyce longioribus angulatis, alabastris ovatis lævibus ecostatis brevissime pedicellatis, tubo operculum interius conico-hemisphæricum dimidio excedente, operculo exteriori imperfecto, fructibus campanulatis triloculatis vertice planis, valvis inclusis, seminibus lævibus apteris.

Hab. In montibus porphyriticis tractus Newcastle Range. Anth. Oct., Nov.

* Sent as *E. undulata*, n. sp., by Dr. Mueller, but evidently the same as Schauer's plant.—(A. B.)

Arbor minor vel mediocris, trunco recto, *cortice undique persistente lamellari fragillimo squalide fulvo nitente!* *Ramuli* cum pedunculis scabritie cinerea et ferruginea obducti. *Folia* petiolo $\frac{1}{2}$ –1" longo semitereti ut plurimum supra basin raro ad marginem affixa, normaliter 2–3" longa, $1\frac{1}{2}$ –2 $\frac{1}{2}$ " lata, in abnormi specimine Mitchellii ad 5" longa et 1" tantum lata, nunc acuta, nunc obtusa immo emarginata. *Calycis* tubus nitens obconico-semiovatus 2–3" longus, in pedicellum brevissimum attenuatus. *Operculum* duplex, exterius castaneo-fuscum interiori accretum in frustulis tarde secedens; interius $1\frac{1}{2}$ " longum. *Fructus* circiter 4" longi exacte campanulati virentes vertice planiusculi, valvis supra medium tubi insertis. *Semina* brunnea nitentia. Species duplici nota memorabilis.

§ 4. *Species fructu incognito.*

32. *EUCALYPTUS BIGALERITA.* Arborea, ramulis teretiusculis, *foliis* alternis rarius oppositis longe petiolatis *cordatis vel subtrapezoides* acutiusculis nunc acuminatis vix pellucide punctatis opacis penniveniis, vena peripherica a margine inaequaliter remota, umbellis lateralibus axillaribusque 4–7-floris solitariis, pedunculo crasso verruculoso calycibus parum longiore cum pedicello per brevi anguloso, calycis tubo semiovato 3–2-costulato operculo triplo longiore, *operculo duplici: utroque obtusissimo coriaceo* vel externo apiculato,

Hab. In pratis fertilioribus sylvaticis tractus australis terræ Arnheim's Land (3–5 Jul. 1856). Anth. Jul.–Sept.

Arbor parva vel mediocris rarius excelsa, gummi-resina pulchre rubiginosa abunde scatens. *Cortex* post strati supremi lævis cinerei lapsum dilute *fulvidus* lævigatus. *Folia* pleraque 3–4" longa, 2–3" lata, petiolo inferne teretiusculo superne semitereti $1\frac{1}{2}$ –2" longo prædita, satis saturate viridia. *Calyces* circiter 3" longi virides. *Operculum* externum (denique fuscescens) cito secedens bi–tri-costulatum, costis iisdem tubi continuis; operculum internum virens ecostatatum. *Fructum* non habui.

33. *EUCALYPTUS CONFERTIFLORA* *. Arborea, *ramulis* teretibus *foliisque scabris*, foliis oppositis ovatis vel ovato-lanceolatis acutis basi subcordata amplexanti sessilibus prominenter penninerviis venosis opacis imperforatis, *umbellis* axillaribus lateralibus et terminalibus *in fasciculum multiflorum confertis*, pedicellis calyces pedunculosque longitudine duplo triplove excedentibus teretibus, calycis tubo obconico exangulato operculi patellaris apiculati lævis longitudinem triplo excedente, fructibus campanulatis.

Hab. A flumine Victoria ad rivum Gilbert in pascuis siccis proveniens. Anth. Oct., Nov.

Arbor mediocris squarrosa. *Corticis* stratum superficiale sordide cinereum ad trunci partem inferiorem persistens rimulosum in frustulis

* Sent by Dr. Mueller under the name of *E. floribunda*, which is preoccupied; the *E. floribunda* of Hügel being evidently quite distinct.—(R. K.)

separabile; pars trunci superior ut rami læves albidi. *Ramuli* etiam juveniles cano-fusci. *Folia* pleraque $2\frac{1}{2}$ –4" longa, $1\frac{1}{2}$ –2" lata, interdum acuminata. *Glandula* oleiferæ non conspicuæ. *Pedunculus* primarius solitarius brevis vel brevissimus, in plures secundarios teretiusculos inæquales solutus. *Pedicelli* graciles $\frac{1}{2}$ –1" longi. *Calycis* virentis tubus 3–4" longus. *Operculum* nitens tubo paulo angustius.

E. ferrugineæ Schauer nimis videtur propinqua.

IV. *Folia opposita, latitudine conspicue longiora.*

34. EUCALYPTUS TETRODONTA. Arborea, ramulis angulatis, *foliis oppositis falcato-lanceolatis* sensim acuminatis modice petiolatis opacis indistincte penniveniis imperforatis, vena peripherica margini subcontigua, umbellis axillaribus terminalibusque solitariis bibracteatis trifloris, *bracteis tarde secedentibus majusculis*, pedunculo petiolum æquante angulato, *calyce* subcampanulato *quadridentato* sensim in pedicellum compressum tubo vix æquilongum attenuato dentibus deltoideis operculo hemisphærico et tubo fere duplo brevioribus patulis,

Hab. In plagis elevatis nemorosis minus fertilibus terræ Arnheim's Land passim. (Ad Portum Essington, *Armstrong*; et in ora boreali, *A. Cunningham*, in hb. Hook.) Anth. Aug., Sept.

Arbor mediocris, trunco gracili recto, cortice sordide cano fibroso ubique persistente. *Cortice* arborum "Stringy-bark-trees" dictarum prædita. *Ramuli* rufescentes rigiduli. *Folia* 3–6" longa, $\frac{1}{2}$ –1 $\frac{1}{2}$ " lata. *Pedunculi* 3–4" longi apice bracteas 2 cymbiformi-lanceolatas obtuse acuminatas circiter 3" longas deciduas gerentes. *Calycis* tubus additis dentibus 4–5" longus. *Operculum* coriaceum obtusum opacum viridulum.

Species calyce dentato quam maxime insignis, transitum ad Angophoras præbens.

V. *Sectio dubia.*

35. EUCALYPTUS BRACHYANDRA. Arborecens, ramulis angulatis, foliis alternis v. oppositis modice petiolatis chartaceis ovatis vel late oblongis obtusis opacis tenuiter penniveniis subtiliter venulosis imperforatis subtus pallidioribus, vena peripherica margini subcontigua, umbellis 3–5-floris in paniculam terminalem concretis, pedunculis angulatis, pedicellis tenuibus calyce brevioribus vel eidem æquilongis, operculo conico-hemisphærico tubo brevior, *filamentis perbrevis*, *antheris didymis*, *fructibus minutis campanulatis* exangulatis ecostatis 3–4-loculatis vertice concavis, valvis subinclusis brevissimis, seminibus apteris.

Hab. In decliviis rupestribus ad partes fluvii Victoriae superiores. Anth. primo vere.

Frutex arborecens. *Folia* ut plurimum $1\frac{1}{2}$ –3" longa, $\frac{2}{3}$ –1 $\frac{1}{2}$ " lata obtusa ima basi acutiuscula. *Calyx* florifer 1" paulo excedens, fructifer sesquilinearis v. paulo longior. *Stamina* ad summum 1" longa! *Operculum* tantum in alabastris juvenilibus visum.

Species minutie florum et fructuum valde insignis.

36. *EUCALYPTUS* (*E. clavigera*, *A. Cunn. in hb. Hook.*) POLYSCIADA, *F. Muell.* sp. Arborea, ramulis validis teretibus junioribus angulatis, foliis alternis v. suboppositis breviuscule petiolatis ovatis v. lanceolatis acuminatis tenui-coriaceis imperforatis margine undulatis opacis glaucescentibus prominenter penniveniis et reticulato-venulosis, vena peripherica a margine inæqualiter remota, *umbellis* paucifloris v. frequentius *multifloris* inæqualiter pedunculatis partim divisiv. compositis *secus ramulos paniculam ditissimam aphyllam construentibus, pedicellis tenuibus angulatis calyce ter quaterve longioribus, alabastris pyriformibus, calycis tubo obconico apice leviter ampliato ecostato exangulato operculum patellare nitens muticum longitudine aliquoties excedente, fructibus truncato-ovatis sublævibus,*

Hab. In collibus apricis lapidosis et planitiebus aridis prope M'Adam Range. Anth. vere.

Arbor minor, cortice (si recte in memoria retento) lævi cinereo. *Folia* latitudine variabilia basi sæpe in petiolum decurrentia, plerumque 3-4" longa, $\frac{3}{4}$ -2" lata. *Pedunculi* sæpe pedicellis breviores magis minusve compressi. *Pedicelli* $\frac{1}{2}$ -1" longi. *Calyx* addito operculo $2\frac{1}{2}$ -3" longus. *Operculum* læve interdum paulo apiculatum. *Stamina* albida ad summum vix 3" longa. *Antheræ* ovato-oblongæ. *Fructus* 4" longus.

E. clavigerae affinis.

37. *EUCALYPTUS ODONTOCARPA*. Fruticosa, ramulis angulatis, *foliis oppositis* breviuscule petiolatis *lineari-* v. *angusto-lanceolatis* subfalcatis basi acutatis nitidulis pellucide punctatis penniveniis et reticulato-venulosis, vena peripherica a margine paulo remota, *umbellis* axillaribus subtrifloris breviter pedunculatis, *calycis* brevissime pedicellati *tubo* obconico acute *quadridentato* operculi depresso-hemisphærici longitudinem triplo excedente, fructibus ovato-obconicis indistincte costatis quadridentatis trilocolatis, valvis infra marginem insertis inclusis.

Hab. In deserto arenoso ad rivum Sturt's Creek. Anth. autumnis.

Frutex 8-10'. *Rami* sat tenues. *Folia* 2-5" longa, 3-6" lata. *Umbellæ* interdum geminæ, altera depauperata. *Fructus* 3-4" longi nitentes.

38. *EUCALYPTUS PACHYPHYLLA**. Fruticosa, ramulis juvenilibus angulatis, *foliis* alternis modice petiolatis crasso-coriaceis *ovatis* v. lanceolato-ovatis acuminatis vix inæquilateris imperforatis tenuissime penniveniis, vena peripherica a margine remota, *umbellis* axillaribus subtrifloris, pedunculis pedicellisque brevissimis,, *tubo calycis fructiferi* *depresso-hemisphærico quadricostato* et obsolete

* Not *E. pachyphylla*, Cunn. MSS., from King George's Sound (No. 231 of 4th Voyage).

costulato, *marginē* elevato, capsulæ 4-5-loculatæ vertice convexo, valvis subexsertis, seminibus fertilibus angusto-alatis sublævibus.

Hab. In eremo arenoso ad Hooker's Creek. Anth. autumnno.

Frutex orgyalis v. paulo altior. *Folia* pleraque $1\frac{1}{2}$ - $2\frac{1}{2}$ " longa in specimenibus siccis opaca. *Flores* inœogniti. *Fructus* diametro 6-8"', *marginē* demum supra valvas producto. *Semina* fertilia alis additis circiter $1\frac{1}{2}$ " longa.

E. alpinæ propinqua.

Tentamen dispositionis Eucalyptorum Australiæ intratropicæ et subtropicæ, secundum corticis structuram, texturam, et separationem, usui Colonorum accommodatum.

- I. LEIOPHLOIÆ. Cortex post delapsum strati supremi undique lævis. (Vulgo: Flooded Gum-trees, White Gum-trees, Blue Gum-trees partim, Red Gum-trees partim, Yarra-trees.)
- II. HEMIPHLOIÆ. Cortex in trunci parte inferiore persistens rugosus et rimosus, in parte superiore ramisque delapsu strati superioris lævigatus. (Vulgo: Moreton Bay Ash, Black-buttèd Gum-tree, Box-trees partim.)
- III. RHYTIPHLOIÆ. Cortex ubique persistens rugosus et rimosus intus solidus. (Vulgo: Bloodwood-trees, Box-trees partim, Peppermint-trees partim.)
- IV. PACHYPHLOIÆ. Cortex ubique persistens rugosus intus fibrosus. (Vulgo: Stringy-bark-trees.)
- V. SCHIZOPHLOIÆ. Cortex ubique persistens profunde sulcatus intus solidus. (Vulgo: Ironbark-trees.)
- VI. LEPIDOPHLOIÆ. Cortex saltem in trunco persistens lamellaris friabilis. (Vulgo: Melaleuca Gum-trees, Mica-trees.)

I. LEIOPHLOIÆ.

§ 1. *Folia alterna subfalcata concoloria.*

1. *E. tereticornis*, Sm. (1.) Operculum elongatum conico-subulatum curvatum. Valvæ alte exsertæ.
2. *E. rostrata*, Schlecht. (2.) Operculum subulato-acuminatum rectum. Valvæ alte exsertæ.
3. *E. signata*. (6.) Operculum hemisphæricum. Valvæ vix exsertæ. Fructus semiglobosi.
4. *E. variegata*. (13.) Operculum hemisphæricum. Valvæ inclusæ. Fructus semiovari.

5. *E. citriodora*, Hook. (23.) Operculum hemisphæricum? Valvæ
 Odor foliorum citreus.
6. *E. brevifolia*. (3.) Operculum hemisphæricum. Valvæ exsertæ.
7. *E. dichromophloia*. (17.) Operculum semiovatum. Valvæ inclusæ.
 Semina alata.

§ 2. *Folia alterna subfalcata discoloria.*

8. *E. hemilampra*. (7.) Operculum elongato-conicum rectum. Valvæ
 semiexsertæ.

§ 3. *Folia alterna et opposita ovata vel orbiculata.*

9. *E. bigalerita*. (32.) Operculum duplex. Valvæ
10. *E. latifolia*. (28.) Operculum Valvæ inclusæ.
11. *E. platyphylla*. (26.) Operculum hemisphæricum. Valvæ exsertæ.

§ 4. *Folia opposita subovata.*

12. *E. aspera*. (29.) Operculum Valvæ inclusæ.

II. HEMIPHLOIÆ.

§ 1. *Folia alterna subfalcata.*

13. *E. tessellaris*. (14.) Operculum patellare. Valvæ inclusæ.
14. *E. semicorticata*. (8.) Operculum acuminatum. Valvæ subexsertæ.

§ 2. *Folia opposita cordato-ovata.*

15. *E. confertiflora*. (33.) Operculum patellare. Valvæ

III. RHYTIPHLOIÆ.

§ 1. *Folia alterna subfalcata.*

16. *E. polycarpa*. (15.) Operculum Valvæ profunde in-
 clusæ. Paniculæ multifloræ. Semina alata.
17. *E. terminalis*. (16.) Operculum Valvæ breviter inclusæ.
 Paniculæ multifloræ. Semina alata.
18. *E. tectifca*. (24.) Operculum conicum acuminatum. Valvæ
19. *E. leptophleba*. (9.) Operculum Valvæ subinclusæ.
 Rami undique corticati.
20. *E. microtheca*. (10.) Operculum Valvæ subinclusæ.
 Rami apice decorticati.
21. *E. patellaris*. (4.) Operculum patellare umbonatum. Valvæ
 exsertæ.
22. *E. trachyphloia*. (18.) Operculum Valvæ profunde
 inclusæ. Semina aptera.

23. *E. bicolor*, A. C. (19.) Operculum hemisphæricum. Valvæ inclusæ.
Semina aptera.

§ 2. *Folia alterna rotundata.*

24. *E. populnea*. (25.) Operculum hemisphæricum. Valvæ inclusæ.

§ 3. *Folia opposita cordato-ovata.*

25. *E. ferruginea*, Schauer. (30.) Operculum Valvæ inclusæ.
Semina alata.

IV. PACHYPHLOIÆ.

§ 1. *Folia alterna subfalcata.*

26. *E. fibrosa*. (11.) Operculum conicum. Valvæ breviter exsertæ.
27. *E. exserta*. (5.) Operculum conicum. Valvæ alte exsertæ.
28. *E. ptychocarpa*. (20.) Operculum hemisphæricum costatum. Valvæ
profunde inclusæ.

§ 2. *Folia opposita subfalcata.*

29. *E. tetradonta*. (34.) Operculum hemisphæricum. Tubus quadri-
dentatus. Valvæ

V. SCHIZOPHLOIÆ.

§ 1. *Folia alterna subfalcata.*

30. *E. crebra*. (12.) Operculum semiovatum. Valvæ breviter exsertæ.

§ 2. *Folia opposita cordato-ovata.*

31. *E. melanophloia*. (27.) Operculum late conicum. Valvæ breviter
exsertæ.

VI. LEPIDOPHLOIÆ.

§ 1. *Folia alterna subfalcata.*

32. *E. aurantiaca*. (21.) Operculum semiglobosum costatum. Valvæ
inclusæ. Fructus sessiles.
33. *E. phænicea*. (22.) Operculum Valvæ profunde inclusæ.
Fructus pedicellati.

§ 2. *Folia opposita cordato-ovata.*

34. *E. melissiodora*, Lindl. (31.) Operculum conico-hemisphæricum
subduplex. Valvæ inclusæ.

VII. SECTIO DUBIA.

35. *E. brachyandra*.

37. *E. odontocarpa*.

36. *E. clavigera*, A. C.

38. *E. pachyphylla*.

On some Tuberiform Vegetable Productions from China.

By the Rev. M. J. BERKELEY, M.A., F.L.S.

[Read April 15th, 1858.]

SOME months since I received, by the kindness of Professor Horaninow, two tuberiform productions from China, of which one was nearly allied to *Mytilitta australis*, Berk., and the other, marked *Pachyma Coniferarum*, Horaninow, was evidently identical with the Tuckahoe or Indian Bread of the United States, *Pachyma Cocos*, Fries.

At a later period, specimens of a drug, known in China under the name of Pe-foo-ling, were shown by Mr. Daniel Hanbury to Mr. Kippist, who at once pointed out their identity with *Lycoperdon solidum* of the 'Flora Virginica,' *Pachyma Cocos*, Fries.

The subject was brought to my especial notice by Dr. Hooker; and having ascertained the identity of the productions of Mr. Hanbury and Prof. Horaninow, I thought that a short note on it might possibly be acceptable to the Society; and the more so, as Mr. Hanbury has a second production very nearly allied, while I am in possession of a third very distinct though allied substance, through Prof. Horaninow.

The best introduction to my note will be an extract from a letter received by me from Mr. Hanbury:—

"There are *two* Chinese esculent *Fungi*, which I think are worthy of notice. My attention was first drawn to them while examining some specimens of Chinese Materia Medica, by stumbling on the following passage in Loureiro's 'Flora Cochinchinensis' (ed. Willd. 1793, p. 710):—

"'Ad radices Pinorum sylvestrium magnæ longævitatatis in provincia boreali Chinensi *Su chuyen* gigni solent quædam tubera, subrotunda, magna, scabra, fusca, intus albissima, quæ ab Europæis vocantur *Radix Sinensis alba*, a Cochinchinensibus *Bach phuc linh*, ab ipsis vero Sinensibus *Pě fú lín*. Horum tuberum decocto feliciter utuntur in praxi medica, præcipue in morbis pulmonum et vesicæ.

"'Radix Sinensis rubra provenit ex diversa planta, quæ a Linnaeo dicitur *Smilax China*.'

"Nor was my curiosity diminished by finding in Endlicher's 'Enchiridion Botanicum' (p. 144) the following allusion to the same subject:—

"'In annosis *Pinus Massonianæ* Lamb. radicibus apud Sinas gigni solent tubera (vulgo *Pe-fu-lin*, *Radix Sinensis alba*) magna,

subrotunda, extus scabra, fusca, intus albida, insipida, tactu cerasca, quorum decocto in morbis pulmonum et vesicæ utuntur.'

"I therefore wrote to my brother Thomas Hanbury of Shanghai, who obtained for me not only the substance called *Pe-foo-ling*, but a second, known as *Choo-ling*, together with some cakes said to be made from one or both of them. These cakes, or an imitation of them, are commonly sold in the streets of Shanghai; and the cry of the itinerant vendors—*À Hoo Ka Foo-ling Ka!*—is one of the first of the many strange sounds to salute the ear of the newly-arrived foreigner.

"With respect to the *Foo-ling* itself, my first impression was to regard it as the rhizome of some species of *Smilax*, allied to *S. China*, L., the source of the drug known as *China Root*. Such was the opinion of the older writers, as Martini, who, in his 'Novus Atlas Sinensis' (1655), describes it as being the *true China Root*. Cleyer also, in his 'Specimen Medicinæ Sinicæ' (1682), says of it*, 'Est idem quod Lusitanice dicitur Pao de China, nisi quod album et multo melius sit rubeo illo, et etiam carius multo.'

"I had soon, however, to alter my opinion on testing a decoction of the *Foo-ling* with iodine and finding it to contain no starch, the abundant presence of that body being a marked character of the *Smilax* rhizome. I found also, upon turning to the 'Herbarium Amboinense' (xi. 123), where Rumphius describes it as *Hoelen*, that its distinctness from *China Root* had been there noticed. Mr. Kippist, however, soon settled the question, by pointing out to me in the 'Linnean Transactions†' a paper by Dr. James Macbride, of South Carolina, entitled "Some account of the *Lycoperdon solidum* of the Flora Virginica," read before the Society 3rd June, 1817; and at the same time laying before me a fine series of specimens of *Lycoperdon solidum*, with which plant it was evident the Chinese *Pe-foo-ling* was, if not identical, at least very nearly related.

"Of the *Choo-ling*, I have nothing to tell you, except that, in common with the *Pe-foo-ling*, it is described and figured in the great Chinese Herbal, the *Pun-tsaou*."

Mr. Hanbury has, in addition to these remarks, furnished me with a translation of that portion of the 'Pun-tsaou' which relates to these productions, which I have the pleasure of now laying before the Society‡.

* *Medicamenta simplicia*, No. 189.

† Vol. xii. p. 368.

‡ *Fuh-ling* and *Choo-ling*.—Abstract of the account given in the great

A microscopical examination of the several specimens of Foo-ling from Messrs. Horaninow and Hanbury, and a comparison with a fine series from South Carolina, sent to me by Mr. Curtis,

Chinese Herbal, 'Pun-tsaou-kang-muh,' Chap. 37. sect. 4. (Translated by the Rev. W. C. Milne.)

茯苓 *Fuh-ling*: synonyms 伏菟 *Fuh-too*, — *too* being a name

given to it because it is found on the same tree as the *Too-sze*, another medicinal plant; or rather, as some say, because it resembles a small hare.

松腴 *Sung-yu*, a name derived from its connexion with the pine-tree.

不死麴 *Puk-sze-mien*, literally *Undying-flower*.

伏神 *Fuh-shin*, which name is restricted to a species to be found

clinging to the root of the pine. Such, it is presumed, contains the finest essence of the pine. One of the fairy tales says, that there are pieces of this species to be found as big as a man's fist, one of which, if you sling it as an amulet round your person, will discomfit a hundred devils, in full proof of its divine origin.

In describing the Fuh-ling, one author observes that both it and the species called Fuh-shin grow under the large pines on the heights and valleys of lofty mountains, and that they may be gathered in the second and eighth moons [*i. e.* during spring and autumn].

Another writer remarks, that samples come from Yuh-chow as large as a vessel with a capacity of three or four shings [pints]. The outer skin is black, with small wrinkles on it; underneath it is fine and white. Its appearance is that of a small tortoise; and that with a reddish tinge is not unlike a frog after being imbedded underground for thirty years.

A third writer notes that Fuh-ling is produced in the Tai-shan mountains of the province of Shantung, but that the best kind is decidedly that of the Hwa-shan hills of Shen-se.

According to the testimony of a fourth writer, wherever large pines flourish you have the Fuh-ling; but as at Hwa-shan there stands an immense number of old firs, you have there excellent specimens.

A fifth observer remarks, that pines of 1000 years old are sure to have the Fuh-ling; but a sixth observes, that after the resin of the pine has fallen on the ground and remained there 1000 years, it is changed into Fuh-ling. When you see the pine-tree turn red, you have the Fuh-ling. Fuh-shin is a product of the pine superior to the Fuh-ling.

At present all the hills of the Hwa-shan range produce it. It clings to the under-roots of the pine-trees, and grows leafless and flowerless, as large as a man's fist. Sometimes underground you meet with it so big as to be several catties* in weight. There are two varieties, red and white. Some say it is the gum of the fir-tree metamorphosed; and others, that it is the excrescence of the spurious pine-tree. But down to the present day there are people who constantly meet with the Fuh-ling under masses of very old pines which have long been cut down, and whose trunks, branches, and twigs lie about rotten and decaying.

* The catty equals $1\frac{1}{3}$ lb.

as also with a portion of an authentic specimen of Schweinitz, show that they are all identical. The structure varies a little with age, and in Horaninow's specimens there are abundant very

To procure it, a plot of ground is cleared and probed with an iron barbed instrument. Should any Fuh-ling be there, it will be impossible to pull out the instrument again, except by digging about it.

[Under this heading some legends are given, which it is needless to translate, as they would be unintelligible, and (as the author hints regarding one) are treated with little faith.]

Five forms of Fuh-ling are mentioned as of medicinal use, viz. :—

1. Ordinary Fuh-ling.
2. Red Fuh-ling.
3. Fuh-ling bark.
4. Fuh-shin.

5. Shin-muh or Hwang-shin-tsoh, a rare species found in the heart of the Fuh-shin: one of its names signifies *Yellow-fir-knot*.

In the preparation of this medicinal plant, whoever uses the bark must put away the heart of the Fuh-ling, then pound the bark small in a basin of water, take off the scum and filter the water. An erroneous application of this may prove hurtful to the eye. To make it into powders or pills, let it be boiled thoroughly two or three times, and then dried.

Its taste and smell are agreeable, and not poisonous.

The class of diseases for which it is used are, to sum them up generally, pains in the chest, severe ague, great debility, depression of spirits, stoppage of urine, want of sleep, excess of phlegm, dropsy, affections of the kidneys, violent retching, rheumatism, infantile convulsions, fatigue in body and mind, dysentery, disease in the groin, and female complaints.

豬苓 *Choo-ling*, derives its name, first, from its resemblance in colour to the faeces of the pig (*Choo*); and secondly, from its being found lying here and there as droppings from the tree upon which it is parasitic. Its other names indicate the same, viz.

豕屎 *Kia-choo-she*, literally *Hog's-dung*.

豕囊 *She-tōh*, literally *Pig's-entrails?*

地烏桃 *Te-woo-taou*, literally *Earth-walnuts*.

The following is an abridged summary of the opinions of various Chinese observers relative to the Choo-ling.

It is found principally on the heights and valleys of Hang-shan*, as also in Shuh-chow and Seih-chow.

It is picked up in spring and autumn. It is a parasite on the Fung-shoo tree [*Acacia* sp. ?], though also found upon other trees. It much resembles the Fuh-ling.

The skin of the Choo-ling is black, but the flesh is white and firm. It can be used only after scraping off this skin. In preparing it for medicinal pur-

* [Either in the province of Kiang-nan, or in that of Hoo-nan.]

delicate threads which traverse the mass in every direction; but the nature of the bodies of which the greater part of the substance is composed, their form, and chemical characters are precisely the same, and there can be no doubt that they all belong to one and the same category.

This matter consists of irregular bodies, varying very greatly in size, often globular, but frequently forming broad bands with transverse markings and clefts, exhibiting no trace of starch under iodine, and without the slightest appearance of an investing membrane. This substance has been submitted to chemical investigation by Professor Ellett of South Carolina College, and has been ascertained to consist entirely of pure pectine of Braconnot. It is quite insoluble in water, though it dissolves in alkaline solutions, forming neutral pectates, whence the pectic acid is separated, by the addition of muriatic acid, in the form of a colourless jelly. By a particular management, with the details of which I am not acquainted, this jelly may be prepared so as to form an agreeable article for the dessert*.

It is not surprising, therefore, that it is manufactured in China into a popular and nutritious food. It is probable that the cakes which are made of it are regarded as medicinal as well as economical; and it is curious that Prof. Ellett remarks that the nutritious jelly formed from the Tuckahoe is an excellent antidote against several of the most powerful mineral poisons.

The structure of the Choo-ling is somewhat different from that of the Foo-ling. The several parts are far smaller in their dimensions, and there are none of the streaked and incised bands. The greater part of the mass consists of short, sometimes forked, and

poses, scrape off the coarse skin with a copper knife, cut the Choo-ling into thin slices, and steep them in Tung-lew† water for a whole night; drain off the water thoroughly; pack the slices in a bundle of Shing-ma‡ leaves for a day, and, on removing the wrapper, they will be quite dry and fit for use. The smell and taste of the Choo-ling are mild, sweet, and not poisonous—something like the Fuh-ling.

The diseases for which it is generally used are, severe ague, severe dropsy, long-suppressed urine, debility and age, abdominal swellings attended with violent pains, depression of spirits, diseases in the groin, dysentery, and some affections peculiar to females in pregnancy.

* See "Observations on Tuckahoe," in Gardener's Chronicle, 1848, p. 829.

† [If Tung-lew is the name of a place, it is in the department of Che-chow, province of Ngan-hwuy.]

‡ *Shing-ma*, literally the *Ascending Hemp*: it is described in the 'Pun-tsaou,' chap. 13. fol. 29.

sometimes torulose linear bodies, varying, however, much in outline; and dispersed among them are a number of small granules, many of which contain a minute nucleus; while other larger bodies, exhibiting one or two faint traces of concentric circles, are scattered about, exactly like the asci of a truffle, but containing only a very small irregular nucleus. Treated with the same chemical tests as the Foo-ling, it exhibits precisely the same reaction. There is not the slightest trace of starch or cellulose, and it is evident that the structure is not accordant with that of any Fungus or phænogamous Tuber.

As there is some outward resemblance between this production and the tuberiform body which precedes the growth of *Peziza tuberosa*, I have made a comparative examination of the two, and though there is some resemblance as regards chemical reaction, the structure is totally different. In the *Peziza* tuber the whole mass consists of large threads with very thick gelatinous walls, and an abundant proteinous endochrome.

No fungus has ever been found on the American or Chinese tubers, and, unfortunately, *Pachyma tuber regium*, which gives rise to a species of *Lentinus*, as figured by Rumphius, is quite unknown. It is probably, however, of the same nature with the Pietra funghaja or Fungus-stone of Italy (a mere mass of earth and mycelium), which produces the edible *Polyporus tuberaster* even in our own hothouses.

Unfortunately but little light is thrown upon the real nature of these productions by all the specimens and information we possess. Dr. Macbride asserts that the Tuckahoe originates between the wood and bark of *living* roots; that it gradually detaches the bark, while it spreads round the wood and converts it into a substance similar to itself; and that if it comes in contact with the root of another tree, that root is also assimilated with it. Specimens, however, are wanting to show this transitional state.

I have still to notice briefly the third production sent to me by Prof. Horaninow, of which I forward a portion for your inspection. It is evidently closely allied to the native bread of Australia, but differs in the reddish, not black, cuticle, which does not crack and peel off, the total absence of an intermediate stratum between the cuticle and central mass, and the want of large clavate cells amongst the linear bodies of which the central mass is composed. The internal substance is marbled like a truffle; but there is not a trace of fruit, and in consequence, together with *Mylitta australis*, it must be considered of very doubtful affinity.

Notes on *Abuta*, a genus of *Menispermæ*. By N. GRISEBACH, Professor of Botany in the University of Göttingen. Communicated by Dr. J. D. HOOKER, F.L.S.

[Read March 18th, 1858.]

THE *Menispermæ* of tropical America, though less numerous than those of the East Indies, are in a state of some confusion; and when I studied the West Indian forms for my intended Flora of those islands, Aublet's *Abuta* seemed to require a particular investigation. Miers had reduced correctly to *Abuta* Persoon's genus *Trichoa* (*Batschia*, Thunb.), but at the same time he excluded *Abuta concolor*, Poepp., which Endlicher before him had referred to *Trichoa*. From this South American species, and from the West Indian *Cocculus domingensis*, which, together with some other forms, he considered congeners, Miers constructed his new genus *Anelasma* (Ann. Nat. Hist. 2nd ser. vii. p. 37 seq.). The result of my inquiries is, however, at variance with his views, and the object of these remarks is to prove that *Abuta* is a distinct genus of *Cocculæ*, comprising Aublet's and Poeppig's species, and that *Cocculus domingensis* does not belong to the same. The character of *Abuta*, which, as Miers has well suggested, approaches most to the East Indian genus *Tiliacora* (distinct by a greater number of carpels), is the following:—

Abuta, Aubl. CHAR. GEN. *Sepals* 6, biserial, the interior larger. *Petals* 0. ♂: *Stamens* 6. ♀: *Ovaries* 3; styles cylindrical, uncinatè. *Drupes* large, ovoid: the cavity divided by a thin vertical plate of the endocarp, penetrating from the base to the arch of the seed. *Seed* completely inflexed, with the inner sides flat and accumbent to the plate: *endosperm* thick, ruminatè, and separated by numerous horizontal incisures penetrating almost to the middle: *embryo* inflexed-cylindrical, almost equalling in length the endosperm, and included by its central channel.—Woody vines; leaves leathery, entire, with the petiole thickened at the top; flowers small, arranged in axillary racemose panicles.

The materials upon which this character has been constructed are: 1st, flowers of both sexes and fruit of *A. rufescens*, Aubl., from the Rio Negro, in the Brazilian Collection of Spruce (♂, *Abuta*, no. 2; ♀, no. 2340; fruit, no. 2303); 2nd, male flowers and fruit from the same (♂, no. 2829; fruit, no. 2102).

The genus is distinct from *Cocculus* chiefly by its ovoid (not compressed) drupes, by its ruminatè endosperm, and by wanting petals: but its character, as given by different authors, was either

incomplete or erroneous. Thus, if we compare our specimens with the analysis of *A. concolor*, as represented by Poeppig (Nov. Gen. t. 190), his 3 petals do not exist, the monadelphly is only a slight adherence of the stamens at the base itself, and his embryo (figured erroneously on the inner side of the endosperm, and bearing foliaceous cotyledons) is merely a thickening of the endocarpic dissepiment, the real embryo having been overlooked in the interior channel of the endosperm. Miers, on the other hand, of whom I have compared such materials as exist in Sir W. Hooker's and Bentham's herbaria, was mistaken, in consequence of the incompleteness of the specimens, in his character of *Anelasma*, which he describes as apetalous, and presenting an exalbuminose embryo with large thick cotyledons,—though Poeppig, with respect to *A. concolor*, had given a nearly correct idea of the large ruminated albumen, formed exactly in the same way as in *A. rufescens*, and though *Cocculus domingensis*, the second species of his genus *Anelasma*, exhibits 6 petals in its male flower. A seed of the latter, which had been examined by Miers, I found not impregnated, and in consequence the drupe filled only partially by a dead tissue, taken possibly for an exalbuminose embryo.

Abuta rufescens, Aubl., is characterized by ovate, pointed, five-nerved leaves, velvety on their under side, and by the inflorescence and the ovaries downy. Its apparent synonyms are *Batschia racemosa* and *conferta*, Thunb. (Nov. Act. Ups. v. t. 2. f. 1, 2,—a tolerable representation of the genus), both forms from New Granada,—the range of the species comprising the whole of equatorial America from that country to the Amazons and Guiana.

A. concolor, Poepp., approaching in habit to *Cocculus domingensis*, is distinguished by elliptical polished leaves, the primary veins of which are separate at the base itself, and the tertiary veinlets not prominent. Its synonyms are, *Anelasma Spruceanum*, Miers!, *A. guianense*, Miers!, and probably *Cocculus lævigatus*, Mart. Its geographical range comprises a still larger area, viz. equatorial Brazil!, Goyaz (Gardn. no. 3567!), Cayenne (Martin).

Notes on Arctic Plants. By E. DICKIE, Esq., M.D., A.L.S.,
Professor of Natural History, Queen's College, Belfast.

[Read April 15th, 1858.]

DR. J. D. HOOKER, in April 1856, communicated to the Linnean Society "Remarks on some Collections of Arctic Plants." It being desirable that as many facts as possible should be placed on

record respecting the vegetation of the North Polar circle, I have thought it right to put together notes on small collections made at various periods by some of my former pupils, while in medical charge of whaling vessels.

The specimens were contributed by Messrs. W. F. Clarke, A. K. Clark, Maitland, Philips, Craig, and Sutherland.

The localities extend on the east side of Davis's Straits, from lat. $69\frac{1}{2}^{\circ}$ N. to 76° N.; and on the west side from 65° N. to 74° N.

One of these gentlemen, Dr. P. C. Sutherland, now of Port Natal, made good collections when attached to Penny's and Inglefield's expeditions; records of these are appended to the published accounts of these voyages.

Ranunculus nivalis, <i>L.</i>	Cape Lawson; Black Hook.
R. hyperboreus, <i>Rottb.</i>	Operniwick (full flower July 15); Durban Harbour.
Papaver nudicaule, <i>L.</i>	Operniwick (full flower July 15); Cape Lawson (full flower June 22); Duck Islands; North Fore- land; Exeter Bay; Durban Har- bour.
Draba alpina, <i>Wahl.</i>	Black Hook (full flower June 14); Pond's Bay.
D. rupestris, <i>R. Br.</i>	Cape Lawson (full flower June 22); Frau Islands (full flower July 15); Cape Searle; Durban Har- bour.
Cardamine bellidifolia, <i>L.</i>	Frau Islands (flower July 15).
Vesicaria arctica, <i>Richards.</i>	Black Hook (flower July 27).
Platypetalum purpurascens, <i>R. Br.</i>	Black Hook, sea-level to 500 feet.
Cochlearia fenestrata, <i>R. Br.</i>	Cape Searle.
C. anglica, <i>D.C.</i>	Cape Dudley Digges; Durban.
Silene acaulis, <i>L.</i>	Operniwick (flower July 15); Black Hook; Exeter Bay.
Lychnis apetala, <i>L.</i>	Operniwick (flower July 15); Cape Searle; Durban.
Stellaria longipes, <i>Goldie</i>	Durban.
Arenaria rubella, <i>Hook.</i>	Exeter Bay; Durban.
A. Rossii, <i>R. Br.</i>	Operniwick.
Honckeneya peplodes, <i>Ehrh.</i>	Operniwick; Rugged Rock.
Cerastium alpinum, <i>L.</i>	Black Hook; North Foreland; Exeter Bay; Cape Searle (flower August 23); Durban; Cumber- land Inlet.
Oxytropis campestris, <i>D.C.</i>	Pond's Bay (flower July 27).
Astragalus alpinu <i>L.</i>	Pond's Bay (flower July 27).

