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No. 4892







JOURNAL

OF

THE PROCEEDINGS

OF

THE LINNEAN SOCIETY.

---

ZOOLOGY.

---

VOL. V.

LONDON:

SOLD AT THE SOCIETY'S APARTMENTS, BURLINGTON HOUSE;

AND BY

LONGMAN, GREEN, LONGMANS AND ROBERTS,

AND

WILLIAMS AND NORGATE.

1861.

PRINTED BY TAYLOR AND FRANCIS,  
RED LION COURT, FLEET STREET.

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# PROCEEDINGS

OF THE

## LINNEAN SOCIETY OF LONDON.

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November 3rd, 1859.

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

Dr. Alexander Carte was elected a Fellow.

The special thanks of the Society were directed to be presented to J. J. Bennett, Esq., F.R.S., Secretary of the Society, for his valuable donation of Casts from the Busts of Sir J. E. Smith, Sir Joseph Banks, Bart., the Hon. Shute Barington, Bishop of Durham, and of John Hunter, Esq.

Mr. Joseph Woods, F.L.S., exhibited specimens of *Leersia oryzoides*, discovered by himself in September last, in a new locality, at Tillingbourne, near Shalford, Surrey.

Mr. Busk, F.R. & L.S., exhibited specimens of *Peziza aeruginosa*, gathered by himself, in Bolton Woods.

Read, first, "Descriptions of new species of Hymenopterous Insects, collected by A. R. Wallace, Esq., in Celebes;" by Frederiek Smith, Esq. Communicated by W. W. Saunders, Esq., F.R.S., V.P.L.S. (See Zoological Proceedings," vol. v. p. 57.)

Read, secondly, "On the Zoological Geography of the Malay Archipelago;" by A. R. Wallace, Esq. Communicated by Charles

Darwin, Esq., F.R.S., F.L.S. (See "Zoological Proceedings," vol. iv. p. 172.)

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November 17th, 1859.

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

Jabez Hogg, Esq., and William Henry Ince, Esq. were elected Fellows.

The special Thanks of the Society were directed to be given to Drs. Hooker and Thomson, for an extensive and valuable collection of plants, formed by them in the Upper Himalaya.

Read, first, "Descriptions of some new species of *Utricularia* from South America, with notes upon the genera *Polypompholyx* and *Akentra*;" by Daniel Oliver, Esq., F.L.S. (See "Botanical Proceedings," vol. iv. p. 169.)

Read, secondly, a Memoir "On the *Fumaria capreolata* of Britain;" by C. C. Babington, Esq., M.A., F.R.S., F.L.S. (See "Botanical Proceedings," vol. iv. p. 157.)

Read, thirdly, "Synopsis Crescentiacearum; an Enumeration of all the Crescentiaceous plants known;" by Berthold Seemann, Esq., Ph.D., F.L.S. (See "Transactions," vol. xxiii. p. 1.)

Read, fourthly, "On *Combretum butyrosomum*, a new kind of Butter-tree from South-eastern Africa;" by Sig. T. Caruel, of Florence. Communicated by J. D. Hooker, Esq., M.D., F.R.S., F.L.S. (See "Botanical Proceedings," vol. iv. p. 167.)

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December 1st, 1859.

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

Alfred Henry Barford, Esq., Peter Hinckes Bird, Esq., Arthur Edward Durham, Esq., John M. Jones, Esq., and Salter Livesay, M.D., were elected Fellows.

The special Thanks of the Society were directed to be given to C. C. Babington, Esq., F.R.S., F.L.S., for an extensive series of Dried Plants for the British Herbarium.

Mr. Birkett, F.L.S., exhibited living plants of *Ophioglossum lusitanicum*, gathered by him on the South Cliffs of the Island of Guernsey; and of *Asplenium marinum*, var. *microdon*, from a damp wall, in the Parish of St. Pierre du Bois, Guernsey.

Read, first, a Memoir "on the Anatomy and Development of *Pyrosoma*;" by T. H. Huxley, Esq., F.R.S., F.L.S. (See "Transactions," vol. xxiii. p. 193.)

Read, secondly, a "Notice of *Rosa rubella*, Winch, and other English plants, observed during the past summer;" by John Hogg, Esq., F.R.S., F.L.S. (See "Botanical Proceedings," vol. iv. p. 198.)

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December 15th, 1859.

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

Richard Ratliff, Esq., Assist. Surg. R.N., was elected a Fellow.

Among the presents, were casts from a Bust of John Ray, by Roubilliac, and a Medallion of the late William Yarrell, Esq., V.P.L.S., by Barnard, both presented by John Van Voorst, Esq., F.L.S., to whom the special thanks of the Society were ordered to be given for this very acceptable donation.

Read, first, "Notes upon the Society's British Herbarium;" by Daniel Oliver, Esq., F.L.S. (See "Botanical Proceedings," vol. iv. p. 194.)

Read, secondly, "Revision of the genus *Spathodea*;" by Berthold Seemann, Esq., Ph.D., F.L.S.

Read, thirdly, "On Indian *Hepaticæ*;" by William Mitten, Esq., A.L.S. (See "Botanical Proceedings," vol. v. p. 89.)

Read, fourthly, "Remarks on the Botany of Paramatta;" by William Wools, Esq. Communicated by Dr. Ferdinand Müller, F.L.S.

Read, fifthly, "On the discovery of *Lastrea remota* in England;" by Thomas Moore, Esq., F.L.S. (See "Botanical Proceedings," vol. iv. p. 192.)

Read, sixthly, "Notes of a visit to the *Cinchona* Forests, on the western slope of the Quitenian Andes;" by Richard Spruce, Esq. Communicated by Sir W. J. Hooker, F.R.S., F.L.S. (See "Botanical Proceedings," vol. iv., p. 176.)

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January 19th, 1860.

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

C. R. Bree, Esq., M.D., George McLeay, Esq., Henry Parfitt, Esq., M.D., S. N. Ward, Esq., and Tuffen West, Esq., were elected Fellows.

Read, first, "Catalogue of the Dipterous Insects collected in Amboyna by Mr. A. R. Wallace, with descriptions of new species;" by Francis Walker, Esq., F.L.S. (See "Zoological Proceedings," vol. v. p. 144.)

Read, secondly, a "List of plants observed at Mogador and its environs in April, 1859;" by the Rev. R. T. Lowe, M.A. Communicated by the Secretary. (See "Botanical Proceedings," vol. v. p. 26.)

Read, thirdly, "Further Researches on *Tomopteris onisciformis*;" by W. B. Carpenter, Esq., M.D., F.R.S., F.L.S., &c., and Edouard Claparède, M.D. (See "Transactions," vol. xxiii. p. 59.)

Read, fourthly, "On the distribution of the *Tracheæ* in Insects;" by John Lubbock, Esq., F.R.S., F.L.S. (See "Transactions," vol. xxiii. p. 23.)

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February 2nd, 1860.

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

J. W. Dunning, Esq. and G. C. Wallich, Esq., M.D., were elected Fellows.



Read, a Paper "On the mode of branching of some Amazon trees;" by Richard Spruce, Esq. Communicated by George Bentham, Esq., V.P.L.S. (See "Botanical Proceedings," vol. v. p. 3.)

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February 16th, 1860.

George Bentham, Esq., V.P., in the Chair.

J. H. Belfrage, Esq., William Coulson, Esq., and Herr Gatke, were elected Fellows.

Read, first, "On the *Ferrucariæ* of New Zealand;" by Charles Knight, Esq., F.L.S. (See "Transactions," vol. xxiii. p. 99.)

Read, secondly, "On a species of Hawk in New Zealand;" by W. L. Buller, Esq., F.L.S.

Read, thirdly, "On the Homologies of the so-called 'Univalve' Shell and its Operculum;" by J. D. Macdonald, Esq., R.N., F.R.S. Communicated by Professor Huxley, F.R.S., F.L.S. (See "Zoological Proceedings," vol. v. p. 204.)

Read, fourthly, "Notice of the occurrence of *Gyrodactylus elegans* on Sticklebacks in the Hampstead Ponds;" by C. L. Bradley, Esq. Communicated by Professor Busk, F.R.S., F.L.S. (See "Zoological Proceedings," vol. v. p. 209.)

Read, fifthly, "Further observations on the Metamorphosis of *Gasteropoda*;" &c., by J. D. Macdonald, Esq., R.N. Communicated by Professor Huxley, F.R.S., F.L.S. (See "Transactions," vol. xxiii. p. 69.)

Read, sixthly, "On the Shells observed at Mogador and its environs, in April, 1859;" by the Rev. R. T. Lowe. Communicated by the Secretary. (See "Zoological Proceedings," vol. v. p. 169.)

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March 1st, 1860.

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

Henry G. Bohn, Esq., was elected a Fellow.

Read, first, "Botanical Notes made during a tour to Moulmyne, in February, 1859;" by the Rev. C. Parish. Communicated by Sir W. J. Hooker, F.R.S., F.L.S.

Read, secondly, "On the value of Hairs, as a character in determining the limits of subordinate groups of *Compositæ*;" by William Archer, Esq., F.L.S. (See "Botanical Proceedings," vol. v. p. 17.)

Read, thirdly, "Mosses of the Amazon and Andes;" by Richard Spruce, Esq. Communicated by George Bentham, Esq., V.P.L.S. (See "Botanical Proceedings," vol. v. p. 45.)

Read, fourthly, "On *Sphærocoma*, a new genus of *Caryophyllææ*, from Aden;" by Thomas Anderson, Esq., M.D., F.L.S. (See "Botanical Proceedings," vol. v. p. 15.)

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March 15th, 1860.

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

G. E. Fryer, Esq., C. H. Gatty, Esq., G. G. Little, Esq., George Maw, Esq., and John Shortt, Esq., M.D., were elected Fellows.

Read, first, "On *Sycopsis*, a new genus of *Hamamelidææ*;" by Daniel Oliver, Esq., F.L.S. (See "Transactions," vol. xxiii. p. 83.)

Read, secondly, "On *Apocynum androsæmifolium*;" by J. P. Litchfield, M.D. Communicated by the Secretary.

Read, thirdly, "On some new species of *Musci*, from Tropical Africa, in the Herbarium of Sir W. J. Hooker;" by William Mitten, Esq., A.L.S. (See "Transactions," vol. xxiii. p. 51.)

Read, fourthly, "Note on the species of *Nissolia*;" by Asa Gray, M.D., F.M.L.S. (See "Botanical Proceedings," vol. v. p. 25.)

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April 5th, 1860.

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

A. B. Squire, Esq., and Lucas Barrett, Esq., were elected Fellows.

Read, first, "On the discovery of *Alpheus Edwardsii* on the coast of Cornwall;" by Jonathan Couch, Esq., F.L.S. (See "Zoological Proceedings," vol. v. p. 210.)