<i>Dryas octopetala</i> , <i>L.</i>	Cape Searle.
<i>D. integrifolia</i> , <i>Vahl</i>	Cape Lawson (flower June 22); Cape Dudley Digges; Cape Searle.
<i>Potentilla nivea</i> , <i>L.</i>	Cape Lawson (flower June 22); Black Hook (flower June 24); Duck Islands; Cape Searle; Pond's Bay; Durban.
<i>Epilobium latifolium</i> , <i>L.</i>	Cape Searle (flower August 23); Cape Dudley Digges, sea-level to 500 feet; Durban.
<i>Saxifraga tricuspidata</i> , <i>Retz.</i>	Cape Searle (flower August 21); Cape Dudley Digges.
<i>S. nivalis</i> , <i>L.</i>	Operniwick; Cape Searle (flower August 21); Black Hook; Dur- ban.
<i>S. cæspitosa</i> , <i>L.</i>	Pond's Bay; Operniwick; Waigat Strait; Cape Searle (August 21 in flower).
<i>S. cernua</i> , <i>L.</i>	Pond's Bay; Operniwick; Cape Searle (in flower August 23); Durban.
<i>S. rivularis</i> , <i>L.</i>	Mollymoak Head.
<i>S. rivularis</i> , var. <i>hyperborea</i>	Black Hook, three miles inland.
<i>S. oppositifolia</i> , <i>L.</i>	Cape Lawson (flower June 22); Exeter Bay; Waigat Strait.
<i>Galium pusillum</i> , <i>L.</i>	Cape Dudley Digges.
<i>Gnaphalium supinum</i> , <i>L.</i>	Durban (September 1, in flower); Cumberland Inlet.
<i>Arnica montana</i> , <i>L.</i>	Frau Islands; Cape Searle; Durban.
<i>Erigeron uniflorum</i> , <i>L.</i>	Cape Searle.
<i>Campanula linifolia</i> , <i>A. D. C.</i>	Cape Searle (flower August 21); Durban.
<i>Vaccinium uliginosum</i> , <i>L.</i>	Operniwick; Durban (flower Sept. 1).
<i>Azalea procumbens</i> , <i>L.</i>	Operniwick; Duck Islands; Dur- ban (flower July 13).
<i>Pyrola rotundifolia</i> , <i>L.</i>	Cape Dudley Digges; Durban, sea- level to 200 feet (flower Septem- ber 1).
<i>Cassiopea tetragona</i> , <i>Don</i>	Operniwick; Exeter Bay; Black Hook, sea-level to 500 feet.
<i>Ledum palustre</i> , <i>L.</i>	Durban; Cumberland Inlet.
<i>Phylodoce taxifolia</i> , <i>Don</i>	Durban (flower August 21).
<i>Rhododendron Lapponicum</i> , <i>L.</i> ...	Cape Lawson (flower June 22); Durban (flower September 1).
<i>Arctostaphylos alpina</i> , <i>Sprengel</i> ...	Exeter Bay; Durban.

<i>Menyanthes trifoliata</i> , <i>L.</i>	Exeter Bay.
<i>Armeria maritima</i> , <i>Willd.</i>	Cape Searle.
<i>Diapensia Lapponica</i> , <i>L.</i>	Frau Islands.
<i>Mertensia maritima</i> , <i>Don</i>	E. side of Searle Roads.
<i>Pedicularis hirsuta</i> , <i>L.</i>	Cape Lawson (flower June 22); Operniwick (flower July 6); Black Hook (flower July 12).
<i>Empetrum nigrum</i> , <i>L.</i>	Operniwick, sea-level to 800 feet (flower July 15).
<i>Polygonum viviparum</i> , <i>L.</i>	Cape Searle; Operniwick; Durban.
<i>Oxyria reniformis</i> , <i>Hill</i>	Operniwick, sea-level to 400 feet (flower July 15).
<i>Salix arctica</i> , <i>R. Br.</i>	Operniwick; Four Island Point; Exeter Bay; North Foreland; Durban.
<i>S. herbacea</i> , <i>L.</i>	Operniwick (flower July 15).
<i>Tofieldia borealis</i> , <i>Wahl.</i>	Durban; Operniwick.
<i>Juncus biglumis</i> , <i>L.</i>	Durban.
<i>Luzula campestris</i> , <i>R. Br.</i>	Operniwick; Frau Islands; North Foreland; Cape Lawson; Cape Searle.
<i>L. hyperborea</i> , <i>R. Br.</i>	Durban; Cumberland Inlet.
<i>Festuca brevisolia</i> , <i>R. Br.</i>	Durban Harbour.
<i>Poa abbreviata</i> , <i>R. Br.</i>	Durban Harbour.
<i>P. cæsia</i> , <i>Sm.</i>	North Foreland.
<i>P. arctica</i> , <i>Hook.?</i>	Operniwick, sea-level to 1000 feet.
<i>Phippsia algida</i> , <i>R. Br.</i>	Cape Dudley Digges; Cumberland Inlet.
<i>Hierochloa pauciflora</i> , <i>R. Br.</i>	Cape Searle.
<i>Alopecurus alpinus</i> , <i>Sm.</i>	Cape Lawson; Cape Searle; Black Hook; Cumberland Inlet.
<i>Trisetum subspicatum</i> , <i>Beauv.</i>	Cape Searle; Durban.
<i>Eriophorum vaginatum</i> , <i>L.</i>	Black Hook; Operniwick.
<i>E. polystachyum</i> , <i>L.</i>	Black Hook; Durban.
<i>Carex nardina</i> , <i>Fries</i>	Cape Searle; Waigat; Operniwick; Durban.
<i>C. rupestris</i> , <i>All.</i> , No. 2.	Cape Lawson.
<i>C. glareosa</i> , <i>Wahl.</i>	Waigat Strait; Durban; Cumber- land Inlet.
<i>C. fuliginosa</i> , <i>Sternb. & Hoppe</i>	Cape Searle; Black Hook.
<i>C. stans</i> , <i>Drejer</i>	Cape Searle; Durban.
<i>C. compacta</i> , <i>R. Br.</i>	Operniwick.
<i>Lycopodium Selago</i> , <i>L.</i>	Cape Lawson; Durban, sea-level to 800 feet.
<i>Equisetum arvense</i> , <i>L.</i>	Durban Harbour.
<i>Cystopteris fragilis</i> , <i>Bernh.</i>	Black Hook, at 400 feet.

On a new species of *Bellevalia* from Mount Ida. By MAXWELL T. MASTERS, Esq., Lecturer on Botany at St. George's Hospital, &c. Communicated by the SECRETARY.

[Read May 6, 1858.]

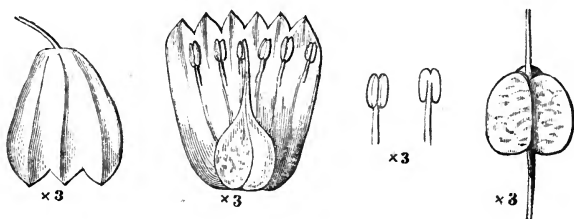
AMONG the plants collected on Mount Ida by the medical officers attached to the Civil Hospital at Renkioi, during the Crimean war, is what appears to be a new species of *Muscari*, or rather of *Bellevalia*, Kunth. For this opportunity of describing it, I am indebted to my friends Drs. Armitage and Playne; and I regret that the name proposed for it (supposing it to be an undescribed species of *Muscari*) is not applicable. Under this name, *Muscari latifolium*, it has been described by Dr. Kirk, one of its discoverers, in a paper read before the Botanical Society of Edinburgh, in January, and reported in the 'Edinburgh New Philosophical Journal' for April. But though in habit and external appearance it presents the greatest resemblance to the species of *Muscari*, yet the form of the perianth and the consolidated condition of the styles and stigmata necessitate its being placed in the genus *Bellevalia* of Kunth. If I am right in this conjecture, I would venture to propose the name of *Bellevalia Muscarioides* for it, and thus to define its characteristics more fully than has been done in the report above referred to.

Bellevalia. Floribus inferioribus campanulatis basi angulatis pedicellatis horizontaliter patentibus vel pendentibus; superioribus tubulosis sessilibus approximatis neutris; folio unico erecto oblongo-acuto versus basin attenuato.

Descr.—Habit, that of the species of *Botryanthus* or *Muscari*, Kunth.—*Bulb* ovate. *Leaf* erect, oblong-acute, tapering towards the base, 6–8 inches long, greatest width 8–10 lines. *Scape* erect, twice the length of the leaves, bearing an oblong crowded raceme 1–2 inches long; lower pedicels horizontal or pendent, 2–3 lines long, decreasing in length upwards; uppermost flowers sessile. *Bracts* minute, membranaceous, lanceolate: *Perianth* in perfect flowers purple, 2–3 lines long, deciduous, campanulate, angular at the base, not contracted at the throat, limb divided into six short-ovate connivent lobes. Upper flowers azure-blue, tubular, sessile, barren. *Stamens* six, arising from the middle of the tube of the perianth, included. Anthers adnate, bluish. *Ovary* deeply three-lobed, slightly rugose on the surface, three-celled, each cell containing two large flattened ovules superposed. *Style* one, tapering, as long as the ovary, included. *Stigma* entire

Fruit membranaceous, three-celled. *Seeds* two in each cell, large, compressed, testa brown.

The habit and general appearance of this plant are so entirely those of the species of *Botryanthus* or *Muscari*, Kunth, that some doubt may well be entertained as to whether this may not be merely a variety of one of the species of one or other of those genera. If so, the validity of the genus *Bellevalia*, as distinct from the above-mentioned, will be much impaired. In the meantime, as the present plant agrees entirely with the genus *Bellevalia* in the characters derived from the perianth and reproductive organs, no other course seems open than to consider it a new species of that genus.



Contribuciones ad Acaciarum Australiae Cognitionem. By Dr. FERDINAND MUELLER, Government Botanist, and Director of the Melbourne Botanic Garden, Victoria. Communicated by GEORGE BENTHAM, Esq., V.P.L.S., with notes on the new species.

[Read May 6th, 1858.]

[Dr. MUELLER's contributions are not only valuable for the number of new and well-marked species which he has added to this extensive and polymorphous genus, but still more so for the additional characteristic notes which enable us more or less to complete our knowledge of many species previously published from specimens so incomplete that they could scarcely be recognized. And there is still very much that is doubtful, chiefly from the difficulty of procuring specimens in fruit, or, when procured, of matching them with certainty with the flowering specimens. In so far as the specimens have admitted of it, I have, at Dr. Mueller's request, carefully compared his species with those nearly allied to them, and added any remarks which suggested themselves, at the end of his descriptions. In the few cases where I clearly identified them with others previously described, I have given the published

names, adding his manuscript ones for the purpose of reference, and retaining his characters as completing our previous knowledge of the plants. The following general observations by Dr. Mueller were contained in the letter to Sir W. Hooker, which accompanied this paper.—G. B.]

The Uninerves, although comprising such a large array of species in the southern latitudes of Australia, are exceedingly rare within the tropics. Indeed, only two desert plants of wide range, *A. Sentis* (doubtfully combined by Mr. Bentham with *A. decora*) and *A. salicina*, Ldl., accompany some of their usual companions as far as North Australia; and only a solitary new one, allied to *A. elliptica*, was observed in the Gregorian journey. Those of this group, which extend to subtropical latitudes in East Australia, are for the greater part identical with southern forms (for instance, *Acacia falcata*, *penninervis*, *suaveolens*, *oleifolia*); still *A. podalyriifolia* and *A. prominens*, from Moreton Bay and Wide Bay, are not to be found in Australia Felix. The plant referred by Mr. Bentham, in the 'Linnæa,' to the last-mentioned species, is assuredly distinct, and probably *A. lunata*, Sieber. A new species, of this section, allied to *A. vestita*, seems to be restricted to the warmer parts of the east coast, while my southern collections exhibit three other unknown kinds. I feel very reluctant to combine our common *A. reclinata* with what I assumed to be *A. leprosa*, which is with us a rare species, occurring towards the sources of the Yarra. Unfortunately, many kinds ripen the fruits so rarely, that one of the best specific characters for distinction in this genus also remains often beyond avail. *A. imbricata*, from Spencer's Gulf, belongs to the Uninerves, not to *A. conferta* amongst *Brunioideæ*, which I noticed near Wide Bay. The habitat "Ponindi," mentioned under *A. verniciflora* in the 'Linnæa,' vol. xxvi., belongs to *A. dodonæifolia*, Bauer having, no doubt, collected it on the very spot, near Port Lincoln. *A. salicina* is remarkable for the scarlet arillus which surrounds the seed,—a character in which, as far as I know, only *A. melanoxyton* participates. *Acacia gladiiformis* and *A. hakeoides* seem combinable. Nearly related to them is *A. notabilis*, a desert plant of Spencer's Gulf and Lake Torrens, but scarcely referable to *A. obtusata*, Sieb., a mountain-plant of East Australia. I venture also to deviate from Mr. Bentham's opinion when he unites *A. microcarpa* (singular for the smallness of its fruit) with *A. buxifolia*; for the figure in Sir W. Hooker's 'Icones Plantarum' seems to exhibit something very different.

The section *Brachybotryæ* is not well represented in the tropics. We observed of it, in Mr. Gregory's expedition, only two new species,—one with winged fruit, the other an *Acacia* from N.W. Australia, mentioned by Mr. Bentham under *A. melanoxyton* as imperfectly known from Cunningham's collection, and of which a full description will be found in the accompanying pages. Both show the rather unusual character amongst phyllodineous *Acaciæ*, of being deprived of the strophium. *A. complanata* and *A. venulosa* are not found beyond the warmer parts of East Australia. Unless imperfect specimens misled me in judging, I may pronounce that *A. pendula* and *A. sclerophylla* extend through Central Australia to Arnhem's Land, where *A. translucens* was likewise noticed. We possess a common desert-plant in South Australia and Australia Felix, enumerated in the 'Linnæa' (1856) as *A. elongata*; it seems to me not identical with the Blue Mountain plant, which I have compared, but rather to belong to *A. viscidula*. *A. multinervia* is found rarely in this colony; but quite common is *A. homalophylla*, from Lake Torrens to the Darling and Murray, where *A. stenophylla* likewise occurs. In a retrospective view it will be seen that 64 well-marked species alone occur in the collections of the North Australian Expedition, of which, after a patient scrutiny, I am obliged to admit 33 as new. By a further addition of some unpublished extratropical kinds, already contained in my former collections, the number of Australian *Acacias* becomes advanced to beyond 300, notwithstanding that some reductions of former species have been effected on this occasion. Most singular is the vast preponderance of *Julifera* in N. Australia, being nearly equal in number to those of all other sections collectively. Only 4 desert-species traverse Australia from south to north; and 8 only have hitherto been traced from Western Australia into the south-eastern portion of this continent. If, on the contrary, I rightly unite *Acacia cuspidata* with *A. diffusa*, not one of the Tasmanian species shows itself restricted to that island, except *A. axillaris*.

Mr. Gregory observes that no pinnate-leaved *Acacia* is harboured by the interior of West Australia.

Series I. *Phyllodineæ*.

§ 1. *Aphyllæ*.

1. *Acacia spinescens*, *Bth. in Hook. Lond. Journ. of Bot.* i. p. 322, pl. 2.
Ad sinum Spencer's Gulf, *C. Wilhelmi*. Ad sinum St. Vincent's Gulf, prope montes Barossa Range. Ad flumen Onkaparinga.

Legumina glabra coriacea valde curvata fusca basi acuta apice obtusa enervia tenuiter marginata, intus continua inter semina valde contracta, $1\frac{1}{2}$ " longa v. breviora, $1\frac{1}{2}$ " latitudine vix excedentia. *Semina* turgide ovata 1" tantum longa nitentia sordide obscuro-fusca utrinque areola cinerascens notata. *Strophiolium* pallidum cymbiformi-acuminatum dimidium semen saltem æquans.

§ 2. *Alatæ.*

2. *Acacia Muelleri*, *Benth. in Linnæa*, xxvi. p. 603. (*Acacia megaphylla*, *Ferd. Mueller*, MS.)

In ditone districtus Portus Lincoln, *C. Wilhelmi*.

Phyllodia crasso-coriacea raro oblongo-lanceolata. *Capitula* læte lutea. *Calyx* 1" circiter longus glaber campanulato-cylindraceus; dentes breves triangulares *conniventes*. *Petala* lanceolato-linearia inferne cohærentia. *Legumina* coriacea fusca compressa oblonga ad crassum marginem flexuosa oligosperma circ. $1\frac{1}{2}$ " longa, fere $\frac{1}{2}$ " lata, in stipitem brevem contracta, intus continua. *Semina* compresso-ovata e sordide cano et nigro variegata. *Strophiolium* lividum cymbiformi-lanceolatum acuminatum in funiculum longissimum varie implexum rufum transiens.

[In publishing this species as *A. Muelleri*, I stated my reasons for not adopting Dr. Müller's manuscript name, which appeared to me too little appropriate in a genus which contains so many species with phyllodia twice or three times as large.—G. B.]

§ 3. *Armataæ.*

3. *Acacia armata*, *R. Br. in Ait. Hort. Kew.* ed. 2. vol. v. p. 463.

Ad sinum Spencer's Gulf, *C. Wilhelmi*.

§ 4. *Triangulares.*

4. *ACACIA PRAVIFOLIA*, n. sp. Puberula, *ramulis* rigidis *spinescentibus* teretibus striatis, stipulis brevibus setaceis v. subulatis deciduis, phyllodiis parvis triangularibus crasso-coriaceis paucinerviis acutis mucronatis, angulo superiore valde protracto obtuso eglanduloso, capitulis subsessilibus v. breviter pedunculatis axillaribus solitariis, *bracteolis magnis subcordatis*, sepalis spathulatis diu cohærentibus corollam dimidiam æquantibus margine ciliolatis, *leguminibus pubescentibus spiraliter contortis*.

In montibus Flinders et Elder's Range, et ad Crystal Brook.

Phyllodia $1\frac{1}{2}$ -3" longa et lata, iis *A. decipientis* non absimilia, nervo infimo magis prominente. *Flores* 1" longi. *Calyx* satis laxus. *Legumina* circ. $1\frac{1}{2}$ " lata.

Illustris Bentham forsam optime judicans hanc speciem cum sua *A. sublanata* combinat, tacens autem de bracteolarum indole et ramorum rigiditate pungente. Nec vidit pedunculorum breviteratem. *Le-*

gumina pæne cincinnata contorta affinitatem cum *A. obliqua* et *A. acinacea* demonstrant.

[Dr. Mueller's specimens were so very imperfect, that I was unable to detect any specific difference between them and *A. sublunata*. The branches in Bauer's specimen are not pungent; but they are almost as stiff as in Mueller's, and they may not unlikely become pungent. The bracts, however, in Bauer's plant certainly are not such as Müller describes them; they are broad at the base, with a narrow subulate point as long as the flower.—G. B.]

5. *Acacia obliqua*, *All. Cunn. ex Benth. in Hook. Lond. Journ.* i. 334. Prope montes Buffalo Range. Ad sinum St. Vincentii alibique in colonia South Australia.

Frutex pluripedalis, ramis sæpe arcuatis. *Ramuli* plurimi conspicue angulati. *Calyx* 5-partitus corollæ dimidium subæquans, laciniis spatulato-linearibus. *Legumina* fuscescentia ætate fere nigrita tenui-coriacea insigniter cincinnato-spiralia stipitata enervia circiter $1\frac{1}{2}$ " lata. *Semina* subfusco-nigrescentia fere reniformia nitentia 2" longa breviter pallide strophiolata.

Variat glabra et pubescens.

6. ACACIA PRAVISSIMA (*Ferd. Mueller, First Gen. Report; Benth. in Linnæa*, xxvi. p. 608, *adnot.*). Arborescens, glaberrima, virens, ramulis gracilibus angulosis, stipulis perminutis subulatis v. oblitteratis, phyllodiis parvis tenui-coriaceis oblique triangularibus v. trapezoides mucronulatis opacis imperfecte binerviis venosis supra basin glandulam gerentibus, angulo superiore rotundato-obtuso, racemis polycephalis phyllodia longe superantibus summis paniculam constituentibus, bracteis minutis cymbiformi-deltaoideis, capitulis paucifloris, bracteolis rhomboideis fimbriatis, calyce obtuse 5-dentato petalis fere triplo brevioribus, leguminibus compressis linearibus tenui-coriaceis obtusis breviter stipitatis fuscescentibus enerviis margine repandis intus continuis, seminibus nigritis compresso-ovatis minutim livide strophiolatis vix areoligeris.

In vallibus et ad torrentium ripas tractus Buffalo Range et secus partes superiores fl. Snowy River.

Arbuseula v. *frutex* pulcherrimus flexilis altitudinem 20' attinens. *Cortex* sordide fuscus lævis. *Rami* sæpe recumbentes. *Ramuli* elongati adscendentes. *Phyllodia* ut plurimum 3-4" rarius ad 6" longa et lata, sessilia, nervis antice evanescentibus, supero tenuiore. *Racemi* jam ante anthesin 1-2-unciales. *Flores* tantum e residuis annotinorum descripti. *Legumina* bipollicaria v. breviora, 2" lata. *Semina* sesquilineam metientia.

Stirps quam maxime memorabilis, species triangulares, quibuscum phyllodiis convenit, cum quibusdam sectionis uninerviarum inflorescentia convenientium (e. g. *A. vestita*, *A. cultriformi*, et *A. scapuliformi*) conjungens. Anth. vere.

[This will probably prove a very distinct species, if more perfect specimens show the inflorescence to be normal. The capitula appear to be reduced to a single flower each, and are arranged in a simple raceme; but it is not impossible that the whole may be a monstrous or abnormal elongation of the axis of a single capitulum.—G. B.]

7. *ACACIA STIPULOSA*, n. sp. Glanduloso-pubescens, ramulis teretiusculis, *stipulis persistentibus setaceis inferne connatis* ciliolatis, phyllodiis confertis parvis oblique lanceolatis curvatis mucronatis tenuiter plurinerviis, margine supero prope medium glanduligero, pedunculis axillaribus solitariis monocephalis phyllodium superantibus capitulis globosis multifloris puberulis, bracteolis acutissimis, *sepalis* liberis linearibus obtusis *corollæ subæquilongis*, leguminibus coriaceis lato-linearibus hispidulis curvatis sessilibus intus subcontinuis inter semina non contractis, seminibus ovatis leviter compressis lucenti-nigris utrinque impressis strophiole pallido plicato triplo brevioris suffultis.

Secus partes australes fluminis Victoriae. *Hb. M.* No. 71.

Phyllodia $1\frac{1}{2}$ –3''' longa, $1-1\frac{1}{2}$ ''' lata, mucrone tenui terminata. *Stipulae* $1-1\frac{1}{2}$ ''' longæ. *Capitula* læte lutea. *Corolla* vix 1''' longa. *Legumen* circiter sesquipollicare acutum, 3''' latum, satis compressum dilute fuscum. *Semina* $1\frac{1}{2}$ ''' longa.

Huc pertinere videtur *A. deltoidea* β . *pungens*, Bth. *l. c.* p. 333, vix autem varietas primaria *Cunninghami*.

[This plant differs from the true *A. deltoidea* chiefly in the hairy pod; it is also generally more downy; but I have still considerable doubts whether it will not prove a mere variety of *A. deltoidea*.—G. B.]

8. *Acacia Gunnii*, *Benth. in Hook. Lond. Journ.*, i. p. 332; *J. D. Hook. Fl. Tasman.*, t. xviii. (*A. vomeriformis*, *A. Cunn. ex Bth. l. c.*)

In montibus ad sinum St. Vincent's Gulf et coloniae Victoriae, e. g. Grampians, Mount Alexander, &c.

§ 5. *Pungentes.*

9. *Acacia latipes*, *Benth. in Hook. Lond. Journ. of Bot.* i. p. 334. n. 40.

Ad sinum Spencer's Gulf, *C. Wilhelmi*.

Quidem nec flores nec fructus vidi; speciem autem phyllodiorum forma facile recognitam hac occasione nolui præterire.

10. *ACACIA PHLEBOCARPA*, n. sp. Fruticosa, viscidula, parce puberula, mox glabrata, ramulis teretiusculis, phyllodiis patentibus angustolanceolatis acutis subsessilibus breviter mucronatis basi minute glanduligeris multinerviis æquilateris, nervo mediano prominente, stipulis triangularibus acuminatis, pedunculis axillaribus solitariis monocephalis phyllodio parum v. dimidio brevioribus, sepalis oblongo-linea-

ribus obtusis demum liberis vix corollæ dimidium æquantibus, legumine fuscescente coriaceo arcuato acuto subsessili marginato compresso venoso imperfecte oblique septato, seminibus nitenti-nigris ovato-rotundis leniter compressis areolam circularem utrinque gerentibus strophiole bilobo pallido basi amplexis.

Hab. In locis petraeis ad ortum fluvii Seven Emu River sinus Carpentariæ. No. 41.

Frutex 2-5'. *Phyllodia* rigidula 1-1½" longa, 1½-2½" lata. *Pedunculi* crassiusculi. *Flores* glutinosi 1" paulo excedentes. *Legumina* 1-2" longa, circiter 2" lata. *Semina* 1⅓" longa.

[Closely allied to *A. cochlearis*, Labill. The phyllodia are rather thicker; the nerves, especially the lateral ones, less distinct; the minute brown stipules are broader, and the pod broader, thicker, with a more thickened margin, and much curved, that of *A. cochlearis* being nearly straight.—G. B.]

11. *Acacia colletioides*, *Benth. in Hook. Lond. Journ. of Bot.* i. p. 336. n. 46.

Ad sinus St. Vincent's Gulf and Spencer's Gulf.

Legumen arcuatum v. cyclicum tenui-coriaceum 1-1½" longum, circiter 2" latum, extus sordide fuscum, intus continuum sessile acuminatum.

Semina obscure fusca nitentia ovato-globosa turgida 1" paulo excedentia strophiole cymbiformi fuscescente prædita.

12. ACACIA SICULÆFORMIS (*Cunn.*; *Benth. in Lond. Journ. Bot.* i. p. 337.—*Acacia patens*, *F. Muell. MSS.*). Glabra, erecta, ramulis teretiusculis, *phyllodiis reverso-patentibus* coriaceis angusto- et oblique lanceolatis basi angustatis apice acutis mucronatis uninerviis indistincte venulosis prope basin et juxta medium obscure glanduligeris, stipulis minutis agglutinatis lanceolato-subulatis, pedunculis axillaribus solitariis phyllodia paulo superantibus monocephalis, capitulis globosis multifloris, leguminibus chartaceis linearibus rectis compressis enerviis spadiceis gracili-stipitatis intus continuis ad suturas flexuosis, *seminibus* ovatis leniter compressis minutissime strophiolatis obscure fuscis nitidis.

Ad rivos Hooker's et Sturt's Creek. No. 4.

Phyllodia 4-10" longa, 1-1½" lata. *Flores* evoluti desunt. *Legumina* 1-1½" longa et totidem lineas lata tenuiter marginata. *Semina* 1" paulo excedentia.

A. diffusæ proxima.

Alteram hujus sectionis speciem tropicam et probabiliter *A. siculæformis* proximam absque floribus fructibusque vidi in montibus inter flumen Suttor et planitiem Peak Downs sitis.

[*F. Mueller's* specimens of *A. patens* appear to agree in every respect with the original ones of *A. siculæformis*.—G. B.]

13. *Acacia Stuartiana*, *Ferd. Muell. et Benth. in Linnæa*, xxvi. p. 609; *J. D. Hook. Fl. Tasman.* p. 104, t. 19.

Frutex orgyalis amplius v. humilior. *Semina* ovata satis turgida 1''' paulo longiora e spadiceo nigrita lucida.

14. *Acacia* cuspidata, *All. Cunn. ex Benth. in Hook. Lond. Journ. i. p. 337. n. 51.*

Haud rara in colonia Victoriæ.

Legumina lato-linearia leniter compressa parum curvata fusca enervia marginata breviter stipitata acuminata $1\frac{1}{2}$ –3'' longa, 2''' lata v. paulo latiora ad suturas recta intus continua, valvis coriaceis chartaceis. *Semina* atra vix nitidula ovata leniter compressa $1\frac{1}{2}$ –2''' longa, strophiole brevi crassiusculo sordide fulvescente suffulta.

15. *Acacia* Brownii, *Steudel, Nomencl. Bot. i. p. 2.*

Variis locis in Australia Felice.

Legumina chartacea dilute fusca. *Semina* nitida nigro-spadicea $1\frac{1}{2}$ ''' longa ovata leniter compressa strophiole brevi fulvescente prædita.

16. *Acacia* rupicola, *Ferd. Mueller ex Benth. in Linnæa xxvi. p. 610.* In montibus Lofty Range et ad flumen Bremer.

Legumina bipollicaria vel breviora circiter 2''' lata fusciscentia compressa coriacea plus minusve curvata indistincte venulosa intus continua, basi stipitato-attenuata. *Semina* nigro-fusca nitidula circiter 2''' longa compresso-ovata strophiole pallido majusculo prædita.

17. *Acacia* sphacelata, *Benth. in Hook. Lond. Journ. of Bot. i. p. 338. n. 34.* (*A. tetragonophylla*, *Ferd. Muell. No. 6.*)

In pascuis siccis subsalinis ad lacum Torrens.

Frutex divaricato-ramosissimus, raro arbuscula. *Rami* validi cano-nigrescentes. *Phyllodia* $\frac{3}{4}$ – $1\frac{1}{2}$ '' longa, $\frac{1}{2}$ –1''' lata. *Pedunculi* axillares solitarii vix semunciales. *Sepala* linearia obtusa prorsus libera et distantia, corollæ dimidium æquantia apice non nigrescentia. *Bracteolæ* spathulato-lineares. *Legumina* sessilia compressa valde curvata marginata.

Specimina dubie huc relata, a cl. Bentham ad *A. Brownii* reducta.

18. *Acacia* ovoidea, *Benth. in Hook. Lond. Journ. i. p. 339, f. ; Hook. Flor. Tasman. p. 105. t. xx.*

In paludosis et irriguis coloniæ South Australia affatim occurrens. In terra Gipps Land et aliis partibus coloniæ Victoriæ minus frequens quam *A. verticillata*.

19. *Acacia* verticillata, *W. Sp. Pl. iv. p. 1049.*

γ. cephalantha, phyllodiis tenuissimis setaceo-subulatis, spicis depauperatis ad capitula subglobosa reductis, calycibus corolla ter quaterve brevioribus.

Ad umbrosas subsalinas fluvii Yarra.

Varietas insignis solo peculiari orta clare in formam normalem transiens.

20. *Acacia* Riceana, *Henslow in the Botanist, iii. p. 135.*

In silvis densis montium ad Sealers' Cove.

Antea tantum in Tasmania reperta.

§ 6. *Calamiformes*.

21. ACACIA PINIFOLIA (*Benth. in Mitch. Subtrop. Austr.* p. 342.—*Acacia tenuissima*, n. sp.). Glabra, ramulis teretiusculis, phyllodiis tenuissimis elongatis tetragono-filiformibus curvato-mucronulatis, stipulis minutis deltoideis diu persistentibus, pedunculis brevibus solitariis monocephalis, leguminibus chartaceis lato-linearibus rectis compressis marginatis enerviis ad suturas vix flexuosis breviter stipitatis basi et apice acutis.

In locis lapidosis aridis ad originem fluvii M'Arthur sinus Carpentaria Gulf. No. 5.

Frutex 5–8'. *Phyllodia* 3–8" longa, $\frac{1}{4}$ – $\frac{1}{2}$ " tantum crassa. *Flores* desunt. *Pedunculi* leguminigeri fere semunciales. *Legumina* 2–4" longa, $1\frac{1}{2}$ –2 $\frac{1}{2}$ " lata. *Semina* matura deficiunt.

Num eadem sit ac *Acacia pinifolia* (Bentham in Mitchell, Trop. Austr. p. 342) comparatio speciminum docebit.

[These specimens are in fruit; Mitchell's were in flower; but they appear in other respects identical. Dr. Mueller had inadvertently given the name of *A. tenuissima* to two species; but the present one proving to be already published, his name will be retained for the one described below (No. 74).—G. B.]

22. *Acacia chordophylla*, *Ferd. Muell. ex Benth. in Linnæa*, xxvi. p. 612.

Ad fluvium Murray.

Corolla calycem ciliolatum semisuperans. *Legumen* $1\frac{1}{2}$ –2" longum et totidem lineas latum chartaceum dilute fuscum inter semina flexuoso-constrictum. *Semina* ovata nitenti-fusca leviter compressa $1\frac{1}{2}$ " longa striophiolo livido fere 1" metiente suffulta.

A. ephedroidi inter *Juliferas* valde cognata.

23. *Acacia leptoneura*, *Benth. in Hook. Lond. Journ.* i. p. 340. n. 64.

Ad sinum Spencer's Gulf, *C. Wilhelmi*.

Frutex laxus ramosissimus pluripedalis. *Phyllodia* in speciminibus cultis multo longiora et magis compressa quam in spontaneis *A. chordophyllæ*, abs quo etiam differre videtur corolla calycem paulo nec semisuperante. *Pedunculi* capitulo æquilongi appresso-puberuli.

24. ACACIA SERICOPHYLLA, n. sp. Subsericeo-puberula, ramis teretiusculis, phyllodiis filiformi-linearibus elongatis muticis subtilissime striolatis, floribus, leguminibus coriaceis elongatis curvatis torulosis inter semina conspicue constrictis extus tenuissime cano-puberulis.

In eremo ad flumen Suttor.

Phyllodia 5–8" longa, 1" lata, compresso-filiformia canescentia. *Legumen* circiter semipedale circiter 4" latum. *Semina* et flores nondum visa.

Species *A. calamifoliæ* proxima.

[Of this I have seen no specimen.—G. B.]

25. *Acacia nematophylla*, *Ferd. Muell. ex Benth. in Linnæa*, xxvi. p. 612.

Spencer's Gulf, *C. Wilhelmi*.

Legumina pluripollicaria, circiter 3''' lata, coriacea corrugata, demum fuscescentia, satis compressa, ad suturas flexuosa. *Semina* atra opaca ovata v. oblongo-ovata satis compressa strophiole crasso fulvido fere cymbiformi 1''' longitudine excedente suffulta.

*Acacia Wilhelmana**, a cl. Bentham, *l. c.*, cum *A. nematophylla* conjuncta mihi satis singularis videtur visciditate, phyllodiis brevioribus obtusioribus et leguminibus multo minoribus vix 1½''' latis. Ceterum vidi nulla hujus speciei exemplaria nisi imperfecta.

Frutex orgyalis satis amplus.

Specimina cujusdam *Acaciæ* ad sinum Spencer's Gulf a *C. Wilhelmi* collecta, phyllodiis *A. calamifoliæ* simillima legumine compresso (etsi magis recto et vix flexuoso) ad *A. nematophyllam* accedens, aut hujus format varietatem insignem aut potius speciem propriam phyllodiis longioribus acutioribus, legumine fere chartaceo et strophiolis angustioribus singularem.

§ 7. *Brunioideæ*.

26. *Acacia lycopodifolia*, *All. Cunn. in Hook. Ic. ii. t. 172*.

In clivis petraeis ad flumen Victoriae.

Frutex 2-3' diffusus. *Rami* cano-pubescentes. *Flores* puberuli. *Calyx* corolla breviter 5-loba fere quater brevior, acute dentatus. *Bracteolæ* diu persistentes angusto-lanceolatæ v. lineares acutissimæ ciliatæ circiter 1''' longæ. *Legumina* sessilia 1-1½'' longa circ. 2½''' lata marginata fusca. *Semina* pauca v. plura, immatura late ovata nigrita compressa strophiole cymbiformi triplo brevior livido prædita.

27. *Acacia galioides*, *Benth. in Hook. Lond. Journ. of Bot. i. p. 344*.

In præruptis rupestribus ad flumen Victoriae.

Frutex humilis. *Bracteolæ* lanceolatæ acutissimæ ciliolatæ infractunguiculatæ. *Calyx* triente corollæ pubescentis paulo longior acute dentatus. *Legumina* longe stipitata valde compressa fuscescentia marginata parce viscidulo-puberula bipollicaria vel breviora, vix 5''' lata, transverse plus minus impressa. *Semina* 10 v. pauciora, immatura iis *A. lycopodifoliæ* similia.

28. ACACIA ASPERULACEA, n. sp. Glabra v. pubescens, ramulis tenuibus teretiusculis, stipulis lanceolato-linearibus subulatis subappressis, phyllodiis verticillatis teretiusculis subcanaliculatis apice recurvis mucronulatis, pedunculis phyllodia superantibus, capitulis multifloris, bracteolis unguiculatis lanceolato-linearibus acutissimis, calycis 5-fidi dentibus acutissimis, corolla 5-loba striolata calycem fere duplo superante, leguminibus rectis lato-linearibus sessilibus compressis

* *Ferd. Mueller*, in *Transact. Phil. Society Victoria*, p. 37.

basi et apice acutis marginatis fuscis lævibus continuis, seminibus

In plaga petraea (Sandstone table-land) terræ Arnhemicæ et ad flumen Victoricæ. Hb. M. 1 & 73 partim.

Rami adscendentes. *Phyllodia* 2-4''' longa, in quoque verticillo 8-14. *Stipulæ* lineam metientes v. breviores. *Capitula* 3-4''' diametro tenentia nec ut in *A. Baueri* minima. *Legumina* circiter 1½'' longa, 2''' lata.

[Closely allied to the *A. Baueri*, of which it has the foliage; but the heads of flowers, as well as the flowers themselves, are twice the size.—G. B.]

29. ACACIA SUBTERNATA, n. sp. Glabra, ramulis angulatis sulcatis junioribus innovationibusque viscidulis, stipulis minimis v. oblitteratis, *phyllodiis* lineari-filiformibus compressis ut plurimum *ternatim confertis* rarius geminis sparsisve brevissime recurvo-cuspidatis, pedunculis solitariis *phyllodia* superantibus, capitulis multifloris glabris, calycis corolla semibrevioris 5-partiti laciniis spathulato-linearibus obtusis, legumine plano crasso-coriaceo marginato lanceolato sensim in basin longe angustato oblique striato et oblique septato, seminibus

In plaga elevata petraea terræ Arnhemicæ ad flumina Victoricæ (No. 73 partim), *Roper et Limmen*; Bight River.

Frutex 3-5'. *Phyllodia* 3-6''' longa, vix ½''' lata. *Corollæ* 5-fidæ circ. 1''' longæ. *Legumina* addito stipite 1½-2'' longa, 2-2½''' lata.

Species insignis, quintæ seriei Juliferarum quoad legumina approximans, ceteroquin ad *Brunioideas* certe pertinet.

[Appears to be a good species. The arrangement of the *phyllodia* (should it prove constant) is singular: they are neither verticillate, as in the *Brunioidea verticillata*, nor solitary at each node, as in the *Brunioidea sparsifolia*; but in most cases in fascicles of 2, 3, or 4 from each node, something like the leaflets of *Aspalathus*.—G. B.]

30. *Acacia conferta*, *All. Cunn. ex Benth. in Hook. Lond. Journ. of Bot.* i. p. 345.

Near Balmy Creek and near Mount Mereval, *Sir T. H. Mitchell*. In collibus ad flumen Dawson, *Ferd. Mueller*, No. 2.

Frutex 1-2-orgyalis. *Phyllodia* semuncialia v. breviora marginulata (nullo modo ut habet cl. Bentham margine revoluta) in speciminibus suppetentibus acuta. *Calyx* 5-fidus, lobis obtusis. *Legumina* 1-1½'' longa, circiter ½'' lata, valde compressa, coriacea, pruinosa, ad suturas flexuosa, oligosperma. *Semina* 2''' longa opaco-nigra non areolata, strophiole sublivido 1''' longo cymbiformi sustentata.

§ 8. *Uninerviæ*.

31. *Acacia dictyocarpa*, *Benth. in Linnæa*, xxvi. p. 616.

In virgultis ad flumina Hutt et Hill River, prope St. Vincent's Gulf,

ad flumina Darling, Murray, et Murrumbidgee, in virgultis, ad lacum Alexandrinæ.

Frutex speciosus 3-5'. *Semina* $1\frac{1}{2}$ -2''' longa opaca atra compresso-ovata, areola laterali conspicua. *Strophiolum* lividum cymbiforme longe acuminatum dimidium seminis paulo excedens.

32. *Acacia argyrophylla*, *Ferd. Mueller, Coll. Bot.* 1847 et seq.

Ad flumen South Rhine in virgultis.

Frutex pluripedalis amplus. *Legumina* nigrescentia iis *A. dictyocarpæ* latiora.

33. *Acacia podalyrifolia*, *A. Cunn. in G. Don, Gen. Syst.* ii. p. 405. n. 85.

Wide Bay, *Moore*; Burnett River, Dawson River, on ridges, *Ferd. Mueller*, No. 16.

Frutex altior. *Legumen* subsessile tenui-coriaceum oligospermum complanatum glaucum puberulum $1\frac{1}{2}$ -3'' longum, $\frac{1}{2}$ - $\frac{3}{4}$ '' latum, marginatum venosum flexuosum, inter semina contractum. *Semina* nigra ovata satis compressa circiter $2\frac{1}{2}$ '' longa opaca, strophiole crasso fulvido triplo brevior suffulta.

Variat foliis lato-ovatis obtusis et angusto-lanceolatis acutis.

34. *Acacia oleifolia*, *All. Cunn. in Don, Gen. Syst. Dichlam. Plants*, ii. p. 405.

Wild Dog Creek, near Mount Remarkable. In virgultis ad flumina Dawson, Burdekin, et Burnett River. No. 22.

Capitula reperi pluriflora. *Legumina* subnigrescentia stipitata ut plurimum $1\frac{1}{2}$ -2'' longa lævia. *Semina* lucenti-nigra leviter compressa ovata, areolis valde indistinctis. *Strophiolum* crassum lividum semine triplo brevius.

Variat phyllodiis sesquilineam latis et fere 2'' longis falcatis.

35. *Acacia lunata*, *Sieb. in DC. Prodr.* ii. p. 452.

In montibus sterilibus dumosis ad flumen Ovens, et in montibus Buffalo Range.

Corolla calycem sinuato-dentatum vix ciliolatum pluries superans.

Specimina e locis supra memoratis cl. Bentham, *l. c.*, partim dubie ad *A. buxifoliam* partim ad *A. prominentem* retulit.

36. *Acacia myrtifolia*, *Willd. Sp. Pl.*

Frequens in coloniis South Australia et Victoria.

37. *Acacia iteaphylla*, *Ferd. Mueller ex Benth. in Linnæa*, xxvi. p. 617.

β . *latifolia*, phyllodiis latioribus et brevioribus.

Ad sinum Spencer's Gulf, *C. Wilhelmi*; *Ferd. Mueller*. Ad ostium fluminis Murray, *Wuerth*.

Frutex orgyalis et altior amplus. *Semina* ovata leviter compressa haud areolata 2'' longa nitidulo-nigra. *Strophiolum* seminis dimidium æquans fulvescens angusto-cymbiforme. Glandula *phyllodii* interdum a basi distans.

38. *Acacia pycnantha*, *Benth. in Hook, Lond. Journ.* i. p. 351.

Frequens in coloniis South Australia et Victoria.

Arbuscula v. *frutex* altior. *Legumina* recta obscure fusca coriacea lato-linearis marginata 2''' circiter lata, $1\frac{1}{2}$ –3'' longa, inter semina quasi articulatum impressa, intus continua, ad suturas non aut parum flexuosa. *Semina* circiter $1\frac{1}{2}$ ''' metientia oblongo-ovata compressa nitentia nigra, areola inconspicua. *Strophium* cymbiforme acuminatum lividum seminis dimidium superans.

39. *Acacia falcata*, *Willd. Sp. Plant.* iv. p. 1053.

Ad flumina Brisbane, Burnett, et Dawson River.

40. *Acacia penninervis*, *Sieb., ex DC. Prodr.* ii. p. 452.

Ad flumina Burnett et Brisbane Australiæ orientalis subtropicæ.

No. 13, 14. Broken River! in montibus graniticis ad Snowy River!
Legumina pallide ætate saturate fusca coriacea plana 2–5'' longa, semunciam circiter lata venosa intus continua. *Semina* longitudinalia circiter $2\frac{1}{2}$ ''' longa nitenti-atra non areolata ovata leviter compressa. *Strophium* obscure lividum cymbiforme acuminatum semini æquilongum. *Funiculi* pars superior crassa plicata.

41. *Acacia retinodes*, *Schl. Linnæa*, xx. p. 664.

In coloniis South Australia et Victoria non rara.

Frutex altior vel arbor parva. *Legumina* coriacea dilute fusca paulo pruinosa lato-linearis compressa recta stipitata 2–4'' longa, circiter 3''' lata, venulosa, intus continua, ad suturas vix flexuosa. *Semina* oblonga ovata compressa nigra vix nitentia $1\frac{1}{2}$ ''' longa. *Strophium* lividum crassiusculum cymbiforme semine aliquoties brevius.

42. *Acacia salicina*, *Lindl. in Mitch. Three Exped.* ii. p. 20.

In terra Arnhem's Land, e. g. ad flumen Roper, *hb. M.* 12. In eremo ad flumen Suttor, No. 21.

Corolla calycem glabrum triplo superans. *Legumina* plus minus curvata pallida paulo pulverulenta circiter $\frac{1}{2}$ '' lata intus continua. *Semina* subrotunda v. late ovata compressa splendenti-nigra lævia 2''' metientia strophium coccineum longissimum flexuosum et varie plicatum gerentia.

β. minor, phyllodiis et leguminibus conspicue minoribus.

Spencer's Gulf, *C. Wilhelmi*; St. Vincent's Gulf.

43. *Acacia hakeoides*, *All. Cunn. ex Benth. in Hook. Lond. Journ.* i. p. 354. (A. gladiiformis, *A. C. l. c.*)

In deserto ad fluvium Murray, lacum Torrens et montes Flinders Range.

Frutex 5–6. *Calyx* fimbriolatus corollam dimidiam æquans. *Legumina* fusca inter semina longe tenuiter contracta 3–4'' longa, coriacea,

loculis circiter 3'' latis turgidis. *Semina* oblongo-ovata nigra saltem 2'' longa. *Strophiolium* pallidum cymbiforme acuminatum dimidium seminis æquans.

44. ACACIA NOTABILIS (*Ferd. Mueller*). Glabra, ramulis superne angulatis, *phyllodiis* angusto- v. oblongo-lanceolatis obtusiusculis sessilibus *crasso-coriaceis basi tantum glanduligeris* marginatis uninerviis pallidis venosis, racemis oligocephalis phyllodio brevioribus, leguminibus tenui-coriaceis nigrescentibus angusto-oblongis obtusis planis stipitatis marginatis venulosis parum pruinosis ad suturas rectis, seminibus transverse sitis nigris opacis compressis ovatis strophiole cymbiformi livido longe acuminato dimidio longioribus areolatis.

In vicinitate portus Lincoln, *C. Wilhelmi*. Ad montes Flinders Range. *Frutex* circa orgyalis. *Phyllodia* 2-4'' longa, 4-6'' lata. *Flores* desunt. *Rachis* fructifer flexuosus. *Legumina* 1½-2½'' longa, circiter 4'' lata intus continua. *Semina* circiter 2'' longa.

Species eremicola dubie a clarissimo Bentham, *Acaciæ obtusatæ* montes cæruleos inhabitanti conjuncta, potius ad *A. hakeoidem* (legumine ceteroquin diversam) appropinquans.

[I have still great doubts whether this species be a good one.—G. B.]

45. *Acacia rubida*, *All. Cunn. ex Benth. in Hook. Lond. Journ.* i. p. 355. In collibus petræis inter montes May-day Hills et flumen Ovens. In regionibus montanis graminosis ad flumina King et Delatite. In clivis saxosis ad fluvium Snowy River.

Arbuscula v. frutex.

46. *Acacia crassiuscula*, *Wendl. Comment. de Acaciis aphyll.* p. 31, t. 8. *β. angustifolia*, Benth. in *Linnæa*, xxvi. p. 619.

Ad flumen Snowy River.

γ. *pubescens*, *phyllodiis* augustioribus et brevioribus glabriusculis, ramulis et inflorescentia pubescentibus.

New South Wales.

δ. *latifolia*, *phyllodiis* conspicue latioribus e truncato apice oblique cuspidatis.

Snowy River.

Specimina evoluta hujus varietatis nondum vidi.

47. *Acacia prominens*, *A. Cunn. in Don, Gen. Syst.* ii. p. 406; non *Benth. in Linnæa*, xxiv. p. 620.

Frequens circum Moreton Bay, in montibus ad flumina Pine River et Burnett. Hb. M. no. 15.

Frutex sæpe biorgyalis. *Calyx* repando-dentatus corolla fere triplo brevior ciliolatus. *Legumen* fuscescens leniter pruinose compressum fere biunciale fere ½'' latum stipitatum chartaceum læve inter semina plus minus contractum. *Semina* ovata leniter compressa

nitidulo-nigra lævia non areolata sesquilineam longa strophiole brevi crasso livido prædita.

48. *Acacia decora*, Reichb. *Icon. exot.* t. 199. (*Acacia Sentis*, Ferd. Mueller.)

In Australia centrali, Sturt. Ad flumen Victoriae, N. 19. Secus rivos siccos terræ Arnhemicæ, No. 17. "Plains of Promise" sinus Carpentariæ, No. 20. In Australia orientali tropica.

Ramuli inermes v. ætate spinis geminis præditi. *Corolla* glabra, circiter ad trientem divisa, laciniis angustis, tubo tenui calycem semisuperante. *Calyx* profunde quinquepartitus, laciniis spathulato-linearibus apice ciliatis. *Legumina chartacea* complanata, $1-1\frac{1}{2}$ " longa, circiter $\frac{1}{2}$ " lata, dilute fusca, reticulato-venosa, glabra, oligosperma, inter semina plus minus margine constricta, basi acuta, apice obtusa. *Semina subglobosa* splendentia e fulvo et spadiceo variegata sesquilineam longa, strophiole brevi carnoso fulvescente prædita.

[The specimens now sent show still more the identity of this plant with the *A. decora*, Reichb.—G. B.]

49. *Acacia buxifolia*, A. Cunn. in *Field's New South Wales*, p. 344.

Pine Ridges on the Macquarie River, All. Cunn. auctoritate illustr. Hooker.

β . *subvelutina*, ramulis innovationibus rachibusque velutinis. *Bracteolæ* rhombeo-cordatæ fimbriolatæ minutæ. *Calyx* fimbriolatus obtuse dentatus petalis fere triplo brevior. *Legumen* nigrescens pruinatum brevissime stipitatum coriaceum marginatum fere $\frac{1}{2}$ " latum. *Semina* immatura fere rotunda nigra strophiole livido prædita.

In tergis montium subalpinorum ad flumen Freestone River.

50. ACACIA MICROCARPA (Ferd. Mueller, *Second Gen. Rep.* p. 7).

Glabra, ramulis tenuibus acute angulatis, phyllodiis lineari- v. ovato-oblongis obliquis sessilibus uninerviis obscure venulosis obtusis recurvo-apiculatis infra medium glanduligeris, stipulis minutis deltoideis, leguminibus parvis tenui-chartaceis angustis pallidis arcuatis inter semina parum contractis lævibus, seminibus parvis turgide ovatis nitentibus nigro-fuscis pallide areolatis, strophiole rotundo-ovato acuminato vix dimidium seminis æquante.

Ad margines fruticetorum ad Tumbey Bay, C. Wilhelmi. Ad flumina Avoca et Murray.

Frutex pauci- v. pluripedalis patentim ramosissimus. *Phyllodia* uncialia et breviora $1\frac{1}{2}-3$ " lata. *Flores* omnino desunt. *Legumina* $\frac{3}{4}-1\frac{1}{2}$ " longa, circiter 1" lata. *Semina* 1" paulo excedentia. *Strophiolium* sordide fuscescens.

Species fructus minutie valde singularis ex icone Hook. *Icon.* t. 164, cum *A. buxifolia* neutiquam jungenda.

[Of this I have now no specimen, the fragment I formerly saw having been returned to Mr. Sonder.—G. B.]

51. ACACIA IMBRICATA (*Ferd. Mueller, in herb. Wilhelmiano*). Glabra, ramulis confertis acute angulatis, stipulis oblitteratis, phyllodiis parvis confertis sessilibus oblongo- v. cuneato-linearibus uninerviis aveniis apice obtusis glanduligeris et oblique cuspidato-apiculatis, pedunculis axillaribus solitariis phyllodia superantibus, floribus, leguminibus dilute fuscis lato-linearibus chartaceis subsessilibus ad suturas rectis leviter compressis pleio- v. polyspermis, seminibus rotundo-ovatis leniter compressis nitentibus nigrescentibus strophiole cymbiformi acuminato fere duplo longioribus.

Tumby Bay, Spencer's Gulf ad margines fruticetorum, *C. Wilhelmi*.

Frutex densus 3-4' altus. *Phyllodia* crassiuscula 2-6''' longa, $\frac{1}{2}$ -1''' lata. *Pedunculi* tennes circiter semunciales. *Legumen* (a *Benthamio in Linnæa*, xxvi. p. 614, sub *A. conferta* descriptum) $1\frac{1}{2}$ -2'' longum, 2-3''' latum. *Semina* fere $1\frac{1}{2}$ ''' longa utrinque distincte areolata.

Species certo ad uninervias pertinens, *A. lineatæ* affinis, a *Benthamio, l. c.*, perperam cum *A. conferta* e *Brunioidearum* serie conjuncta, quæ differt habitu multo altiore: ramis pubescentibus non distincte angulatis, phyllodiis acutis glandula terminali orbatis, nervo nullo v. indistincto præditis, satis evidenter marginulatis, legumine valde compresso multo latiore stipitato pruinoso oligospermo, ad suturas flexuoso, seminibus majoribus minus nitentibus magis compressis haud distincte areolatis et forsan quoque floribus.

[Dr. Mueller may be correct in referring this to the Uninerviæ next *A. lineata*. My specimen is too imperfect to determine the point. —G. B.]

52. Acacia acinacea, *Lindley in Mitch. East Austr.* ii. p. 267.

In parte australi coloniæ Victoriæ, a montibus Grampianis usque ad rivum Forest Creek, necnon ad portum Phillip.

Frutex pluripedalis amplus ramosissimus, ramis sæpe recurvatis. *Calyx* 5-partitus corollam vix semiæquans, laciniis lineari-spathulatis. *Legumen* spirale quasi cinnatum, ei *A. obliquæ* persimile. Transitum igitur a speciebus uninerviis ad triangulares parat.

53. Acacia aspera, *Lindl. l. c.*

In locis sterilioribus virgultorum et nemorum Australiæ Felicis; *e. g.* Grampians, Black Forest, Goulburn et Broken River.

Frutex pluripedalis valde ramosus. *Legumina* arcuata leviter compressa 1-2'' longa, vix $1\frac{1}{2}$ ''' lata, dilute fusca hispidula, ad suturas plus minusve flexuosa, basi et apice acuta. *Semina* nigrescentia ovata sesquilineam longa, strophiole carnoso fulvido prædita.

54. Acacia montana, *Benth. l. c.*

Differt ab *A. leprosa* phyllodiis minoribus obscure bi- v. plurinerviis juxta basin conspicue glanduligeris, capitulis multo intensius luteis,

pedunculis glabris et bracteolis brevioribus. *Flores* similes. *Corolla* 5-fida calycem obtuse 5-lobum puberulum semicæquans. *Bracteæ* ad pedunculorum basin rotundæ conspicuæ.

In collibus ad flumen South Rhine.

A. sclerophylla, Lindl., cum hac confluit, nisi fructu differt.

55. *Acacia exsudans*, Lindl. in *Mitch. East Australia*, ii. p. 216.

Differt ab *A. reclinata* et *A. leprosa* phyllodiis divaricatis brevioribus et obtusioribus minutim apiculatis non apice sphacelatis, nervo secundario secus marginem superum percursis, calycibus magis glabris, ab *A. leprosa* præterea glandula minore basali, capitulis minus læte luteis. *Legumina* 1-2" longa, $1\frac{1}{2}$ -2" lata, breviter stipitata, viscoso-puberula lato-lineararia recta compressa sordide fusca coriaceo-chartacea. *Semina* ovato-oblonga nitentia fusco-nigra $1\frac{1}{2}$ " metientia longe areolata. *Strophium* crassum breve.

56. *ACACIA DINEURA*, n. sp. Fruticosa, glabra, ramulis striato-angulatis, phyllodiis chartaceis angusto-oblongis v. oblongo-lanceolatis obtusis leniter falcato-curvatis *binerviis* reticulato-venosis ad basin minute glandulosis, pedunculis axillaribus monocephalis solitariis phyllodio pluries brevioribus, leguminibus complanatis stipitatis elongato-oblongis marginatis venosis, suturis leniter undulatis.

In plaga arenoso-rupestri juxta originem fluviorum Roper et Limmen, Bight River terræ Arnhemicæ, *h. M.* no. 31.

Frutex altior. *Phyllodia* 2-3" longa, 3-8" lata. *Areolæ* venationis magnæ. *Pedunculi* tennes semunciam paulo excedentes. *Legumina* (immatura tantum visa) $2\frac{1}{2}$ -5" longa, circiter $\frac{2}{3}$ " lata. *Flores* et *semina matura* nondum cognita.

A. ellipticæ, Cunn. in Hook. Lond. Journ. i. p. 347, et *A. hemignostæ* proxima.

[Appears to be a distinct species. The phyllodia are thinner and differently shaped from the few 2-nerved species known with solitary flower-heads.—G. B.]

57. *ACACIA LEPROSA* (*Sieb. in DC. Pr.* ii. 450). Elatior, ramulis angulatis apice vix puberulis cernuis v. nutantibus, phyllodiis chartaceis patentibus elongato- et angusto-lanceolatis leviter curvatis sphacelato-apiculatis brevissime petiolatis basi et apice longe angustatis glabris viscoso-punctatis uninerviis tenuiter reticulato-penniveniis supra basin conspicue uniglandulosis, pedunculis axillaribus geminis-quinis cano-velutinis capitulo citrino multifloro æquilongis, corolla glabra 5-fida calycem subvelutinum dentatum semisuperante, bracteolis lanceolatis, leguminibus

Ad ripas superiores fluvii Yarra-Dallachi.

Rami graciles elongati. *Phyllodia* læte viridia pleraque 3-4" longa, 3-6" lata. *Capitula* suaveolentia.

58. ACACIA LEPROSA (*Sieb. in DC. Prod. ii. p. 450, var. sec. Benth.*—*Acacia reclinata, Ferd. Mueller, First Gen. Report, p. 12*). Elatior, ramulis angulatis subglabris demum nutantibus, phyllodiis chartaceis patentibus lineari-lanceolatis sphacelato-apiculatis vix curvatis subsessilibus ima basi minutim glanduligeris basi ut apice sensim angustatis glabris viscoso-punctatis uninerviis tenuiter reticulato-penniveniis, pedunculis axillaribus geminis ternisve capitulo sulphureo multifloro æquilongis puberulis, corolla glabra 5-fida calycem dentatum puberulum semisuperante, bracteolis lanceolatis,

In vallibus Australiæ Felicis orientalis et litoralis.

Frutex densus altus. *Phyllodia* pleraque $1\frac{1}{2}$ – $2\frac{1}{2}$ " longa, 2–3" lata. *Legumen* lineare falcatum arcuatum basi et apice acutum circiter 1–2-pollicare $1\frac{1}{2}$ " latum compressum tenui-coriaceum fuscum inter semina continuum non contractum.

β. *binervis*, phyllodiis binerviis.

In collibus graniticis ad flumen Broken River.

A. leprosa persimilis, vix tamen ejus varietas.

[I still think it a mere variety of *A. leprosa*.—G. B.]

59. *Acacia dodonæifolia, Willd. Enum. Pl. Suppl. p. 68.* (*Acacia viscosa, Schrad. in Wendl. Comment. p. 30.*—*Mimosa dodonæifolia, Persoon, Synops. ii. p. 261.*)

Ad sinum Spencer's Gulf prope Port Lincoln, *C. Wilhelmi*.

Corolla 5-partita calycem glabrum viscidum dentatum triente superans. *Bracteolæ* angustissime lineares, lamina spathulata terminatæ. *Pedunculi* solitarii v. gemini glabri capitulo longiores. *Legumina* dilute fulvida $1-4\frac{1}{2}$ " longa, $1\frac{1}{2}$ " lata lato-linearia curvata viscidula satis compressa tenui-coriacea enervia intus continua inter semina haud aut vix contracta. *Semina* nitentia spadiceo-nigrescentia compresso-ovata $1\frac{1}{2}$ –2" longa, strophiole sordide fulvido replicato basi suffulta. *Frutex* 15–20'.

Differt ab *A. reclinata* et *A. leprosa* phyllodiis distinctius venosis paulo crassioribus ratione longitudinis latioribus, obtusioribus, apiculo minuto non sphacelato terminatis prope et supra medium glanduligeris (præter glandulam basalem), pedunculis longioribus glabris sæpe solitariis, calyce glabro, corolla profundius divisa, bracteolarum forma et forsân quoque leguminibus hactenus mihi ignotis.

60. *Acacia stricta, W. Sp. Plant. iv. p. 1052.*

Kangaroo Island. Satis frequens in colonia Victoriæ.

β. *binervis*, phyllodiis binerviis. Tasmania, *Stuart*.

γ. *pleiocephala*, racemis brevibus oligocephalis.

South Port, Tasmania, *Stuart*.

61. ACACIA PLAGIOPHYLLA, n. sp. Ramulis hirtellis angulatis, phyllodiis parvis glabris triangularibus sive ovato-deltaideis sessilibus

mucronatis curvato-uninerviis subaveniis marginatis ad angulum superum obtusiusculum glanduligeris,

Ad flumen Brisbane, No. 25, *Hill et Muell.*

Habitu ad *Acaciam pravissimam* accedens. *Phyllodia* 2-4''' longa, 1½-3''' lata, satis obscure viridia, nitidula. *Flores et fructus* hactenus ignoti.

[Without further information, it will be impossible to judge of or identify this species. There are no specimens sent.—G. B.]

§ 9. *Brachybotryæ.*

62. *Acacia viscidula*, *Benth. in Hook. Lond. Journ.* i. p. 363. no. 141.

(*Acacia elongata*, *Benth. in Linnæa*, xxvi. p. 624, non *Sieber.*)

Spencer's Gulf, Lake Torrens, St. Vincent's Gulf, et Murray River.

Flores minuti. *Sepala* spatulato-linearia vix ciliolata corollam semi-æquantia. *Legumina* lineari-filiformia acuta sessilia 1½-2½'' longa, circiter 1½''' lata fuscata longitudinaliter venosa coriacea leniter curvata, inter semina modice contracta. *Semina* nigro-fusca nitentia 1-1½'' longa ovata vix compressa areolata. *Strophiolium* crassiusculum lividum basin seminis tantum amplexans.

A. farinosæ affinis.

63. *Acacia farinosa*, *Lindley in Mitchell's Three Exped.* ii. p. 146.

Ad sinum Spencer's Gulf, *C. Wilhelmi.*

Frutex ramosissimus laxis paucipedalis. *Corollæ* profunde 5-partitæ segmenta lanceolata glabra. *Sepala* libera lineari-spatulata ciliolata petalis semisuperata. *Legumina* turgida glabra spadicea circiter 2'' longa, vix ultra 2''' lata, arcuata, basi obtusa sessilia, apice longe rostrata, inter semina constricta. *Semina* ovata 1½'' longa sordide brunnea, strophiole flavescente crassiusculo bilobo ter brevioris suffulta.

64. *Acacia multinervia*, *DC. Legum. Mem.* p. 445.

In vicinitate montis Alexander.

Flores minuti. *Capitula* nonnunquam terna. *Calyx* 5-fidus ciliolatus.

Vidi in specimine meo ramos striato-angulatos puberulos. *Stipulæ* e lata basi lineari-setaceæ demum deciduæ.

Species situ glandulæ inter affines valde distincta.

[The true *A. multinervia*, DC., is probably one of the Pungentes, as I pointed out (*Linnæa*, xxvi. p. 625). The plant here alluded to by Dr. Mueller, among the *Brachybotryæ*, is probably the one I myself formerly mistook for the *A. multinervia*,—a variety of *A. ixiophylla* with a marginal gland. I have not, however, seen any specimen from Dr. Mueller.—G. B.]

65. *Acacia translucens*. *All. Cunn. in Hook. Icon. Plant.* ii. t. 160.
 Ad rivos Sturt's Creek et Hooker's Creek Australiæ subcentralis et ad
 flumen Victoriæ in locis petræis, *Hb. Muell.* No. 8, 81, et 83.
Calyx corolla aliquoties brevior. *A. impressæ* inter Juliferas affinis.

66. *ACACIA IMPRESSA* (*Ferd. Mueller, non Cunn.*). Breviter pubes-
 cens, ramulis angulatis, *stipulis semilanceolatis acuminatis diu per-*
sistentibus, phyllodiis parvis ovatis v. ovato-lanceolatis apice obtusis
 cuspidato-apiculatis 3-5-nerviis anastomosanti-venosis juxta basin
 obscure glanduligeris, pedunculis axillaribus solitariis phyllodio paulo
 v. dimidio brevioribus (capitulis globosis v. subovatis), bracteolis lan-
 ceolatis longe acuminatis, calyce 5-partito ciliolato corolla 5-fida
 rigidula ter brevior, legumine fusco glutinoso pubescente oblongo-
 lineari compresso vix inter semina contracto et vix curvato intus con-
 tinuo, *seminibus* ovatis *subfuscis utrinque insigniter impressis, stro-*
phiolo minuto albedo.

In rupibus ad flumen Victoria River, No. 82; Sturt's Creek, No. 8; inter
 Sturt's Creek et Victoria River, No. 83.

Frutex 8-12'. *Phyllodia* $\frac{2}{3}$ -1" longa, 3-6" lata. *Corolla* 1" longa.
Legumina biuncialia circiter 4" lata. *Semina* vix 2" longa.

[Very closely allied to the broad-leaved varieties of *A. translucens*,
Cunn., scarcely differing except in the down which covers the branches,
 phyllodia, and pods. Dr. Mueller refers it to the Juliferæ; but the
 capitula are globular in most of the specimens, only slightly ovoid in
 the specimens numbered 82, which are almost past flower; and the pod
 is quite different from that of the *A. Wickhami* and its allies among
 Juliferæ.—G. B.]

67. *Acacia homalophylla*, *All. Cunn. ex Benth. in Hook. Lond. Journ.*
of Bot. i. p. 365. no. 148.

Murray, Darling et Murrumbidgee River, Avoca, St. Vincent's Gulf,
 Spencer's Gulf, Lake Torrens.

Frutex interdum arborescens. *Capitula* brevissime pedunculata. *Se-*
pala angusta basi cohærentia subpuberula corollam semiæquantia.
Legumina tortuosa coriacea extus nigrescentia 4-5" longa, semunciam
 lata, acuta inter semina leniter contracta.

68. *Acacia pendula*, *All. Cunn. in Don, Gen. Syst.* ii. p. 404.

Sturt's Creek Australiæ subcentralis.

Specimina sine flore et fructu reperta satis dubia.

69. *Acacia stenophylla*, *All. Cunn. ex Benth. in Hook. Lond. Journ. of*
Bot. i. p. 366. no. 151.

Ad flumen Murray prope originem fluvii Sturt's Creek Australiæ
 boreali-occidentalis.

Arbor minor. *Legumina* pallida stipitata compressa lignoso-coriacea

inter semina valde contracta, loculis vix $\frac{1}{2}$ " latis. *Semina* longitudinalia subolivacea ovata leviter compressa $2\frac{1}{2}$ " longa utrinque areolato-imprensa. *Strophiolium* minutum fulvidum, funiculo recto. Speciminum tropicorum legumina nondum vidi, conveniunt autem cum aliis ab equite Mitchell in Australia orientali extratropica collectis.

70. ACACIA EXCELSA (*Benth. in Mitch. Austr. Subtrop.* p. 225.—*Acacia* pterocarpa, *Ferd. Mueller, MSS.*). Arborescens, ramulis angulatis, phyllodiis falcato-lanceolatis subopacis tenui-coriaceis acutis sessilibus plurinerviis imperfecte reticulato-venosis supra basin minute glanduligeris, pedunculis axillaribus solitariis monocephalis phyllodio pluries brevioribus, *leguminibus* stipitatis subcoriaceis compressis oblongo-linearibus angustissime alatis inter semina plus minusve contractis *indehiscentibus*, *seminibus estrophiolatis* ovatis leviter compressis nitidulo-nigris, areolis non impressis.

In virgultis Brigalow Scrub circum planities Peak Downs, No. 36.

Arbor minor. *Cortex* nigrescens rugosus frustulosus. *Phyllodia* viridia $1\frac{1}{2}$ –2" longa, 3–5" lata. *Pedunculi* circiter semunciales. *Flores* ignoti. *Legumina* bipollicaria v. breviora, circiter 3" lata, non distincte venosa. *Semina* 2" vix metientia.

A. multinervia et *A. excelsa* finitima.

[Dr. Mueller's specimens are in fruit, Col. Mitchell's in flower; but they appear to belong to the same species. The phyllodia are precisely the same, so is the inflorescence; for in Dr. Mueller's specimen the peduncles are not always solitary. Col. Mitchell notes that it is a large forest tree, Dr. Mueller found it a small tree; but that might depend upon locality.—G. B.]

71. ACACIA HEMIGNOSTA, n. sp. Glabra, ramulis tenuibus junioribus angulatis, *phyllodiis* tenuicoriaceis subglaucis lanceolato-oblongis obtusis leviter curvatis in basin longe angustatis subtrinerviis *creberrime venulosis* supra basin minute glanduligeris, pedunculis tenuibus axillaribus monocephalis solitariis phyllodio pluries brevioribus v. terminalibus racemum constituentibus, capitulis parvis multifloris, sepalis paulo puberulis perangustis liberis corolla parum brevioribus, *leguminibus* dilute fuscis chartaceis elongato-oblongis complanatis marginatis stipitatis indistincte venosis ad suturas flexuosis, *seminibus rotundis* leviter compressis *estrophiolatis* conspicue circulariter areolatis opacis squalide fuscis.

Ad flumen Albert sinus Carpentariæ, No 34. Ad fluvium Victoriæ, No. 87. Gilbert River, Roper River.

Frutex v. *arbuscula*. *Phyllodia* $1\frac{1}{2}$ –4" longa. *Racemi* terminales inferre non raro foliati. *Capitula* vix pisi magnitudine. *Legumina* 3-pollicaria vel breviora, 3–5" lata. *Semina* vix 2" metientia.

Huc probabiliter referenda est *Acacia* illa *hemignosta* ab illustri Bentham sub *Acacia melanoxydon* l. c. indicata olim ad sinum Cambridge

Gulf Australiæ boreali-occidentalis a beato Cunningham imperfecte collecta.

[Dr. Mueller is right in referring this to the plant gathered by A. Cunningham at Cambridge Gulf. It is very nearly allied to *M. melanoxylon*; but the flower-heads appear to be always solitary, on slender peduncles, and much smaller than in that species, and the pods more straight, broader, thinner, and shorter. The phyllodia are also usually more glaucous.—G. B.]

72. *Acacia implexa*, Benth. in Hook. Lond. Journ. of Bot. i. p. 368. no. 156.

Prope urbem Bathurst, C. Moore. Ad ripas fluviorum a portu Phillip usque ad flumen Snowy River. Ad montem MacIvor. In tractu Bacchus Marsh.

Arbor minor. Cortex nigricans ramosissimus. Sepala cuneata ciliolata demum superne secedentia. Semina fusco-nigra nitentia oblongo-ovata leniter compressa circiter 2'' longa exareolata. Strophium lividum implexum basin seminis tantum ambiens.

73. *Acacia complanata*, All. Cunn. ex Benth. in Hook. Lond. Journ. of Bot. i. p. 369. no. 160.

Wide Bay, C. Moore. Brisbane River, Hill et Mueller.

β. *fasciculata*, pedunculis numerosis fasciculatis raro racemosis, No. 32. Frutex altior. Sepala cuneato-linearia puberula corollæ dimidium superantia. Legumina stipitata compressa tripollicaria v. breviora, circiter 3'' lata, marginata, inter semina plus minusve contracta.

§ 10. *Juliferæ*.

74. ACACIA TENUISSIMA, n. sp. Glabra, ramulis gracilibus subangulatis, phyllodiis tenui-filiformibus leniter compressis muticis striolatis, spicis brevibus axillaribus solitariis densifloris glabris, calyce membranaceo obtuse dentato, corolla 5-loba calycem triente superante, leguminibus

Ad rivum Sturt's Creek Australiæ subcentralis, No. 72.

Phyllodia 2-4'' longa. Pedunculi floriferi semunciales vel breviores.

Spicæ circiter 4'' longæ, floribus minutis.

A. filifoliæ Benth. proxima.

[A good species. The striæ of the phyllodia are like those of *A. aciphylla*, Benth.; but the phyllodia are very much more slender, and not pungent. The spikes when in bud are like those of *A. xylocarpa*, the angular corollas projecting considerably above the calyx.—G. B.]

75. ACACIA PITYOIDES, n. sp. Glabra, ramulis teretiusculis, phyllodiis compresso-filiformibus oblique apiculatis subtiliter v. indistincte striatis, spicis brevibus densis cylindraccis axillaribus solitariis gemi-

nise breviter pedunculatis, floribus parvis glabris, sepalis tenerissimis liberis oblongis corolla triente brevioribus, leguminibus linearibus flexuosis pallidis chartaceis inter semina leviter contractis aveniis.

In virgultis Brigalow Scrub, a fluvio Gilbert usque ad flumen Suttor, No. 6. Ad rivum Sturt's Creek, No. 5.

Phyllodia opaca $1\frac{1}{2}$ –4" longa, $\frac{1}{3}$ – $\frac{2}{3}$ " lata. *Spicæ* vix unciales. *Legumen* circiter sesquipollicem longum, $1-1\frac{1}{2}$ " latum. *Semina* desunt.

A. aneuræ et *ephedroidi* propinquæ.

[A specimen of this species is amongst Cunningham's specimens of his *A. xylocarpa*, which it closely resembles; but the phyllodia are not broader than thick, and the corollas appear more membranous, projecting less in the young spike. The foliage is precisely that of the following species (*A. orthocarpa*); but the pod, which I have not seen, is differently described by Dr. Mueller.—G. B.]

76. ACACIA ORTHOCARPA (*F. Muller, MS.*). Glabra, ramulis teretiusculis, phyllodiis filiformibus estriatis oblique et obtuse apiculatis, spicis axillaribus subgeminis pedunculatis, leguminibus lignescentibus lanceolato-linearibus rectis acutis margine obtusis longitudinaliter venosis intus oblique transversim septatis.