Read, secondly, "Notes on Ants;" by Mrs. Lewis Hutton. Communicated by the Secretary. (See "Zoological Proceedings," vol. v. p. 217.)

Read, thirdly, "Notes on *Ternstrœmiaceæ*;" by George Bentham, Esq., V.P.L.S. (See "Botanical Proceedings," vol. v. p. 53.)

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April 19th, 1860.

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

Dr. Hooker, F.R. & L.S., gave some account of the steps recently taken by the Indian Government, with the object of introducing living plants of the medicinal *Cinchonas* of South America.

Read, first, "Note on the Tree-Mallow (*Lavatera arborea*);" by John Hogg, Esq., F.R.S., F.L.S. (See "Botanical Proceedings," vol. v. p. 51.)

Read, secondly, "On the germination of certain species of *Cyrtandra*;" by Mr. C. W. Crocker, Foreman of the Propagation Department, Royal Gardens, Kew. Communicated by J. D. Hooker, Esq., M.D., F.R.S., F.L.S. (See "Botanical Proceedings," vol. v. p. 65.)

Read, thirdly, "Contributions to the Lichenographia of New Zealand;" by Charles Knight, Esq., F.L.S., and William Mitten, Esq., A.L.S. (See "Transactions," vol. xxiii. p. 101.)

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May 3rd, 1860.

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

J. G. Wainwright, Esq., and Dr. D. Brandis, were elected Fellows; and M. Edmond Boissier and the Rev. M. Sars, Ph.D., were elected Foreign Members.

Read, first, "On certain Sensory Organs in Insects, hitherto undescribed;" by J. B. Hicks, Esq., M.D., F.L.S. (See "Transactions," vol. xxiii. p. 139.)

Read, secondly, "Catalogue of Hymenopterous Insects collected by Mr. A. R. Wallace in the Islands of Batchian, Kaisaa, Amboyna, &c., and in New Guinea;" by Frederick Smith, Esq. Communicated by W. W. Saunders, Esq., F.R.S., V.P.L.S. (See "Zoological Proceedings," vol. v. p. 93.)

Read, thirdly, "On two tuberiform vegetable productions from Travancore;" by the Rev. M. J. Berkeley, M.A., F.L.S. (See "Transactions," vol. xxiii. p. 91.)

Read, fourthly, "Remarks on *Sclerotium stipitatum*, *Pachyma Cocos*, and some similar productions;" by Frederick Currey, Esq., M.A., F.R.S., F.L.S., and Daniel Hanbury, Esq., F.L.S. (See "Transactions," vol. xxiii. p. 93.)

Read, fifthly, "Notes on *Anonaceæ*, on *Ventilago*, a genus of *Rhamneæ*, and on *Fissicalyx*, a new genus of *Dalbergiæ*;" by George Bentham, Esq., V.P.L.S. (See "Botanical Proceedings," vol. v. p. 67.)

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May 24th, 1860.

*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,

THE return of our Anniversary claims from me this accustomed recognition of our mutual relation to each other, and I gladly commence my brief address by the expression of the feeling which is naturally uppermost in my mind on this occasion, of the warmest gratitude for the continued confidence and kindness which the experience of the past year has again exhibited on the part of the Society towards me, and which, I may well be proud to say, has never sustained a single check, or been shadowed by a single cloud, since the day when you first unreservedly confided to me the responsible and honourable occupation of this chair. If I know my own heart, that confidence, far from engendering on my part an indifference to the welfare of the Society, will only render me the more anxious to deserve it, by an unremitting watchfulness over your interests, and a constant endeavour so to fulfil the duties of my office, that when I shall finally resign it into your hands, I may still be able to congratulate myself on the continuance, *usque ad finem*, of the same uninterrupted good feeling and hearty trust.

Like its predecessors, the past year has been chequered by light and shadow. The general brightness of our career has not been without its clouds, nor can we reasonably expect, in so large a body as ours, that a year could pass away without some event to cause us sorrow, and to qualify our exultation at the increased prosperity with which we have been favoured.

When alluding to the darker phase of our year's experience, your thoughts will at once be directed with my own to the temporary removal from amongst us of one who for twenty years has been the life of our Society. The merits and services of Mr. Bennett require no eulogy from me in this place. They have been too long known and are too duly appreciated for anything that I can say to add one throb to the gratitude and affection which fill the heart of every one who has had the opportunity of observing the unwearied constancy, the rare judgment, the extensive and varied knowledge, the devotion to our interests, and the affectionate attachment, which have all been brought to bear upon the welfare of a Society of which Mr. Bennett has for so long a period been the stay and ornament, the *decus et tutamen*. These services, as modestly as efficiently conferred, have been requited by the gratitude and affection of

those who have been their recipients, the consciousness on his own part of having deserved that return, and the happiness which a reciprocity of affection and esteem must always bring to a warm and generous heart. Mr. Bennett is now seeking in a change of air and scene the restoration of his health, so precious to us all; and your earnest wishes and aspirations will go with mine, that he may be soon restored to the society of his friends, to whom the fine qualities equally of his mind and heart have rendered him so deservedly dear. Mr. Busk, who, to the great advantage of the Society, has of late acted as the Zoological Secretary, under the title (soon to be abrogated) of Under-secretary, will this day be submitted to you for election as Secretary in Mr. Bennett's place; and to the manner in which this removal has been proposed by the Council to be supplied—and which proposition you will presently be asked to confirm—I shall now briefly allude.

When Mr. Bennett found that his health was not likely to be speedily so far restored as to enable him to continue those services which the Society has for so long a time enjoyed, he considered it his duty to intimate his intention, at whatever sacrifice of feeling on his part, to resign his office of Secretary. It was represented to him that there was every reason to hope that he might before very long be enabled to resume his duties to some extent, and that in any case his name might be retained until the necessity for his retiring should become more certain, for we should all have rejoiced in affording him every assistance in our power, and his excellent colleague was ready to take as much of the extra duty as might be required; Mr. Bennett, however, felt that it would be painful to hold merely a nominal office without performing its functions, and his resignation was, perforce, accepted by the Council. They have now selected for nomination, to fill the vacancy which will be occasioned by Mr. Busk's appointment as Secretary in Mr. Bennett's place, a gentleman who I feel confident will be entirely acceptable to the Society. Mr. Currey is well known to us as a constant attendant upon our meetings, a valued contributor to our Transactions, an efficient member of the Council, and as one who, for his position, his education, his acquirements, and the amiable qualities of his heart, is admirably adapted to succeed one whose possession, in so high a degree, of all these qualifications would naturally render us fastidious in the choice of a successor.

In connexion with this subject I have to offer a few further observations. The change which it was thought desirable some time since to make in the office of "Under-secretary" by the

election of a gentleman who should perform the duties of Secretary with reference to the zoological element in our organization, has rendered it very desirable so to modify the existing by-law which relates to the former office, as to meet the new requirements; and you would have had such modification submitted to you before this, had it not been considered more convenient to bring it forward in connexion with some other slight changes, which the lapse of years and the altered circumstances of the Society have appeared to call for. This subject will shortly be referred to a committee to be appointed by the Council. The effect of this alteration will be to abolish the obsolete office of Under-secretary, and to secure in future the services of two Secretaries, attached respectively to the two branches of natural science which constitute our professed objects,—a change which is in entire accordance with the spirit and intention of the Charter.

The losses which the Society has sustained by death include several honoured names which have for a great number of years adorned our list of Fellows. Amongst them occurs that of one who, in conjunction with the revered and venerable Mr. Kirby, produced, by the publication of their truly great work, an effect which scarcely any single publication in Natural History has ever done before or since. The 'Introduction to Entomology' of these two eminent and amiable naturalists was characterized by a very rare combination of scientific accuracy, of amplitude of information, and of a style and treatment as fascinating as that of the most exciting romance. For the last few years the infirmities of age, and especially his increasing deafness, deprived Mr. Spence of that close association with this Society which long constituted one of his most cherished sources of enjoyment, and contributed so much to the pleasure of those with whom he was so long and so intimately connected. When I mention the names of Dr. Horsfield, of Sir George Staunton, of Samuel Curtis, of Henfrey, of Col. Hamilton Smith, with most of whom I have been intimately associated for a considerable portion of my life, it will readily be imagined that their removal must be painfully felt by me, as it is by all who have been associated with them. Leaving, however, to Mr. Busk the interesting but often painful office of further noticing those whose loss we have to regret,—a duty which by long custom constitutes one of the many sources of obligation under which we lie to our Secretary,—I turn with great satisfaction to the general condition of the Society, and to the circumstances of success and progress which have characterized the past year.

In many respects this success has been unprecedented in our annals.

Adverting, in the first place, to that element without which all the talent and energy and zeal of our Fellows would be unavailing,—the financial condition of the Society,—I have the greatest satisfaction in directing your attention to the Auditors' report, by which I find that the income has exceeded that of any former year, for a period certainly of the last thirty years—amounting to no less than £1345. It is true that our expenses have been large—in some respects, considerably larger than usual; but when we look at the character of our publications, and at the gratifying fact that we have paid off the only two bonds remaining at the last Anniversary, and that we are now able, for the first time for more than thirty years, to declare ourselves free from bonded or other debt, and with such a balance in our favour as to leave us free from all anxiety on this head, I am sure you will respond cordially to an expression of thankfulness for our unprecedented prosperity, which enables us to keep up the high tone of our publications and to carry out all the objects of the Society, without the distressing and depressing consciousness of perpetual debt. And now I cannot but express my most anxious desire that, in the course of the year on which we have entered, we may be enabled to increase, by however moderate a sum, that funded capital to which I look as the main condition of permanent prosperity, and as our resource in case of any emergency that may occur; for it is surely prudent, and I may say imperative, that we should not recklessly trust to a continuance of the happy state of our finances which we at the present moment enjoy, but determine, at whatever sacrifice, to provide for any future adverse contingencies.

Another very important phase in our present well-being is the number of new Fellows who have been elected in the past year, amounting to no less than thirty-six—a larger number than I have ever known during the long period of forty-five years that I have belonged to the Society, and very greatly in advance of the average. Of late years there has been upon the whole a considerable increase: in the year ending in May 1857 there were thirty-one elected, in 1858 there were twenty, and in 1859 twenty-six. All these numbers were considerably above the average of many years; and when we look at the scientific character of those who have thus recently joined us, we shall find that we have a still higher



ground for congratulation than the mere accession of numbers, and that we may look with confidence to numerous rising naturalists, who will honourably fill the places of those who, as the natural consequence of the lapse of time, are passing away from the scene of our labours.