In plagis dumoso-rupestribus ad ortum fluvii M'Arthur River, No. 4.

Phyllodia longitudine inter $1\frac{1}{2}$ et 4" varia, circiter $\frac{1}{2}$ " crassa, sulcis duobus indistincte percursa. *Legumina* circiter bipollicaria 3–4" lata in basin sensim attenuata.

Species *A. gonocarpæ* propinqua.

[Closely allied to *A. xylocarpa* Cunn., and *A. pityoides* F. Muell. With the foliage of the latter, the fruit is precisely that of the *A. xylocarpa*.—G.B.]

77. ACACIA GONOCARPA, n. sp. Ramulis tenuibus compresso-angulatis junioribus ramulisque viscidis, phyllodiis angusto-linearibus elongatis uninerviis recurvo-apiculatis basi glanduligeris, spicis brevibus densis axillaribus geminis v. solitariis breviter pedunculatis glabris, sepalis linearibus liberis corolla 5-fida duplo brevioribus, *legumine sublignoso ad suturas rectas contracto oblique septato, valvis dorso convexis utroque latere acute carinatis.*

In terra Arnhem's Land juxta partem austro-occidentalem sinus Carpentariæ in plagis rupestribus, No. 7.

Frutex pluripedalis. *Phyllodia* pleraque 2–3" longa, circiter $\frac{1}{2}$ " lata. *Spicæ* unciales v. breviores. *Legumina* 2–3" longa, fusca, ad suturas tantum $1\frac{1}{2}$ " lata sed inter angulos dorsi 3" metientia, basi et apice sensim attenuata striolata. *Semina* desunt.

Species quam maxime singularis ad quintam Juliferarum sectionem pertinet, ad *A. xylocarpam* quoque approximans.

[Those specimens which are in flower only, precisely resemble the flatter-leaved specimens of *A. xylocarpa*, Cunn.; but the pod, from Dr. Mueller's description, must be quite different.—G. B.]

78. ACACIA DREPANOCARPA, n. sp. Erecta, glabra, ramulis superne angulatis, phyllodiis brevissime petiolatis elongato-linearibus subrectis basi et apice longe angustatis hinc apiculatis supra basin glanduligeris uni-trinerviis crebre parallelo-venosis, spicis axillaribus solitariis brevissime pedunculatis, *leguminibus lignescensibus complanatis subfalcatis intus oblique septatis margine planis integerrimis apice obtusis basi longe acutatis.*

In rupibus plagæ austro-occidentalis sinus Carpentariæ, No. 27.

Frutex. *Phyllodia* iis *A. juliferæ* et *delibratæ* simillima, sed glandula a basi paulo remota. *Rachis* cylindracea circiter sesquipollicaris. *Flores* desunt. *Legumina* iis *A. loxocarpæ*, *oncinocarpæ* et *aulacocarpæ* similia, $1\frac{1}{2}$ -3" longa raro recta, margine (statu saltem immaturo) subcanaliculato-plana, extus oblique et fere parallelo-venosa.

A. loxocarpæ propinqua.

[Closely allied to *A. avida* Benth., and only appears to differ, as far as the specimens indicate, in the much narrower pods; but these are far from ripe in Dr. Mueller's specimen, and the only one on Cunningham's specimen is quite ripe and open.—G. B.]

79. ACACIA LYSIPHLOIA, n. sp. Subglabra, viscidula, ramulis angulatis, *phyllodiis* sessilibus (fere uncialibus) oblongis leviter curvatis cuspidatis 1-3-nerviis obscure parallelo-venosis *creberrime punctulatis* vix glanduligeris, *stipulis e lata basi lanceolato-subulatis diu persistentibus*, spicis brevibus axillaribus solitariis breviuscule pedunculatis densifloris cylindricis, sepalis angustis glabris corolla 5-partita triplo brevioribus.

Sturt's Creek, No. 84; Hooker's Creek, No. 86. In arenosis planitierum et vallium sinus Gulf of Carpentaria, e. g. ad ortum fluvii Limmen et Bight River, No. 3.

Arbuscula, coma planiuscula dilatata. *Cortex* exterior tenuis castaneo-fuscus in frustulis revolutis secedens. *Phyllodia* $\frac{3}{4}$ -1" longa, 1-1 $\frac{1}{2}$ " lata. *Spicæ* uncia sæpe breviores. *Legumina* ignota.

A. ptychophyllæ approximanda.

[Very near *A. linarioides*, Benth. The phyllodia are rather shorter and thicker and sometimes rather broader. The flowering spikes are closer and shorter, but they are younger; in the specimen No. 84, where they are more developed, they are nearly as long as in *A. linarioides*. If the pod (which is unknown) should not prove different, it must be considered as a mere shortened variety of *A. linarioides*.—G. B.]

80. *Acacia linearis*, Sims, *Bot. Mag.* t. 2156.

Satis frequens in vallibus silvaticis irriguis partis austro-orientalis coloniæ Victoriæ.

81. *Acacia floribunda*, Willd. *Sp. Pl.* iv. 1051.

Ad flumen Tamba terræ Gipp's Land.

Frutex 10-12' altus,

82. *Acacia mucronata*, Willd. *Enum. Suppl.* p. 68.

In ericetis terræ Gipp's Land, prope flumen La Trobe River.

83. *Acacia Sophoræ*, R. Br. in *Hort. Kew.* ed. 3. p. 462.

Frequens ad litus arenosum coloniarum Victoriæ et South Australia.

β. montana, phyllodiis majoribus crassioribus distinctius venosis, ramulis spicisque viscidulis, legumine lato-lineari compresso (illo iconis Bill. non dissimili).

A. phlebophylla, *First Gen. Rep.* p. 12. In montibus altioribus graniticis (4000' saltem elevatione) tractus Buffalo Range. Species forsan distincta.

84. ACACIA DALLACHIANA, n. sp. Arborescens, glabra, ramulis angulatis, phyllodiis falcato-lanceolatis breviter petiolatis opacis bi- vel trinerviis reticulato-venosis prope basin glanduligeris, spicis sessilibus axillaribus geminis cylindræcis densifloris, corolla glabra quadrifida calycem ciliolatum triente superante, germine glabro, leguminibus . . .

In montibus Buffalo Range.

Phyllodia illis *A. longifolia* persimilia ut plurimum 3-4" longa, 8-12" lata, in basin longius quam in apicem angustata. Spicæ 1-1½" longæ odore inamæno, ante florum expansionem bracteolis dense et pulchre squamatae. Bracteolæ peltatæ deltoideo- v. nephroideo-cordatæ obtusæ parce ciliolatæ vix ½" longæ. Calyx late campanulatus puberulus ad medium 4-fidus, lobis semiovatis, fere hyalinis. Corolla ochroleuca, laciniis deltoideis. Stamina sulphurea circiter 1½" longa, corollam triplo superantia.

[Of this I have seen no specimen.—G. B.]

85. ACACIA DELIBRATA (*All. Cunn. ex Benth. in Hook. Lond. Journ. of Bot.* i. p. 374. no. 177). Arborescens, ramulis angulatis glutinosis glabris v. velutinis, phyllodiis subsessilibus lineari-falcatis vel ensiformibus vel rarius abbreviatis angusto-oblongis oblique acuminatis v. cuspidato-apiculatis prominenter 1-3-nerviis glabris v. raro puberulis crebre parallelo-venosis ima basi glanduligeris, spicis brevibus axillaribus solitariis geminisve densis breviter pedunculatis, corolla 5-partita calycem dentatum ciliolatum semisuperante, legumine stipitato chartaceo angusto oblongo compresso marginato dilute fulvo margine undulato, seminibus lucenti-nigris compresso-ovatis strophiole albedo cymbiformi triplo longioribus utrinque insigniter impressis.

Arnhem's Land, No. 28. Head of Seven Emu River, No. 40. Upper Roper, No. 25. Moreton Bay, Moore. Fitzmaurice River, No. 91. Sturt's Creek, No. 92. Victoria River, No. 93.

Frutex 1-2-orgyalis. *Phyllodia* semipedalia v. breviora, raro tantum sesquipollicem longa, 1½-3" lata. Spicæ unciales v. breviores. Legumina 1-3" longa circiter 4" lata, nitidula ad suturas non undulata. Semina sesquilineam longa. *Strophiolium* semel plicatum.

86. *ACACIA OLIGONEURA* (*Ferd. Mueller, MSS.*—*Acacia delibrata, All. Cunn. ex Benth. in Hook. Lond. Journ. of Bot. i. p. 374, var.?*).
 Glabra, ramulis gracilibus angulato-compressis, phyllodiis chartaceis subsessilibus elongatis angusto-lanceolatis acuminatis longe in apicem basinque angustatis leniter curvatis trinerviis reticulato-venosis basi glanduligeris, nervis juxta basin cum margine inferiore confluentibus, glandulis marginalibus nullis, spicis axillaribus solitariis vel fasciculatis brevibus cylindraceutis glabris, pedunculis gracilibus, calyce laxo membranaceo dentato corolla ter brevior, leguminibus

In terra Arnhem's Land prope MacAdam's Range, No. 96; et Victoria River, No. 95.

Phyllodia pleraque 4-6" longa, semunciam lata. *Spicæ* semunciales v. paulo longiores.

[The specimens Nos. 95 and 96 are in young seed, and Cunningham's are out of flower with a loose fruit; but as far as these materials admit of identification, they appear to belong to the same species: the phyllodia are, it is true, longer and not so coriaceous; but so they are in some of Cunningham's specimens. Dr. Mueller's specimen No. 91, from Fitzmaurice River, is exactly like one of Cunningham's, except with rather more coriaceous phyllodia; it is in good fruit, and the pod similar to Cunningham's. The specimens Nos. 71, 90 and 92 from Sturt's Creek, No. 25 from Roper, No. 40 from Seven Emu River, and No. 93 from Lower Victoria River, have still more coriaceous phyllodia, and, in the case of the two last, considerably shorter; but they probably all belong to one species.—G. B.]

87. *ACACIA TORULOSA*, n. sp. (*Acacia julifera, F. Muell. MSS., non Benth.*). Arborescens, ramulis superne angulatis, phyllodiis breviter et crasse petiolatis elongato- v. lineari-falcatis oblique glanduloso-apiculatis v. cuspidatis prominenter 3-5-nerviis crebre parallelo-venosis glabris ima basi glanduligeris, spicis brevibus axillaribus terminalibusque solitariis geminis ternisve densis breviter pedunculatis, calycis profunde partiti segmentis angusto-spathulatis ciliatis puberulis corolla triente brevioribus, *legumine flexuoso toruloso marginato acuminato stipitato inter semina valde contracto.*

Sandy banks of the Nicholson, No. 26. Roper River, No. 23. Gulf of Carpentaria, No. 24.

Frutex elatior. *Phyllodia* et *spicæ* illis *A. delibratæ* similia. *Legumina* 2-4" longa, matura non visa.

[This appears to me to be a good species; the pod is different from any one I am acquainted with in this section. It is not my *A. julifera*, which may perhaps be one of the numerous forms of *A. delibrata*.—G. B.]

88. *ACACIA DORATOXYLON* (*A. Cunn. in Field, N. S. Wales, p. 345?*—*Acacia pachycarpa, n. sp., F. Muell, MSS.*). Glabra, ramulis superne angulatis, phyllodiis brevissime petiolatis lanceolato- v. elon-

gato-linearibus plus minus falcatis recurvo-apiculatis subtrinerviis crebre et tenuissime parallelo-venosis, basi glanduligeris, spicis brevibus axillaribus terminalibusque solitariis geminisve densis breviuscule pedunculatis, *calyce 5-sinuato glabro corolla ter brevior, legumine pallide fusco crasso elongato-oblongo flexuoso indehiscente toruloso marginato apice obtuso basi acuto ad suturas fere recto, seminibus ovato-globosis opacis atris subcompressis minutim albedo-strophiolatis.*

Ad rivum Sturt's Creek Australiæ subcentralis, No. 89.

Arbor, nisi fallor, elata. *Phyllodia* bipollicaria v. fere pedalia, circiter 3" lata. *Corollæ* parvæ. *Legumina* $1\frac{1}{2}$ – $2\frac{1}{2}$ " longa, vix semunciam lata. *Semina* circiter 2" longa, altero latere sæpius valde convexa, altero magis applanata.

Species phyllodiis *Acaciæ drepanocarpæ, juliferæ et delibratæ* similis, legumine autem ample diversa.

[I can see nothing in the phyllodia and flower to distinguish this from the *A. doratoxylon*, A. Cunn., of which the fruit is unknown.—G. B.]

89. *Acacia Leucadendron*, *All. Cunn. ex Benth. in Hook. Lond. Journ. of Bot.* i. p. 374. no. 178.

In montibus Newcastle Range Australiæ orientalis tropicæ, No. 29.

90. *ACACIA CONSPERSA*, n. sp. *Elatior*, erecta, ramis teretibus rachibusque pubescentibus, phyllodiis sessilibus coriaceis parce pulverulentis angusto-lanceolatis tenuicuspido-apiculatis uninerviis creberrime parallelo-venosis supra basin glanduligeris, spicis axillaribus subsessilibus, *leguminibus teretiusculis* leviter compressis coriaceis vix venosis intus continuis breviter stipitatis non marginatis, seminibus ovato-oblongis compressis nitenti-nigris strophiolo plicato albedo aliquoties longioribus lateraliter conspicue areolatis.

In plaga arenoso-petræa prope ortum fluvii Roper et Limmen Bight River, No. 30.

Frutex 5–10'. *Phyllodia* $1\frac{1}{2}$ –3" longa, 3–4" lata, furfure deciduo subtili conspersa. *Rachis* fructifera uncialis v. paulo longior. *Legumina* 2–4" longa, sesquilineam lata dilute fusca extus canescentia. *Semina* sesquilinearia areolis oblongo-linearibus notata.

A. leptocarpæ proxima.

[Differs from *A. leptocarpa* in the pubescent stems, the phyllodia shorter, rather narrow, straighter, and more coriaceous, terminated sometimes by an almost pungent point, although occasionally obtuse or with a terminal gland. The pod is also thicker. It will require more complete specimens to determine how far these differences are specific.—G. B.]

91. *Acacia Cunninghamsi*, *Hook. Icon. Plant.* ii. p. 165. no. 180.

Moreton Bay, *Ferd. Mueller*. Clarence et Richmond River, *C. Moore*.

92. *ACACIA GONOCCLADA*, n. sp. *Erecta*, ramulis robustis pruinosis compresso-triquetris, phyllodiis glabris subglaucis brevissime petiolatis

lanceolato-oblongis leviter curvatis apice obtusis *callo glanduligero terminatis* basi distincte glanduligeris bi- v. trinerviis parallelo-multivenosis, spicis axillaribus solitariis geminisve brevibus cylindraceis breviter pedunculatis, calycibus quinquentatis rachibusque velutinis, *petalis enerviis* glabris calycem semisuperantibus demum liberis obtusiusculis, leguminibus compressis marginatis.

Ad partes superiores fluvii Victorix et in terra Arnhem's Land in rupibus, No. 9.

Frutex paucipedalis strictus. *Phyllodia* $2\frac{1}{2}$ –4" longa, 4–6" lata, tenui-coriacea. *Spicæ* $\frac{1}{2}$ –1" longæ. *Calyces* semilineam paulo excedentes. *Legumina* matura deficient.

Species *A. calyculatæ* et *A. acradeniæ* (*A. umbellatæ*, Cunn.) proxima.

[Allied to *A. Cunninghamii*, and has the same remarkably angular branches; but the phyllodia are much shorter and straighter, and the young pods are different, although it evidently belongs to the same group.—G. B.]

93. ACACIA AMENTIFERA, n. sp. Glabra, ramulis angustatis, *phyllodiis* parvis *fasciculatis* angusto-oblongis obliquis basi angustatis sessilibus apice recurvis brevissime rostellatis (enerviis v.) obscure 1–3-nerviis, glandula marginali venisque nullis, spicis densis axillaribus oblongo-cylindraceis solitariis sessilibus glabris, bracteolis lineari-subulatis stipitatis, petalis lanceolatis solutis *sepala lineari-filiformia libera* triente superantibus, leguminibus

Upper Victoria, No. 74.

Phyllodia 3–5" longa, $\frac{3}{4}$ –1 $\frac{1}{2}$ " lata, exsiccatione rugulosa. *Spicæ* *floriferæ* 3–4" longæ. *Flores* 1" breviores. *Legumina* desunt.

Species distinctissima, *A. Wickhami* consocianda.

[A very distinct species. The phyllodia are small and fasciculate, as in *A. subternata* among *Brunioideæ*, shaped more like some of the narrow-leaved forms of *A. arcuata*, but much smaller, whilst the flowers show an affinity to *A. Wickhami*.—G. B.]

94. *Acacia Wickhami*, *Benth. in Hook. Lond. Journ. of Bot. i. p. 377. no. 187.*

Inter flumina Victoria River et Sturt's Creek, No. 85.

β . *viscidula*, ramulis innovationibusque subviscosis, phyllodiis late et oblique ovatis prominenter plurinerviis. Sturt's Creek.

Calyx glaber leniter sinuatus. *Legumina* non visa, et species igitur incerta.

95. ACACIA WICKHAMI, specimen fructiferum? (*Acacia calligera*, *Muell. MS.*). Glabra, glaucescens, ramulis angulatis, phyllodiis parvis sessilibus oblique ovatis undulatis *callo glanduligero terminatis uninerviis* obscure venosis, spicis densis axillaribus solitariis breviter pedunculatis, legumine viscidulo duro plano oblique striato angustolanceolato ad marginem recto obtuso oblique septato.

Gulf of Carpentaria, No. 38.

Phyllodia tenuicoriacea 2-4''' longa. *Rachis* fructifera fere 1'' longa.

Legumina bipollicaria v. breviora. *Flores et semina* desunt.

[I can see nothing to distinguish this from *A. Wickhami*, except that the specimens are in fruit, all those hitherto described of *A. Wickhami* being in flower only.—G. B.]

96. ACACIA PTYCHOPHYLLA, n. sp. Subglabra, viscidula, ramulis angulatis, phyllodiis coriaceis subsessilibus (fere uncialibus) oblongis obtusis vix curvatis subglanduloso-apiculatis prominenter paralleloque plurinerviis prope v. infra medium obscure glanduligeris, spicis axillaribus solitariis densis cylindraceis breviuscule pedunculatis, calyce 5-partito petalis duplo breviora laciniis obtusis.

Sturt's Creek, No. 3 et 80.

Phyllodia $\frac{3}{4}$ -1 $\frac{1}{2}$ ''' longa, 2-2 $\frac{1}{2}$ ''' lata striata. *Spicæ* floriferæ circiter unciales, pedunculo semunciali. *Legumina* incognita.

A. stigmatophyllæ congrua.

[Differs from *A. stigmatophylla* in its rather shorter thick coriaceous phyllodia, in the viscosity of the young shoots, and the thicker, denser spikes, with larger flowers.—G. B.]

97. ACACIA UMBELLATA (*A. Cunn., Benth. in Hook. Lond. Journ. of Bot.* i. p. 378.—*Acacia acradenia, F. Muell. MSS.*). Elatior, erecta, ramis superne compresso-angulatis, phyllodiis breviter petiolatis coriaceis oblique oblongo- v. ovato-lanceolatis marginatis *callo glanduligero terminatis* plurinerviis parallelo-multivenosis basi indistincte glanduligeris ramisque glabris, nervis prope basin marginis inferi confluentibus, spicis axillaribus et terminalibus solitariis geminis ternisve cylindraceis brevissime pedunculatis phyllodio brevioribus, bracteolis spatulatis unguiculatis, calycibus ad trientem 5-fidis rachibusque velutino-puberulis, corollæ 5-fidæ calycem semisuperantis laciniis acutis carinulatis rigidulis, leguminibus coriaceis teretiusculis leviter curvatis obtusis continuis, seminibus lucenti-nigris ovatis compressis strophiole fulvido triplo breviora præditis.

Ad sinum Gulf of Carpentaria, No. 10. Seven Emu River. Ad originem fluminis Victoriae in plagis sterilioribus, No. 6.

Rami juniores et innovationes sæpe visciduli. *Phyllodia* 2-3'' longa, $\frac{2}{3}$ -1'' lata. *Spicæ* 1 $\frac{1}{2}$ -2'' metientes. *Rachis* glabrescentes. *Calyces* $\frac{1}{2}$ ''' longi. *Legumina* circiter 1 $\frac{1}{2}$ ''' longa, totidem lineas lata. *Semina* sesquilineam metientia.

Species *Acacias* juliferas et dimidiatas conjungens inter illas *A. stigmatophyllæ* proxima, inter dimidiatas venis numerosissimis parallelis nec anastomosantibus distinguenda.

[Cunningham's specimen is very bad, which accounts for the imperfect description which prevented Dr. Mueller from recognizing it. The name is also inappropriate, unless it referred to the character of the tree from which it was gathered.—G. B.]

98. ACACIA AULACOCARPA (*A. Cunn., Benth. in Hook. Lond. Journ. of Bot. i. p. 379.*—*Acacia leptophleba*, n. sp., *F. Mueller, MSS.*). Subglabra, ramulis compresso-angulosis, phyllodiis coriaceis oblongis subfalcatis brevissime petiolatis basi glanduligeris apice obtusis et glanduloso-apiculatis tenuiter trinerviis subtilissime crebroque longitudinaliter venosis, spicis axillaribus pedunculatis solitariis longiuscule cylindraceis, sepalis subliberis oblongis laxis membraneis corolla 5-fida dimidio brevioribus, leguminibus

Ad rivum Sturt's Creek, No. 97.

Phyllodia $1\frac{1}{2}$ – $2\frac{1}{2}$ " longa, 5–8" lata (in unico suppetente specimine).

Spicæ circiter sesquiunciales. *Corollæ* vix 1" longæ. Species *A. gonoclade* proxima.

[The specimens are small and in flower only; but they do not appear to me to be in any point distinguishable from the *A. aulacocarpa*.—G. B.]

99. *Acacia aulacocarpa*, *All. Cunn.*

β. brevifolia (*F. Muell. MSS.*), phyllodiis oblique ovatis 1– $1\frac{1}{2}$ " longis.

Suttor Desert, No. 39.

Legumen fuscum pollicare in stipitem semuncialem sensim contractum.

[Probably a distinct species: the pod is broader, narrowed into a much longer stipes than in Cunningham's specimens, which, however, are not ripe. The phyllodia are very much shorter.—G. B.]

100. *Acacia crassocarpa*, *A. Cunn. ex Benth. in Hook. Lond. Journ. of Bot. i. p. 379. no. 194.*

Point Pearce, No. 94. Victoria River, No. 95.

Paulo recedit a descriptione phyllodiis duplo minoribus. *Legumina* dilute fusca tantum ima basi angustata prominenter venosa, venis transversis plus minusve anastomosantibus. *Semina* obliquo-transverse sita, 2" longa *oblonga* nitentia olivaceo-nigrescentia, strophilolo vix 1" metiente livido prædita.

101. ACACIA MEGALANTHA, n. sp. Glabra, ramulis teretiusculis superne compressis, phyllodiis coriaceis brevissime petiolatis dimidiato-ovatis v. falcato-oblongis obtusiusculis prominenter bi- v. trinerviis crebre parallelo-venosis basi glanduligeris, spicis axillaribus solitariis pedunculatis, floribus magnis remotiusculis glabris subglutinosi, calyce arcto acute 5-dentato petalis crassis triplo brevior, legumine

In deserto Australiæ subcentralis ad rivum Sturt's Creek, No. 98.

Phyllodia $1\frac{1}{2}$ –3" longa, $\frac{2}{3}$ –1" lata. *Spicæ* circiter unciales læte luteæ.

Corollæ sesquilineares.

Haud prætermittere volui speciem ut videtur raram *A. acradeniæ* propinquam, etiamsi e frustulis fructu destitutis pessime circumscribendam.

[Very distinct in the unusually large size of the individual flowers.—G. B.]

102. *ACACIA RETINERVIS* (*Benth. in Lond. Journ. Bot. i. p. 379.*—*Acacia tumida, F. Muell. MSS.*). Arborescens, glabra, ramulis tere-tiusculis, phyllodiis breviter petiolatis oblongo-falcatis basi acutis prominenter plurinerviis creberrime parallelo-venosis glaucescentibus glanduloso-apiculatis, glandula basali parva v. indistincta, spicis axillaribus solitariis geminis ternisve raro subpaniculatis tenuiter cylindraceutis phyllodio multo brevioribus, pedunculo perbreui pubescente, calyce profunde partito velutino corolla dimidio brevior, leguminibus subcylindraceutis torulosis coriaceis arcuatis v. leniter curvatis fuscescentibus intus subcontinuis, seminibus nigrescentibus lucentibus ovatis leniter compressis utrinque conspicue areolatis strophiolo fulvido plicato pluries longioribus.

In locis rupestribus ad flumen Victoriae, ad promontorium Point Pearce, No. 100. Ad rivum Sturt's Creek, No. 99.

Phyllodia 3-5" longa, 8-12" lata. *Spicæ* circiter unciales læte luteæ. *Flores* parvi. *Legumina* breviter stipitata, $1\frac{1}{2}$ -2 $\frac{1}{2}$ " longa, circiter 3" lata, intus septis membranaceis imperfectis oblique percursa. *Semina* circiter 2" longa, areola fuscescente.

A. Cunninghami et quoad legumina *A. acradeniæ* affinis.

[The anastomosing of the smaller veins can scarcely be seen without the help of a glass; and it is not so frequent in the broad-leaved as in the narrow-leaved specimens.—G. B.]

103. *ACACIA STIPULIGERA*, n. sp. Pubescens, ramulis tere-tibus, phyllodiis breviusculis oblique lanceolatis leviter curvatis sessilibus cuspidato-apiculatis prominenter bi- v. trinerviis creberrime anastomosanti-venosis supra basin glanduligeris, *stipulis scariosis deltoideis persistentibus*, spicis axillaribus geminis breviter pedunculatis dense cylindraceutis, bracteolis lanceolatis unguiculatis acuminatis.

Sandstone table-land with scrub at the head of the Victoria River, of Hooker's Creek, and Sturt's Creek.

Frutex 5-8'. *Phyllodia* 1-1 $\frac{1}{2}$ " longa, 3-8" lata, tenuiter venosa. *Stipulæ* fuscæ circiter 1" metientes. *Pedunculi* albo-velutini. Nec flores evolutos nec fructus vidi.

Species probabiliter cum *A. retinervi* concatenata.

[Appears to be a distinct species; but the specimen is very imperfect.—G. B.]

§ 11. *Dimidiatæ.*

104. *Acacia latescens*, *Benth. in Hook. Lond. Journ. of Bot. i. p. 380.* *γ. grandifolia* (var. *dubia*) glabra phyllodiis chartaceis majoribus. In collibus inter flumina Dawson et Burnett, No. 35.

Sepala cohærentia cuneato-lineararia corollæ dimidium æquantia.

[The phyllodia are rather broader than in Cunningham's specimens, with more nerves; but they do not otherwise differ.—G. B.]

105. ACACIA PLATYCARPA, n. sp. Glaberrima, ramulis gracilibus flexuosis apice angulatis subpruinosis, phyllodiis glaucescentibus lanceolato-falcatis dimidiatis chartaceis in petiolum brevem angustatis apice obtusis bi- v. trinerviis crebre reticulato-venosis, nervis basin versus cum margine infero confluentibus, glandulis marginalibus duabus vel tribus, capitulis axillaribus solitariis longiuscule pedunculatis, leguminibus oblongis complanatis glaucis anguste alatis obtusis dense reticulato-venosis inter semina non contractis.

Ad sinum Gulf of Carpentaria, No. 8. Ad flumen Victoriae.

Frutex arborescens. *Phyllodia* 3-4" longa, $\frac{1}{2}$ -1" lata. *Pedunculi* circiter pollicares. *Legumina* 2 $\frac{1}{2}$ -4" longa, circiter 1" lata, prorsus matura ut flores ignota.

[The phyllodia are precisely those of the *A. sericata*, Cunn.; but the minute glaucous down is wanting, and the pods are thinner than the one I described, which I have not now before me to compare.—G. B.]

106. *Acacia holosericea*, *All. Cunn. in G. Don, Gen. Syst.* ii. p. 407, no. 201.

Ad flumen Victoriae alibique in terra Arnhemica, No. 79.

β . *pubescens* spicis interdum geminis. In rupibus secus flumen Victoriae. Ad flumen Roper.

Legumina coriacea cincinnata, extus dense pubescentia, intus continua glabra, inter semina vix contracta. *Semina* nigrescentia sesquilineam longa compressa ovata.

107. ACACIA LIMBATA, n. sp. Glaberrima, ramulis acutangulis glaucis, phyllodiis sessilibus subfalcato-oblongis breviter uncinato-cuspidatis subtrinerviis supra basin crebre reticulato-venosis glandula minuta præditis, nervis basin versus cum margine infero confluentibus, spicis axillaribus solitariis longiuscule pedunculatis, leguminibus duris complanatis angusto-lanceolatis margine crasso cinctis inter semina non contractis pleiospermis venulosis basi sensim angustatis.

In Australia boreali.

Phyllodia 1 $\frac{1}{2}$ -2 $\frac{1}{2}$ " longa, circiter $\frac{1}{2}$ " lata. *Venæ* primariae nervis parallelæ. *Pedunculi* fructiferi recti unciales v. paulo longiores. *Legumen* 1 $\frac{1}{2}$ -2" longum oblique subparallelo-venosum. *Semina* matura deficientia.

[I have not seen the specimens of this plant.—G. B.]

108. *Acacia dimidiata*, *Benth. in Hook. Lond. Journ. of Bot.* i. p. 381, no. 202.

North Australia, No. 11. M'Adam Range, No. 78. Victoria River.

Legumina usque ad 5" longa, vix 3" lata. *Semina* subtetragono-ovata lucenti-nigra fere 3" longa, strophio squalide fulvo fere triplo breviora cupulata.

β . *eristachya*, petalis calycibusque tomentosis.

Victoria River, No. 77.

Variat quoque phyllodiis duplo minoribus subvelutinis, leguminibus viscidulis cano-velutinis.

[The variety β connects the *A. humifusa*, Cunn., with this species as a mere variety.—G. B.]

109. *Acacia latifolia*, Benth. in Hook. Lond. Journ. of Bot. i. p. 382, no. 204.

In plagis elevatis petræis prope originem fluvii Limmen Bight River terræ Arnhemicæ et ad sinum Carpentariæ.

Frutex pauci-pluripedalis. *Legumina* compressa lato-lineararia leviter curvata v. arcuata glabra marginata imperfecte venosa inter semina vix aut leniter contracta pleiosperma $1\frac{1}{2}$ – $2\frac{1}{2}$ " longa, circiter $2\frac{1}{2}$ " lata. *Semina* matura ignota.

Variat phyllodiis conspicue minoribus.

Series II. *Botrycephalæ*.

110. *Acacia polybotrya*, Benth. in Hook. Lond. Journ. of Bot. i. p. 384, no. 209.

Burnett River.

Variat paribus foliolorum usque ad xxv.

111. *Acacia decurrens*, Willd.

Ad flumen Snowy River.

Series III. *Pulchellæ*.

112. *Acacia Mitchelli*, Benth.

Glenelg River. Portland Bay.

113. *ACACIA BASALTICA*, n. sp. Fruticosa, inermis, ramulis teretiusculis petiolis pedunculisque fusco-subvelutinis v. puberulis, stipulis imperfectis, pinnis 1–3-jugis, glandulis jugalibus minutis rotundis sessilibus, petiolarum nullo, foliolis 5–10-jugis oblongo-ovatis puberulis obtusis muticis uninerviis subtus pallidioribus, pedunculis axillaribus solitariis monocephalis folio brevioribus v. subæquilongis, capitulo globoso, calyce breviter dentato corollaque parce puberulis, hac illum dimidio excedente ad trientem divisa, legumine angusto-oblongo venoso breviter stipitato compresso puberulo margine parum flexuoso.

In virgultis planitierum basalticarum Peak Downs, No. 42.

Epidermis ramorum membranacea secedens. *Foliola* $1\frac{1}{2}$ – 3 " longa. *Pedunculi* crassiusculi subangulati, sæpius supra medium bractea minuta præditi. *Legumen* fuscum circiter 3" longum, $\frac{1}{2}$ " latum venosum. *Semina* matura desunt.

[A very distinct species, which may be placed next to *A. nigricans* and *A. Mitchelli*.—G. B.]

Series IV. *Gummiferæ*.

114. ACACIA LENTICELLATA (*F. Muell. MS.*—*Acacia Farnesiana*, *Willd., Benth. in Hook. Lond. Journ. of Bot.* i. p. 494). Fruticosa, ramulis flexuosis glabris crebre lenticulatis vix angulatis, spinis tenuibus rectis, pinnis 1–3-jugis, petiolis rachibus foliolisque ciliolatis, glandula scutellari paris inferi manifesta, paris superi minima v. nulla, rachi decidue mucronata, foliolis 8–16-jugis oblongis v. oblongo-linearibus uninerviis, pedunculis axillaribus solitariis velutinis folio brevioribus apice bracteatis, capitulo globoso, corolla glabra ad quadrantem divisa calycem ciliolatum semisuperante, legumine oblique oblongo-cylindrico turgido spadiceo loculato glabro indehiscente, seminibus horizontalibus ovatis fuscis opacis.

Ad ripas, circum lacunas et in locis tempore pluviali inundatis Australiae borealis centralis et intratropico-orientalis.

A. Farnesiana, *Leich. Overland Exped.*; *Benth. in Mitch. Trop. Austr.* p. 256; *Ferd. Mueller collect.*; an *Willd.*?

Frutex amplus elatior. *Foliola* pleraque $1\frac{1}{2}$ – $2\frac{1}{2}$ " longa. *Legumen* $1\frac{1}{2}$ – $2\frac{1}{2}$ " longum. *Semina* fere 3" metientia.

[The fewer pinnæ and pubescent peduncles in the Australian specimens induced me formerly to doubt whether they really belonged to the *A. Farnesiana*, especially as I had not then seen the fruit, and the specimens generally were bad. But I have since seen both East Indian and South American specimens agreeing precisely with the Australian form, and passing gradually into the commoner Tropical varieties.—G. B.]

115. ACACIA PALLIDA (*F. Muell., non Willd.* quæ *Prosopis* species). Arborea, glabra, ramulis parum angulatis, spinis crassis curvato-divergentibus interdum abolescentibus, pinnis paucis novem-jugis, glandula scutellari inter paria infimum et supremum ovata, foliolis 8–22-jugis oblongis obtusis glaucis venulosis uninerviis, pedunculis axillaribus solitariis monocephalis folio brevioribus angulatis medio bracteatis, capitulo globoso glabro, corolla ad quadrantem divisa calycem argute dentatum fere triplo excedente, legumine angusto-oblongo basi attenuato satis compresso recto lævi nervi, seminibus verticalibus dilute fuscis quadrato-ovatis.

In locis minus fertilibus præsertim campis apricis Australiae intratropicæ non rara, No. 76.

Arbor minor, cortice suberoso sordide cano rugoso et rimoso. *Spine* 2–3" longæ basi valde incrassatæ. *Foliola* $1\frac{1}{2}$ –3" longa, $\frac{1}{2}$ – $1\frac{1}{2}$ " lata. *Capitula* majuscula. *Legumina* 2–4" longa, circiter $\frac{1}{2}$ " lata. *Semina* 3–4" longa nitoris expertia.

A. suberosæ propinqua.

[The specimens marked 76, from Victoria River, are nearly allied to *A. Bidwelli*, but differ in the longer leaflets, the shorter pods, and

some other points. The proper place of *A. Bidwelli* is probably also among *Gummiferae*. I had only seen it in fruit, when the real inflorescence is not always very certain; and I doubted whether the capitula were not sometimes racemose: but most probably they are (as in *A. pallida*) solitary, with the bract in the middle of the peduncle, the scar of which has sometimes the appearance of the scar of a pedicel. Dr. Mueller's specimens, No. 76, are also without spines, and have much more numerous pinnæ than he describes (15 to 20 pairs with leaflets barely 2 lines long). These are, like Bidwell's, in fruit only. There is, however, a flowering specimen of Dr. Mueller's marked 75, from M'Adam's Range, which answers better to his character, and has the stipular spines of *Gummiferae*. In it the pinnæ vary from 3 to 11 pairs, and the leaflets are 3 to 4 lines long. These clearly indicate the affinity of the species with *A. suberosa*, from which it differs in the usually numerous pinnæ and the broader pod. It remains to be proved whether it be specifically distinct from *A. Bidwelli*, which has the leaflets seldom 1 line long, and the pod, although unripe, already above 4 inches, and marked with veins, which may possibly disappear when the pod is ripe. —G. B.]

Contributions to Organographic Botany. By CHRISTOPHER DRESSER, Esq. Communicated by the Secretary.

[Read April 1st, 1858.]

[Abstract.]

MR. DRESSER passes successively under review the scales of the leaf-buds, the bracts, the sepals, the petals, the stamens, and the carpels of plants, with the view of showing that they are not, as usually considered, metamorphosed leaves, but metamorphosed leaf-stalks or petioles.

In support of this view, in relation to the development of leaf-buds, he enters into a detail of the structure of the Horse-chestnut, the Sycamore, the Walnut, the Cherry, the Currant, &c., but admits that in some instances, the Holly for example, the scales are more obviously analogous to the lamina of the leaf. With regard to bracts he instances *Angelica officinalis* and *Salvia fulgens*, in the latter of which he particularly calls attention to certain monster bracts and their venations, as affording clear evidence of their petiolar origin. The cases adduced in proof of a similar origin in the calycine leaves are, first, the abnormal development of one of the sepals in *Mussænda*; secondly, the frequent greater or less development of foliola upon the margins of the sepal in roses, which sepal consequently is to be regarded as equivalent to the

common petiole of the ordinary leaves of the plant; thirdly, the monstrous calyces of the Primrose, figured in Dr. Lindley's 'Elements of Botany' (figs. 147 and 148), in which laminae corresponding with those of the leaves are seen to be developed on the apices of the united sepals; and lastly, the analogy of the ascidia of the Pitcher-plant, which are acknowledged to be petioles and not laminae, with the calyx of the Lavender, in which one of the sepals developes a lamina or lid, which is slightly articulated with the tube of the gamosepalous calyx. In relation to sepals, however, Mr. Dresser thinks it highly improbable that those plants which have sessile leaves should produce petiolar calyces, but believes that the sepals may in these instances be derived either from the true lamina, or from a modification of its midrib. He applies the same reasoning to the origin of the petals; but although admitting the petals to be in some instances representatives of the laminae of the leaves, he thinks it contrary to reason to suppose that this is really their mode of formation in some of those instances in which the petiole and the lamina of the leaf are thought to be most conspicuously manifested in the unguis and limbus of the petal. Thus, for instance, in the Sweet William and the common Pink, in which these two subdivisions of the petal are most distinct, the ordinary leaves are all sessile. His conclusion is, that therefore "on those plants which have sessile leaves we may look for petals formed of the lamina of the leaf or of its midrib, and on those with petiolar leaves for those formed of the petiole."

With regard to stamens, in which the filament is usually regarded as representing the unguis of the petal and the petiole of the leaf, and the anther as analogous to the limb of the petal and the lamina of the leaf, he thinks there exists no good ground for such a supposition. In the transformation of the stamen of the Rose there is no trace to be found of such a distinct origin of its parts; the stamen of the Poppy, in passing into the petaloid condition, is wholly transformed into an exunguiculate petal; and in *Tradescantia Virginica* the anther is evidently a modification of a portion of a petal only, while another portion is transformed into the filament. It is evident therefore, Mr. Dresser thinks, that where petals are petiolar bodies, the entire stamen owes its origin to the petiole alone. So also in relation to carpels, he entirely dissents from the opinion that they are derived from the laminae of the leaves and that the ovules bear the same relation to them as the buds on the margins of the leaves of *Bryophyllum* to the leaves of that plant. The monster carpels of the Columbine, figured

in Dr. Lindley's 'Elements' (fig. 180), he regards as offering a clear indication in their venation of their petiolar origin, and their ovules metamorphosed into leaflets as bearing the same relation to the carpels as the leaflets of a compound leaf to the common petiole from which they arise. This view of the relation of ovules to carpels leads him to propose the following theory of their origin; viz. "that ovules are a metamorphosed state of the leaflets of compound leaves, or of the lobes or parts of simple leaves;" and he concludes his Paper by some observations in which this theory is developed more at length.

Letters on the Vegetation of West Equinoctial Africa. From Dr. FREDERICK WELWITSCH, addressed to W. W. SAUNDERS, Esq., V.P.L.S.

[Read July 1st, 1858.]

S. Paulo de Loanda,
12 Sept., 1857.

MY HIGHLY ESTEEMED FRIEND,—A few days since, I returned from the interior suffering from fever, which for five weeks has daily attacked me. I cannot, however, refrain from sending you a hasty sketch of the extent and success of my botanical rambles in the interior of this wonderful country, with best wishes that these lines may find you and my other London friends in good health.

During the first year of my residence in this country, I endeavoured to investigate the botanical treasures of the coast territory from the Quizembo River north of Ambriz as far as the mouth of the Coanza, which I very nearly succeeded in doing. In October 1854 I ascended by degrees over the lower mountains, which were mostly covered only with *frutices*, to the dark shady region of the mountain forests of Cazenajo and Golungo Alto, where I stayed nearly two years. Everything that reminds you of the flora of the coast and of the lower mountains disappears suddenly as if by magic in this region, whose highest mountain-peaks rise more than 2000 feet. Above 300 different species of trees and more than 400 kinds of climbing plants, closely entwined, form here a most magnificent primeval forest, whose ground is luxuriantly overgrown by more than sixty species of ferns, partly of arborescent forms. Amongst other most remarkable trees I found a *Napoleona* (*ramis verticillatis*), a *Myristacacea* (a noble tree 80 to 100 feet high), twenty-eight species of *Ficus*, some gigantic specimens of a *Na-*

thusia (foliis simplicibus), and also a multitude of species, almost all large trees, of the families *Hypericaceæ*, *Rubiaceæ*, *Bignoniaceæ*, *Verbenaceæ*, *Leguminosæ*, *Mimoseæ*, &c. But what particularly delighted me was the discovery of *Monodora Myristica*, already supposed to be native here by R. Brown, which is a native of all the primeval forests of these districts, and which represents one of the most gigantic and certainly one of the most splendid forest trees of the whole of tropical Africa. Later I found at Pungo Andongo, a second species, specifically different in the leaves and fruit, which I have named *Monodora Angolensis*. I will send many fresh seeds of both to England.

Terrestrial and parasitical Orchids are pretty tolerably abundant. Among the former there is one remarkable species, probably of the genus *Lissochilus*, distinguished by broad leaves nearly 5 feet long; a flower-stem 10 feet to 12 feet high; and particularly by a spike of blossoms often 1½-foot long, bearing twenty to twenty-five large rose-coloured flowers. This is probably the largest and most magnificent of all terrestrial Orchids hitherto discovered. Of this species I have roots ready to be sent to London at the first direct opportunity which offers. To show the gigantic dimensions of this species, I shall send you the dried flower-stem. Generally speaking, the whole vegetation of Golungo Alto has a truly gigantic character, so that there is no room left for the growth of smaller plants, especially annuals, with the exception of some *Gramineæ* and *Cyperaceæ*. An Umbellifer, whose leaves at the same time form one of the most famous remedies of the negroes, occurs in the form of a large tree of 1 foot to 1½ foot in diameter, used as timber; likewise, among the numerous and in most instances woody *Compositæ*, there occur two species as strong lofty trees. Almost all the *Artocarpeæ* which are found here will form quite new and very remarkable genera, but at the same time will show in the clearest light the transition of this family into the *Moreæ* on one side, and the *Urticeæ* on the other. A genus nearly allied to *Dorstenia* grows as a large woody shrub 4 feet high, in general habit like a Fig; but the receptacles are obconic, truncate, and open, just as in *Kosaria*. Also among the *Sapindaceæ* and *Combretaceæ*, and especially among the *Leguminosæ*, many highly interesting new genera are to be found.

The most interesting fact in Phytogeography will be that I have found here a *Begonia*, a *Hypoxis*, an *Ottelia*, a *Gnetacea*, a *Balsaminea*, and two *Cedreleæ*—all families of plants which have not before been met with in tropical Africa. A still more

interesting fact in geographical botany, which has come to my notice, is that a pendent parasitical *Rhopsalis*, often 6 feet to 8 feet long, occurs here, growing abundantly in the elevated woods of this country, particularly luxuriating on *Adansonia* and *Sterculia*, which consequently proves that *Cacti* are not restricted to America, as has hitherto been asserted. I will send living specimens also of this *Rhopsalis*, which I call *Rh. Æthiopica*, to you and Sir William Hooker.

In the whole, I believe I have collected in this wood-region 2000 species of plants, of which I have tried to describe the most remarkable genera, chiefly from living specimens. Farewell.

DR. FRIEDRICH WELWITSCH.

A *Polygalea* occurs as a climber 20 feet to 50 feet high, $\frac{2}{3}$ foot in diameter. I believe it to be a *Lophostylis*, Hochst.

S. Paulo de Loanda, 10th Feb. 1858.

HIGHLY ESTEEMED SIR AND FRIEND,—When I was about to communicate to you last September a preliminary report on some of the results of my journey in the interior of Equinoctial Africa, I was prevented by a long illness from completing my letter, but send it now with these lines, as it contains something important about the vegetation of Golungo Alto and the adjacent mountain district. As I now feel rather better, I take the liberty of continuing today the letter I had then commenced. In the first place, I beg to remark that I have penetrated, in a direct line, about 250 geographical miles into the interior; and I divide the territories I have visited into three regions:—1. Littoral and lower mountain region; 2. Region of the primeval dense forest woods (*Regio montoso-sylvatica*); and, lastly, 3. The flat woody region (*Regio plano-sylvatica*). The first region rises to about 1000 feet, the second to about 2500, the third about 3300 feet. I have taken the measurement of the heights of these regions, but have not yet made an exact computation of the results, and therefore note the heights as given above only as temporary. These three regions extend from west to east in such a way that the first stretches towards the east as far as 80 geographical miles, the second to about 160, and the third to somewhere about 250. Regarding the vegetation of the littoral region, which is almost the same from Sierra Leone to the mouth of the Cuanza, there have been many important facts already published in the 'Niger Flora' of Sir W. Hooker. With regard to the second region,

which comprises the districts of Golungo Alto and Cazengo, together with Dembos, and partly also Ambaca, I have reported cursorily in my letter of the 12th September, 1857, and consequently I have only to tell you something about the third and most interesting region. Pungo Andongo (more correctly "Pungo ià N'dongo") forms the centre of this region, which, as you will quickly perceive from the little I am going to tell about it, forms an African district of vegetation of its own, which I shall call the kingdom of the Equinoctial African highlands. About fifteen to twenty geographical miles from Golungo Alto towards the east, the majestic dark shady woods of this district, which are so difficult to penetrate on account of the immense climbers, disappear; the forests in general become more rare and less dense, and are mostly formed by low trees, among which the most common is a new genus of *Araliaceæ*, with a most curious habit. The ground everywhere is now less shaded, on which account a greater number of smaller kinds of plants occur, especially *Convolvulaceæ* and splendid *Acanthaceæ*. New forms, never seen in the primeval forests of the second region, now make their appearance, among which are, especially, *Amorphophallus*, a magnificent climbing *Bauhinia*, small pretty *Compositæ*, the *Ancylanthus rubiginosus*, Desf., and an extremely pretty fruticose *Rubiaceæ*, which at first sight looks exactly like an *Azalea*!! Where the ground changes to mountains or higher hills, there occur *Sterculiea foliis glaucis*, *Nathusia foliis indivisis* (which have not appeared before), and a considerable number of *Compositæ*, all more or less related to *Sonchus*, as well as a few species of *Helichrysum*, which remind you already of the Cape flora. There now become mixed with the forest trees *Büttneriaceæ* with bunches of large white flowers; pretty *Rubiaceæ* and *Tiliaceæ* (among others an herbaceous *Grewia*) are more and more frequent; and a kind of *Thesium* (*Santalaceæ*) tells again of the Cape flora: but, far surpassing all other herbaceous plants, in splendour, size, and richness of blossoms, appears prominently in all the less dense places of the wood a *Sesamum*, which, as I have collected many seeds of it, will soon become an ornament of European gardens. As we approach the rocky scenery of the præsidia of Pungo Andongo, the forests of *Araliaceæ* occur alternately with forests of *Pterocarpus*; and all at once quite a new world of plants, a new geographical kingdom, starts before the eye. The ground is everywhere rocky, grown over with short grasses and *Cyperaceæ*; but in the many narrow ravines the most luxuriant forest-vegetation

abounds, consisting chiefly of *Leguminosæ*; *Ficus*; three species of *Nathusia*; *Apocynæ*, forming trees with large blossoms; *Mimosæ*, sometimes as trees, sometimes as climbers; several Asiatic *Rubiaceæ* in the form of trees (e. g. *Hymenodictyon*, Wallich); and a stately new *Monodora* (*M. angolensis*, mihi). At the foot of the rocks, and along the many little brooks, grow seven species of *Ophioglossum*, three *Schizææ*, and many Ferns, partly gold-dusted, and a magnificent tree-fern. Under these woody ferns (*Cyathea*, spec.) are found four or five *Umbelliferæ* and several curious *Rubiaceæ*. On the almost naked rocks grow fleshy *Euphorbiaceæ*; about ten species of *Commelynæ*, with the habits of *Mesembryanthemum*, besides beautiful *Portulacææ*, *Tillææ* (!), *Cyperaceæ leucocephala*; and in the brooks themselves two species of *Podostomeæ*, together with pretty *Batrachospermeæ* and *Zygnemata*. In stagnant water appear *Ottelia*, *Nymphæa*, and two *Aponogtoneæ* with blue blossoms, probably new genera. In wet meadows there occur six species of *Utricularia*, a *Drosera*, several *Campanulacææ* (*Lightfootia*), an *Isoëtes* (*terrestris*), and a great number of small *Scrophulariaceæ* and *Leguminosæ*, as well as a kind of *Erigeron*. But now, on the steep walls of the higher rocks, what sort of viscid shrubs with scaly stems and blue flowers do we perceive? Two species of *Vellosiææ*! which, in conjunction with several fruticose Orchids that grow even on the barest rocks, cover all the mountains of Pungo Andongo. However, the before-named plants are not the only American guests of this territory. As soon as one approaches the summits (*juga altiora rupium*) of the rocky mountains, one finds the sides of the top overgrown with *Heurnia* and *Sarcostemma* (which announce the Cape of Good Hope), together with a *Cactus*, which is a RHIPSALIS; whilst on rough places there appear a *Musa* (scapo ventricosus! sæpius diametr. 5–6-ped.), a *Diploclinium* (*Begoniaceæ*) and *Erythroxyllum*, spec.

But notwithstanding these curiosities, so frequently paradoxical, the splendour and variety of the flora of Pungo Andongo is not nearly exhausted. About a hundred species of pretty *Cyperaceæ* (*Cyperus*, fifty spec.), and above a hundred *Gramineæ*, in connexion with very pretty *Polygalacææ* and *Ampelideæ*, adorn the lower plains; and whilst from the coast up to the boundary of this region I scarcely met with ten *Liliaceæ*, I was surprised to find around Pungo Andongo more than fifty species! Four spec. *Hypoxis*, above twenty-five *Orchideæ* (among them a *Disa*!) and *Commelynacææ* occur in such abundance, that the whole of large

regions appears at one time pink, at another time sky-blue. A large *Kniphofia*, of 6 to 8 feet, is the queen of the lilies, whilst several new genera allied to *Anthericum* and *Scilla*, together with *Chlorophytum*, *Sansevieria*, and pretty *Asparagineæ*, form as it were the underwood of the lilies. One *Tacca* and two *Hæmanthi*, together with *Crinum* and a small-flowered *Narcissea*, adorn the skirts of the forests, besides a countless number of little *Rubiaceæ*, with sky-blue or rose-coloured flowers. Species of *Hibiscus* appear everywhere. The *Violariaæ* are represented by three *Ceranthæ* in the form of small trees (one with the habit of *Ilex aquifolium*!). A *Myricacea*, with an extremely delicious powerful smell, forms quite a new genus, which is only related to *Comptonia* in the formation of the anthers; but it has, like no other *Myricacea*, opposite leaves. I have described it as *Myrothamnus flabellifolius*. *Pistia* and *Ceratophyllum*, with an *Azolla* and a *Marsileacea*, abound in the fresh water with *Polygonaceæ* and *Scirpoideæ*, accompanied almost everywhere by two or three species of *Nymphæa* (*Nymphæa Lotus*, P. de B.), whilst a *Ruppia* (similar to *R. maritima*) and several *Charæ* fill the stagnant water. Among the climbers are two species of *Hugonia*, a 5-gonous *Mimosa*, and several species of *Strophanthus*. Among others *Asclepiadeæ* are also numerous, and mostly climbers. Also an *Oleacea* occurs as a large tree; and tree-like *Euphorbiaceæ* (*Bridelia*, &c.) are found everywhere. The *Daphnoideæ* are represented by a very pretty scarlet *Gnidia*, the *Proteaceæ* by two thickheaded *Proteæ*. *Labiataæ* and *Verbenaceæ* are in great abundance everywhere; the latter and several *Acanthaceæ* mostly assume the forms of trees or shrubs. *Loranthaceæ* glitter frequently from out the dark-leaved tops of the *Combretaceæ* and *Anonaceæ*; but they occur also on *Mimoseæ*, and (in spite of De Candolle's assertion) very frequently on fig trees, even on the cultivated *Ficus Carica*. *Celastrinæ*, *Hippocrateaceæ*, and *Chailletieæ* are not numerous. Of *Myrtaceæ* were observed ten, of *Melastomeæ* only thirteen species, of *Connaraceæ* eight, of *Lythraceæ* ten or twelve species, of *Ranunculaceæ* I have five species of *Clematis*; of *Rosaceæ* I have found only one *Rubus* (*apetalus*). A *Cochlospermum*, as a tolerably large tree, is to be met with everywhere; besides, I have to enumerate five *Piperaceæ* and two *Dorstenieæ*, among which occurs a *Kosaria*. These all appear to be new species. The *Scrophulariaceæ*, of which there are about thirty species, principally adorn the meadows where they grow, with four species of *Eriospermum* (*Liliaceæ*), with several species

of *Anthericaceæ*, *Drosera*, *Disa*, *Corchorus*, and *Triumfetta*. I have also found in the marshes quite a new and highly interesting Monocotyledonous family represented by five species, which in its characters somewhat resembles *Centrolepidæ*. I am firmly convinced that this new family will be received by all phytologists as quite original, and will be considered as a contribution to the filling up of the vacancies which exist to this day between the true *Cyperaceæ* and the *Enantioblastæ*. Not less variety is found in the Cryptogamic Flora of Pungo Andongo, among which particularly the *Fungi* are remarkable. *Polyporoideæ*, *Agaricoideæ*, and *Sphæriaceæ* are extremely numerous, in beautiful forms and bright colours. I have observed about 300 species; and of most of them I have collected illustrative specimens, which now all lie safely in my English Herbarium. Among the *Algæ* are especially to be noticed many sorts of *Scytonema*, which here compose, as the *Sphagna* do in Europe, the swampy ground for the so-called peat plants (*plantæ turfosæ*), and in whose thickly-matted turf *Droseræ*, *Utriculariæ*, a kind of *Xyris*, and many *Hepaticæ* and *Musci* usually take root. Of *Musci* there were in all about eighty species, of *Lichenes* above a hundred; of *Filices*, on the whole and including the insulares, nearly a hundred species, among which are two *Filices arboreæ*, two *Platyceria*, two *Lycopodia*, three *Hymenophylla*, one *Marattia*, one *Gleichenia*, &c. There are rarely met with more than six kinds of *Lycopodia*, for the most part extremely pretty *Selaginellæ*. I must also remark, with regard to the *Algæ*, that two *Rhodophyceæ*, namely, two *Hildenbrandiæ*, are found in the brooks between Golungo Alto and Pungo Andongo, and indeed in such abundance, that certain parts of the brooks assume a blood-colour or purple dye.

The haste with which I have been compelled to compile this letter will be in some degree an excuse for the confusion which would necessarily follow in enumerating the different families, as I have mentioned them only just as they presented themselves one by one to my memory. However, I permit myself to express the hope that this enumeration, although rather confused, will at least be sufficient to give a general idea of the riches and variety of the flora of the interior of Africa. As soon as I have put my herbarium in better order, and have arranged, in a preliminary way, those plants which can only be determined in Europe, I intend to give a general summary of all the plants which I have observed on the continent and the adjacent islands, together with indications relative to their propagation and distribution. As regards

the collection of insects I have made in Africa (among which the *Coleoptera* especially are very numerous, and also the *Hymenoptera* not unfrequent), I have communicated to Mr. S. Stevens some general remarks. With regard to the wishes of Mr. D. Hanbury, I may remark that I have collected about eighteen species of *Scitamineæ*; but from want of time I have made no drawings of their flowers, for I am a very bad and slow draughtsman: however, most of the species are very tolerably preserved, even as regards the flowers and fruit. Pray remember me kindly to Sir W. Hooker and R. Brown. I have been much pleased to find, even in the place itself, almost all the prophecies confirmed which R. Brown pronounced in his celebrated Appendix to Tuckey's Travels: this appendix was my gospel. It is very true, that I could have worked more effectually during my long stay in equinoctial Africa, if I had not had to fight again and again with fever, scurvy, and dysentery, which is in some degree but natural; for I had to penetrate the densest woods, to examine the deepest ravines, and to wander for miles slowly under a burning sun through marshy land, whilst common travellers are moved along, lying comfortably in hammocks, only on roads. (*Sapienti sat!*)

With the assurance of my greatest esteem and gratitude, I remain your most obedient,

DR. FRIEDRICH WELWITSCH.

Dennisonia, Barklya, et Laboucheia; genera floræ Australiæ nondum cognita. Descripsit Dr. FERD. MUELLER, S.L.S., etc.

[Read Jan. 20, 1859.]

DENNISONIA, n. g. VERBENACEARUM.

Calyx subcampanulatus, quinquefidus. *Corolla bilabiata*; labio supero brevior bifido; labii inferi tripartiti lacinia media majore; tubo cylindræo subincluso intus barbato. *Stamina* quatuor didynamia, omnia fertilia, infra faucem corollæ inserta, emergentia. *Antheræ* biloculares inter loculos affixæ, loculis ovatis divergentibus rima longitudinali hiantibus. *Stylus* filiformis apice breviter bifidus, cruribus acutis. *Drupa exsucca* nucamentacea, obovata, calyce inclusa, dipyræna, basi perforata, pyrenis bilocularibus arete cohærentibus. *Semina* in loculis solitaria, erecta, parce albuminosa. *Radicula* brevis infera.

Frutex Australiæ borealis concinnus, glandulosus, pube ramosa articulata vestitus; *foliis verticillato-ternis* acute ovatis sessilibus serratis; *floribus axillaribus solitariis* bibracteolatis breviter pedunculatis, corollis roseis coccineo-venosis.

Genus habitu eximium, characteribus autem *Newcasteliae* et praesertim *Pityrodiæ* valde cognatum, cum summa veneratione et gratissimo animo dicavi viro præillustriissimo Guiljelmo Dennison ordinis balnei equiti, coloniarum Australiæ gubernatori, scientiarum artiumque hinc elato patrono et cultori, qui ad perlustrationem Australiæ intra-tropicæ phytologicam benignissime mihi obtulit facultatem.

Dennisonia ternifolia.

In rupibus originem versus fluviorum M^cArthur et Seven-Emu River ad sinum Carpentaria Gulf.

BARKLYA, n. g. CÆSALPINEARUM*.

Calyx ebracteolatus campanulatus breviter 5-dentatus; dentibus æqualibus v. summis minoribus. *Petala* 5 subæqualia obovato- v. orbiculari-spathulata longe et tenuiter unguiculata æstivatione imbricata uno ex infernis exteriore? *Stamina* 10, omnia fertilia breviter exserta cum petalis *basi calycis affixa*, libera, alterna paullo breviora. *Antheræ* sagittatæ versatiles eglandulosæ, loculis longitudinaliter dehiscentibus. *Ovarium* stipitatum, 3-4-ovulatum, glabrum. *Stylus* brevis filiformis. *Stigma* minutum truncatum. *Legumen* stipitatum compressum glabrum reticulato-venosum oligospermum, isthmis cellulosis imperfecte loculatum. *Valvæ* oblongo- v. ovato-lanceolatæ chartaceæ. *Semina* albuminosa compressa oblique ovata hinc truncata. *Strophium* nullum. *Cotyledones* rectæ planæ. *Radicula* brevis arcuato-incumbens hilo proxima.

Arbor Australiæ orientalis subtropicæ admodum venusta; *foliis* coriaceis *simplicibus* cordatis palmatinerviis; *racemis* elongatis conferte multifloris; *pedicellis* solitariis; *petalis* aureis.

Genus *Moræ* forsân propinquum gratissima mente et summa observantia dicatum viro excellentissimo Henrico Barkly, ordinis balnei equiti, coloniæ Victoriæ gubernatori, scientiarum fautori prænobilissimo.

Barklya syringifolia.

In sylvis ad flumen Pine River detexit amiciss. et clariss. W. Hill.

LABOUCHERIA, n. g. MIMOSEARUM.

Flores hermaphroditi regulares. *Calyx* infundibulari-campanulatus quinquedentatus. *Petala* 5 libera spathulato-ovata æqualia. *Stamina* decem libera glabra breviter exserta, omnia fertilia cum petalis infra faucem calycis inserta. *Antheræ* ovatæ introrsæ dorsifixæ biloculares, loculis rima longitudinali dehiscentibus, *connectivo* apice compresso *semiorbiculariter producto*. *Germen* dense pubescens. *Stylus* crassus brevissimus glaber. *Stigma* minutum concavum.

* The specimens are not sufficient to make out the æstivation of the corolla satisfactorily; but it appears to me, that one of the lower petals is the external one: the habit and other characters in the flower are those of *Cæsalpineæ*, of the subtribe *Cynometræ*; whilst the incurved radicle would place it in the *Sophoræ*, where I know of no genus at all allied to it.—G. B.

Legumen oblongum continuum bivalve plano-compressum oligospermum. *Semina* rotunda compressa strophiolata.

Arbor Australiæ intertrôpicæ inermis; *foliis* abrupte bipinnatis bijugis, pinnis paucijugis; *racemis* lateralibus et axillaribus spiciformibus; *petalis* parvis virentibus.

Genus *Adenanthère* proximum maxima cum pietate tributum præclaro Henrico Labouchere, rerum ad colonias spectantium summo ministro, sub cujus auspiciis alteram expeditionis Gregorianæ partem fauste perduximus.

Laboucheria chlorostachya.

A plagis boreali-occidentalibus Australiæ usque ad flumen Burdekin tractus orientalis, tam in solo fertiliore quam steriliore planitierum montiumque satis frequenter obvia.

Illa arbor infelicissimo nostro Leichhardtio "Leguminous Iron-bark tree" nuncupata huc pertinet.

Dabam ex horto botanico Sydneyano, idibus Martii 1857.

Note on the Morphology of the *Balsaminaceæ*.

By Prof. HENFREY, F.R.S., F.L.S.

[Read Dec. 2, 1858.]

THE different theories which have been proposed to explain the irregular character of the flower of *Impatiens* are briefly enumerated in Lindley's 'Vegetable Kingdom' (p. 490), where the view of Kunth is adopted, namely, that the organ standing on the opposite side of the flower to the spurred sepal consists of two confluent sepals, which, with the spurred sepal and the two small lateral sepals, make up a 5-leaved calyx; while in the next circle a petal is suppressed which should stand before the line of junction of the two confluent sepals. An apparently accidental confusion exists, however, in the description of the flower of *Balsaminaceæ* given by Dr. Lindley: the spurred sepal is correctly stated to stand next the axis of inflorescence (posterior); nevertheless the supposed "double sepal" on the opposite side of the flower is called "dorsal" and "back-piece," notwithstanding that it stands in front within the subtending bract. This *lapsus* is rendered more serious by the woodcut of the diagram of the flower of *Impatiens* being reversed, so as to show the spurred sepal in front.

Kunth's view, supported by Walker-Arnott, and adopted by Lindley, was, we think, sufficiently refuted by Røeper (Linnæa,

ix. p. 112), from the consideration of the structure of the genus *Hydrocera*. Through the kindness of Dr. Hooker, I have seen further observations by himself and Dr. Thomson, which not only confirm Røeper's view, in reference to *Hydrocera*, but illustrate it further by certain East Indian species of *Impatiens*, in which the number of sepals is either regularly or occasionally the same as in *Hydrocera*. In this genus the calyx has five sepals: first, the posterior spurred sepal; next, two lateral sepals, corresponding to the two small and usually green sepals of *Impatiens Balsamina*; with two anterior sepals, which are mostly suppressed in *Impatiens*. Within this circle occurs a whorl of five petals, the anterior one being the so-called "double sepal" of Kunth, which is *inside* the two anterior sepals just referred to.

Payer (*Traité d'Organogénie végétale*) states that he finds the rudiments of this pair of anterior sepals on very young buds of *Impatiens Royleana*. I have not been able to find them in the Garden Balsam, nor in a developed state in the numerous monstrous specimens which I have examined. On the other hand, the monstrosity presently to be described favours the doctrine of Røeper far more than that of Kunth. In order to explain it more clearly, I have appended diagrams of the normal structure of *Impatiens* and *Hydrocera* (figs. 1 and 2).

It is a well-known fact that the common Double Balsams of our gardens produce seed freely. Since only one circle of stamens exists, we should scarcely have expected this; but the fact is that an extra corolline whorl is produced without the suppression of the stamens, and the metamorphosis takes place in a manner which bears an interesting relation to certain general questions of morphology, as well as to the theory of the flower of *Impatiens*. In the common Double Balsams of our gardens the flowers usually present a natural calyx, the small lateral sepals being often more or less coloured, and sometimes gibbous or slightly spurred; I have never found the two anterior (suppressed) sepals developed. Within the calyx stand five petals (a broad anterior one and two pairs of lateral petals), which are, as usual, mostly more or less adherent by their limbs on each side, but with their claws free. Succeeding these are found five free petals resembling in appearance the lateral petals of the previous whorl, standing in the usual place of the stamens—that is, alternating with the normal petals, as shown in the diagram (fig. 3). Next comes a circle of five stamens, mostly all perfect, alternating with the preceding circle, and therefore in the ordinary place of the carpels. Lastly, the

five-celled ovary has its carpels alternating with the stamens so that the odd one is necessarily posterior instead of anterior, as in the normal condition.

Here therefore we have a case of "doubling" distinctly referable to an absolute increase in the number of whorls of organs; for the regular alternation of the organs of successive whorls, both in the normal and monstrous forms of the same flower, precludes the idea of any development of usually suppressed organs, and of any *dédoublement* or *chorisis*, to which recourse is had, perhaps too frequently, for the explanation of double flowers.

Such multiplication of whorls doubtless occurs to a considerable extent in cultivated plants, especially in genera with few stamens and carpels. In the double Daffodil there are found forty or fifty petaloid organs, while the flower naturally contains only fifteen organs; and each piece exhibits a more or less perfect lobe at the junction of the claw and limb, showing that there is no *chorisis* causing the separate development of the coronal lobes.

In most cases of doubling we find more or less of the organs abnormally developed, rendering the conditions somewhat obscure; but in these Balsams the circles are formed of perfectly natural structures; and there is a point of physiological interest in the throwing forward of the functions consequent upon the conversion of the organs. The stamens are replaced by petals, the carpels by stamens; and an additional whorl of carpels is produced at the summit of the axis. Generally speaking, the stamens are well-developed; but now and then one or two are found sterile, or surmounted by small petaloid lobes.

These monsters are more favourable to Rœper's than to Kunth's view; for, if what we regard as the anterior petal were a "double sepal," we should expect to find a petal developed within it, opposite its commissure, which was never the case in any of the very numerous specimens examined.

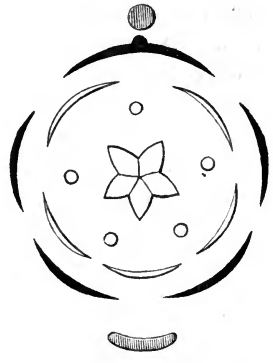
Somewhat related to the above metamorphoses are the conditions described by Al. Braun in *Delphinium* (Pringsheim's *Jahrb. f. Wiss. Bot.* 1857, i. 206). In that genus the stamens and carpels are members of a continuous spiral series, not of successive whorls. In *D. cardiopetalum* the spiral is (approximately) $\frac{2}{3}$; so that the 9th organ is opposite the 1st, &c. In cases where 16 stamens were found, the first carpel, being the 17th organ of the series, stood opposite stamens No. 9 and No. 1; the second carpel (18th organ) was opposite stamen 10, &c. (fig. 4). In another case 18 stamens were developed before the carpels appeared, in which case

Fig. 1.



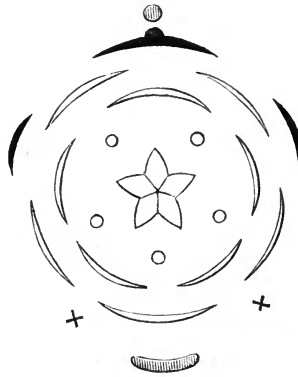
Impatiens Balsamina.

Fig. 2.



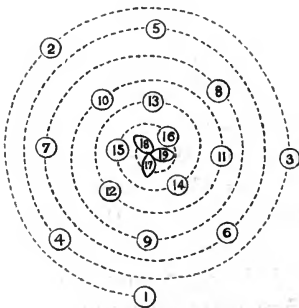
Hydrocera triflora.

Fig. 3.



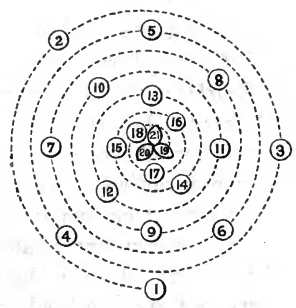
Double Garden Balsam.

Fig. 4.



Delphinium cardiopetalum
(16 stamens and 3 carpels).

Fig. 5.



Delphinium cardiopetalum
(18 stamens and 3 carpels).

the first carpel (organ 19) stood opposite stamen No. 11; the second carpel (organ 20) opposite stamen No. 12; and the third opposite No. 13 (fig. 5). This advance of the stamens, driving forward the carpels, is still more clearly seen when only one carpel exists, since this then stands, according to circumstances, in an anterior, lateral, or posterior place. These conditions seem exactly comparable with the advance of the stamens in an entire whorl, and the production of a new whorl of carpels, such as I have described in the double Balsam.

On the Arborescent Ferns of New Zealand. By THOMAS SHEARMAN RALPH, Esq., A.L.S.

[Read Dec. 2, 1858.]

THINKING that some observations on the Arborescent Ferns of New Zealand may interest the members of the Society, I have thrown them into the form of a paper; and I have also forwarded specimens to illustrate the various points which I think are either unnoticed or are most worthy of remark.

Of the four species of *Cyathea* described in Dr. J. D. Hooker's 'Flora of New Zealand,' the most prominent one is the *C. dealbata*, or Silver Fern, known by its straight upright stem and white fronds. It is by far the commonest species, and grows in all situations, from the stream in the bottom of the gully to the very tops of the highest hills (in the south part of the north island), where perhaps it is more inclined to form groups.

C. medullaris, or Black Fern, can be recognized in the early stage, before it has made much stem, by the very long fronds mounted on long black stipes, rising almost perpendicularly upwards, while its greater height and more solid appearance of stem mark it out at an older stage.

C. Cunninghamsi is scarce, and likely to be often passed over as *C. Smithii* in the dark recesses of the gullies in which it chiefly delights to shelter itself; but it may, after some acquaintance, be picked out of the crowd at a little distance. When very young, its stem is entirely covered with the remains of the black bases of the stipites, from which the dead fronds dangle all the way up, giving it a very untidy and ragged appearance. The darker hue of its fronds, which in the older state of the plant are as many as thirty or forty in a head, and form a funnel-shaped crown, serves also to distinguish this species from—

C. Smithii, whose delicate spreading fronds of brighter green are mounted on a stem which is furnished with a wiry fibrous structure, and whose top is adorned (?) with the remains of the stipites of dead fronds, hanging closely to the stem, from sixty to seventy in number, but all *divested* of the pinnæ. This is what may be seen in the bush when uninjured by the action of violent winds. Thus much for a glance at these species; a more detailed account I now give, from investigations carried on uninterruptedly during three months.

C. dealbata (White or Silver Fern) presents two or perhaps three forms; but the characters are scarcely marked enough to make out so many varieties. One state of the fern is marked by the frond being furnished with sori well within the margin, thus giving the appearance of a broader pinna, &c.; another form appears to be characterized by a more delicate frond; while a third is a coarse or hard-fronded form, with a yellowish hue along the upper side of the main and partial rachis, and which is perceptible at a distance—the pinnules are also inclined to curl inwards at the margins: this may be termed the full-fruited form, as the sori are very abundant.

No decided character can be drawn from the persistence of the bases of the dead fronds. I have seen these stipital remains covering a stem (of *C. dealbata*) from top to bottom, in others halfway up, in some on one side only; seldom, however, is the stem entirely bare, but a wiry fibrous structure (aerial rootlets) issues out and covers it more completely. When this tree-fern has attained some size, the base gradually enlarges by the addition of these fibres, till it reaches perhaps a foot and a half in diameter. The greatest height to which it seems to attain is about 24 feet. The fronds vary from 8 feet to 12 feet in length and from 2 feet to 3 feet in breadth, and they spring out nearly horizontally from the crown.

Although the fronds are so beautifully white underneath, it is almost impossible at times, even in open places, to be sure one sees a white-fronded fern; but a blow from a stick or a wave of the wind is necessary, to turn but a little portion of the frond, in order to satisfy the observer that it is white beneath.

C. medullaris (Mamaku, or Mamagu of the natives, Black Fern of the settlers).—This fern may be recognized at a very early stage of its growth, and before any trunk has been developed, by the general form and texture of the young frond. The main rachis is usually of a very dark-brown or black colour. When it has formed a stem, it will be observed that these black stipites are

closely pressed to its sides and spring upwards nearly straight and almost parallel with the direction of the stem, till the first or lower pinnæ are produced, even to a distance of five, six, or more feet; from this point the frond springs outwards, and, carrying its breadth well up into the air, brings its apex out a little below the body of the frond. The rachis is rough to the touch, and rounded in form, with a perceptible channel or mid-groove commencing some distance above the base. [A portion of the rachis cut off here, for three feet or more, has very much the appearance of a double-barreled gun, from the groove and the dark colour.] Lower pinnæ alternate, ascending nearly at right angles with the rachis, while the succeeding ones gradually assume the horizontal direction (from the rachis). Fronds coriaceous, usually of a bright shining green above, paler beneath, 6-9 springing out at once, and at this stage of its growth appearing to be rather brittle.

When this fern has made a stem of ten feet or more, it will be noticed that the stem is ragged, from the remains of the fallen fronds, the stipites of which, often empty of cellular matter, hang merely by the internal fibres and outer black shell-like covering. When these last have decayed away, the fibres in connexion with the scars on the stem still stand out like so many dried-up grassy tufts. Should the stem at this time begin to form its dense, matted, granular addition, which it puts on sooner or later, and by which the stem is greatly increased in diameter up to a variable height, then these persistent fibres occasion the additional growth to protrude over them, thus making this portion of the stem appear more knobbed than it otherwise would do. As this fern usually grows on the side of a gully, and generally on one side of it in preference to the other, this additional growth is always greater in thickness towards the centre of the gully and away from the bank, and gives the lower part of the stem a kind of rough-triangular form. This growth sometimes attains a girth of six or seven feet, extending in a gradually lessening deposit upwards to a height of perhaps ten or more feet from the ground.