I can also point with equal satisfaction to the contents of the publications, in both forms, which have emanated from the Society during the past year. In accordance with a wholesome arrangement on which we have acted for the last few years, a Part of the Transactions is regularly published, so as to be ready for delivery to the Fellows as nearly as possible on the reassembling of the Society after the recess. The part of the Transactions which was published in November last is in no respect inferior to those which have preceded it, and the illustrations are of a very high character in that department of art. Without any depreciating comparison, I would especially point to Mr. Fitch's illustrations of Dr. Hooker's paper on the Pitcher-plants, as affording a remarkable example of artistic effect combined with scientific accuracy of detail, in mere outline, such as I am confident could have been produced by no other artist. The bold freedom of hand, never entrenching upon the necessary severe accuracy of character, is unsurpassed. I cannot refrain from adding that, for defraying the expense of placing these beautiful plates on stone, we are again indebted to the liberality of the distinguished author of the paper.

I took occasion, at the last Anniversary, to express my regret that the Zoological element in our publications had been considerably subordinate to the Botanical. I have great pleasure in observing that this inequality has been in great measure obviated during the past year. Out of sixteen papers contained in the last part of the Transactions, seven are of a Zoological character, and nine are Botanical; and with regard to the Proceedings, it has become necessary, from the influx of Zoological papers suited for publication in that form, to issue a supplementary part of Zoological Proceedings similar to those which have been already added to the ordinary quarterly issue in Botany.

It is unnecessary for me to enter into any analysis of the various papers contained in these publications, but I would for a moment advert to another, and, as I conceive, not an unimportant element in our customary work,—I mean the conversational discussions which arise out of the communications read at the ordinary meetings.

I have always felt that the introduction of this custom has been productive not only of immediate interest, but of much valuable information. Conducted, as I am happy to say these discussions have always been amongst us, with good temper and kindly feeling, they tend greatly to enliven our meetings, to correct mistakes and errors, to elicit fresh information, to give confidence to the younger and authority to the older Fellows, and to create a more intimate and friendly relation between the members of our body. It has even sometimes happened, on the rare occasions when we have scarcely had a paper of interest left for the evening's reading, that some subject has been incidentally started, the discussion of which has been carried on with so much spirit and intelligence, and has elicited so much fresh information, as to make ample amends for the absence of any long systematic paper, which, however valuable in a scientific point of view, might have excited but little attention in the hearers, and have accomplished its object of usefulness and interest, only when it should have appeared in our publications. When the custom of sitting in solemn silence to listen to the reading of papers, whether dull or interesting, without the opportunity of even hazarding a single remark upon the subject of them, was broken through, and friendly discussion was allowed and invited, there were some of our most distinguished members, the intensity of whose conservatism led them to anticipate the ruin of the Society, or at least that its meeting-room would become the arena of almost gladiatorial combats of rival intellects. I need not say how fallacious these forebodings have, happily, proved, and I cannot but hope that those who have the power, will never want the will to take a part in so agreeable a means of contributing to the general stock of our knowledge.

Whilst dwelling on the pleasant subject of our prosperity, I cannot pass without notice a striking proof of the estimation in which the publications of the Society are held,—I mean the extent of their sale out of the Society. Notwithstanding the number of members who have recently joined us, the amount received for the sale of the Transactions and Proceedings is no less than £178, which is not only far in excess of any previous year, but more than double the average of many years past.

The Auditors' report is before you, but I will recapitulate one or two items, in order to place our present condition in a simple and perspicuous point of view. Our balance at the banker's is diminished by no less than £139, but our debt is abolished to the extent of £439, leaving a balance in favour of the Society on the

year's account in round numbers of £300; besides this, we possess £300 Consols, the amount of the two legacies of Mr. Brown and Mr. Solly.

Having now, Gentlemen, alluded to what is past, I must beg your kind attention to some further remarks with regard to a possible future.

The object of the Linnean Society, as defined by the Charter, which, I presume, must be considered as the indisputable authority and exponent of its functions, is "the cultivation of the science of Natural History, especially of the Natural History of Great Britain and Ireland." I have already referred to its ordinary means of effecting this and its more extended objects—namely, the reading of papers and other contributions, and the publication of the contents of such papers. But is this the only mode in which its influence and prestige can be exerted in furtherance of this great end? May not the same means, legitimately and in perfect consistency with its other duties, be employed in giving important assistance to those local Associations which in various parts of the country have become the centres of districts, as regards the collection and description of their natural products? I took the opportunity afforded me at one of our former Anniversary meetings to express an earnest wish that some of these local Associations could be brought into connexion with the Linnean Society, and communicate to us the results of their labours; selections from which might be published, after careful consideration, in our Proceedings. This suggestion has not hitherto been responded to, but I still think that the plan may very safely be worked out, so as to ensure a considerable accession to our knowledge of local botany and zoology. The promotion of this kind of knowledge, by the introduction of such topics into the usual course of popular education, would be of immense advantage, not only as affording great opportunities of enlarging our knowledge of the natural history and the geographical distribution of the plants and animals of the country, but in fulfilling a far higher and more important end, that of training the mind of the multitude in the pursuit of the most humanizing, the most religious, the purest, and at the same time the most available of all branches of human knowledge.

It has appeared to me that in England and in Scotland this branch of education has been too little attended to. The information which I have been able to obtain on this subject is far from satisfactory. It is true that in some provincial towns, where

Mechanics' Institutes or Scientific and Literary Societies are occasionally established, very imperfect courses of lectures are given, chiefly by amateurs whose knowledge is ordinarily but slender, and whose lectures are attended rather as a passing amusement than as a means or stimulus to the attainment of a really efficient knowledge of the subject. The absence, until within a very recent period, of all recognition of such departments of knowledge by our educational authorities, whether in the higher or lower places of education, has necessarily precluded the general extension of even the most elementary instruction in Natural History. I took occasion, in a former Anniversary Address, to record the concessions which had been wrung from the authorities of our two time-honoured Universities; and the step of granting Degrees in Science, which has been recently taken by the University of London, must have a most beneficial influence hereafter; but it is as yet rare to find any individual in authority, whether a clergyman or a schoolmaster, who has the inclination, even if he had the time, to devote his energies to this object; and the rare exceptions are only sufficient to prove the rule.

In Ireland, on the contrary, there appears to be a very widely spread disposition, wherever a general education is allowed, to cultivate Natural History as an important branch of it. I have lately had my attention drawn to this subject in relation to the sister kingdom, and I will detain you for a few minutes in detailing some of the results of my inquiries. The establishment of the Queen's Colleges in Ireland, whatever may have been the objections to some details in their organization in the first instance, has undoubtedly already been of very great service to the cause of education amongst the middle and the upper middle classes of the community. It is also to be remembered, that from these classes must spring all the education, for good or for ill, of the masses of the people. In these colleges, professors are appointed in those sciences, to which we, in this Society, are professedly addicted.

The Queen's University in Ireland requires, for the degree of Bachelor of Arts, attendance, in the third year, upon lectures on Zoology or Botany, and this is included amongst the subjects on which the candidate must pass examinations. Either Natural Science generally, or, specifically, Zoology or Botany, is insisted on when the candidate goes in, either for or without honours; and also for the first-class University certificate, to such as are not members of the University. Taking the Belfast College as an example, I find that in the year 1849-50 the number of students in ma-

thematics of the first year was 86, but in the year 1858-9 they had dwindled to 45. In Zoology and in Botany, on the contrary, whilst in the former academical year they were only 12 in each of these departments of Natural Science, they had increased in the last-named year to 63 and 62. This appears to me to be a remarkable fact, as indicative of a rapidly advancing taste for the sciences of observation, and for Natural History in particular. That these courses of lectures do not consist of slight elementary outlines, or of dry systematic details, the brief summary of the course of Dr. Dickie, the Professor of Natural History in the College of Belfast, published in the Government Report, will sufficiently attest. It has, however, been recently proposed to render the attendance upon these lectures so far voluntary that the student may substitute some other named subject for either or both of them. This is a very unfortunate, and, as it appears to me, a very mistaken procedure, and will, I fear, tend to negative the beneficial results which might have been anticipated from a continuance in the former arrangement. But it is not only in the regular curriculum of the University that the teaching of Natural Science is provided. The Professors are frequently called upon to lecture in various parts of the country, and Professor Thomson recently informed me that he had lectured in a small country town to an audience whose numbers during the whole course of ten lectures did not fall short of about 400. I have also recently been favoured with interesting returns from several flourishing provincial societies in Ireland, in which, as a general rule, the Natural History sciences are successfully cultivated.

On a recent visit to London, my friend Mr. Robert Paterson of Belfast (a most zealous and accomplished naturalist, and the author of the best school-book on Systematic Zoology which has ever appeared) favoured me with some information on the subject of the spread of Natural History science in Ireland, which induced me to seek, through his kind intervention, for fuller details; and the result is, that I have received communications of a more or less interesting nature from a considerable number of the provincial institutions in that part of the United Kingdom.

With reference to the work I have just alluded to, the 'Zoology for Schools,' and another little book by the same author, 'First Steps to Zoology,' I understand that about 40,000 copies have been sold, besides 10,000 copies of Illustrations of vertebrate and invertebrate animals,—an extent of distribution which I presume to be unparalleled in the same number of years, with regard

to any works by one author, introductory to a particular science.

The Natural History Society of Dublin, of which our respected Fellow, Dr. Harvey, is a zealous supporter, numbers about 160 members. Its meetings are held monthly, from November to June, besides popular meetings which are held occasionally under direction of the Council. The papers and more important discussions are published quarterly in the 'Natural History Review' and 'Quarterly Journal of Science;' they are annually distributed amongst the members in a collected form, under the title of 'Proceedings of the Natural History Society of Dublin.'

The Dublin University Botanical and Zoological Association was founded by the lamented Dr. Ball, about ten years since, and the Proceedings are published quarterly in the 'Natural History Review,' and twice a year in a separate form.

The Belfast Natural History Society was established in 1821. Commencing with but few members, it has gradually increased in numbers and importance, and a commodious building has been erected for collecting their specimens and holding their meetings, which take place twice in the month during the session. In proof of the extent to which the inhabitants are interested in the objects of the Society, I am informed that on Easter Monday in this year the Museum was visited by 7000 persons. The Society, which now consists of about 250 members, does not itself publish any regular Transactions, but the members have on many occasions *sent contributions* to publishing Scientific Societies.

At Holywood there is a Society having the usual objects of provincial Scientific and Literary Associations; it is under the presidency of the learned Bishop of Down and Connor. Here lectures are delivered every fortnight by Professors of the Queen's College, Belfast, and others. No Transactions published.

At Carrickfergus the Literary and Scientific Society is under the patronage of the Marquis of Downshire. Here also lectures are given on Natural History, under the sanction of Government, by a Professor from Dublin, and medals and books are awarded as prizes to proficient students. The Society appears to be very useful and flourishing, but, as in other cases, there is no opportunity of publishing any new facts or contributions to science.