This is a provision of nature applied to the weaker side of the stem, occasioned by the damp and moisture trickling down the stem, and provides a firm buttress to the lofty rise of the stem, which sometimes attains a height of forty or fifty feet, and even, as it is said, of eighty. The trunk seldom rises straight up, but takes a bend or stoop, and always towards the gully, as if it experienced a great weight of fronds; and having formed this additional prop, it

seems to recover strength and determination to ascend more straightly than before.

It is to be observed that as the stem attains a height of ten feet, or thereabouts, the stipites become shorter, or, in other words, the pinnæ are set closer to the base of the stipites—but these last still continue close-pressed to the stem,—that the black colour above is replaced by a yellowish green, and greater asperities make their appearance beneath, and are extended now all the way up the rachis. The rachis in its outline is altered from the rounded to a flattened form; and as it springs from the stem, it assumes a gentle curve, so as to bring the frond to a horizontal position. The fronds are now seldom more than twelve feet in length, and of such a weight as to require considerable effort to raise them off the ground by one end in order to shoulder them, when one may be readily carried. At this more mature stage of growth, the fronds, when fully ripened, decay somewhere about six inches from their insertion into the stem, and no doubt suddenly fall from their horizontal position to a pendent one, and remain suspended perhaps during the greater part of the winter, giving a majestic tree fern the appearance of wearing a clothing of matting, much like a native chief. These fronds ultimately fall off, and leave the stem almost bare, so as to show the scars. This fern is seldom beset by climbing plants,—a circumstance possibly due to the long persistence of the stipital remains.

If the stem of *C. medullaris*, of a height varying from 20 to 40 feet, be examined, the following will be the features it will present. A large, rough, black, triangular-shaped buttress tapering upwards to 6 or 8 feet, when the original stem will most likely be seen marked with elliptical-shaped scars of 6 or 8 inches in length and about 3 in width. As the eye is carried higher up, these scars will be seen to be set closer together, and to become altered in form; and at a height of 20 feet and upwards, they become nearly hexagonal, and very regularly placed; so that six of them occupy the circumference, while the six above and those below alternate with them. The woody matter at this part is very hard and heavy with sap.

I have counted about 34 or 36 fronds in full vigour in one crown at one time; and, supposing that a circle of fronds attain their full growth and live only six months, it will be seen that these ferns are slow growers.

The linear form of the scars below accords with the brittle nature of the rachis and their mode of intortion, by which a great

amount of weight is taken off from the young and soft stem,—while the advanced stage of growth is marked by the addition of a buttress, more closely-placed scars, harder woody structure, and heavy *horizontally*-placed fronds. I feel almost certain that the different appearance of the young- and the older-formed fronds has given rise to the idea of two species, not only in these islands, but also, in some descriptions, in other places.

I now come to the other two *Cyatheas*; namely, *C. Cunninghamii* and *C. Smithii*. I have found considerable difficulty in making out these two species even when accompanied with plates and descriptions.

C. Cunninghamii, or Warty *Cyathea*, as I have called it for distinction.—This fern is seldom met with, except in the vicinity of streams in the bush; and where this is cleared away, I think it ceases to increase. It appears to me to be less able to resist exposure than either of those already described. It attains a height of 20 feet, or perhaps more, and forms a basal fibrous structure, much resembling that of *C. dealbata*, which extends about 5 feet up. The stem is characterized by the remains of the black persistent bases of the stipites, which are mostly close-pressed to the stem for a foot or more; and these, being hollow from decay of the cellular substance, often contain plenty of water, and give the stem, which is comparatively slender, a ragged, untidy appearance. The young fronds, or rather as they emerge from the fern, are fully charged with scales, which, on the main rachis, appear to me to point towards the base, and not upwards to the apex, of the frond. The fronds are heavier than in *C. Smithii*, and appear from 20 to 30 in a crown. Rachis marked with linear warty scars on either side, besides presenting a remarkable warty or glandular (?) opening situated at the base of each pinna springing from its sides. Sori numerous, generally on all the pinnae; the fertile fronds appear sometimes to be alternate, and are more contracted than the barren ones.

I have called this the *Warty Cyathea*, to give it a local English name, as the others are termed black and white, &c.

C. Smithii, or acorn-fruited *Cyathea*.—This fern also is most frequent in the immediate neighbourhood of streams, at the bottom of well-sheltered gullies. Soil wet or swampy. Stem fully 22 feet high, densely fibrous below, a little resembling that of *Dicksonia antarctica* (at the base), and remarkable for the dead *pinnaless* fronds, or rather raches, hanging from the upper part. Fronds lanceolate, bipinnate, bright shining green, 8–9 feet long, and very

light: pinnæ 20–22 pairs, springing from the upper rounded surface; lower short and erect; middle ones gradually assuming the horizontal position. Veins simply pinnate in barren fronds, forked in fertile ones. Indusium truly cup-shaped, open above, and protruding the compactly arranged sporangia to double the distance; they are covered by it below; receptacle large and club-shaped. I believe the cup *never* covers the sporangia. The main rachis is brownish, channeled above, rough beneath with minute points, the sides being covered at their early stage with soft scales or paleæ, as also are the partial ones. Warty scars situated *between* the pinnæ and on the sides of the rachis.

Note. This fern wants the characteristic sudden acuminate point of the pinnæ, so remarkable in the other three species.

I first noticed this species springing from a trunk which had been buried in the side of a gully by the falling in of the soft upper soil; and it had formed a stem 6 feet high, rising up at a right angle from the stem. I subsequently noticed many other specimens both of this species and of *C. Cunninghamii* similarly circumstanced.

I have sent with the stem-sections some natural skeletons of the stem of *Cyathea medullaris*, which may be of service to compare with some geological remains. I think it is evident also that the natives of New Zealand have taken their scroll-like ornaments, in their houses, &c., from the gyrate fronds of the large ferns, and also from the curious markings on the long scars of the stems when they have decayed off the cellular substance. These stems were in use as fencing, round their paas or villages. (See 'Illustrations of New Zealand Scenery,' &c.)

Dicksonia antarctica.—This tree-fern is getting scarce about Wellington, while *D. squarrosa* seems to be met with rather more freely. A specimen of a stem, which I have sent, was part of one 5 feet high. There was another which stood by, 12 or 15 feet in height; but I had not the heart to cut it down. The lowest part of this last was hard and fibrous, and very different from the specimen sent; but the upper half was so soft, that I could impress it easily with my fingers. The lower portions had become hardened, partly from the decay of the very soft woolly substance which exists so abundantly at the bases of the stipites, and also from the increase in size of the root-like fibres which penetrate the woolly portion. This woolly substance, of a beautiful auburn colour, serves to retain a great amount of moisture around the rootlets which emerge from between the stipites, and facilitates

their growth. A transverse section of the stem varies considerably, according as it is cut high up or low down, as may be seen in my specimens. A section taken 3 or 4 feet from below the head gives us a woody centre or cylinder, and around it an immense mass of a very dry light-brown substance, penetrated by root-like fibres, without any trace of a stipe-like nature. A section, taken 2 feet above this, gives the cylinder closely surrounded by transverse sections of the remains of the stipites,—some 50 or 60, or more, remaining distinct, close-pressed and packed together, with traces of fine hair-like fibres, which clothe the bases of the stipites. Outside these is a surrounding mass of a looser and coarser texture, consisting of a mass of matted fibres of a root-like appearance, and decaying stipites, which have almost lost their form in the general decay. On making a vertical section (and this I believe is best done in recent fern-stems by splitting them with a wedge in place of sawing), it will be seen that the woolly substance closely invests the bases of the stipites, which are deeply buried in the substance of the woody cylinder; and a number of rootlets may also be traced issuing outwards: these, I think, sometimes ascend and then turn downwards, increasing, and penetrating the decaying stipites, and in process of time forming a tangled mesh or net-work of a coarse kind, and which remains after the decay of the fine hairy fibres and the stipital bases. Perhaps this state of things has led to the enumeration of a third species of *Dicksonia* in these parts. As yet I have only met with two.

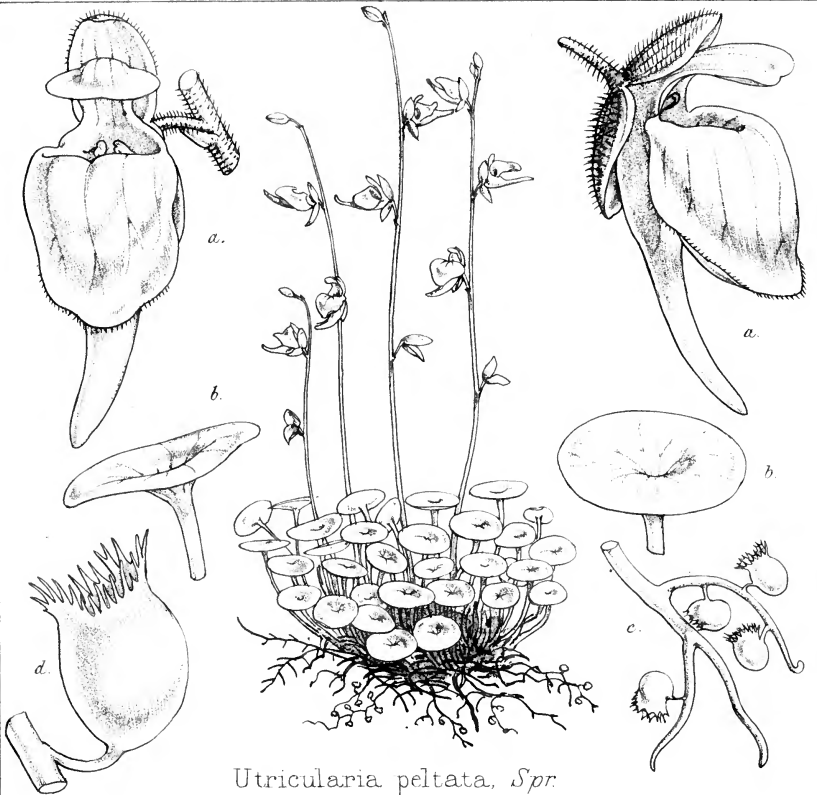
D. squarrosa.—The fronds are about 8 to 10 feet long; stem 16 feet, &c., slender; small rootlets spreading in irregular masses here and there, and forming irregular growths, which ultimately unite, but no appearance of a coating of a fine fibrous nature. The black stipites run up the stem for a foot or more, and ascend clear of the head 18 inches or 2 feet before the lower pinnæ appear, being clothed with inch-long, erect, brownish-black hairs or setæ, springing from the upper surface and sides of the stipe; rough, with minute tubercles; branching rootlets, tufted with brownish tomentum issuing upwards from between the stipites. The very young gyrate fronds are clothed with auburn hair.

The Indian Species of *Utricularia*. By DANIEL OLIVER, Esq.,
Jun., F.L.S.

[Read Dec. 16, 1858.]

SOME few months ago Dr. J. D. Hooker was kind enough to entrust to me, for arrangement, the very valuable collection of Utricularias brought together by himself and Dr. Thomson during their recent Indian journeys, with also an ample series of the Southern and Ceylon species collected by the late Dr. Stocks, and the numerous excellent botanists whose contributions are acknowledged by the authors of the 'Flora Indica' and the 'Præcursores.' In addition to these, moreover, I may mention the important series in Griffith's extensive herbarium, until recently in the keeping of the East India Company, but now, through the exertions of Dr. Hooker, in course of arrangement at Kew. From the excessive entanglement of the nomenclature of this interesting genus, at least of its Indian members, I found it needful thoroughly to re-examine nearly every form, and to work them up in the first place almost *de novo*, irrespective of their literature; and it is in the trust that the views which I have felt myself required to adopt, as to the limitation, &c. of the species, may serve as a stepping-stone to their more complete illustration, that I venture to lay before the Linnean Society the result of my inquiries. A few species from the temperate region of the Himalaya are new, and especially demand publication, from their common peculiarities.

In the elaboration of these plants, I have derived great advantage from the herbaria of Sir William J. Hooker, of G. Bentham, and Dr. Wight, which have been most freely placed at my service; these, with our Wallichian and Smithian collections, and the important fasciculi preserved in the British Museum, have been invaluable in determining their synonymy, otherwise quite inextricable, as well as their range in respect not only to variation in form, but also of geographical distribution within the borders of the Indian empire. Unfortunately, the insufficiency of material, particularly as to North Australian and African species, and, to some extent, to those of the Eastern Archipelago, precludes any satisfactory working-out of their general distribution; and upon this head, from the importance of absolute accuracy in the identification of species, I feel it the safest course to say but little. I have especially to congratulate myself on the ample



Utricularia peltata, Spr.



U. Jamesoniana, D. Oliv.

suites of specimens which have been placed in my hands illustrative of each or of most of the species. I have thus been enabled to dissect and compare numerous examples, and have been spared the contracted views of their specific limitation, which, with less ample material, I should surely have adopted. The chief difficulties in their study I have found to arise from the extreme brevity and insufficiency of the older descriptions, and the multiplication of 'book species,' founded upon the unwarrantable data afforded by solitary or very imperfect specimens. The examination of the parts of the flower in the Utricularias, also, is a labour absorbing much time, from the care required in their dissection, resulting less from any structural complication than from the marked tenuity of the corolla,—while the frequent variability, even in the same species, in the form of parts upon which important characters are often based, demands an attentive comparison of examples. The settlement of the synonymy of several species, and the reduction of those specific names which have been applied either to individual varieties or to mere forms, has been, I hope, not an unuseful result of their study.

The more important recent contributions to our knowledge of these plants are the papers of Benjamin, in the 'Botanische Zeitung' and the 'Linnæa;' of Edgeworth in the 'Proceedings of the Linnean Society;' of Dalzell in the 'Kew Journal of Botany;' and the figures and descriptions in the 'Icones Plantarum Indiæ Orientalis' of Dr. Wight. With regard to the descriptions of the first-named author (although generally drawn up with care, yet founded too often upon very imperfect and incomplete examples), I should have felt them particularly embarrassing, were it not that, in the herbarium of Sir W. J. Hooker, I have had access to specimens of many of them authenticated by his own labels. The contribution of M. P. Edgeworth, contained in the first volume of our old 'Proceedings,' I should have most certainly overlooked, had not J. J. Bennett kindly called my attention to it. Its most important feature is the description of a supposed new genus of *Lentibulariæ*, under the name of *Diurospermum*, from the Western Himalaya. It would appear that no specimens of this plant have been sent over by the author of this paper; at least, in the herbaria to which I have referred, none are to be found; but I feel tolerably confident that his plant may be recognized in a small and very interesting species collected in Kumaon by Strachey and Winterbottom. I account for one or two little discrepancies by the assumption that Edgeworth's specimens have been either few or

in an advanced state of growth, the chief difference between the description of his plant and that of S. and W. being the lobate upper segment of the calyx of the former. I find, in one or two *Utriculariæ* of this group, that this lobe of the calyx, originally entire, or at most retuse or emarginate, often splits more or less towards maturity, thus presenting quite a bilobate form. The appendaged seeds are very remarkable; but in this respect they differ from other Himalayan species of the same series (including the well-known *U. orbiculata* of Wallich) merely in the form of the produced epidermal cells of the testa, which, as noted by Dr. Wight, in this latter species are glochidiate or capitate, while in the Kumaon plant they are elongated hairs from the extremities.

The Sikkim and Khasia collections of Dr. Hooker include two or three new species belonging to the same group with these plants; but I have not been fortunate enough in every case to meet with matured seeds, the further examination of which is very desirable. These singular *Utricularias* constitute a most interesting section of the genus, characterized by small stature, orbiculate, reniform, or obovate-spathulate leaves, very unequal calyx-lobes, the lobed, more or less plane, lip of the corolla, and (so far as sufficiently matured specimens enable me to speak) the appendaged seeds; perhaps, too, the dehiscence of the capsule, and the ultimately more or less reflexed inferior lobe of the calyx, may be common to them. Although these characters confer a striking individuality, yet I do not discover that the species presenting them are entitled to a rank superior to that of a subgenus. They are, too, so essentially *Utriculariæ*, that by separating them we should open a door yet more widely to a destruction of the genus as interpreted in books—already, indeed, impending from the separation, by some writers, of certain South American forms. It is perhaps possible that a carefully conducted series of observations upon the embryo and structure of the seed may lead to a different conclusion; but until such observations are forthcoming, the more correct course is undoubtedly to retain them as a section of the genus. Dr. Wight, in his valuable 'Icones' (vol. iv.), figures and describes twenty-three species. Some of these, in most cases identified in his herbarium, after examination and comparison with other series, I have thought it quite impossible to maintain, and have accordingly reduced them. Dr. Wight particularly observed the characters afforded by the surface and form of the seed in certain species, resting, in some cases,

important specific characters upon them. I have examined the seeds of many species, and believe that marked characters, available in their discrimination, are, in some instances, afforded by them. The variety in their form and surface is striking; but we are yet very deficient in information as to whether parallel differences are presented in the internal structure of the seed, which it is extremely difficult to investigate in many instances—in part from the excessively oleaginous nature of the cell-contents, and perhaps, too, the relatively small or imperceptible cotyledons. Of the older descriptions of Indian *Utriculariæ*, the most important are those of Linnæus and Vahl. From the accumulation of species subsequent to their period, the extreme brevity of their notices, and the imperfection of the absolute material upon which they were framed, it is very difficult, and frequently indeed impossible, to arrive at a confident determination of their species. When authentic specimens have been accessible to me (as in the case of the Linnean Herbarium) corresponding sufficiently nearly with the published descriptions of the author, I have adopted the Herbarium names; in the case, however, of a few of Dr. Kœnig's plants in the collection of the British Museum, which appear to be unusual or aberrant forms of frequent species, or else very imperfect and insufficient for positive determination, I have not thought it desirable to disturb nomenclature unduly by the adoption of the Vahlian names which, with reason, may be supposed to apply to them. Examples of a *Utricularia*, however, in that herbarium, from Dr. Kœnig, bearing the name *U. flexuosa* Vahl, together with the description of that species in the 'Enumeratio Plantarum,' compel me to give it its fair precedence, at the sacrifice of Dr. Roxburgh's generally adopted name, *U. fasciculata*.

In the distribution of the Indian species in this paper, for the purpose of ready reference, I have availed myself of sectional characters, based upon, chiefly, the presence or absence of a leafy axis, whether submerged or terrestrial; the attachment of the squamæ* and bracts; the length of the pedicels; the direction and

* I employ the word '*squamæ*,' with previous writers, to denote the minute empty scales attached, like the bracts, sometimes by the base, sometimes about or below the middle, to the scape. Although the transition to these from the true leaves at the base of the scape, or, when present, from the capillary segments of the submerged axis, may be very abrupt, I take them to be reduced foliar organs, referable probably to the 'hypsophyllary' series, and corresponding to similar appendages in *Pyrola*, &c.

At the base of the pedicel, in nearly all of the Indian species destitute of a floating axis, are found, by and within the bract (as noted in the sectional cha-

proportion of the spur of the corolla; the comparative proportions of the calyx-lobes, &c. The sections of A. De Candolle employed in the 'Prodromus,' of questionable utility in their general application, are almost useless in the apportionment of the Indian species.

Finally, I may be allowed to express my conviction, that in the investigation of the development and general morphology of the 'Bladder-worts,' there is a wide field for extended observation; and I believe that a monograph of the genus, thoroughly worked out in respect to these, would be, although a work of much labour and difficulty, a most valuable contribution to science.

UTRICULARIA, L.

§ I. *Scapi ex axi demerso, segmentis multisectis plus minus capillaceis sæpissime aciculiferis, per florescentiam persistente. Bractea solitariae (i. e. bracteolæ nullæ).*

A. *Scapus vesicis inflatis in verticillum unicum dispositis instructus (vide obs. sub U. flexuosa, infra).*

1. *U. stellaris*, L.; *Wall. Cat.* 6400; *A. DC. Prodr.* viii. 3; *Wight, Icones*, 1567.

Loc. Per totam Indiam tropicam. Moradabad, *hb. Hook.*! Rohilkhand, *Edgew.*! Concan, *Stocks*! Tanjore et Orissa, *Wight*! Carnatica, *Kœnig.* &c.! Khasia, *hb. Griff.*! Forma macrocarpa, Nipalia, *Wall.*! &c.

Distrib. Nubia, *Kotschy*! Africa aust., *Dreg.*! (Nov. Hollandia bor., *Mueller*?)

Scapi supra v. infra medium vesicis circiter 3-5 lanceolatis oblongis v. ovato-oblongis apicem versus filamentis capillaribus plus minus ramosis instructis in verticillum sæpissime dispositis. *Pedicelli* apice sæpe incrassati fructiferi patentes v. deflexi capsulam æquant v. excedentes.

Corollæ labio superiore ovato v. rotundato obtuso calyce sæpe duplo longiore, calcaris brevi saccato obtuso v. alabastro emarginato corollæ

racters), a pair of very small laterally disposed laminæ, which I call *bracteolæ*; these, in certain species, almost equal the bract in length and proportions, excepting that in the case of those having bracts volute at the base, the bracteoles are, I think, not to the same extent free below their attachment. In none of the Indian *Utriculariæ*, however, do the bracts and bracteoles assume anything like the development of those of the singular section 'Orchidioides' (A. DC.), a South American group of the genus, in which they are relatively very long, attaining a length of from $\frac{1}{2}$ to $\frac{3}{4}$ in.

labium inferius versus curvato et idem subæquante. *Capsulæ* globosæ lobis calycinis ovatis rotundatisve sæpe inæqualibus plus minus obtectæ, seminibus peltatis 5-6-angulatis.

β, *Coromandeliana* (A. DC. Prodr. viii. 4.), forma tantum mihi incognita.

B. *Scapus nudus vel squamis paucis instructus.*

2. *U. flexuosa*, *Vahl, En. Pl. i. 199.* (*U. fasciculata*, *Roxb. Fl. Ind.; Wall. Cat. 1499; Wight, Icones, t. 1568.*—*U. inæqualis*, *Benjamin in Linnæa, xx. 304* (exempla cujus cum schedulis auctoris in *hb. Hook. vidi*, forma mera gracilior *U. flexuosæ*).—*U. ramosa*, *Vahl? Ind. or.; Kæinig, hb. Mus. Brit.?*)

Loc. Per totam regionem tropicam. *Ludihana, Edgew. in hb. Bth.!* *Assam (Goalpara, &c.) hb. Wall.!* *hb. Hook.!* *Silhet, hb. Wall.!* *Nipalia, hb. Wall.!* *Malabar, Wight;* *Bengalia, Roxb. in hb. Mus. Brit.!* *Travancore, hb. Wall.!* *Ceylonia (C. P. 2089), Thwaites!* *Tavoy, hb. Wall.!* *Mergui, hb. Griff.!*

Forma gracilis:—*Ceylonia* (sub nom. *U. vulgaris*, *Macrae*), *hb. Hook!* *Burdwan!* *Chittagong, J. D. H. et T. T.!* *Malacca, Cuming, 2278!*

Vesicæ natantes (vel axes foliacei potius abnormaliter dilatati sæpe 2-unc. longi lineares) foliolis capillaribus multisectis passim instructæ (ut in *U. inflata*, sp. occid.) prope basin scapi in verticillum infrequenter dispositæ sunt.

Pedicelli primum erecti fructiferi sæpius deflexi. *Calyx* lobis fructiferis accrescentibus divergentibus sæpe plus minus inæqualibus. *Calcar* breve curvatum v. porrectum obtusiusculum, corollæ labio inferiore late ovato palato (fid. sched. in *hb. Wight*) valde prominente macula aurantiaca notato brevius longiusve. *Semina* peltata plerumque 5-6-angulata.

U. confervifolia, *Don, Prodr. Fl. Nep. p. 84*, specimen auct. imperfectum cujus in *hb. Mus. Brit. vidi*, *U. flexuosæ* valde accedit et verisimiliter eidem referri debet.

3. *U. PUNCTATA* (*Wall. Cat. 2121*). *Scapo* 4 unc. ad ped. et ultra pauci-multifloro sæpe elongato cicatricibus minutis pedicellorum bractearumque delapsorum nonnunquam notato, pedicellis gracilibus fructiferis adscendente-patentibus apicem versus erectis bracteis basi-volutis suffultis, calycis lobis subæqualibus ovato-rotundatis superiore corollæ labio superiore brevi rotundato integro brevioris lobo inferiore calcari crasso subcylindraceo obtuso corollam vix excedente dimidio brevioris, capsula ovato-oblonga v. ovata obtusa calycem denique superante, seminibus peltatis suborbiculatis circumalatis margine profunde dentato-lacinatis.—*Wight, Icones, 1570.*

Loc. *Tavoy (W. G.), Wall.!* *Rangoon, hb. Wall.!* *Mergui, Griff. in hb. Hook.!*

Folia demersa segmentis capillaribus dichotome multisectis aciculifera.

Bractea ovatæ plus minus acutæ infra medium adfixæ. *Calcar* corollæ labium inferius interdum parum excedens. *Stylus* brevis. *Semina* speciei hujus notabilia et quoad sciam peculiariora sunt.

4. *U. DIANTHA* (*Ræm. et Sch. Syst. Veget.* i. 169, non *A. DC. Prodr.* viii. 21). Scapo gracili 2-4-unc. vel gracillimo duplo triplove longiore 1-2-floro rarius 3-floro, bracteis parvis amplexicaulibus obtusissimis, pedicellis erectis infimo florem 2-3-plo excedente, calycis lobis ovatis obtusis subrotundatisve corollæ labio superiore integro late ovato-quadrato v. subrotundato calcarique dimidio brevioribus, calcari cylindrico-conico corollæ labium inferius subæquante v. excedente, capsula subglobosa stigmatibus minuto sessili, seminibus peltatis alatis 5-6-angulatis.—*Wight, Icones*, t. 1569.

U. biflora, *Roxb. Fl. Ind.* i. 43, non *Wall. Cat.* 1498.—*U. Roxburghii*, *Sprengel, Syst.* i. 52.—*U. elegans*, *Wall. Cat.* 1502.—*U. pterosperma*, *Edgew. Proc. Linn. Soc.* i. 352.—*U. Saharunporensis*, *hb. Royle*. Conf. *U. exoleta*, *R. Br.*

Loc. India bor.-occ. *hb. Hook.*! Ludihana, *Edgew. in hb. Bth.*! Nipalia, *Wall.*! Khasia, *J. D. H. et T. T.*! Bengalia, *Roxb. in hb. Mus. Brit.*! Coromandel, *Kænig*! Quilon, *hb. Wight*!

Parva. *Axis demersus* subramosus segmentis foliaceis capillaceis utriculiferis. *Scapus* nudus v. squamis (1-2) minutis instructus; scapi uniflori bractea vacua sæpe cum axi abortivo v. flore tardo potius ei opposita observatur. *Calyx* lobis parum inæqualibus capsula matura valde brevioribus. *Corolla* labio inferiore integro calcaris basin amplectente eodemque sæpius brevior. A summo corollæ labii superioris ad apicem calcaris 2-3 lin.

The occurrence of an apparently abortive axis or flower-bud on the single-flowered scapes opposite to the bract is, in this plant, as in *U. gibba*, &c. (North American sp.), especially frequent. It is an interesting instance of a secondary superseding a primary axis, and of a definite inflorescence in a group in which an indefinite raceme prevails.

5. *U. minor*, *Linn.*

Loc. In Tibetia occidentali. Nubra, alt. 11,000 pedum, *T. Thomson*!

Folia demersa di-trichotomo-multipartita utriculifera segmentis linearibus lineari-subulatisve remote subtiliter spinulosis glabrisve. *Scapus* erectus 3-10 unc. (sæpius 4-8 unc.) pauci-multiflorus squamis 2-3 minutis bracteisque basifixis ovatis auriculatis plus minus obtusis instructus. *Pedicelli* post anthesim sæpius arcuato-patentes v. adscendentes calyce 2-4-plo longiores. *Calyx* lobis subæqualibus ovatis obtusis superiore corollæ labio superiore ovato subrotundatove integro brevior. *Corolla* labio inferiore late elliptico obovato-rotundato vel suborbiculato superius 2-3-plo excedente, calcari brevissimo saccato obtusissimo.

A basi calycis ad extremum corollæ labii inferioris 3-4 lin.

It may be proper here to state that I do not admit the specific value of *Utricularia Bremii* (Heer), and doubt further if the *U. intermedia* of British botanists be distinct, except as a mere form or perhaps variety, from *U. minor*, L. It is not improbable that the *U. sacciformis* of Benjamin (*Linnaea*, xx. 302) may refer to this plant; I have not, however, seen authentic specimens.

§ II. *Scapus basi foliis linearibus, lineari-spathulatis v. spathulatis, integris, ante florescentiam sæpe evanescentibus. Calyx lobis æqualibus, interdum parum inæqualibus.*

A. *Scapus squamis, bracteis bracteolisque basifixis instructus.*

a. *Glabra. Calcar conico-subulatum v. subulatum, dependens, sæpius plus minus curvatum. Calyx fructifer, lobis capsulam obtinentibus.*

* *Flores violacei, purpureo- v. albo-cærulei.*

6. U. ALBO-CÆRULEA (*Dalz. in Kew Journ. Bot.* viii. 279). Floribus paucis, pedicellis floriferis erectis subpatentibusve calcar subæquantibus fructiferis curvato-deflexis, calycis lobo superiore late ovato acutissimo corollæ labio superiore albo suborbiculato integro emarginato v. retuso marginibus reflexis brevior, lobo inferiore calcari dependente subulato acuto sæpius valde brevior, labio inferiore corollæ amplo subintegro v. emarginato calcar plerumque duplo excedente.

Loc. Concan, *Stocks!* (In rupibus prope Vingorla, fl. temp. pluviali, *Dalz. l. c.*)

Fragrans (fid. *Dalz. l. c.*). *Radices* sparse ramosæ, utriculis paucis. *Scapus* 3-10 unc. (sæpius 4-5 unc.), teres, erectus, firmus gracilisve, squamis raris parvis ovatis instructus, 1-2-florus, nonnunquam elongatus 4-5-florus. *Bracteæ* ovatae acutæ. *Flores* primum approximati. *Corolla* labio inferiore (fide descript. opt. *Dalz. l. c.*) quadrato-orbiculari emarginato, palato macula pallida venosa antice 3-lobata notato. Capsula globosa v. sacciformis calycis lobis accrescentibus pedicello demum leviter decurrentibus obtecta. *Stigma* sessile. *Semina* minuta, oblonga v. ovata, utrinque obtusa v. subsphærica, scrobiculato-reticulata.

Corolla a summo labii superioris ad apicem calcaris 4-6 lin., a basi calcaris ad extremum labii inferioris 4-7 lin.

Ab *Utriculariis* alteris affinibus, floribus paucis, corollæ amplæ albo-cæruleæ labio inferiore calcar valde excedente, pedicellis fructiferis denique curvato-deflexis, dignoscitur.

7. U. ARCUATA (*Wight, Icones*, t. 1570-1). Floribus paucis, calycis lobis subæqualibus superiore paulo majore late ovato v. cordato-ovato corollæ labio superiore suborbiculato obovato-orbiculato v. obcordato

integro v. plus minus profunde emarginato brevior, lobo inferiore ovato calcar 3-4-plo brevior, corollæ labio inferiore amplo integro rarius emarginato calcar longum gracile lineari-subulatum dependens v. falcato-curvedum subæquante.

a. Corollæ labio superiore bilobato, calcar dependente, pedicellis calcar vix excedentibus.

β. Corollæ labio superiore suborbiculato integro subintegro, calcar sæpius arcuatim curvato, pedicellis florem æquantibus v. paulo excedentibus.

Loc. a. Bombay, Jacquemont (565^a).

β. Malabar, Law! Concan, Stocks! Belgaum, Law!

Flores cærulei (Wight, *Icones*, Not. ^a 1571); mihi corollæ (in spec. exsicc.) labium inferius deorsum pallide violaceum palatum flavum(?) versus pallescens videtur. *Radices* ramosæ utriculiferæ. *Folia* brevina, lineari-spathulata v. spathulata, obtusa, utriculis nigris interdum instructa, sub anthesin pauca nullave. *Scapi* 3-10 unc. (sæpius 3-5 unc.), erecti, nonnunquam bifidi, squamis paucis (2-3) minutis ovatis. *Pedicelli* fructiferi, adscendentes v. arcuato-patentes, apicem versus leviter marginati. *Capsula* ovata v. elliptica, stigmatibus sessili v. subsessili. *U. albo-cærulea* et *U. affini*, quibus proxima est, calcar gracillimo corollæ labium inferius æquante, distinguitur.

Planta Jacquemontiana forsitan ad speciem distinctam pertinet.

8. *U. AFFINIS* (Wight, *Icones*, t. 1580. f. 1). Scapo pauci- multifloro, pedicellis brevibus plus minus arcuato-adscendentibus vix patentibus nunquam deflexis, calycis lobis subæqualibus superiore late ovato v. orbiculato-ovato acutissimo v. cuspidato, inferiore ovato calcar subfalcato dependente conico-subulato acuto v. acutiusculo valde brevior, calycis fructiferis lobis plus minus rotundatis apiculatis acutiusculis v. obtusis, lobo majore sæpius suborbiculato orbiculato-cuspidato, corollæ violaceæ v. cæruleæ labio superiore obovato-cuneato subobovato vel late oblongo integro emarginato calyce paulo brevior v. longior, labio inferiore integro v. emarginato calcar sæpius subæquante, seminibus plus minus profunde scrobiculatis.

a. Scapo sæpius 3-8 unc. floribus primum paucis postea 5-7, pedicellis calycem subæquantibus, corollæ labio superiore sæpius plus minus obovato emarginato v. integro. Corolla a summo labii superioris ad apicem calcaris sæpius 3-4 lin., a basi anteriore calc. ad extremum labii inferioris 1½-3 lin.—*U. decipiens*, Dalz. Kew Journ. Bot. iii. 279; conf. *U. acuta*, Benj.

β. Scapo 1½-4 unc. 1-4-floro, pedicellis brevissimis bracteam vix excedentibus, labio corollæ superiore obovato emarginato. A summo corollæ labii inferioris ad apicem calcaris 3-4 lin., a basi calcaris anterioris ad extremum corollæ labii inferioris 1½-2 lin.—*U. brachypoda*, Wight, *Icones*, t. 1578-1. Præcedentis vix varietas, forma mera parva. Cf. *U. graminifolia*, MSS. β. Nov. Cambria (Cape Grafton), 1770, in hb. Mus. Brit.

γ. Scapo majore erecto v. subvolubili 6 unc. ad ped. et ultra 3- multifloro, foliis gramineis linearibus v. lineari-spathulatis obtusis, pedicellis fructiferis calycem æquantibus sæpius remotis, corollæ labio superiore oblongo v. subobovato integro v. subintegro. Petala cærulea albo lineata (fid. *not. in hb. Griff.*).—*U. Griffithii*, Wight, *Icones*, t. 1576; *U. intricata*, hb. Griffith.

Loc.:—α. Concan, *Dalz.*! *Stocks!* *Law!* In montibus Nilghiri, *Wight*, *hb!* Maulmein, *Lobb*, *hb.* *Hook.*!—β. Quilon, *hb.* *Wight!*—γ. Malacca, *hb.* *Wight!*

Distr. Borneo ins., *Barber!*

Radices parce utriculiferæ. *Folia* ante anthesin plerumque decidua, in var. γ. nonnunquam persistentia, sæpe 1-1½ lin. lata. *Scapi* sæpius erecti teretes, squamis paucis bracteisque ovatis ovato-lanceolatisve, pedicellis plerumque subremotis remotisve. *Capsula* ovata v. elliptica, stigmatate subsessili.

Characteres diagnostici formis speciei hujus communes, in colore scapi &c. (in specc. herb.) pallide viridi, pedicellis brevibus suberectis v. curvato-adscendentibus, calycis loborum fructiferi forma plus minus rotundata acuta, et seminibus sæpe profunde scrobiculatis, inveniuntur. *U. graminifolia* (Nov. Cambria, *Banks et Solander*), MS. in hb. Mus. Brit., forsân ad eandem referri debet.

9. *U. CÆRULEA* (*Linn. herb.*, non *A. DC. Prodr.* viii. 19). Scapo firmo v. gracili erecto v. subvolubili 2 unc. ad ped. et ultra (sæpius 3-8 unc.) 1-8-floro, squamis paucis (in var. β. valde numerosis) bracteisque ovatis sæpius acuminatis, pedicellis fructiferis gracilibus erectis adscendentibus v. laxè adscendenti-patentibus nunquam deflexis calycem demum æquantibus v. excedentibus, calycis lobo superiore ovato acuminato corollæ labio superiore obovato oblongo-obovato v. orbiculato-obovato (in var. γ. angustiore oblongo obtuso) integro breviorè vix longiore, calycis fructiferi lobis ovatis acutis v. acuminatis, seminibus minutis reticulato-striatis.

α. Scapo firmo v. gracili 2-8-10 unc., racemis denique elongatis floribus remotis remotiusculisve, pedicellis fructiferis calycem æquantibus v. excedentibus erectis v. erecto-patentibus, labio superiore corollæ sæpissime obovato, inferiore plerumque plus minus adscendente.—*U. pedicellata*, Wight, l. c. t. 1578. f. 2; *U. conferta*, Wight, l. c. t. 1575.

β. Scapo sæpe firmiore squamis ovatis acutis numerosis instructo, floribus paucis subterminalibus, pedicellis rectis calycem subæquantibus.—*U. squamosa*, Wight, l. c. t. 1579 (an forma tantum?).

γ. Elongata. Scapo gracili v. volubili, pedicellis gracilioribus laxè adscendenti- v. arcuato-patentibus, corollæ labio superiore angustiore, &c.—*U. uliginoides*, Wight, l. c. t. 1573.