The Cuvierian Society of Cork does not publish papers. Its only publication has been the Fauna and Flora of the County, which appeared in 1845.

Of the Armagh Natural History and Philosophical Society, I

have been favoured with the reports of several years. This flourishing institution is under the patronage of the Primate of Ireland, and the presidency of the distinguished astronomer Dr. Robinson. Lectures have been delivered on Natural History, and there is the nucleus of a good Museum, and it is now proposed to form a collection of the Fauna of Ireland. Here also there is no publication of the Society's contributions to science.

The last Society on which I shall detain you is that of Dunganon. Here lectures have been given from time to time upon Natural History, by Mr. Patterson of Belfast, Professor Allman, and others, and prizes awarded for proficiency in this science. Papers are read at the meetings, but there is no opportunity of publishing them offered by the Society.

A great number of very interesting details connected with the several societies to which I have now briefly called your attention, and others, have come to my hand, but I have not thought it necessary to detain you by relating them. I must, however, ask your attention for a few moments whilst I mention some reflections which have occurred to me, arising out of the perusal of these reports.

The first remark I would make is, that the arrangement and constitution of the Queen's University in Ireland, and the Colleges in connexion therewith, recognize the right of the various provincial Associations to apply to them for appointed lecturers, amongst the professors in the colleges, to give courses of lectures on Natural History to the members, and to others who wish to attend them. A second circumstance connected with the general details which I have glanced at is, that when such lectures are given by really competent persons, they are attended by large numbers of those who are anxious to obtain good solid information in the science of Natural History.

The importance of these facts as bearing upon the intellectual, and therefore the moral character of the Irish people, if carried out as it has been begun, can scarcely be overrated. But the consideration arising out of these circumstances, which I would most particularly impress upon your minds as a Society, is, that with all the advantages derived from the existence and due administration of the Institutions which I have been enumerating, and the recognition in so many ways of the importance of Natural Science as a branch of popular education, and the mass of facts which must be continually brought before them, there are, with two or three exceptions, no means whatever provided for the register of those facts, or for the publication of communications made to the Socie-

ties, however valuable and interesting they may be. It is to this point that I have been principally endeavouring to lead; and to suggest (for I am not competent to do more) whether the Linnean Society may not, both in this and the sister kingdom, by offering a place in our publications for a selection from those contributions, be the means of preserving much valuable matter from being lost, and extending the patronage and prestige of the Society to such provincial institutions as may be desirous to avail themselves of this advantage. You will perceive that this is merely carrying further, and founding upon a still broader basis, the views which I took the liberty to enunciate upon a former occasion. Should the suggestions which I have now ventured to make, ever appear to the Society to be in any degree susceptible of being efficiently carried out, without infringing upon our more normal and important duties, I believe that any increase of our expenses which may thus be entailed upon us would be amply supplied by an accession of members from Ireland; and I cannot but believe that the closer union which would thus be created between the naturalists of the two components of the united kingdom would, *inter alia*, tend to that increasing good-will and mutual understanding which every lover of his country, on both sides of the Channel, must be rejoiced to recognize as already progressing, and earnestly endeavour to promote.

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#### OBITUARY NOTICES.

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

*Mr. Charles Barter* entered the service of the Royal Botanic Gardens, Kew, in April 1849, having been previously employed under his father, who was gardener at Cadlands, near Southampton. During the two years that he remained at Kew, Mr. Barter seems to have been most industrious in acquiring a knowledge of botany, and, as one proof of his proficiency, Mr. Smith, the Curator, states that a copy of Hooker's 'British Flora' having been offered by him as a reward for the best and most correctly named collection of native specimens, and four of the young men connected with the Gardens having competed for it, the prize was gained by Mr. Barter. In April 1851, he exchanged the service of the Royal Gardens, Kew, for that of the Royal Botanic Society,



in the Regent's Park, where he remained as a foreman till 1857, when, on the recommendation of Sir W. Hooker, he was engaged as Botanist to the Niger expedition, under Dr. Baikie.

Of his energy and industry while in Africa it is impossible to speak too highly. His collections, now forming part of the rich Herbarium of the Royal Gardens, Kew, embrace upwards of 1300 species, about 220 of which are probably undescribed, including twenty-four or twenty-five new generic types, and examples of the eight following orders, not previously known in the Niger Flora; viz. *Humiriaceæ*, *Balsamineæ*, *Primulaceæ*, *Cuscutæ*, *Myoporineæ*, *Aristolochiaceæ*, *Cycadaceæ*, and *Butomeæ*.

Dr. Hooker has dedicated to him, and described in the present volume of the Society's 'Journal' (Bot., p. 14, tab. 2), a very singular and anomalous genus of *Passifloreæ*, allied to *Smeathmannia*, R. Br., and detected by Barter himself at the mouth of the Niger. In proposing that this interesting plant should bear the name of its indefatigable discoverer, Dr. Hooker observes that his collections far exceed in magnitude, condition, and value, those of any other explorer in those regions.

An extract of a letter from Mr. Barter to Prof. Bentley, dated Rabba, River Quorra, Sept. 29, 1857, about three months after his arrival in the river, was published in vol. ii. of our 'Journal' (Bot., p. 180), and two letters addressed by him to Sir William Hooker, and dated, respectively, January 2, 1859, and March 7, 1859, are printed in the fourth volume.

Extracts from many of the letters addressed by him to Sir W. Hooker during the progress of the Expedition, appeared from time to time in the 'Gardener's Chronicle' for 1858 and 1859, and the announcement of his death, which, as stated by Dr. Baikie, in a letter to his brother, occurred at Rabba, on the Niger, on the 15th of July, 1859, is accompanied by the following observations by the editor:—"We, in common with all who knew Mr. Barter, regret his untimely fate. The letters from him, published in our columns, in the early part of the present year, showed him to be a man of great intelligence; and the very valuable collections of both living and dried plants sent by him to Kew proved that his intelligence was accompanied by much zeal and untiring energy. We believe that his death was caused by dysentery—a dreadful scourge in such climates as the banks of the Niger."

Mr. Barter was elected an *Associate* on the 18th of November, 1858, but the news of his death arrived before his name could be inserted in the printed list.

*Jacob Bell*, who died on the 12th of June, 1859, was elected a Fellow of the Society on the 6th of March, 1832.

Although he never took any active part in the labours of the Linnean Society, Mr. Bell was a distinguished patron of art and science. As the founder, moreover, of the Pharmaceutical Society, and the active agent, at great personal labour and expense, in the procuring of its Charter, he contributed very largely to the advancement of an art in many ways intimately connected with our pursuits, and thus demands from us a tribute to his memory. A brief account of his useful life and career is given in the 'Pharmaceutical Journal' for September 1859. In this he appears as an upright, earnest, and excellent man, to whom science and art were, indirectly, under considerable obligations.

*Lieutenant-General Sir Thomas Makdougall Brisbane, G.C.B., G.C.H., Colonel of the 34th Regiment, F.R.S., and Pres. Roy. Soc. Edin., D.C.L. of Oxford*, was born at Brisbane, near Largs in Ayrshire, in July 1773. He entered the Army in 1782, at a very early age, and accompanied the forces under the Duke of York in the campaigns in Flanders, where he was actively engaged and received a wound. He subsequently served with distinction under Sir Ralph Abercrombie in the West Indies, and under the Duke of Wellington in the Peninsula, where he commanded a brigade, and was present in most of the important battles, and wounded in that of Toulouse.

From 1820 to 1825 he filled the post of Governor-general of New South Wales, where he established an observatory, and favoured science in every way in his power.

He was elected a Fellow of the Linnean Society on the 5th of June, 1821, and died at Brisbane on the 27th of January, 1860, in the 87th year of his age.

*Samuel Curtis, Esq.*, son of the well-known original proprietor of the 'Botanical Magazine,' and author of the 'Flora Londinensis,' was born in the year 1780. He commenced life as a nurseryman in Essex, and acquired a considerable reputation in the planting and laying-out of pleasure grounds and gardens. His scientific labours appear to have been confined principally to the continuation of the publication of the 'Botanical Magazine,' which, as is well known, has since long flourished under the editorship of Sir W. J. Hooker. Mr. Curtis was elected a Fellow of the Linnean Society, November 20, 1810.

Some years since he retired to a curious little property which he had purchased in the island of Jersey, and where he died on

the 6th of January, 1860, in his 81st year. At this spot Mr. Curtis' talents as an ornamental gardener appear to have been displayed to great advantage, and in opposition even to apparently insurmountable difficulties.

For the following particulars respecting this abode I am indebted to Mr. Adam White, who paid Mr. Curtis a visit in the year 1858. The place is named La Chaise, and is one of the rocky knolls lying close to Rozel Bay, in the island of Jersey. Many years ago Mr. Curtis was struck with the sheltered situation of the bay, and thought of it as a place to which he would like to retire. For a trifling sum he purchased the rock and immediately began to transform it into a Chinese garden. It was so steep and bare, that, excepting a scanty sprinkling of rock flowers, it produced nothing and seemed incapable of being turned to any account. By quarrying the rock, however, he made a smooth surface on which he built a house, and by dint of labour he carried winding walks to the top, and succeeded in bringing up some of the rich vegetable soil of the island, with which he filled artificial fissures and hollows in the rock. The result was, that in a few years La Chaise was covered with a mass of the most varied vegetation, and in 1858 Mr. Curtis informed Mr. White that he had at least 2000 different species of plants, shrubs, trees, and flowers growing in the utmost luxuriance on what a few years before was a bare rock. Shrubs that require a greenhouse even in the Isle of Wight, stood all seasons at Rozel Bay without any injury.

*Thomas Forster, M.B., A.S.S.*, a nephew of our late much-lamented Treasurer, Mr. Edward Forster, was elected in 1811. He had lived abroad for many years, and died at Brussels on the 2nd of February, 1860, at the age of 70. He was a man of eccentric habits and views, and an accomplished linguist. Respecting the department of science to which he was more particularly addicted I am not informed, but he has written on the subject of the Migration of Swallows. He also published, some twenty years ago, "An Account of Myself and my Family," in which any further particulars concerning him will be found.

*Arthur Henfrey* was born, of English parents, at Aberdeen, on the 1st November, 1819, and died on the 7th September, 1859.

Originally intended for the medical profession, he studied medicine and surgery at St. Bartholomew's Hospital, and was admitted a member of the College of Surgeons in 1843. His precarious health, however, owing to a distressing asthmatic affection, precluding him from the practice of his profession, he devoted

himself to scientific pursuits, and more especially to botany. He soon became distinguished for his scientific knowledge and untiring industry, and in 1847 undertook the duties of Lecturer in Botany in the Medical School of St. George's Hospital, which he relinquished on becoming the successor of his distinguished friend Edward Forbes in the Botanical Chair at King's College—a post which he occupied up to the time of his death. He was also appointed Examiner in Natural History to the Royal Military Academy and to the Society of Arts.

Manfully contending with his constitutional infirmity, and with the frequent recurrence of a distressing complaint, Professor Henfrey nevertheless laboured incessantly and devotedly in the cause of science. Though continually engaged in original and minute research, in the department more especially of physiological botany, he yet found time to aid in many other ways the advance and diffusion of knowledge. Besides several systematic works, he contributed numerous papers, original and translated, to different scientific journals, in addition to the valuable *Memoirs* which have appeared from his pen in our own publications and in those of the Royal Society. In 1849 he established the '*Botanical Gazette*,' a valuable scientific publication, which he supported, I believe at his own risk, with zeal and perseverance, for two or three years, when, finding that, like almost all strictly scientific periodicals in this country (to our shame be it spoken), it could be carried on only at a loss, he was reluctantly compelled to discontinue it. He was also at one time Editor of the '*Photographic Journal*'—a post which must have entailed considerable trouble, and made many demands upon his indefatigable industry. The numerous and highly valuable botanical articles in the '*Micrographic Dictionary*' were contributed by him; and a second edition of this work had but just passed under his revision shortly before his death. His last and most important work was an '*Elementary Course of Botany*,' which was published in 1857.

But this brief and imperfect abstract of Arthur Henfrey's scientific labours is but a small part of the tribute due to his memory. High as the scientific position he occupied was, and higher as it undoubtedly would have become had his useful life been prolonged, his worth as a man is not to be measured by this standard alone. To those, and they are many, who were more intimately acquainted with him, his memory will be endeared by the warm remembrance of his kindly and affectionate disposition, his genial manners, and his eagerness at all times to oblige and assist.

Deeply as science must regret his loss, the tear of friendship will be a warmer tribute to his early grave.

He was elected an Associate of the Linnean Society in March 1843, and a Fellow in June 1844.

*Thomas Horsfield, M.D., F.R.S., &c. &c.* was born on the 12th of May, 1773, at Bethlehem, Pennsylvania, U.S. His parents belonged to the Moravian sect, in whose faith Dr. Horsfield himself lived and died. His tastes very early in life led him to the study of botany, and a similar inclination, perhaps, to the pursuit of all branches of biological science caused him to select medicine as a profession. He took his degree as Doctor in his 23rd or 24th year.

In 1799 Dr. Horsfield quitted America, and proceeding to Java resided there and in Sumatra, under the Dutch and British rule, for nearly twenty years. It was here that he secured the warm friendship of Sir Stamford Raffles, who, it is believed, acquired from Dr. Horsfield that love of natural history by which he was distinguished, and which rendered him so zealous in its promotion.

During Sir S. Raffles' administration in Sumatra, Dr. Horsfield was employed in the exploration of the island of Banca, the result of which was the publication of a most important and valuable report upon the mineralogy, geology, botany, and zoology of that country. Dr. Horsfield left the Eastern Archipelago in 1818, and, soon after his arrival in England, was in 1820 appointed Keeper of the Museum of the East India Company—a post which he held up to his death, or for a space of more than forty years.

Dr. Horsfield, though perhaps more eminent as a zoologist, was almost equally versed in botanical and mineralogical knowledge. He made a large collection of objects of natural history in Java and Sumatra. Selections from his botanical collections were published, with the aid of his friends Dr. Robert Brown and Mr. J. J. Bennett, in 1838–52, under the title of '*Plantæ Javanicæ Rariores*,' in the introduction to which a particular account of his career will be found. The most important, however, and the earliest of Dr. Horsfield's independent works after his coming to England, was his '*Zoological Researches in Java and the Neighbouring Islands*,' published in 1821 and the following years. He also contributed very numerous papers, chiefly on zoological subjects, to the Linnean Transactions, and to the Proceedings of the Zoological and other scientific Societies, as well as to the Transactions of the Batavian Society of Arts and Sciences. The valuable illustrated Catalogues of the Mammalia, Birds, and Lepidoptera in the East India House, were compiled by his assistant,

Mr. Moore, from Dr. Horsfield's materials and manuscripts, and under his immediate inspection, so that they may properly be included in a list of his own works.

Dr. Horsfield always took the deepest interest in the progress of natural history, and especially in the systematic arrangement of animals, in which he adopted the views of Mr. M'Leay. His classifications of the Diurnal Lepidoptera and of Birds exhibit great powers of philosophical analysis.

His numerous scattered papers, if put together, would constitute several large and valuable volumes, and many of them, more especially those on the Geology and Natural History of the Eastern Archipelago, well deserve to be collected in a separate form.

Amiable, beloved, and deeply lamented, this estimable man and excellent naturalist died on the 24th July, 1859, at the age of 86, the survivor of an illustrious triumvirate, who about the same time commenced in a very similar manner careers eminently useful to mankind, and which have rendered their own names as lasting as science itself, and who have all passed away as it were together at the same advanced age. The names of Humboldt, of Robert Brown, and of Thomas Horsfield, though, as regards the latter, not coequal in renown, may perhaps, in such a tribute as we are now paying, not improperly be associated, and their deaths, within the space of little more than a year, be looked upon as the severance of so many of the more important remaining links connecting the science of the last with that of the present century.

*Salter Livesay, M.D.*, was a Surgeon in the Navy, and acted in that capacity on board one of the vessels engaged in the Rajah Brooke's attack upon the Borneo pirates. For the last year or two he had been occupied in Mr. Cuming's vast conchological collection.

Elected a Fellow of the Linnean Society on the 1st of December, 1859, he enjoyed his privileges but a very short time, dying suddenly, whilst apparently recovering from an attack of gout, on the 8th April, 1860.

*D. W. Mitchell, Esq., B.A., Oxford*, was elected Fellow, Nov. 21, 1843. He died in Paris, under very painful and melancholy circumstances, in November 1859. Mr. Mitchell was well known as a zoologist, and as Secretary for twelve years to the Zoological Society, which owes much of its prosperity to his tact and zealous exertions.

*Thomas Nuttall*, an Englishman by birth, though by adoption, as well as by his scientific labours and reputation, an American,

was born in the year 1786, at Settle, in Yorkshire. He was originally brought up as a printer, and pursued that business at Halifax and Liverpool, where he worked for some years as a journeyman. The hope of improving his circumstances, which at this period of his life do not seem to have been the most encouraging, and, as he said, the love of Natural History, induced him to emigrate to the United States, where he landed at Philadelphia in the spring of 1808. Even at this early period of his life, and in spite of his adverse circumstances, Mr. Nuttall appears to have acquired a considerable amount of knowledge on various subjects, and must have made himself acquainted to some extent with the classical languages. Mineralogy seems to have been his earliest and favourite study, but when he landed in America he appears to have been wholly ignorant of botany, a branch of science in which he afterwards acquired his chief reputation. Accidental circumstances having introduced the journeyman printer to Professor Barton, a well-known American botanist, an intimacy sprang up between them, and he became imbued with an ardent zeal for the cultivation of botanical science. This zeal was so ardent, in fact, as to induce Mr. Nuttall to undertake long, and sometimes laborious and perilous excursions. In the year 1809 he accompanied a Scotch naturalist, Mr. John Bradbury, in an exploratory expedition into the interior of North America. They started from St. Louis with a party of traders and hunters on the 31st of December, and, crossing the Kansas and Platte rivers, passed through different Indian tribes, and, visiting the Mandan villages, ascended the Missouri beyond the point reached by Lewis and Clarke in 1804-5. On this journey, which lasted for two years, the travellers seem to have been exposed to many dangers from the Indians, and to have endured the greatest fatigues.

Mr. Nuttall returned to Philadelphia with ample treasures of plants, seeds, minerals, and other objects of natural history. For the next eight years he occupied the summer months in botanical excursions, and the winter season in the study and arrangement of his collections, and the preparation of his materials for 'The Genera of the North American Plants,' which was published in 1818. Of this work, upon which principally stands the reputation of Mr. Nuttall as a botanist, Professor Torrey in the preface to his 'Flora' remarks that "it has contributed, more than any other, to the advance of the accurate knowledge of the plants of the United States." It is a curious circumstance that the author himself set up the best part of the type, and such was his accuracy in type-

of the Society in the year 1852, and died on the 5th of August, 1859, aged 57.

*Lieut.-Col. Charles Hamilton Smith, K.H., K.W., F.R.S., &c., &c.*, was born in the year 1776 in Austrian Flanders. He belonged to a Protestant family holding a good position in the province, and partly of British descent. At an early age he was sent to school in England, but, on the outbreak of the revolutionary troubles, returned to Flanders, and prosecuted his studies at the Engineer Academy of Mechlin and at Louvain.

Attached to the British forces, and under the patronage of the Earl of Moira, he served in various parts, and in December 1797 joined the 60th Regiment in the West Indies, where he became Brigade Major under Major-General Carmichael. He served for twelve years in the West Indies, and in 1809 took part in the Walcheren expedition as Deputy Quartermaster General. He afterwards served with great distinction in Holland and Brabant, capturing the fortress of Tholen with a handful of German auxiliaries.

He continued to be actively engaged in different capacities and in various parts of the globe, in all displaying the utmost zeal and intelligence. He went on half-pay, however, in 1820, after which he was not again employed. Services such as these, so varied and so incessant, speak for themselves. They constitute, however, but a small portion of Col. Smith's claims to distinction and remembrance. In the intervals of his active military career he found leisure to prosecute various branches of study, and to accumulate materials for numerous writings on subjects of historical, zoological, antiquarian, and scriptural research, in which he was aided by remarkable powers of memory, and by a skill and facility of pictorial representation almost unrivalled.

Col. Smith was a voluminous author on various subjects, historical and military,—works to which no particular reference need here be made. But of his scientific labours, should be noticed, in the domain of Natural History, the account of the Ruminantia in Cuvier's 'Règne Animal' in Griffith's edition, 1855, which was written by him, and many of the engravings in that edition were from drawings furnished by his pencil. At a later period he supplied the volumes on "Dogs," "Horses," and "Introduction to Mammalia," to the 'Naturalists' Library,' edited by Sir W. Jardine; and, in connexion with the same work, he published in 1848 the "Natural History of the Human Species." He was also the author of the elaborate articles on Natural History and on Warfare in the 'Cyclopædia of Scriptural Knowledge' of Dr. Kitto.



He has also left more than twenty thick volumes of MS. notes, on almost every subject that can be named; and besides this, an enormous collection of water-colour drawings, most valuable to the antiquarian and naturalist; and these, during his life, were at the free disposal of all to whom they could be of the slightest service.