Loc.:—α. In montibus peninsulæ: Concan, *Stocks!* *Law!* Nilghiri, *Foulkes!* *Schmid!* Pulney, *hb.* *Wight!* Courtalam, *hb.* *Wight!* In Ceylonia (*C. P.* 2086), *Thwaites!*—β. Sispara, *hb.* *Wight!*—γ. Courtalam, *hb.* *Wight!*

Species variabilis, formis extremis valde dissimilibus. *Folia* spathulata v. lineari-spathulata plerumque ante anthesim evanescentia. *Scapus* squamis raris ovatis acutis acuminatisve (excepta var. β) instructus, firmus, debilis v. subvolubilis. *Flores* quam in *U. reticulata*, *U. albo-cærulea*, et *U. arcuata* minores, corollæ labio inferiore integro sæpius adscendente calcar conico-subulatum subæquante.

Pedicellis gracilibus plus minus adscendentibus vix marginatis calyce fructifero rarius brevioribus plerumque longioribus, corollæ labio superiore integro et sæpissime obovato, dignoscitur. (*U. Smithiana*, herb. Wight, mihi forma præcedentis major videtur.)

10. *U. RETICULATA* (*Smith, Exot. Bot.* 119). Scapo ped. et ultra volubili v. breviori firmo erecto, calycis lobo superiore ovato acutissimo cuspidatove corollæ (excl. var. β) amplæ labio superiore ovato obtusissimo v. ovato-rotundato integro marginibus reflexis brevior (in var. β idem æquante v. paulo superante), calcari subulato dependente, calyce fructifero accrescente marginibus pedicello deflexo (v. in forma β patente) sæpius decurrentibus.

Species magnitudine scapi florumque valde variabilis: sub tribus modificationibus occurrit. *Folia* linearia, ante anthesin sæpius decidua. *Corolla* cærulea v. violaceo-cærulea, labio inferiore faucem versus pallido v. albido nervis coloratis longitudinaliter et transverse striato, calcari pallido v. albido.

a. Scapo 6 unc. ad ped. et ultra sæpissime volubili squamis bracteisque ovatis acutis acuminatisve instructo, pedicellis fructiferis patentibus v. sæpius deflexis apicem versus marginatis calycem æquantibus v. interdum 3-4-plo excedentibus, floribus remotis remotiusculisve, calycis lobis fructiferis valde accrescentibus, sæpe 3-4 lin. latis, late ovatis acutis, corollæ labio superiore ovato apice rotundato v. ovato-orbiculato integro calycis lobum superiorem superante et marginibus reflexis fere obtegente, labio inferiore amplo galeato integro v. emarginato calcar rectum v. vix curvatum subulatum acutum æquante v. sæpius valde excedente, capsula ovata v. elliptica calyce accrescente obtecta, seminibus ovatis oblongisve striatis reticulato-striatisve.

Corolla magna, a basi calcaris ad extremum labii inferioris (in herb. sp.) sæpe 6-8 lin.—*A. DC. Prodr.* viii. 19; *Wight, Illust.* ii. t. 143; *Rheede, Hort. Mal.* ix. t. 70; *Wall. Cat.* 1493.—*U. cærulea, hb. Heyn., Wall.*

Forma occurrit cum scapo erecto v. volubili 3-8 unc., floribus paucioribus. An plantæ typicæ forma junior? *U. spiricaulis*, Miq. Pl. Hohen. 574.; *U. uliginosa*, Wight, Icones, t. 1574 (in parte).

β. (stricticaulis). Scapo erecto firmo 2-5 unc. nonnunquam longiore, squamis plus minus acutis, pedicellis fructiferis marginatis calycem accrescentem æquantibus v. brevioribus bracteam paulo excedentibus, adscendentibus vel deflexo-patientibus, calycis lobis denique ellipticis acutis deorsum angustatis.

Corolla, quam in forma typica, valde minor, labio superiore calycem

æquante v. brevior, inferiore calcar subæquante, calcari calyce brevior vix longior. *U. cærulea* interdum non parum similis, sed corollæ labio superiore calyce brevior, habitu firmiter, pedicellis sæpius brevibus firmis distinguitur.—*U. cærulea*, var. *stricticaulis*, Kœnig in hb. Mus. Brit.; *U. uliginosa*, Vahl, En. Pl. i. 203.; *U. humilis*, Heyn., Wall. Cat. 1495; *U. polygaloides*, Edgew. l. c. 351. *Loc.* :— α . In Ceylonia, *Walker!* (C. P. 2090) *Thwaites!* (sub nom. *U. cærulea*) *Macrae!* Nilghiri, *Lobb!* Malabar, *Pl. Hohen.!* Mysore, *Buchan.*, hb. Mus. Brit. ! Concan, *Stocks!* *Law!* Forma *U. spiricaulis*, Miq. (v. supra). Prope Mangalore, *Pl. Hohen.!* Quilon, hb. *Wight!* Concan, *Stocks, &c.!* Ceylonia (C. P. 2091), *Thwaites!*— β (*stricticaulis*). In Ceylonia, *Walker!* (C. P. 2088) *Thwaites!* Coromandel, *Kœnig, &c.!* Mysore, hb. *Wall.!* Bengalia, *Edgew.*

11. *U. SCANDENS* (*Benj. MS. in hb. Hook.* (in parte), non *Linnæa*, xx. 309). Scapo tenuissimo volubili squamis paucis minutissimis ovatis instructo, pedicellis remotis subremotisve sæpe brevissimis v. calycem æquantibus, fructiferis plerumque deflexis, calycis lobis paulo inæqualibus superiore brevior ovato-orbiculato corollæ labium superius obtusissimum integrum v. subemarginatum subæquante, lobo inferiore ovato calcari conico-subulato dependente paulo brevior, calycis fructiferi lobis obtusis obtusiusculisve capsulam ovatam v. ellipticam subæquantibus.

U. minima, gracillima. *Scapus* 1–4 unc. sæpe volubilissimus. *Bractea* minutæ, ovatæ, subacutæ v. obtusæ. *Flores* cærulei, plerumque remoti, pedicellis brevibus vel fructiferis calycem subæquantibus. *Stylus* brevis. *Semina* minuta, reticulato-striata, scrobiculata.

A summo corollæ labii superioris ad apicem calcaris circiter 2 lin.; calyx fruct. $1\frac{1}{4}$ – $1\frac{3}{4}$ lin. longus.

Loc. Prope montes Maduræ, Madras, hb. *Wight!*

Formæ minori *U. Wallichiana* (quacum a Benj. confusa est) similis, sed calycis lobis fructiferi plus minus obtusis parum inæqualibus, pedicellis deflexis, corollæ colore, &c. ab eadem dignoscitur.

In the 'Linnæa' (vol. xx. p. 309), Benjamin describes a *Utricularia* under the name of *U. scandens*, quoting as a synonym '*U. volubilis*' of the Hookerian herbarium. Referring to this collection, I find a sheet upon which are mounted two very distinct species of *Utricularia*. To each of these is a label attached bearing the name '*U. scandens*, Bj.,' I believe, in the handwriting of its author. To the specimens of one of these species the name *U. volubilis*, quoted by Benjamin, had been previously affixed: it is to this plant, moreover, that his description applies; and from these specimens it was most probably framed. These latter, however, are obviously referable to the voluble and slender variety of *U. Wallichiana*, *Wight*, while the other examples belong to the very different plant which I have here described, additional specimens of which were met with in Dr. *Wight's* herbarium. I have thought it better not to import a new specific name for the species,

trusting that, if this explanation be accepted, the old one may be retained.

** *Flores flavi.*

12. *U. BIFIDA* (*Linn. herb.*). Scapo sæpius erecto 2-10 unc. 2- multifloro, squamis paucis, pedicellis brevibus marginatis fructiferis nutantibus bractea brevioribus v. parum longioribus, calycis lobo superiore ovato v. ovato-rotundato obtusiusculo corollæ labio superiore quadrato-oblongo ovato subobovatove integro paulo brevior, lobo inferiore ovato obtuso v. bidentato calcari brevior, corollæ labio inferiore integro v. emarginato calcari dependente paululo falcato-curvato brevior v. subæquante, capsula sæpius globosa v. ovata calycis lobis accrescentibus demum ovato-rotundatis obtusis oblecta, seminibus plerumque ovatis oblique striatis.

U. biflora, *Wall. Cat.* 1498.—*U. antirrhinoides*, 1498 *b.*—*U. diantha*, *A. DC. Prodr.* viii. 21.—*U. Wallichiana*, *Bj. Bot. Zeit.* 1845, 213.—*U. humilis*, *Wight, l. c. t.* 1572. f. 2. (*U. humilis*, *Vahl. En. Pl.?*)

Loc. In Ceylonia, *Walker! Wight.* Malabar et Mysore, *Wight.* Chit-tagong, *J. D. H. et T. T.!* Silhet, *hb. Wall.!* Nipalia, *Wall.!* Tavoy, *Wall.!* Malacca, *Griff. hb. Wight!*

Distr. China, *Nelson, in hb. Mus. Brit.!* Ins. Philip., *Cuming*, No. 2289 (sec. *Benj. in Linnæa*, xx. 303); sp. nova, *U. brevicaulis*, *Bj.*; sphalmate, *hb. Hook!*

Scapus squamis bracteisque ovatis plus minus acutis instructus. *Radices* fibrosæ, parce utriculiferæ. *Folia* lineari-spathulata, sub anthesin nulla subnullave. *Capsula* globosa v. ovata, stylo brevi.

Ab omnibus affinis satis diversa; discrepat corollæ colore flavo, calycibus fructiferis obtusis nutantibus pedicello brevi denique plus minus decurrentibus.

13. *U. WALLICHIANA* (*Wight, Icones*, t. 1572. f. 1 (male), non *Benj.*). Scapo stricto v. volubili firmo v. gracillimo 1-2- multifloro, floribus remotis subremotisve, pedicellis erectis adscendentibusve calcari subæquantibus interdum longioribus laxè patentibus, calycis lobis subæqualibus, fructiferis accrescentibus ovatis acutis v. cuspidatis, floriferis superiore late ovato v. ovato-orbiculato cuspidato v. acuminato corollæ labium superius plus minus obovatum v. rotundatum integrum (in var. γ submarginatum) subæquante, calcari subulato dependente sæpe falcato-curvato corollæ labium inferius integrum v. subretusum plus minus excedente v. æquante, calycis lobo inferiore calcari interdum 2-3-plo longiore (in var. γ æquilongio v. parum longiore).

β . Scapo gracili v. capillaceo sæpe volubili, floribus remotis pedicellis adscendentibus patentibusve.—*U. scandens*, *Benj. Linnæa*, xx. 309, &c. γ (*firmula*). Scapo 1-3-unc. 1-3 floro, corollæ labio superiore integro v. subemarginato, calcari calycem sæpe parum excedente.

Loc. In regione temperata montium peninsulæ, Himalaya &c.—*a.* Courtalam, *Wight.* Madras, *hb. Wall.!* Khasia, *J. D. H. et T. T.!*

Sikkim, inter *Sphagna*, alt. 9000 ped., *J. D. H.*!— β . In montibus Nilghiri, *hb. Wight!* Courtalam, *hb. Wight!* Sirra Mullay, *hb. Wight!* Arcot, *Hunter, hb. Hook.!* Khasia, *J. D. H. et T. T.*!— γ . Khasia, *J. D. H. et T. T.*! Sikkim ad Lachoong, alt. 10–11,000 ped., *J. D. Hooker!*

Radices utriculiferæ. *Folia* per anthesin subnulla, linearia v. lineari-spathulata, in var. γ petiolis interdum utriculiferis. *Scapus* squamis 1–4 minutis ovatis v. ovato-lanceolatis acutis instructus (*U. macrolepis*, *Wight*, l. c. t. 1580. f. 2), forma cum floribus (?) abortivis squamis scapi suffultis). *Bracteæ* acutæ v. acuminatæ. *Pedicelli* sæpissime erecti v. erecto-patentes, fructiferi apicem versus calyce decurrente plus minus marginati, floriferi calcar æquantés v. excedentes. *Calyx* lobis ovatis superiore latiore acutissimo cuspidatove, inferiore acuto v. minute bidentato calcar sæpius valde brevior. *Corolla* aurea flavescensve, labio superiore (var. γ excepta) integro. *Capsula* ovata v. elliptica, stigmatē sessili, seminibus minutis striatis v. reticulato-striatis.

Forma typica a summo labii corollæ superioris ad apicem calcaris 4–5½ lin.

b. *Calcar cylindricum vel conico-cylindricum, plus minus porrectum.*

* *Scapus, &c., pilis laxè patentibus hirtus.*

14. *U. HIRTA* (*Klein, in hb. Willd.? vide Link, Jahrbuch, i. 55.*)

Scapo gracili 1–6 unc. sæpius 1–2-floro, pedicellis bracteis calycibusque laxè subpatentim pilosis v. pilosiusculis, pedicellis brevissimis bracteam vix excedentibus, corollæ labio superiore obovato oblongo-obovato v. quadrato-oblongo integro obtusissimo calycem sæpius duplo excedente, calcar conico v. conico-cylindrico adscendente v. porrecto corollæ labio inferiore plus minus longiore, capsula matura calycem subæquante.

U. setacea, *Wall. Cat. 6398*, non *Michx.*

Loc. Khasia, *J. D. H. et T. T.*! Hb. Madras, in *hb. Wall.*!

Scapus erectus debilisve, raro triflorus, sæpe uniflorus, squamis paucis bracteis bracteolisque angustis lineari-subulatis subulatisve. *Calyx* lobis æquilongis ovatis obtusiusculis. *Stigma* sessile. *Semina* minuta reticulata.

Corolla cærulea v. purpurea, venosa, faucem versus et in calcar albida v. flavescens. A basi calycis ad apicem calcaris porrecti 2–3½ lin.

Ab *U. racemosa* et affinibus, quibus habitu similis, scapo calycibusque laxè hirtis, ceterisque valde diversa primum distinguitur.

From the small number of specimens of the Wallichian *U. setacea* which I have seen, and their rather imperfect condition, I may err in determining it to be identical with the Khasia species. Of the latter, however, I have had an abundant series through my hands; and upon these my description rests.

** *Scapus glaber.*

15. U. CAPILLACEA (*herb. Wight, Wall. Cat. 6399*). Species mihi non optime cognita. Scapo tenuissimo 1-2 unc. interdum bifido sub anthesin foliis nullis, squamis paucis minutis, floribus 1-3, pedicellis brevissimis bracteam ovatam v. lanceolatam acutam æquilongis v. parum excedentibus, calycis glabri lobis ovato-rotundatis vix acutis, superiore majore corollæ labio superiore brevior, labio inferiore corollæ (3-lobato v. integro?) calcari cylindrico porrecto obtuso brevior.

Loc. — ?

Incerta: corollæ color, labiorum corollæ forma.

B. *Scapus squamis bracteisque basi-volutis; capsula calycem sub-æquans vel excedens.*

a. *Pedicelli fructiferi capsula non breviores, sæpius longiores; bracteolæ nullæ; capsula calycem superans.*

16. U. VERTICILLATA (*Benj. in Linnæa, xx. 312*). Scapo 8-12 unc. erecto 4- multifloro, pedicellis floriferis fructiferisque adscendenti-patentibus, calycis lobis subæquilongis obtusissimis v. superiore obtusiusculo subrotundato, corollæ (flavæ?) labio superiore calycem excedente, inferiore calcar dependens subcylindraceum v. cylindrico-conicum subæquante v. paulo brevior, capsula erecta globosa, seminibus minutis scrobiculatis.

U. bifida, Wight, l. c. t. 1584. f. 2.

Loc. Malacca, *Griff. hb. Wight! Hook. ! &c.*

Radices fibrosæ, parce utriculiferae. *Folia* ante anthesin plus minus decidua. *Scapus* sæpe bifidus v. subramosus, ramis erectis, squamis bracteisque plus minus utrinque acutis v. basi obtusiusculis. *Pedicelli* fructiferi capsula sæpe longiores, cæsiopuberulenti. *Stigma* sessile v. subsessile.

Corollæ color et forma labiorum incerta sunt; planta tamen ab affinibus satis distincta, et characteribus præcedentibus facile dignoscitur.

b. *Pedicelli brevissimi, cum bractea subæquilongi. Squamæ et bractea mediofixæ, utrinque acutæ; bracteolæ minutæ v. bracteam æquantes. Calyx lobis minute puberulis. Corollæ calcar plus minus porrectum. (Nigrescentes.)*

* *Corollæ calcar labio inferiore non longius.*

17. U. ROSEA (*Edgew. Proc. Linn. Soc. i. 352*). Scapo 4 unc. ad ped. erecto gracili v. firmo 2- multifloro, squamis paucis pluribusve, floribus subremotis approximatisve magnitudine valde variabilibus, calycis purpurei lobis ovato-rotundatis subæqualibus, superiore corollæ labio superiore rotundato obtusissimo integro plus minus brevior, calcari

porrecto crasso cylindrico-conico v. cylindrico obtusissimo labio inferiore brevior eodemque plus minus obtecto.

U. racemosa, *Wight*, *l. c.* t. 1584. f. 1; *Benj. in Linnæa*, xx. 307.—*U. cærulea*, *A. DC. Prodr.* viii. 19.

Loc. In Bengalia, *Edgew.* Ceylonia, *Walker!* *Gardner!* (C. P. 2085) *Thwaites!* Montibus Pulney, *hb. Wight!*

Radices fibrosæ, utriculis paucis nullisve. *Folia* spathulata v. lineari-spathulata, ante anthesin sæpe evanescentia. *Scapus* interdum bifidus. *Pedicelli* brevissimi, bracteam æquantes v. parum excedentes, bracteolis minutis lanceolatis a basi plus minus volutis. *Corolla* (purpurea v. rosea?) labio inferiore cucullato striis 4 latis pulchris notato (fide sched. in *hb. Hook.*) calcar obtegente. *Capsula* globosa v. subglobosa, calycem æquans v. parum excedens, seminibus minutis. *U. racemosa* (Wall. Cat. 1496) varietas? cf. *U. complanatum*, Wall. Cat. 1497.

U. rosea, *Edgew.*, is known to me solely from the description in the 'Proceedings of the Linn. Soc.' (*l. c.*); I may therefore err in referring to the same form the plant occurring in the South and Ceylon, As noted above, perhaps both may be forms of *U. racemosa*, Wall. Cat. 1496, although I scarcely consider them as such.

** *Corollæ calcar labium inferius excedens.*

I desire especially to draw the attention of Indian botanists to the forms which group themselves under this subsection. Notwithstanding the extensive suites of specimens illustrative of most of these, together with the other aids which have been freely and most liberally afforded me, I feel myself, after devoting no little anxious care to their study, quite unable satisfactorily to adjust or subordinate them. While, on the one hand, I fear to unite them under one presumed species (the extreme forms of which, however, would by no means present structural differences irreconcilable with the reasonable adoption of such a course), on the other, from the variability of those parts which alone can afford characters not common to the whole series, I cannot, with a fair confidence, say between which groups a line may be most suitably drawn. Therefore, although I incline to the opinion that there may be of these two (or perhaps three) species, under existing circumstances I have thought it the safer course to pursue, to indicate merely the groups which I conceive may not improbably be of specific value, without, however, positively attributing such import to them.

Characteres omnibus communes.

Folia lineari-spathulata v. spathulata. *Scapus* erectus, debilis vel subvolubilis, floribus paucis v. numerosis. *Calyx* lobis subæqualibus ovato-rotundatis rotundatisve, superiore sæpe obtusiusculo v. subapiculato corollæ labio superiore integro v. emarginato plerumque brevior. *Corolla* labio inferiore cucullato integro v. subintegro calcaris

porrecti basin amplectente. *Capsula* globosa v. subglobosa, calycem æquans v. parum superans, stylo brevissimo, seminibus numerosis minutis.

18. *U. RACEMOSA* (*Wall. Cat.* 1496). Scapo erecto v. nonnunquam debili 2 unc. ad ped. et ultra (sæpius 6-12 unc.) 1-2- multifloro, calycis lobo superiore inferiorem parum excedente, labio corollæ superiore subovato ovato-oblongo v. quadrato-ovato plus minus abrupte obtuso integro v. subemarginato calycis lobo superiore sæpe duplo longiore, labio inferiore corollæ calcari porrecto crasso subcrassove conico-cylindraceo v. conico plus minus obtuso v. oblique obtusiusculo brevior, capsula globosa calycis lobos subæquante.

Loc. Chittagong, *J. D. H. et T. T.!* Silhet, *hb. Wall.!* Ceylonia, *Walker!* Maulmein et Mergui, *Griff. hb. Hook.!* &c.

Flores magnitudine valde variabili. Corolla in exemplis e montibus Khasiæ purpurea (fid. *sched. J. D. Hook.*).

Utricularia (e Concan, *Stocks coll.*) floribus paucioribus 1-5 (sæpius 1-3), scapo 2-6 unc., corollæ labio superiore plus minus oblongo v. elliptico-quadrato obtuso integro calycis lobo superiore ovato-rotundato v. rotundato subapiculato longiore.

Corollæ recentis color incertus. An forma *U. racemosæ*, Wall.?

19. *U. NIVEA* (*Vahl(?)*, *Wall. in Rab. Fl. Ind. ed. Carey*, i. 144, ex *Wall. l. c.*). Scapo suberecto circiter 6 unc. filiformi interdum bifido fructifero elongato volubili, floribus parvis 4-8, corollæ labio superiore brevi lineari emarginato, inferiore calcari conico adscendente fere duplo brevior, capsula globosa.

Loc. In oryzetis prope Serampore.

Corolla alba palato flavescente.

20. *U. FILICAULIS* (*Wall. Cat.* 1501). Scapo filiformi erecto 2-4 unc. paucifloro, calycis lobis subæqualibus ovato-rotundatis obtusis v. superiore obtusiusculo, corollæ labio superiore integro v. emarginato (ex descr. A. DC. "oblongo obtuso integro") quam calycis lobus superior vel parum longior vel brevior, calcari porrecto cylindraceo v. cylindrico-conico quam lobus inferior non parum longior.

Loc. Tavoy, *W. G. hb. Wall.!*

Utricularia scapo erecto capillaceo 1-4 unc. 1-4-floro, calycis lobis æqualibus subæqualibusve, superiore ovato-rotundato subapiculato v. obtuso, inferiore subtrotundato, corollæ labio superiore lanceolato v. oblongo integro obtuso calycis lobum superante, inferiore cucullato integro, calcari conico-cylindrico vel fere subulato porrecto v. adscendente, capsula subglobosa calycem æquante v. superante, stylo brevi, seminibus minutissimis obsolete reticulato-striatis.

Loc. In montibus Khasiæ, *J. D. H. et T. T.!*

Corolla pallida lilacina (fid. *sched. cum sp.*). An ad *U. filicaulem*, Wall., referri debet?

Indeterminatæ (Nigrescentes).

U. squamosa, Bj. (*Bot. Zeit.* 1845, 212).

U. paucifolia, Bj. (*Linnæa*, xx. 309).

U. obtusiloba, Bj. (*l. c.* 312).

U. albiflora, Griff. (*Notulæ*, iv. 168).

§ III. *Folia sub anthesin persistentia, reniformia, orbiculata v. orbiculato-spathulata. Calyx lobis valde inæqualibus, inferiore minore. Corolla labio inferiore non galeiformi plus minus lobato.*

Plantulæ e rosula foliorum stolones v. ramulos graciles repentès utriculiferos sæpe emittentes. (Semina sæpe (semper?) appendiculata, pilis elongatis v. spinulis (cellulis testæ productis) capitatis glochidiatisve plus minus instructa.)

A. *Folia reniformia v. orbiculato-reniformia.*

21. *U. BRACHIATA* (*sp. nova*). Scapo nudo gracillimo erecto v. ascendente 2-4 unc. sæpius 1-floro rarissime 2-floro, foliis reniformibus gracili-petiolatis, corollæ labio inferiore quinque-lobato, lobis laterali-bus superioribus divergentibus linearibus obtusis, lobo inferiore centrali valde latiore subquadrato rotundatove plus minus abrupte obtuso.

Loc. In Himalaya orientali temperata, prov. Sikkim, Lachen, inter muscos, alt. 8-11,000 ped., *J. D. Hooker!*

Species elegans. Radix fibrosa, ramulis repentibus gracilibus interdum parce utriculiferis. Folia petiolis basin versus gracillimis. Bractea minuta, basi-soluta v. adnata, pedicellum gracilem calcar v. florem æquantem gerens, cum bracteolis lanceolatis v. latioribus, acutis v. obtusis, v. minute denticulatis. Calyx purpureus, lobo superiore late orbiculato emarginato v. retuso (forsitan interdum integro) lateribus inflexis lobum inferiorem obovatum valde excedente. Corolla alba, labio inferiore infra faucem macula flava notato, superiore minimo bilobato v. profunde emarginato laciniis obtusis v. minute emarginatis calycis lobum superiorem æquante v. paulo brevior, corollæ labii inferioris lobi laterales inferiores sæpius distincti, obtusi, nonnunquam vix prominentes. Calcar dependens v. subcurvatum, lineare, obtusum, calycis lobum inferiorem 3-4-plo excedens, corollæ labio inferiore brevius.

Folii reniformis lamina cum petiolo sæpe $\frac{1}{2}$ - $\frac{3}{4}$ unc. longa, corollæ lobis superioribus labii inferioris plus minus linearibus divergentibusque, ab *U. orbiculata* dignoscitur.

A basi calcaris ad extremum corollæ labii inferioris 3-4 lin. Folia interdum 2-3 lin. lata.

B. *Folia orbiculata v. orbiculato-spathulata.*

22. *U. ORBICULATA* (*Wall. Cat.* 1500). Foliis orbiculatis orbiculato-

spathulatisve petiolatis, scapo tenuissimo 2-4 unc. 2-4-floro interdum elongato multifloro (8-12), corollæ lilacinæ labio superiore brevissimo minute bilobato bidentatove calyce brevior, inferiore quinquecrenulado-lobato lobis obtusis æqualibus subæqualibusve v. interdum lobulis duobus superioribus majoribus tribus inferioribus minoribus, calcari dependente lineari-subulato labium inferius æquante, seminibus ovatis ovato-oblongisve cellulis productis glochidiatisve testæ plus minus armatis.

U. glochidiata, *Wight*, l. c. t. 1581. (U. striatula, *Sm.*?)

Loc. In Ceylonia, *Gardner!* *Walker!* &c. Cochin, *Johnstone!* Concan, *Law!* Khasia, *J. D. H. et T. T.!* Nipalia, *Wall.!* Tavoy, in *hb. Wall.!* Maulmein, *Lobb!* (Forma lobis corollæ labii inferioris distincte inæqualibus) Maulmein, *Parish!* Prope Malacca, *Griff. herb.!*

Pulcherrima. *Scapus* nudus v. squamis (1-2) minutis basi-solutis instructus. *Pedicelli* calcari longiores v. breviores, fructiferi sæpe laxe patentis v. dependentes. *Calyx* lobo superiore late rotundato plus minus emarginato v. integro capsulam globosam parum superante, inferiore valde minore suborbiculato ovato demum deflexo.

Corolla lilacina, fauce flavo (fid. *sched. Parish.*)

Corollæ labium inferius basi 2-4 lin. latum, nonnunquam latius, magnitudine valde variabile.

I am unable to satisfy myself of the identity of this plant with the *U. striatula* of Smith, from the imperfect examples preserved in the Smithian herbarium or the British Museum. If they be not the same species, they are certainly very closely allied, as already noted by Benjamin, who, indeed, quotes Smith's name as synonymous with *U. orbiculata*. Benjamin is certainly in error in describing the lower lip of the corolla in the latter plant as 4-lobed.

23. U. MULTICAULIS (*sp. nova*). Cæspitosa, scapo firmo nudo 1-2 unc. 1-3-floro, foliis orbiculato-spathulatis petiolatis, pedicellis ante anthesin sæpius cernuis per anthesin tamen erectis, corollæ carneæ labio superiore brevissimo semi-orbiculato integro emarginatove, inferiore 4-lobato vel 3-lobato lobo inferiore centrali plus minus profunde emarginato, interdum sub-6-lobato lobulis duobus lateralibus superioribus sæpe dentiformibus subnullisve, calcari crassiusculo dependente conico-cylindrico obtusiusculo labio inferiore sæpius brevior.

Loc. In Himalaya orientali temperata, prov. Sikkim, locis paludosis, Lachen, alt. 11,500 ped., Lachoong, 6-7000 ped., *J. D. Hooker!*

Species minima, cæspitose crescens. *Scapi* stricti, fere robusti, conferti, pedicellis subcrassis fructiferis erectis v. cernuis calyce sæpe 3-4-plo longioribus. *Bractea bracteolæque* minutæ lanceolatæ v. oblongæ, vix acutæ, basi-solutæ. *Calyx* lobo superiore late rotundato primum integro, postea (a læsura?) sæpissime bilobato v. bidenticulato, inferiore obovato-orbiculato emarginato v. minute denticulato. *Corolla* carneæ, fauce flavescens (ex *sched. J. D. H.*), lobulis labii inferioris sæpius

plus minus angustis oblongisve nunquam patenti-divergentibus. *Capsula* globosa, calycem subæquans v. excedens, stylo nullo. *Semina* satis maturata non certe observavi.

A basi calcaris ad extremum corollæ labii inferioris 1-1½ lin. Scapus sæpius 1-1½ unc. longus.

24. *U. FURCELLATA* (*sp. nova*). Minima, scapo gracillimo ¼-1½ unc. 1-2-floro, corollæ albæ labio inferiore forma lobata varia sæpius quadrilobato laciniis duabus inferioribus æqualibus obtusis subemarginatisve, superioribus lateralibusque brevibus obtusis interdum minutis subnullisve (labio tunc bilobato), calcari dependente subulato quam calycis lobus inferior 3-5-plo longiore labium corollæ inferius æquante v. excedente, seminibus pro planta tantula magnis ovatis ad extremitatem crassam cellulis testæ productis glochidiatis v. capitatis instructis.

Loc. In montibus Khasia, Boga Panee, *J. D. H. et T. T.!* Prov. Sikkim, Lachen, ad rupes humidas, *J. D. H.!*

Folia orbiculata, petiolata. *Scapus* rarissime 3-florus, nudus, bracteis bracteolisque minutissimis ovatis oblongisve acutis obtusisve basi vix solutis. *Pedicelli* graciles, calcari breviores v. longiores. *Flores* parvi; albi. *Calyx* lobo superiore late orbiculato sæpe emarginato lobum inferiorem oblongum v. obovatum apice interdum denticulatum valde excedente. *Corolla* labio superiore calyce brevior plus minus bilobato v. emarginato, inferiore 2- v. 4-lobato vel (segminibus inferioribus plus minus coalescentibus) subtrilobato. *Calyx* fructiferus, lobo inferiore denique sæpius deflexo. *Capsula* calyce brevior. A summo calycis lobi superioris ad apicem calcaris 1½-2 lin.

Formam majorem notavi (in coll. Darjiling, "*E. I. C.*") 1-3-floram, calcari longiore, corolla lobo inferiore calyci æquilongo v. paulo excedente, foliisque late orbiculatis.

Ab affinis dignoscitur calcari dependente subulato recto v. vix curvato acuto, corollæ labio haud 5-lobato, seminibus et foliorum forma.

25. *U. KUMAONENSIS* (*Oliver*). Minima, scapo ½-2 unc. 1-3-floro, foliis orbiculatis orbiculato-spathulatisve petiolatis, corollæ labio inferiore 5-lobato, lobo centrali valde latiore subquadrato emarginato v. integro, lobis lateralibus parvis linearibus v. lineari-oblongis obtusis plus minus divergentibus, calcari dependente subcylindraceo v. cylindrico-conico obtuso obtusiusculove quam labium inferius paulo brevior, capsula subglobosa calycem æquante v. subæquante, seminibus (ut in præced.) magnis testæ cellulis sæpe papillæformibus e seminis apice plus minus longe capillaceo-productis.—*Diurospermum album* (Edgew. in Linn. Proc. i. 351) verisimiliter conjungi debet (vide obs. supra).

Loc. In Himalaya occidentali temperata, Pilti fl., alt. 7,500 ped., *Strachey et Winterbottom!* (? *Diurosp. album* "super rupes madidas in Vishnu Gangetis valle," alt. 8,000 ped., *Edgeworth, l. c.*)

Pedicellus infimus demum patens v. adscendens, calyce 2-3-plo longior.

Bracteæ *bracteolæque* minutissimæ, a basi vix solutæ. *Calyx* lobo superiore suborbiculato corollæ labium superius excedente, inferiore valde minore subrotundato calcari 2-3-plo brevior. A basi posteriore calcaris ad extremum corollæ labii inferioris 1-2- lin.

Ab *U. brachiata* (cujus semina matura non certe vidi) differt, foliorum forma præsertim, statura minore, et a ceteris sectionis hujus seminibus longe-appendiculatis vel corollæ labii calcarisque forma.

Utriculariæ Indicæ mihi non satis cognitæ.

26. *U. MINUTISSIMA* (*Vahl*). Scapo capillari 2-3 unc., squamis raris bracteisque (ut mihi videtur) basifixis, floribus parvis paucisque subremotis, pedicellis brevissimis bracteam æquantibus v. parum excedentibus, calycis lobis vix æqualibus subobtusis.

Loc. Malacca (*in hb. Smith. vidi*).

27 (?). *UTRICULARIA* (*Madras coll. No. 52*). Habitu *U. reticulatam* revocans, differt corollæ labio superiore ovato elliptico vel subrotundato marginibus reflexis *emarginato*, calcari labium inferius æquante v. interdum non parum excedente.

That this paper may embrace all the Indian members of the natural order *Lentibulariæ*, I append to the foregoing monograph of the *Utriculariæ* a notice of the only species of *Pinguicula* hitherto discovered in India.

PINGUICULA, *L.*

1. *P. ALPINA*, *L.*

Loc. Himalaya alpina; Sikkim, alt. 10,000-13,000 ped., *J. D. Hooker*! (? Kumaon, alt. 11,000, ped., *Strachey et Winterbottom*). Planta Kumaonensis (exempla fructifera tantum, *in hb. Hook. vidi*) verisimiliter ad speciem eandem pertinet.

The occurrence of this plant in the Himalaya is an interesting extension of its area towards the south and east.

Regarding the *P. flavescens* of Flörke as a form of the same species, we may trace it from the north of Scotland, through Scandinavia, and Northern and Central Russia, to the Urals, and the vicinity of Lake Baikal. At more considerable elevations it crosses Europe from the Pyrenees, through the Alps, Austria, &c.

I do not discover any material difference between Dr. Hooker's specimens, aided by a coloured drawing from the fresh plant, and the European series of *P. alpina* in the Hookerian herbarium. The Sikkim specimens are almost or quite glabrous, of the stature of *P. vulgaris*, and with pale yellowish-white flowers, bearing a yellow spot in the throat.

On Five New Plants from Eastern Peru. By RICHARD SPRUCE,
Esq. Communicated by GEO. BENTHAM, Esq., V.P.L.S.

[Read March 3rd, 1859.]

I. WETTINIA ILLAQUEANS, a new PALM from the Peruvian
Andes.

Among the many interesting plants discovered by M. Pöppig in his downward journey from the sources of the Huallaga to the mouth of the Amazon, none was more remarkable than the undescribed Palm which he gathered "in Transandine Peru, in the beautiful shady woods which border the northern bank of the river Tocache," and which was afterwards published by himself and M. Endlicher under the name of *Wettinia augusta*. Its place in the system was considered doubtful by Endlicher, who left it at the end of *Pandaneæ*, with the remark that it afforded a passage from Screw-pines to Palms, and would perhaps be ultimately reckoned among the latter. I have been on the look-out for this plant from the day of my entering the forests of the Huallaga; and though I have not yet seen the original species, nor have reached within 100 miles of Pöppig's locality for it, I have found what is obviously a second species of the same genus, which has enabled me to decide that *Wettinia* must definitively be stationed among the true Palms. I have been so many years away from books, that I know not how botanists now-adays distribute the genera ascribed to Screw-pines by Endlicher and Kunth; but I believe that the American have been separated from the Eastern genera, and, as it appears, with perfect justice. In fact, the American plants, formerly referred to as Screw-pines, seem to me to constitute two distinct orders, each of equal value with *Palmeæ* and *Pandanaceæ*, viz. 1st, *Phytelephantaceæ*, which are (so to speak) palms with an inferior ovary; and 2nd, *Cyclanthaceæ*, whose inferior ovary alone separates them from Arads. *Wettinia*, however, is far removed from both these; the fruits are superior, and though so densely crowded on the spadix as to suggest the inferior concrete fruits of *Phytelephas*, there is no real resemblance to the latter. The habit, the ringed stems, the male and female flowers, the structure of the ovary and fruit, are in every respect as in Palms. *Wettinia Maynensis*, like *W. augusta*, has entirely the aspect of an *Iriarteæ*. The straight, smooth, ringed stem, of 30 to 40 feet high, is supported on a cone of emersed prickly roots 3 feet in height; the petioles are dilated into long,

tubular, entire sheaths; and the broad pinnæ are præmorse, and cut at the extremity. It differs notably from the *Iriarteas*, in the short spadices, so densely clad with hairy fruits as to have suggested to the prurient imagination of the Peruvians the name by which this palm is known in Maynas—*Púllo-coróto* (i. e. “testiculi hirti”).