Upon his retirement from active service, Col. Smith fixed his residence at Plymouth, and from this town he never afterwards removed. He became a Fellow of the Linnean Society in 1826, and was elected President of the Devon and Cornwall Natural History Society at its formation. He died September 21, 1859.

*William Spence, Esq., F.R.S.*, was born at Hull in the year 1783, and commenced life there in business. At an early age he contracted an ardent taste for the study of Insects, which led to his forming the acquaintance, and afterwards the intimate friendship, of the late Mr. Kirby, in conjunction with whom his name will descend to all time.

The two friends conjointly published the well-known 'Introduction to Entomology,' of whose merits it is needless to say anything, seeing that it has been universally placed in the first rank of English classical Natural History works. The names of its authors will always remain associated with the science of Entomology, to the advance of which, by their admirable popular book, they have so very largely contributed. The first idea or plan of the work is believed to have originated with Mr. Spence, and was suggested by him in a letter to his friend in the year 1808. The first volume, however, did not appear till 1815, and it was so well received as to pass through three editions before the publication of the second volume in 1817. The work, in four volumes, was not completed till 1826. In 1856, subsequently to the death of Mr. Kirby, a seventh edition, in a cheaper and more portable form, was the last important contribution of Mr. Spence to his favourite science. Although the original design and plan of the work be undoubtedly due to Mr. Spence, it is impossible, or nearly so, to discern in its execution the hand of the one or the other author; so closely attached and so intimately united, apparently, by community of thought and feeling, their style is alike, and the two have produced a work as marked by unity of execution as if it were the product of a single mind.

Besides this "magnum opus," Mr. Spence was the author of numerous contributions to the Transactions of the Linnean and

Entomological Societies, of which latter he was several times President.

It should be recorded also that Mr. Spence at one time entered the political arena, and sat in Parliament for his native town; his endeavours in his political capacity being principally directed (as some, perhaps, will deem it, very mistakenly) to the promotion of measures calculated to advance, as he supposed, the impossible, and certainly undesirable, object of rendering Great Britain independent of foreign nations. On this subject he also published a pamphlet, which attracted at the time no little attention.

Of late years Mr. Spence devoted much time and energy to the service of science generally, as a constant attendant, so long as his health permitted him, at the councils of several societies. He was consequently familiarly known in the scientific world, and, where known, his extreme amiability and kindness of disposition, and his gentle urbanity of manner, rendered him universally esteemed and beloved.

Mr. Spence became a Fellow of the Linnean Society on the 18th of February, 1806, and died on the 6th of January, 1860, most deeply lamented.

*Sir George Thomas Staunton, Bart., D.C.L., F.R.S.*, born at Salisbury in 1781, was the son of Sir George Leonard Staunton, who enjoyed a considerable reputation as a physician. In 1792 he accompanied his father, who went out as Secretary to Lord Macartney in the first embassy to China, and on his return entered the University of Cambridge, where, however, he does not appear to have remained very long. In 1799 he returned to China as Secretary to the British Factory at Canton, of which body he afterwards became the President. Continuing to reside in China, he was attached in 1816 to Lord Amherst's embassy as Royal Commissioner; and in this capacity his extensive knowledge of the language and manners of the Chinese enabled him to render important services, and on one occasion to appease a formidable quarrel between the natives and the foreigners resident at Canton. In 1817 he quitted China, and, returning to his native country, in the following year entered the House of Commons, where he sat with brief interruptions for many years, finally retiring into private life in 1852.

Sir George Staunton's literary labours were principally devoted to subjects connected with China, its laws, manners and language, the knowledge of which was much promoted by his translations and writings. Among the latter may be enumerated 'The Penal

Code of the Chinese Empire,' published in 1810, 'A Narrative of the Chinese Embassy in 1821,' and a 'Journal of Lord Amherst's Embassy,' printed, I believe, for private circulation. In addition to these, however, he published a biography of his father, under the title of 'Memoirs of the Life and Family of the late Sir G. L. Staunton.' His great command of the Chinese language was evinced in a work on Vaccination, written in that tongue, and which it is believed has been the means of introducing, or of extending, a knowledge of Dr. Jenner's salutary discovery among the natives of that vast empire.

In 1853 Sir G. Staunton edited, for the Hakluyt Society, Parke's Translation from the Spanish of Mendoza's 'History of the Great and Mighty Kingdom of China;' thus concluding his literary labours, as he had commenced them, with a work devoted to the country in which he spent so many of the most valuable years of his life.

He was admitted into the Linnean Society, November 20, 1797, and concluded his long and useful life on the 10th of August, 1859, in the 79th year of his age.

*George Suttor, Esq.*, was born in the year 1774. In 1778 he became known to Sir Joseph Banks, by whose advice and under whose auspices he undertook a voyage to New South Wales, with the double object of introducing into that country a variety of European fruit-trees, and of making botanical collections. He started accordingly towards the end of 1798, taking with him a large collection of European plants, especially fruit-trees and vines. The voyage, however, was not very successful in its main object, for the vessel in which Mr. Suttor sailed (the 'Porpoise') was either so badly handled, or so unfortunate, as to be compelled to return to England for provisions: thus it was more than two years before she reached her destined port, and during this prolonged passage the greater part of Mr. Suttor's plants necessarily perished.

On reaching Australia, Mr. Suttor appears to have determined upon remaining in the colony, of which consequently he may be regarded as one of the earliest settlers; and he selected the vicinity of Bathurst for his permanent abode.

Here he cultivated the vine to a considerable extent, naming one of his estates the "Vineyard."

In 1842, Mr. Suttor returned to England, and shortly after visited several of the wine-producing districts of the Continent. The result of his investigations was published in 1843, in a volume

entitled 'The Culture of the Grape-vine and the Orange in Australia and New Zealand;' and it is not improbable that Mr. Sutor's meritorious exertions have mainly contributed to the introduction into his adopted country of a culture which in future years will doubtless add much to its resources and prosperity.

He shortly after returned to New South Wales, and resided at his property, called "Alloway Bank," near Bathurst, where he died in May 1859, at the patriarchal age of 85.

He was elected a Fellow of the Linnean Society during his visit to England in April 1843.

The Secretary also announced that thirty-six Fellows and two Foreign Members had been elected since the last Anniversary.

At the election which subsequently took place, Thomas Bell, Esq., was re-elected President, and Francis Boott, Esq., M.D., Treasurer; George Busk, Esq., was elected Secretary, and Frederick Currey, Esq., Under (Botanical) Secretary. The following five Fellows were elected into the Council, in the room of others going out: viz., John Ball, Esq.; T. S. Cobbold, Esq., M.D.; J. B. Hicks, Esq., M.D.; J. D. Hooker, Esq., M.D.; and T. H. Huxley, Esq.

It was moved by the President, and unanimously resolved,

"That the Society desire to record their deep and affectionate regret at the retirement, on account of illness, of Mr. Bennett from the office of Secretary, the duties of which he has fulfilled with unexampled zeal, judgment, and courtesy for twenty years; and to this expression of regret at his retirement, they would add their cordial Thanks for these unrequited services, and their earnest hope that his health may speedily be restored, so that the Society may yet enjoy the pleasure of his presence and the advantage of his counsels for many years."

Among the Presents announced was that of a cast from a bust, by Woolmer, of Sir W. J. Hooker, F.R.S., F.L.S., presented by Henry Christy, Esq., F.L.S., to whom the special Thanks of the Society were directed to be offered for his very acceptable donation.

Mr. Ball, on the part of the Auditors of the Treasurer's Accounts, read the Balance Sheet, by which it appeared that the total receipts during the past year, including a balance of £555 4s. 1*d.* carried from the preceding year, amounted to £1900 17s.; and that the total expenditure during the same period amounted to £1485 2s. 9*d.*, leaving a balance in the hands of the Bankers of £415 14s. 3*d.*

*Receipts and Payments of the Linnean Society from May 1, 1859, to April 30, 1860.*

	£	s.	d.
Balance in the hands of the Bankers at last audit .....	555	4	1
Admission Fees .....	234	0	0
Compositions .....	450	0	0
Annual Contributions of £1 1s. ....	2	2	0
Do. of £2 2s. ....	65	2	0
Do. of £3 .....	387	8	0
Transactions and Journal sold .....	178	7	7
Dividends on Consols .....	8	13	4
Donation to Library Fund from T. C. Janson, Esq. ...	20	0	0
	<hr/>		
	£1900	17	0

	£	s.	d.
Insurance .....	15	2	0
Repairs and Furniture .....	16	16	10
Coals, Gas, Tea, Postage, &c. ....	111	15	9
Salaries .....	170	0	0
Printing, Engraving, Colouring, &c. ....	879	1	2
Books purchased .....	78	4	9
Bookbinding and Stationery .....	61	13	6
Museum Expenses .....	20	0	0
Bond paid off, with Interest .....	114	3	0
Commission on Transactions, &c. sold, and Contributions collected .....	18	5	3
Charges paid by Bankers on a country cheque .....	0	0	6
Balance in the hands of the Bankers .....	415	14	3
	<hr/>		
	£1900	17	0

F. BOOTT, *Treasurer.*

The foregoing Accounts have been examined, and the Balance in hand found to be correctly stated at £415 14s. 3d.

THOMAS BELL, *President.*  
 GEORGE BENTHAM.  
 W. W. SAUNDERS.  
 FREDERICK CURREY.

GEORGE BUSK.  
 JOHN BALL.  
 T. S. COBBOLD.  
 J. B. HICKS.

May 21, 1860.

June 7th, 1860.

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

C. L. Bradley, Esq., was elected a Fellow.

The President nominated J. J. Bennett, Esq., George Bentham, Esq., Richard Owen, Esq., D.C.L., and W. W. Saunders, Esq., Vice-Presidents for the ensuing year.

Read, first, "On the Poisonous Properties of the Liver of a species of *Diodon* inhabiting the Seas of South Africa;" by Julius Hellmuth and Mr. H. Jameson. Communicated (with a note) by Sir John Richardson, C.B., F.R.S., F.L.S. (See "Zoological Proceedings," vol. v. p. 213.)

Read, secondly, "On some oceanic *Entomostraca* collected by Capt. T. Toynebee;" by John Lubbock, Esq., F.R.S., F.L.S. (See "Transactions," vol. xxiii. p. 173.)

Read, thirdly, "On the Nervous System of the *Asteridæ*;" by Henry S. Wilson, M.D. Communicated by Thomas Anderson, M.D., F.L.S. (See "Transactions," vol. xxiii. p. 107.)

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June 21st, 1860.

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

The Rev. Hamlet Clark, M.A., was elected a Fellow.

Read, first, "On the Mutual Relations of the Cold-blooded *Vertebrata*;" by J. Reay Greene, B.A., Prof. Nat. Hist. Queen's Coll., Cork. Communicated by George Busk, Esq., F.R.S., Sec. L.S. (See "Zoological Proceedings," vol. v. p. 218.)

Read, secondly, "Observations on the Neuration of the Hind Wings of *Hymenoptera*; and on the Hooks which unite the Wings together in flight;" by Miss E. Staveley. Communicated by Dr. J. E. Gray, F.R.S., F.L.S. (See "Transactions," vol. xxiii. p. 125.)

Read, thirdly, "Catalogue of Dipterous Insects collected at Dorey, New Guinea;" by Francis Walker, Esq., F.L.S. (See "Zoological Proceedings," vol. v. p. 229.)

Read, fourthly, "Florula Adenensis; being a systematic account of all the Flowering Plants hitherto found at Aden;" by Thomas Anderson, Esq., M.D., F.L.S. (See "Botanical Proceedings," Supplement to vol. v.)

Read, fifthly, "On Arctic Vegetation;" by J. D. Hooker, Esq., M.D., F.R.S., F.L.S. (See "Transactions," vol. xxiii. pt. 2.)

Read, sixthly, "On the Plants collected by Dr. Walker during Sir L. M'Clintock's voyage in the Arctic searching Yacht, 'Fox';" by the same. (See "Botanical Proceedings," vol. v. p. 79.)

Read, seventhly, "Præcursores ad Floram Indicam.—*Cruciferae*;" by the same. (See "Botanical Proceedings," vol. v. p. 128.)

Read, eighthly, "Illustrations of the Floras of the Malayan Archipelago;" by the same. (See "Transactions," vol. xxiii. p. 155.)

Read, ninthly, "Notes and Descriptions of Orchidaceous Plants from Trinidad;" by Edward Bradford, Esq., F.L.S.

Read, tenthly, "On some new species of *Musci* and *Hepaticæ* from Tropical Africa;" by William Mitten, Esq., A.L.S. (See "Transactions," vol. xxiii. p. 51.)

# ADDITIONS

TO THE

## LIBRARY OF THE LINNEAN SOCIETY.

RECEIVED FROM JULY 1, 1859, TO JUNE 30, 1860.

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[Continued from Vol. IV. page lxxxvii.]

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TITLES.	DONORS.
ACADEMIES and SOCIETIES.	
Amsterdam:—Kon. Zoologisch Genootschap ‘Natura Artis Magistra.’ Bijdragen tot de Dierkunde, Aflevering 8. 1859, 4to.	THE SOCIETY.
Antwerp:—Société Paléontologique de Belgique; tome 1, feuilles 1–4. Anvers, 1859, 8vo.	THE SOCIETY.
Basel:—Naturforschende Gesellschaft. Verhandlungen, Theil 2, Heft 2 & 3. Basel, 1859, 8vo.	THE SOCIETY.
Batavia:—Societas Scientiarum Indo-Neêrlandicæ (= Natuurk. Vereeniging in Nederl. Indie). Acta (Verhandelingen), voll. 3 & 4. Batavia, 1857–58, 4to. Natuurkundig Tijdschrift, deel 14 (= 3 <sup>de</sup> serie, deel 4), Afl. 4, 5 & 6. <i>Ib.</i> 1857, 8vo. — — —, deel 15, 16 & 17 (= 4 <sup>de</sup> serie, deel 1–3). <i>Ib.</i> 1858–59, 8vo.	THE SOCIETY.
Berlin:—	
Kön. Akademie der Wissenschaften. Abhandlungen, aus dem J. 1854, 2 <sup>ter</sup> supplement-Band, & aus dem J. 1858. Berlin, 1859, 4to. Monatsbericht, aus dem J. 1859. <i>Ib.</i> 1860, 8vo.	THE ACADEMY.
Verein zur Beförderung des Gartenbaues, &c. Verhandlungen, Neue Reihe. Jahrgang 6, Heft 2. Berlin, 1859, 8vo.	THE ASSOCIATION.
Bologna:—Accademia delle Scienze. Rendiconto delle sessioni 1856–57, 1857–58, & 1859. Bologna, 1857–59, 8vo.	
	DR. A. BERTOLONI, F.M.L.S.



## TITLES.

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ACADEMIES and SOCIETIES (*continued*).

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- Breslau :—Academia Naturæ Curiosorum. Acta, tomus 27. Jenæ, 1860, 4to. THE ACADEMY.
- Brussels :—Académie Royale des Sciences, &c.  
 Mémoires, tome 31. Bruxelles, 1859, 4to.  
 Mémoires couronnés, &c., tome 20. *Ib.* 1858, 4to.  
 — —. Collection in 8vo, tome 9. *Ib.* 1859.  
 Bulletins, 2<sup>e</sup> série, tomes 4–8. *Ib.* 1858–59, 8vo.  
 Tables générales et analytiques du Recueil des Bulletins, 1<sup>e</sup> série, tomes 1–23. *Ib.* 1858, 8vo.  
 Annuaire, 25<sup>e</sup> & 26<sup>e</sup> années. *Ib.* 1859–60, 12mo.  
 Sur les travaux de l'ancienne Académie de Bruxelles; par M. Ad. Quetelet. 8vo. THE ACADEMY.
- Calcutta :—Asiatic Society. Journal, vol. 28. Calcutta, 1859, 8vo. THE SOCIETY.
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 Proceedings, vol. i. Charleston, 1859, 8vo.  
 Journal, vol. i. art. 1 & 2. *Ib.* 1859, 4to.  
 Constitution and Bye-laws. *Ib.* 1857, 8vo. THE SOCIETY.
- Copenhagen :—Kongl. Danske Videnskabernes Selskab.  
 Skrifter. 5<sup>te</sup> Række. Naturvidensk. og Mathem. Afdeling.  
 Bind 4, Hefte 2, & Bd. 5, Hft. 1. Kjöbenhavn, 1859, 4to.  
 Oversigt i aar. 1858. *Ib.* 8vo. THE SOCIETY.
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 Royal Dublin Society. Journal, nos. 14 & 15. Dublin, 1859, 8vo. THE SOCIETY.  
 Royal Irish Academy.  
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 Proceedings, vol. 7, parts 1–8. *Ib.* 1858–59, 8vo. THE ACADEMY.

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University Zoological and Botanical Association. Proceedings, vol. 1, pt. 2. Dublin, 1859, 8vo.	THE ASSOCIATION.
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	THE SOCIETY.
Göttingen:—Königl. Gesellschaft der Wissenschaften.	
Abhandlungen, Band 8. Göttingen, 1860, 4to.	
Nachrichten, vom Jahre 1859 (nos. 1–20). <i>Ib.</i> 12mo.	THE SOCIETY.
Halifax, Nova Scotia:—Literary and Scientific Society. Transactions for 1859. Halifax, U.S., 1859, 8vo.	
	THE SOCIETY.
Helsingfors:—Sällskapet 'pro Fauna et Flora Fennica.' Förhandlingar. Ny Serie. Häftet 1. Helsingfors, 1859, 8vo.	
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	THE SOCIETY.
Leyden:—Nederlandsche Entomologische Vereeniging. Tijdschrift voor Entomologie; onder Redactie van Prof. J. Van der Hoeven, &c. Deel 2, afl. 3–6, & deel 3, afl. 1–3. Leyden, 1858–59, 8vo.	
	THE ASSOCIATION.
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	THE SOCIETY.
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	THE SOCIETY.
London:—	
Art-Union.	
Report of the Council for 1859; with List of Members. London, 1859, 8vo.	
Almanac for 1860. <i>Ib.</i> 12mo.	THE ART-UNION.

## TITLES.

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Geological Society. Quarterly Journal, vol. 15, parts 3-5, &  
vol. 16, parts 1 & 2. London, 1859-60, 8vo.

THE SOCIETY.

Geological Survey. Memoirs. British Organic Remains.  
Monogr. 1. London, 1859, 4to.

— ——. Plates to ditto. *Ib.* 1859, fol.

HER MAJESTY'S GOVERNMENT.

Horticultural Society. Proceedings, vol. 1, nos. 1-13. London,  
1859-60, 8vo. THE SOCIETY.

Medical and Chirurgical Society.

Transactions, vol. 42. London, 1859, 8vo.

Proceedings, vol. 3, nos. 2 & 3. *Ib.* 1859-60, 8vo.

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Microscopical Society:—*v.* Journals.

Pharmaceutical Society. Journal. 2nd Series, vol. 1, nos. 1-12.  
London, 1859-60, 8vo. THE SOCIETY.

Royal Society.

Philosophical Transactions, vol. 149, parts 1 & 2. London,  
1859-60, 4to.

Proceedings, nos. 35-38. *Ib.* 1859-60, 8vo.

List of the Society, Nov. 30th, 1859. *Ib.* 4to.

THE SOCIETY.

Royal Agricultural Society. Journal, vol. 20, parts 1 & 2.  
London, 1859, 8vo. THE SOCIETY.

Royal Asiatic Society. Journal, vol. 17, parts 1 & 2. London,  
1859-60, 8vo. THE SOCIETY.

Royal Astronomical Society.

Memoirs, vol. 27. London, 1859, 4to.

Monthly Notices, vol. 18. *Ib.* 1858, 8vo. THE SOCIETY.

Royal College of Physicians. List of Fellows, Members, &c.  
London, 1859, 8vo. THE COLLEGE.

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ACADEMIES and SOCIETIES ( <i>continued</i> ).		
London ( <i>continued</i> ):—		
	Royal Geographical Society.	
	Journal, vol. 28. London, 1858, 8vo.	
	Proceedings, vol. 3, no. 6, and vol. 4, nos. 1 & 2. London, 1859-60, 8vo.	THE SOCIETY.
	Royal Institution.	
	List of the Members, &c.; with the Report of the Visitors for 1858. London, 1859, 8vo.	
	Notices of the Meetings, part 9. <i>Ib.</i> 1859, 8vo.	THE INSTITUTION.
	Society of Arts. Journal, Nos. 345-397. London, 1859-60, 8vo.	THE SOCIETY.
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	Proceedings, nos. 1-16 (1858-59), & nos. 1-14 (1859-60). <i>Ib.</i> 8vo.	THE SOCIETY.
	Moscow:—Société Imp. des Naturalistes.	
	Nouveaux Mémoires, tome 8. Moscou, 1846, 4to.	
	Bulletin, tome 7 (wanting the plates); tome 8; tome 14, no. 4; tome 17, nos. 2 & 3; tome 19, nos. 1 & 2; tome 27, nos. 2-4; tome 28, no. 1; tome 31, nos. 2-4; and tome 32, no. 1. <i>Ib.</i> 1834-59, 8vo.	THE SOCIETY.
	Munich:—Königl. Bayerische Akademie der Wissenschaften.	
	Gelehrte Anzeigen, Band 48. München, 1859, 4to.	
	Almanach für 1859. <i>Ib.</i> 12mo.	
	Erinnerung an Mitglieder der Math.-phys. Classe; eine Rede, von Dr. C. F. P. von Martius. <i>Ib.</i> 1859, 4to.	
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## TITLES.