Wettinia Maynensis differs from *W. augusta* chiefly in the more numerous pinnæ (38–40 pairs, while in *W. augusta* they are but 18–20 pairs), and in the spadices, which are only three from one leaf-ring, and put forth 5–8 fastigiate branches at their apex; while in *W. augusta* they are simple, and as many as from 8 to 15 grow from the same ring. There is a further difference, in the spathes, which in *W. Maynensis* are 6 in number, the three outer (corresponding to what are called by Martius in other genera “*spathæ incompletæ*”) much smaller, and persisting on the peduncle in the form of sheaths; while the three inner and larger ones (“*spathæ completæ*”) fall away before the fruit is ripe, or persist only in fragments. In *W. augusta* the spathes are said to be two, and the peduncle is said to be furnished with remote coriaceous sheaths—undoubtedly the remains of the incomplete spathes. In both specimens the sepals vary in number, and the stamens are from 12 to 16, nor does there seem to be much difference in the form of the fruit; but in *W. Maynensis* the arilli-form raphe is in every stage thin and papery, while in *W. augusta* it is fleshy. In Endlicher’s description, the scale-like external sepals are considered bracts; but as they quite correspond to what are called sepals in other palms, I describe them as such.

On comparing Endlicher’s description of the ovary of *W. augusta* with that of *W. Maynensis*, given below, there is an apparent difference, which at first sight might be supposed even generic; but when the two species come to be compared, I expect it will turn out to be no difference at all. In *W. augusta* the ovary is said to be solitary, and the style is inserted “*prope ovarii basin eodem cum ovulo latere*”—an abnormal position in palms. In *W. Maynensis* the ovaries are 3, concrete at the base with each other and the central style; two of them are mostly sterile, and at the time of ripe fruit might be taken for a mere thickening of the base of the style, along with which they persist, of course laterally to the fertile carpel. I have no doubt that the same structure obtains in *W. augusta*, and that the sterile ovaries are either obsolete or have been overlooked from their minuteness.

From the detailed description of *W. Maynensis*, an idea may be

obtained of the affinities of *Wettinia* among the genera of palms. If we are guided by the triple ovary, then it must be stationed in *Coryphinae*; but the only genus described by Kunth in this tribe with pinnate leaves is *Phœnix*, which, besides being very different in habit, has the stamens never more than 9, and a sessile stigma on each ovary. But if we be guided by the sum of all the characters, we shall place it next the genus which most resembles it in habit, viz. *Iriartea*. *Iriartea* has the same emersed cone of roots, the obliquely præmorse and incised pinnæ, the numerous stamens; one species (*I. setigera*) has setulose fruit; and a seed of *I. exorrhiza* placed by the side of one of *Wettinia Maynensis*, is scarcely distinguishable—it is veined in the same way by the vessels of the rhaphe, and the embryo has the same position. If the spathes are not the same in number in the two species of *Wettinia*, so also are they different in nearly every species of *Iriartea*; in *I. setigera* they are 4 or 5, in *I. exorrhiza* 5 or 6, and in *I. deltoidea* 10 to 12. Lastly, as the ovaries of *Wettinia* are concrete at the base with each other and the central style, they may, and perhaps ought to, be looked on as a deeply 3-cleft ovary, analogous to the 4-cleft ovary of *Labiates*; and then the difference from the 3-celled ovary of *Iriartea* will not appear so very great. The character of the spadices of *Wettinia*, previously alluded to, though striking at first sight, does not disturb the affinity with *Iriartea*.

Hence we may either place *Wettinia* in *Coryphinae*, and consider it analogous to *Iriartea* in *Arecinae*, or, by another classification of the genera of palms, place it actually by the side of *Iriartea*.

Wettinia Maynensis is not unfrequent at the head of valleys in the Maynensian Andes*, both north and south of the river Mayo, at an elevation of from 3000 to 4000 feet, where it grows in company with the Chonta† (*Euterpe oleracea?*), the Tarapoto (*Iriartea ventricosa*, Mart.; the *Paxiuba barriguda* of Brazil), and another *Iriartea*, which is perhaps *I. deltoidea*, Ruiz et Pav.,

* I apply the term "Maynensian Andes" to so much of the eastern slopes of those mountains as was comprehended in the ancient province of Maynas. They are watered by the lower part of the Huallaga till it emerges into the great Amazonian plain through the Pongo of Chasuta, and by some of its principal tributaries, especially by the Mayo, which, taking its rise a little eastward of Chachapoyas, passes Moyobamba and Lamas, and enters the Huallaga near Tarapoto.

† The name "Chonta" is applied in Maynas to two species of *Euterpe*, and also to the *palmito* or terminal bud of all palms.

though, having not yet seen perfect flowers and spathes, I am not certain about it. When the people go to cut palmitos in the time of Lent, they sometimes mistake the *Wettinia* for the *Iriarteas*, which have edible palmitos, while that of the *Wettinia* is very bitter and may be distinguished from the others by its striped appearance (caused by the vertical imbrication of the young pinnæ), whence it is often called *Shúllu-chonta*. The *Huácara-póna*, or Horn-palm (*I. exorrhiza*, Mart.), though frequent in the moist woods of the plain, I have not yet seen at the same elevation as the palms above-mentioned.

I proceed to give the characters of the two species of *Wettinia*, and a description of *W. Maynensis*, drawn up from fresh specimens. I abstain from offering an amended character of the genus until I shall have an opportunity of examining specimens of *W. augusta*, and perhaps of other species which yet remain to be discovered.

WETTINIA, *Pœpp. et Endl. Nov. Gen.* ii. 39, t. 153 et 154 a-i;
Kunth, Enumer. iii. 109 et 589.

W. AUGUSTA (*P. et E.*). Rhizomate conico e radicibus arcte sibi invicem impositis conflato; pinnis 18-20-jugis; spathis propriis 2; spadicibus simplicibus pluribus (8-15), ex eodem verticillo ortis; rhaphe arilliformi carnosa.

Hab. "In Peruvia Transandinæ sylvis pulcherrimis obumbrantibus, quibus arcetur ripa borealis fluvii Tocache." (*Pæppig, loc. cit.*)

W. MAYNENSIS (*Spruce*). Rhizomate conico, e radicibus inter se liberis dissituseculis conflato; pinnis 38-40-jugis; spathis propriis 3; spadicibus apice congesto-ramosis, paucis (sub 3), ex eodem verticillo ortis; rhaphe arilliformi tenui.

Hab. In convallibus Andium Maynensium umbrosis, præcipue secus rivulos, alt. 3000'-4000', sociis *Iriartea ventricosa* Mart. et *deltoidea* R. et P. (?).

Descr. *Caudex* radicibus strictis subaculeatis e terrâ emersis et in conum 3 pedes altum conniventibus sustentus, erectus, inermis, 30-40-pedalis, diametro 4-unciali, annulatus; annulis latis, spatio 4 unc. sejunctis. *Fronde*s 5 v. 6 contemporaneæ, patulæ, ambitu lanceolatæ, obtusæ, basi in vaginam prælongam 3½-pedalem integram subventricosam dilatatæ, glabræ. Rhachis 9¼-ped., supra triangularis, subtus semiteres, basi solâ subcanaliculata, et a basi ipsâ pinnata. Pinnæ 38-40 paria, subæquidistantes; infimæ minutæ; mediæ 3-pedales, latitudine 3-unciali, angulo 40°-50° insertæ, basi semiverticales duplicatæ cuneatæ, dein dimidiato-lineari-lanceolatæ, apice obtusato- v. truncato-præmorsæ, margine antico apiceque incisæ, dentibus præmorsis subacutisve; venæ plurimæ, basi fere contiguæ, superne magis

dissitæ, et in dentes marginales alternis vicibus excurrentes, subtus prominulæ costæformes, interspatiis plicâ percursis.

Flores monoici, in diversis spadicebus, plerumque tribus (sc. unico ♀, cæteris duobus ♂), ex eodem verticillo ortis*.

♂. *Spathæ* 6: 3 exteriores cuneatæ, vaginæformes, subtrigonæ, 4-unciales, primitus clausæ, apiculatæ, dein apice irregulariter ruptæ, imbricatæ, persistentes; 3 interiores majores, 11×3-unc., e basi angustatâ stipitiformi fusiformes, apiculo brevi compresso obtuso recurvo, pergamenæ, minute crebre striatæ, arcte imbricatæ, pro spadice emissionem laceræ, caducæ; omnes spathæ pilis brevibus appressis fulvescentibus subdeciduis vestitæ. *Spadicis* stipes 6-unc., obsolete trigonus, fere teres, pro spatharum insertionem annulatus, annulo supplementario apicali vaginam bilabiata (quasi spatham rudimentariam) gerente, in ramos subocto, confertos, simplices, 6-unciales, præflorationem sinistrorsum circinatos postea subrectos, teretes, minute pannosos, spiralliter areolatos, floribus dense obteetos, divisus. *Sepala* squamæformia, crassa, rigida, castanea, subpuberula, tuberculis paucis sparsa, æstivationem valvata; *exteriora* 3-5 (plerumque 4), late subulata, obtusiuscula, lineam longa, libera vel nonnunquam duo in unicum bifidum coalita; *interiora* tria, longissima (7 lin.), anguste subulata, subflexuosa. *Stamina* 12-16 (plerumque 13); *antheræ* paullo supra basin in *filamento* brevi ($\frac{1}{2}$ -1 lin.) subulato compresso positæ, lineares, 4 lin. longæ, obtuse 4-gonæ, 2-loculares, longitudinaliter dehiscentes, pilis albidis flexuosis deciduis vestitæ, connectivo centrali tenui in mucronem curvulum producto; *pollen* globosum læve.

♀. *Spathæ* iis spadicebus ♂ subconformes, ancipites tamen, compressulæ, bilabiatis rumpentes, labiis fissis; 3 interiores, fructibus maturatis, caducæ vel eorum reliquia sola persistentia. *Spadicis* stipes subcompressus, 10-uncialis, adscendens, apice decurvus et ramos 5-7 confertos, fere verticillatos, rectos, patulos, 8-unciales, diametro (fructibus inclusis) fere 4-unciali, proferens. *Sepala exteriora* tria, a basi prælatâ triangulari brevi-subulata, 2-3 lin. longa, inter se subinæqualia; *interiora* tria, late subulata, subflexuosa, 5-6 lin. longa. *Ovaria* tria, ovalia, 3½ lin. longa, basi inter se et cum stylo coalita, villosa, 1-locularia, 1 vel sæpius 2 sterilia; ovulum unicum ex baseos angulo interno fere erectum, sessile, anatropum. *Stylus* unicus centralis, 7 lin. longus, subulatus, subtrigonus, villosus, plerumque cum ovariis abortivis ad ovarii fertilitatis basin persistens, rarius deciduus; *stigmata* tria teretia, erecto-flexuosa, 3 lin. longa. *Baccæ* 1-spermæ, siccæ, in spadice densissime collectæ, pressione mutuâ 3-6-angulari-obpyramidatæ, apice lato convexo, pilis cinereis, basi solidis subfasciculatis, superne continue tubulosis, flexuosis, villosæ. *Pericarpium* molliter lignosum, tenuiusculum, apice incrassatum. *Endocarpium* membranaceum,

* Spadices, with ripe fruits, are usually found on the fourth ring below the fronds; the other three rings (which are at first very close, but become more distant as the trunk lengthens) have spadices in different stages of growth.

rapheos vasibus adhærens. *Semen* 11×6 lin., anguste ovali-obovatum subtrigonum; *testa* tenuis, firma, nigrescens, a basi ad apicem usque rraphe tenui percursa et ejusdem vasibus albis complanatis adhærentibus reticulata, cum nucleo connata. *Albumen* æquabile, subosseum. *Embryo* in foveolâ basilari nidulans, conico-cylindricus, ad nuclei centrum directus.

II. DISCANTHUS, a new genus of CYCLANTHACEÆ.

DISCANTHUS, gen. nov. Cyclanthacearum.

Char. Gen.—*Flores* monoici in eodem spadice, in seriebus circularibus, masculis cum femineis alternantibus, dispositi. *Spathæ* 4, imbricatæ, deciduæ. *Perigonia* florum femineorum discis pluribus distinctis bilamellatis spadicem ambientibus constantia; florum masculorum 0. *Stamina* inter perigoniorum annulos vel discos in ordines quatuor structa; *filamenta* omnia ad medium usque inter se coalita, superne libera, antheram paullo brevior, innatam, linearem, obtuse 4-gonam, bilocularem, longitudinaliter dehiscentem, gerentia. *Laminæ* cujusque disci in facie interiori ovarium continuum, sectione verticali ovato-lanceolatum, gerentes, supra ovarium concretæ (unde ovarium inferum), apice iterum discretæ; margine reflexo minute serrato, nervo e spadice axi radiante in dentes singulos excurrente. *Ovula* 00, ovalia vel ovata, anatropa, ad ovarii parietes funiculo æquilongio flexuoso adfixa, pluriseriata. *Styli* tot quot perigonii dentes, iisdem subbreviores, lineares, compressi, medio nervosi, in serie unicâ ad cujusque laminæ faciem interiorem accreti, apice solo brevi-ligulato libero intus stigmatoso. *Fructus* e discis pluribus, carnosus, margine unisulcis, interne ad parietes seminiferis, constans. *Semina* 00, ovata, subgibba, breviter obtuse subapiculata, 12-sulcata, rraphe angustâ apice incrassatâ semicincta. *Testæ* membranæ tres; externa internaque pellucidæ minute cellulosæ, hæc apice brevi-tubulari; media e reticulis parallelogrammis, oblati, medio depressis, in series 12 longitudinales catenatim dispositis, formata. *Nucleus* ellipsoideus, basi minute mamillatus. *Embryo* rectus cylindræus, hilo contiguus, in albuminis carnosi basi nidulans.—Herba Peruviana *acaulis*, frondibus *bipartitis*, facie Carludovicæ vel Cyclanthi; ab hoc perigoniis circularibus nec spiralibus, et ovulis ab initio nudis in ovarium continuum collectis, diversa.

DISCANTHUS ODORATUS, Spruce.

Hab. In sylvis humidis Andium Maynensium, prope Tarapoto, præcipue ad rivuli fauces *Pongo del Shillicaio* dictas.

Caudex 0. *Frondes* plures, petiolatæ, erecto-arcuatæ, pallide virides, subtus albo-virides, fere ad basin usque bipartitæ; lacinia 44 × 7 unc., lineari-lanceolata, subacutæ, angulum 15° inter se formantes, costâ mediâ validâ suprâ elevatâ subtus convexâ, venis crebris parallelis, *plicis nullis*. *Petiolus* 4-pedalis tenuiusculus, basi solâ dilatatus am-

plexicaulis, dein trigonus, facie inferiore convexus. *Spathæ* 4, secus spadiciis stipitis apicem imbricatæ, ovatæ, concavæ; extima apice foliaceo bilobo; interiores sensim minores, acutæ; intima obtusata. *Flores* odorati. *Spadices* subcylindrici, obtusi, superne paullo tenuiores, 3-4 uncias longi; floriferi 13 lineas, fructiferi 18 lineas crassi; stipite tereti 7-unciali. *Disci* 20, floriferi $3\frac{1}{2}$ lineas, fructiferi 6 lineas lati, $1\frac{1}{2}$ lineam crassi. *Semina* vix $\frac{3}{4}$ lin. longa.

This remarkable plant resembles the *Cyclanthi* and bifid-leaved *Carludovicæ* in habit, but differs from both in the laciniaë of the fronds having a single strong costa (whence they should perhaps be considered conjugate pinnæ), and in being destitute of plicæ. It is nearly allied to *Cyclanthus*, but differs essentially in the perigonium consisting of distinct disks (and not of a continuous spiral) embracing the spadix, and in the ovules being naked from their first appearance (long before the opening of the flowers), and springing on longish funiculi from the very walls of the disk, while in *Cyclanthus* they are at first contained in small pluriovulate ovaries, sessile on the walls of the disk in two rows, and finally become confluent. There would seem to be also a difference in the seeds; but though there is a species of *Cyclanthus* in the forests of Tarapoto, I have seen only its young flowers, and Kunth describes the seeds incompletely. The seeds of *Discanthus* are remarkably 12-sulcate, and traversed from base to apex by a narrow rhaphe, which is not arilliform, as that of *Cyclanthus* is said to be. After fecundation, the stamens fall away, and the disks, increasing in thickness, become contiguous. Half-grown ovules had the micropyle still open, and the amniotic sac separable. Great numbers of acicular raphides exist in the cells of the funiculus, rhaphe, and testa; at first they are in bundles, but as the seed ripens they break up from each other.

III. *YANGUA TINCTORIA*, a new genus of BIGNONIACEÆ, whose leaves are used for dyeing blue by the Peruvians of Maynas.

YANGUA, gen. nov. N. O. BIGNONIACEÆ. Tribus TECOMEÆ.

Char. Gen.—*Calyx* latus obpyramidato-campanulatus, ore patulo, profunde 5-plicatus, fere ad medium usque in lobos 5 cuspidatos fissus. *Corolla* basi brevi-tubularis, dein campanulata compressa, antice profunde bisulcata, postice trigona; limbo sub-bilabiato, subæqualiter 5-lobo. *Stamina* 4 didynama, cum rudimento quinti, in corollæ tubi apice inserta, corollâ dimidio breviora. *Antheræ* biloculares, loculis divergentibus. *Ovarium* disco impositum, fusiforme, biloculare. *Ovula* 00, secus septi angulos parietales inserta, subsessilia, globoso-oblonga,

anatropa. *Stylus* corollâ subbrevior, *stigmatè* e lamellis duabus erectis ovatis crenulatis formato. *Capsula* siliquæformis, magna, lata, compressa, profunde 12-sulcata, bilocularis, bivalvis, ab apice loculicide dehiscens. *Semina* late alata, pluriseriata, septo parallela, arete imbricata. *Embryo* planus, exalbuminosus; cotyledonibus oblatis, profunde emarginatis, basi cordatis; radiculâ brevi subulatâ hilo proximâ. —*Arbor* Peruviana *humilis*, *Tecomæ affinis*, floribus *tamen virescentibus*, calyce *laxo 5-plicato*, et capsulâ *insigniter 12-sulcatâ diversa*.

YANGUA TINCTORIA, *Spruce*.

Hab. Tarapoto locisque aliis Andium Maynensium, passim pro foliis cæruleo-tinctoriis culta, et nomine *Yangua* a Peruvianis insignita. In sylvis nusquam vidi; et ubi terrarum indigena sit, mihi nondum constat.

Arbor 30-pedalis, erecta; cortice profunde sulcato; ramis dichotomis, ramulis obtuse 4-gonis compressulis, faciebus 1-sulcatis. *Folia* opposita, digitata, in petiolo 8-unciali, plano-convexo, apice haud incrassato. *Foliola* 7, in petiolulo subunciali suprâ sulcato, terminale majus $5\frac{1}{2} \times 2$ unc., cætera sensim minora, lanceolata vel subobovato-lanceolata, cuspidè longiusculâ unciali et ultrâ subacutâ, tenuia, pellucido-punctata, glaberrima, siccando nigrescentia; in stirpe juniore nunquam supra medium grosse serrata, in adultiori tamen integerrima; venis paucis, angulo 50° e costâ egredientibus, subtus prominulis, longe intra marginem arcuato-anastomosantibus. *Panicula* brevis e ramulorum novellorum dichotomiâ; ramis cymulas 3-12-floras gerentibus; pedicellis basi bracteolatis. *Calyx* albidus, tenuis, fere membranaceus, laxis, corollæ basi multo latior, 5-plicatus, obpyramidato-campanulatus, ore patulo, fere ad medium usque in lobos 5 brevi-ovatos, cuspidè abruptâ tenui nervo fere repletâ terminatos, fissus, 8 lineas longus, seriùs subauctus, longe persistens, ante fructûs maturationem tamen deciduus. *Corolla* pallide viridis, minute puberula, intus tomentella, venis plurimis longitudinalibus percursa, $2\frac{1}{2}$ unc. longa, subcurvata, basi tubulari angustâ calycem vix æquante, dein campanulata, compressa, antice profunde bisulcata, postice obtuse 3-gona; limbo sub-bilabiato, 5-lobo, lobis subæqualibus brevi-ovatis obtusatis subrecurvis. *Stamina* corollæ tubi apice inserta, corollâ dimidio breviora; quinti rudimento subulato fertilibus multoties breviori et paullo inferius inserto; *filamenta* basi glandulis brevi-stipitatis obsessa; *antheræ* lineari-oblongæ, loculis divergentibus. *Ovarium* fusiforme, disco impositum. *Ovula* 00, secus septi margines subsessilia, globoso-oblonga, anatropa. *Capsula* viridis, lineari-fusiformis, acuta, compressa, $9\frac{1}{2}$ unc. longa, 25 lin. lata, 12 lin. crassa, angulis 12 elevatis acutis percursa, ex interstitiis canaliculiformibus 12-sulcata, 2-locularis, ex apice loculicide dehiscens; *septa* binata valvis contraria, margine solo inter se coalita, sed a pericarpio crassiusculo lignoso intus lævissimo soluta, seminum delapsorum cicatricibus notata et ideo limam ferrariam haud male simulantia. *Semina* ad lineas plu-

rimas (spatio 2 lin. sejunctas) a septorum marginibus angulo 45° procedentes, sursum directas, sed ad septorum latitudinis vix tertiam partem attingentes, funiculo brevissimo inserta, sc. 4 ad utramque lineam, in laminas 24 septo parallelas colligata, superiora et lateralia inferioribus et interioribus incumbentia, alâ tenuissimâ 2×1 unc. cincta* ; nucleo 3½×3 lin. obcordato plano. *Testæ* tenuis firmiusculæ membrana exterior in rugas creberrimas irregulariter transversales elevata, interior ab exteriori embryoneque demum separabilis. *Embryo* planus, exalbuminosus; cotyledones oblatae, profunde emarginatae, basi cordatae; radícula brevis, subulata, hilo proxima.

I first saw the tree above described in January 1851, at Janauari, in the angle between the Rio Negro and Amazon, where it had been raised from seeds brought from Peru; but it had no flowers or fruit; and I did not again see it until I arrived at Tarapoto in June 1855, when I at once recognized it growing in the gardens, and here and there in the open grounds near the town. I have not yet seen it truly wild, nor can I learn whence it was originally brought. It is planted in all the villages I have seen in the Maynensian Andes, and is especially noticeable in the pretty English-looking village of Morales, where it forms scattered clumps on the verdant plain, accompanied by oranges and limes; by the *Ciruelo* (*Spondias*, sp.); the *Siamba* palm (an undescribed *Ænocarpus* with clustered stems); picturesque old *Huingos* (*Crescentia Cujete*), whose branches are hidden by a dense coating of mosses, ferns, and orchids; and several species of terrestrial figs, whose tortuous trunks are enveloped in a network of their own roots. It is a small tree, scarcely larger than *Sambucus nigra*, which it much resembles in its thick cracked bark, though its regularly forked and somewhat rigid branches give it otherwise a different aspect. When out of flower, it might be passed over for a *Tecoma*, to which it is undoubtedly closely allied; but the green flowers, the large lax plicate calyx, and the broad pods traversed by twelve deep furrows are marks that at once distinguish it from that genus. The inhabitants of Maynas dye the cotton cloths of their own manufacture a permanent blue by simply boiling them along with Yangua leaves. About every three months every leaf that can be got at is stripped off; and the trees seem not to suffer from being thus denuded; but they rarely put forth flowers till they grow beyond the reach of spoliating hands.

* *Ala* seminum inferiorum margine plurisinuata; funiculis seminum superiorum, quibus ala rectangularis margine subintegra adest, per sinus alarum inferiorum egredientibus.

It should be mentioned that the name "Yangua" is given also to two species of *Indigofera*, cultivated sparingly at Tarapoto: they are sometimes called "Tascha-yangua" (or "small Yangua"), to distinguish them from *Yangua tinctoria*, which is the "Atun- (or great) yangua."

IV. CAPIRONA, a new genus of RUBIACEÆ. Tribe, CINCHONEÆ.

Char. Gen.—*Calyx* obparabolicus, compressulus, inferne cum ovario connatus, dimidio superiore liber, ore obtuse 5-6-dentato; florum axillarium dente externo plerumque in laminam phylloideam producto. *Corolla* e basi angustâ tubulosâ, campanulata, subgibba, 15-18-sulcata, 5-6-lobata; lobis cordato-ovatis imbricatis, 3 (vel omnibus) demum reflexis, quasi bilabiata. *Stamina* 5 (raro 6) corollâ duplo breviora; *filamenta* basi in tubulum corollæ tubo adnatum coalita, dein libera *antheræ* lineares, connectivo adnatæ, 2-loculares, longitudinaliter dehiscentes. *Ovarium* inferum, biloculare. *Ovula* 00 in placentis elongatis, sectione reniformibus, dissepimento utrinque insertis, sessilia, anatropa. *Stylus* brevis cum stigmate lineari bilamellato tubum stamineum paullo superans. *Capsula* anguste obovata, calycis limbo coronata, ab apice ad basin septicido-bivalvis. *Semina* 00, parva, tenuia, alâ trapeziformi vel triangulari basi sæpius bilobâ cincta. *Embryo* in axi albuminis carnosi orthotropus; *cotyledonibus* parvis ovalibus subplanis; *radiculâ* tereti hilo proxima.—*Arbor* Peruviana cortice castaneo deciduo, stipulis intrapetiolariibus, floribus magnis Bignonioides, Calycophyllo proxima; huic tamen sunt flores multo minores, corolla brevi-campanulata symmetrica omnino esulcata, lobis concavis fere fornicatis nunquam reflexis, et filamenta corollæ æquilonga cum eadem ad loborum basin usque concreta, haud in tubulum coalita.

CAPIRONA DECORTICANS, Spruce.

Hab. Tarapoto et aliis locis secus fl. Huallaga, in sylvis primævis recentioribusque, solo arenoso. *Capirona* Peruvianorum dicta est.

Arbor pulchra 30-40-pedalis, apice parce patule ramosa; ramulis subteretibus; cortice castaneo, lævissimo, nitente, lamellis tenuissimis secedente. *Folia* opposita, in petiolo perbrevis 5-lineari, maxima 20 × 10 unc., oblongo-ovalia, apice rotundata vel apiculo brevissimo obtusato terminata, subcoriacea, glaberrima vel in stirpe juniore ad venas et in facie inferiore plus minus pubescentia; venis validis parallelis, angulum 70° cum costâ efformantibus, secus marginem curvatis et anastomosantibus. *Stipule* intrapetiolares, 36 lin. longæ, 13 lin. latæ, elongato-triangulari-lingulatæ, acutæ, 2-costatæ, venulosæ, albidæ, submembranaceæ, basi subcordatâ sese imbricantes. *Cymæ* ex stipularum superiorum plerumque aphyllarum axillis, subinde paniculam magnam terminalem efformantes; pedunculo 9-unciali v. breviori, apice 3-fido; ramis bis terve bifidis, bracteolâ stipulari ad cujusque rami basin. *Flores* ad ramorum apices axillasque solitarii,

sessiles, ebracteolati, visciduli, subodorati; axillaribus præcocioribus, plerumque (haud semper) dente calycis externo in laminam phylloideam, albidam, 3-costatam, venulosam, convexam, ovalem, obtusam, $3 \times 1\frac{1}{2}$ unc., petiolo $1\frac{1}{2}$ -unciali, producto. *Calyx* viridis, obparabolicus, compressulus, obsolete 5-gonus, semuncialis, dimidio superiore libero persistente, ore dentibus 5-6 obtusis. *Corolla* sesquiuncialis, crassiuscula, extus alba roseo tincta, lobis intus sanguineis, e basi brevitybulosâ $2\frac{1}{2}$ lin. longâ campanulata, subgibba, 15-18-sulcata, ab apice ultra $\frac{1}{3}$ in lobos 5-6 cordato-ovatos æstivatione imbricatos vix parum contortos, 3 vel omnibus seriùs reflexis, quasi bilabiata, fissa. *Stamina* 5, basi in tubulum corollæ tubo adnatum ore pilosum coalita; *filamenta* glabra $3\frac{1}{2}$ lin. longa; *antheræ* filamentis æquilongæ, lineares, obtusæ, connectivo adnatæ, ad corollæ loborum basin attingentes, loculis vix basi productis longitudinaliter dehiscentibus. *Ovarium* inferum, disco epigyno crasso cupulari coronatum, 2-loculare; *ovula* plurima, anatropa, secus placentas incrassatas (sectione reniformi) dissepimento utrinque adnatas apice solum liberatas, sessilia, imbricata, angulo 45° ascendentia, tenuia, alâ trapeziformi vel triangulari circumcincta, nucleo minuto infra alæ centrum. *Stylus* brevis cum stigmate lineari profunde bilabiato, intus dense papilloso tubulum stamineum paullo superans. *Capsula* anguste obovata, inferne sensim angustata, 10×5 lin., apice disco et calycis limbo brevi coronata, leviter 10-striata, e folliculorum marginibus introflexis axi coadunatis demum ab apice separatis 2-locularis; epicarpium tenue badium; endocarpium cartilagineum albidum. *Semina* 00, parva, badia, alâ membranaceâ ovulorum formâ, basi sæpius bilobâ, apice lacerâ vel laciniatâ, nucleo ovali compresso infra-centrali, constantia. *Testa* membranacea firmiuscula arcte venoso-reticulata. *Embryo* $\frac{1}{2}$ lin. longus, in albuminis carnosî axi rectus; *radicula* teres, $\frac{3}{10}$ lin. longa, hilo proxima; *cotyledones* parvæ, $\frac{2}{10}$ lin. longæ, ovales, subplanæ.

This handsome little tree is very frequent near Tarapoto, where it grows chiefly on the lower hills, in a sandy soil. Its trunk is conspicuous among the other trees, from the shining reddish bark, which is continually peeling off in broad thin flakes. In this respect it quite resembles the Mulatto-tree of the inundated shores of the Amazon, which bears in abundance corymbs of small white flowers scented like those of the hawthorn, and in structure very like those of a *Cinchona*. The latter tree, called also "Capirona" by the Peruvians, but "Páo mulatto" in Brazil, has been proposed by Mr. Bentham as the type of a new genus of Cinchoneæ, under the name of *Enkylista*. *Capirona decorticans* has, however, very slight botanical affinity with *Enkylista*, and stands much nearer to *Calycophyllum*, from which it is strikingly distinguished by the *large ribbed flowers*, and the much shorter

stamens combined at the base into a tube which lines the short tubular base of the corolla,—although it has the same character, of the outer tooth of the calyx of the axial flowers being produced into a leafy lamina, which gives to *Calycophyllum* its name.

There is some analogy to Bignoniaceæ, in the campanulate sub-symmetrical flowers with a short tubular base and an approach to a bilabiate limb. Indeed the flowers remind one much of those of *Henriquezia*, which on its side shows an approach to Rubiaceæ in the inferior ovary. The winged seeds of *Capirona* it has in common with the rest of the Cinchoneæ, and with all true Bignoniaceæ.

Enkylista I have seen along the shores of the Amazon for full 2000 miles. It perhaps extends downwards to the very mouth of the river, and it is said to be still abundant above the mouth of the Huallaga. On the latter river it is frequent; and I have traced it by the streams among the roots of the Andes up to a height of about 2000 feet. *Capirona* grows only on dry ground; and I have not yet seen it at a greater elevation than *Enkylista*, nor anywhere far from the river Huallaga.

The light tough wood of the *Capirona* renders it very suitable for the beams of houses; and the trees are mostly cut down when they have attained a suitable size; so that it is rare to find a well-grown or a flowering specimen.

There is apparently a second species with subpilose leaves, attenuated at the base and apex, and with paler bark, in which a green tinge is always perceptible. It grows rather higher than *C. decorticans*, and is very abundant at Yurúnaguas on the Huallaga; but as I have never seen its flowers or fruit, and could therefore give only an incomplete character of it, I hesitate to signalize it by a distinct name.

V. ERYTHRINA AMASISA, a new species with follicular pods.

ERYTHRINA AMASISA (*Spruce*). Arborea, foliolis ovato-rhombeis glabrescentibus, racemis terminalibus brevibus subpaniculatis, calyce truncato, vexillo anguste ovato complicato carinam gamopetalam incurvam triente superante, alis e calyce exsertis, legumine folliculari.

Hab. Tarapoto, in sylvis montium inferiorum præcipue secus rivulos.

*A'ma-sísa** a Peruvianis designata est.

Caudex 80–100-pedalis, basi subdilatus, superne ramosus; *ramis* haud late patulis; *ramulis* verrucoso-scabris cinereo-tomentellis; *cortice*

* Query—a corruption of “Amor-sisa,” i. e. “Love-flower”?

lævi, aculeis brevi-conicis pungentibus obsesso. *Folia* pinnatim 3-foliata; *petiolus* 7-uncialis basi incrassatus; *rhachis* $2\frac{1}{4}$ -uncialis; *foliola* in petiolulo semunciali rhombeo-ovata, vix apiculata, subobtusata, juniora pubescentia seriùs glabrescentia; terminale $7\frac{1}{2} \times 5\frac{1}{4}$ unc.; lateralia subminora, eorum petiolulo basi glandulâ stipellari brevi-cylindrica, lineam longa, deflexa, cava, ore truncato aperto instructo. *Folia* inferiora majora et longius petiolata sunt. *Stipulae* minutissimæ squamæformes citò deciduæ. *Racemi* terminales, 2-6-unciales, cinereo-tomentelli, solitarii vel sæpius plures paniculati. *Pedicelli* 5 lineas longi, seriùs elongati, ebracteolati, basi apiceque articulati, decurvo-secundi, ternatim fasciculati, verticillati, nempe quoque verticillo e fasciculis 3 v. 4 constante. *Flores* penduli, magni, speciosi, miniati, graveolentes. *Calyx* obconico-urceolatus, truncatus, puberulus. *Vexillum* anguste ovale, obtusum, 20 lin. longum, primitus complicatum, dein recurvo-explanatum, apice solo haud evoluto, ungue brevi lato. *Alæ* diminutæ, 3-lineares, ovali-spathulatæ, subobliquæ, erectæ, liberæ, margine exteriori paullo supra basin unidentatæ. *Carina* 14 lin. longa, anguste ovata, apice obtuse bidentata, declinata. *Filamenta* ad $\frac{2}{3}$ usque coalita, inter se subinæquilongâ; *antheræ* parvulæ, oblongo-ovales, paullo supra basin adfixæ. *Pistillum* stamina subæquans; *ovarium* stipitatum, tenue, subteres. *Legumen* 4-5-unciale, latitudine semunciali; *pericarpio* tenui subpuberulo. *Semina* plerumque 2 maturata et in folliculis decisis apertis longe persistentia, 3 lin. longa, 6 lin. lata; *testâ* firmâ tenui.

This is the handsomest tree I have seen in the Maynensian Andes. It is frequent towards the mouth of the hill-streams that enter the Mayo wherever any primitive forest has been left. In the very town of Tarapoto, on the rocky banks of the turbulent Shillicai, rise here and there magnificent trees of Amasisa, which have been spared the axe of the first settlers—some of them as much as 100 feet high. Twice in the year, viz. in March to April, and in August to September, they are clad with large flame-coloured or vermilion flowers, sometimes with no accompanying leaves, and sometimes with young leaves of the most delicate green, just appearing. I have been delighted to walk by the Shillicai at sunset and observe the tracery of the crown of the Amasisa, with its copious red tassels, projected on the whitish-blue eastern sky, when the flowers of almost every tree showed a different shade of yellow-red, not, however, paling to yellow on the one hand, or brightening to scarlet on the other. It continues in flower nearly two months at a time; and before it has well done flowering, the ripened follicular pods, splitting up one side only and with the seeds still adhering, begin to strew the ground. The wood is white and softish, and of no use but for firewood. The trunk is

more or less beset with sharp conical prickles, on which account it is constantly selected by the sagacious Troopial (*Cassicus icteronotus*, Swains.) for its long pensile nests,—though, as if doubting that this were sufficient to render them inaccessible, it hangs them on the very point of the outermost twigs. All the species of Troopial I have seen on the Amazon and Rio Negro, show similar foresight in selecting a place where to rear their infant colonies; and the robber who, observing no impediment from below, ventures to climb to their eyry, finds, to his cost, that it is defended by some large wasps' nest, or by hordes of stinging ants.

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— <i>paniculata</i> , <i>Lindl.</i>	55, 56	— <i>Hookeri</i> , <i>F. Müll.</i>	90
— <i>pannea</i> , <i>Lindl.</i>	50	— <i>latifolia</i> , <i>F. Müll.</i>	82, 94, 100
— <i>pauciflora</i> , <i>Wight</i>	58, 59	— <i>leptophlebia</i> , <i>F. Müll.</i>	82, 86, 100
— <i>pubescens</i> , <i>Wight</i>	54	— <i>melanophloia</i> , <i>F. Müll.</i>	82, 93, 101
— <i>pulchella</i> , <i>Griff.</i>	54	— <i>melissiodora</i> , <i>Lindl.</i>	82, 92, 95, 101
— —, <i>Lindl.</i>	51	— <i>microtheca</i> , <i>F. Müll.</i>	82, 87, 100
— <i>pulvinata</i> , <i>Lindl.</i>	56	— <i>miniata</i> , <i>A. Cunn.</i>	92
— <i>pusilla</i> , <i>Lindl.</i>	46, 48	— <i>odontocarpa</i> , <i>F. Müll.</i>	83, 98, 101
— <i>Reinwardtii</i> , <i>Lindl.</i>	55, 56	— <i>pachyphylla</i> , <i>A. Cunn.</i>	98
— <i>reticosa</i> , <i>Wight</i>	48	— —, <i>F. Müll.</i>	83, 98, 101
— <i>retroflexa</i> , <i>Lindl.</i>	60	— <i>parviflora</i> , <i>F. Müll.</i>	90
— <i>retusa</i> , <i>Rehb. f.</i>	52	— <i>patellaris</i> , <i>F. Müll.</i>	82, 84, 100
— <i>ringens</i> , <i>Rehb. f.</i>	55	— <i>phenicea</i> , <i>F. Müll.</i>	82, 91, 101
— <i>rosea</i> , <i>Lindl.</i>	50	— <i>platyphylla</i> , <i>F. Müll.</i>	82, 93, 100
— —, <i>Wall.</i>	50	— <i>polycarpa</i> , <i>F. Müll.</i>	82, 88, 100
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