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Newcastle-on-Tyne:—Tyneside Naturalists' Field Club. Transactions, vol. 4, part 2. Newcastle-upon-Tyne, 1859, 8vo.  
THE CLUB.

New York:—Lyceum of Natural History. Annals, vol. 6, nos. 8–13, & vol. 7, nos. 1–3. New York, 1858–59, 8vo.  
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[Continued from vol. iv. page lxxxviii.]

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JOURNAL OF THE PROCEEDINGS  
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Synopsis of the *Distomida*. By T. SPENCER COBBOLD,  
M.D., F.L.S.

[Read June 16th, 1859.]

*Preliminary Remarks.*—In offering the present communication to the Society, I design, if possible, to supply a deficiency in the helminthological literature of this country, and by references to facilitate the recognition of specific forms of Entozoa. With a view also of rendering this contribution something more than a mere catalogue, I shall allocate under their respective generic types such new forms as may be legitimately regarded as distinct, as well as several undescribed or hitherto imperfectly known species. At the same time, it is my intention, so far as our very limited knowledge on this head goes, to refer to their proper adult types some of the numerous *Cercariæ*, or larval individualities, usually classified as independent organisms. While continental periodicals teem with lengthened memoirs in this special and, in some respects, peculiar department of Zoology, comparatively few and meagre are the additions that have emanated from ourselves. To the Sydenham Society and Dr. Lankester we are indebted for the issue of Dr. Küchenmeister's work on the "Parasites of the Human Body," its value being considerably enhanced by Prof. Huxley's translation of C. T. Von Siebold's Essay on the "Tape- and Cystic Worms," appended to the second volume. In respect of original contributions, I have great satisfaction in pointing to valuable papers by Dr. Baird, Prof. Huxley, Dr. Nelson, Professors Busk, Allen Thomson, Harley, Quekett, Gamgee, and a few others; whilst our more sustained compositions are represented by Dr.

Baird's admirable 'Catalogue of Entozoa contained in the Collection of the British Museum,' Dr. Bellingham's "Catalogue of Irish Entozoa," in the 13th volume of the 'Annals of Natural History,' and Prof. Owen's classic article "Entozoa," published twenty years since in the 2nd volume of Dr. Todd's 'Cyclopædia of Anatomy and Physiology.'

PRIMARY DIVISION OF HELMINTHS.

Classis. ENTOZOA.	Subclassis I.	Ordo I. <i>Cestoidea</i> .
		Ordo II. <i>Trematoda</i> .
	Subclassis II.	Ordo III. <i>Acanthocephala</i> .
		Ordo IV. <i>Nematoidea</i> .

The members of the second order, or Trematoda, are divided by Van Beneden into two natural groups: the digenetic section, or those species which have a double mode of propagation, represented by the *Distomidæ* proper; and the monogenetic section (all being oviparous except *Gyrodactylus elegans*), embracing the *Tristomidæ* and *Polystomidæ*.

It is now proposed to revise only the first of these three families, and in doing so to adhere to C. M. Diesing's authority, except under circumstances where his arrangements may be reasonably modified, contra-indicated, or even superseded.

DISTOMIDÆ.	<i>Fasciola</i> , Linnæus.
	<i>Campula</i> , Cobbold.
	<i>Distoma</i> , Zeder.
	<i>Bilharzia</i> , Cobbold.
	<i>Köllikeria</i> , Cobbold.
	<i>Crossodera</i> , Dujardin.
	<i>Echinostoma</i> , Dujardin.
	<i>Gasterostoma</i> , Von Siebold.
	<i>Wedlia</i> , Cobbold.
	<i>Monostoma</i> , Zeder.
	<i>Nematobothrium</i> , Van Beneden.
	<i>Codonocephalus</i> , Diesing.
	<i>Eustemma</i> , Diesing.
	<i>Holostomum</i> , Nitzsch.
	<i>Hemistoma</i> , Diesing.
	<i>Diplostomum</i> , Nordmann.
<i>Rhopalophorus</i> , Diesing.	
<i>Amphistoma</i> , Zeder.	
<i>Amphiptyches</i> , Grube et Wagener.	

## Ordo I. TREMATODA.

## Tribus I. DISTOMIDÆ.

## Genus I, FASCIOLA, Linn. (pars).

This genus, originally established by Linnæus, has been for a long time associated with other generic types by most authorities, but, as Blanchard and myself have endeavoured to show, without any sufficient cause. The presence of a branched intestinal canal divided into numerous cæcal appendages is highly distinctive; and I am satisfied that the custom of rejecting the old title is not only an injustice to its distinguished author, but is a change fraught with no corresponding advantage.

## 1. FASCIOLA HEPATICA, Linn.

*F. hepatica*, Linn. Syst. Nat. vol. xii. p. 1077; also by Pallas, Fabricius, Müller, Frölich, Schrank, Bose, Blainville, Lamarck, Blanchard, Cobbold, &c.

*F. humana*, Gmelin.

*Distomum* and *Distoma hepaticum*, of Abildgaard, Zeder, Mehlis, Rudolphi, Bremser, Bojanus, Delle Chiaje, Dujardin, Creplin, Bellingham, Siebold, Owen, Diesing, Baird, Küchenmeister, and others.

*Planaria latiuscula*, Goeze.

*Hab.* Though most frequent in ordinary grazing cattle, it has been noticed in the Horse and Ass by Daubenton, in *Capra Hircus* by Diesing, and in *C. Ammon* by Bremser, in *Bos Urus* by Miran, in *Cervus Capreolus* by Pluskal, in *C. Elephas*, *C. Dama*, and *Antilope Dorcas* by others, in *Camelus bactrianus* by Bremser, in *Castor Fiber* by Czermack, in *Sciurus vulgaris* by Tozetti, in *Lepus timidus* and *L. Cuniculus* by myself and others, in *Macropus giganteus* by Bremser and Diesing.

Pallas, Bauhinus, and Bidloo have recorded the occurrence of this parasite in man; and doubtful instances are also given by Mehlis and Duval. More recently, Prof. Partridge detected it in the human gall-bladder, particulars of the case being given in the second edition of Dr. Budd's work on "Diseases of the Liver." Giesker of Zurich describes an undoubted example, where an immature form occupied the cavity of an abscess in the sole of a woman's foot; and a similar case has occurred in the practice of Mr. Fox of Topsham, Devon, the abscess containing a living worm, and fragments of a second being situated about three inches behind the ear. Mr. Harris of Liverpool has likewise communicated a case where six or seven flukes are said to have escaped from an abscess connected with the scalp of a child. These several Distomes, occurring in England, have been preserved, and their

identity with *Fasciola hepatica* clearly established on the authority more particularly of Professors Busk and Owen and of Mr. Clapp of Exeter. Full particulars are given in an Appendix to the 1st volume of the Sydenham Society's edition of Küchenmeister's treatise. Up to the present hour the history of the development of this species is unknown. The recent investigations of Pagenstecher, Filippi, Wagener, and others, though they have done much in regard to other species, do not at present enable us to satisfy the inquiries of agriculturists and cattle-breeders, who are so well acquainted with the ravages of this parasite.

2. *FASCIOLA GIGANTEA* (Cobbold).—*Corpus* planum oblongum, lanceolatum, antrorsum attenuatum, retrorsum obtusum. *Collum* elongatum cylindricum. *Os* terminale, anticum. *Acetabulum* ore majus, superum ad colli basin. Longit. 1-3 unc.; latit.  $\frac{1}{4}$ - $\frac{1}{2}$  unc.

*F. gigantea*, Cobbold, British Assoc. Rep., Edin. Phil. Journ. for 1856, with coloured figures and anatomical details.

*Distomum giganteum*, Diesing, Revis. der Myzelminth. p. 28.

*Hab.* I discovered forty individuals in the liver of a young Nubian Giraffe (*Camelopardalis Giraffa*) which had been exhibited in a travelling menagerie in this country for about five months. There also existed in the liver a number of *Cysticerci*; as well as three larval Distomes in cysts connected with the sublingual cellular aponeurosis.

#### Genus 2. *CAMPULA*\*, Cobb.

*Corpus* compressum, elongatum, armatum. *Collum* nullum. *Os* terminale. *Acetabulum* unum, ventrale, sessile. *Tractus* intestinalis bifurcatus, regulæ non consentaneus vel *campulatus* (καμπύλος).

I have established the existence of this generic type, which clearly affords additional proof of the accurate views of those entozoologists who, with Blanchard and others, are willing to retain the Fascioles as distinct from the Distomes. This genus forms a well-marked intermediate type.

1. *CAMPULA OBLONGA* (Cobbold).—*Corpus* compressum, ellipticum, retrorsum, obtusum. *Collum* nullum. *Os* terminale, ovale. *Acetabulum* subcentrale, superum. *Aperturæ* genitalium supra et pone acetabulum. Longit.  $\frac{1}{10}$ - $\frac{1}{4}$  unc.; latit.  $\frac{1}{30}$ - $\frac{1}{15}$  unc.

*C. oblonga*, Cobbold, Linn. Soc. Trans. vol. xxii. part iii. p. 168, figs. 84 & 85, tab. 33.

*Hab.* I procured about fifty specimens from the liver of a common porpoise (*Delphinus Phocæna*) in April 1855. They occupied the peripheral extremities of the biliary ducts, which were remarkably thickened and knotted. Seventeen individuals were associated together at one spot. From the same Cetacean I removed numerous Nematodes and Cestodes, which are described in the memoir above indicated.

\* From καμπύλη -ης, a crooked stick.

## Genus 3. DISTOMA, Zeder.

This genus, even in its reduced limits, embraces a very large proportion of the digenetic Trematodes; and its members are characterized chiefly by their varied form and size. The presence or absence, either in whole or in part, of dermal spines, forms in some instances a distinguishing feature; but this character has not been recorded with sufficient accuracy. Much uncertainty exists in regard to certain of the species, which are probably larval forms, and also in respect of others that have not been figured or have only been imperfectly represented. The presence and condition of the reproductive organs are the best criteria of the adult state.

A. *In corpore mammalium.*

## 1. DISTOMA LANCEOLATUM, Mehlis.

*Distoma lanceolatum*, Mehlis, *Observ. de Dist. hep. et lanceolat.*, 1825, with figs.; also Gurlt, Valentin, Dujardin, Blanchard, Diesing, Baird, Küchenmeister, Leidy, Moulinié, Dubini, and others.

*D. hepaticum*, Zeder, Rudolphi, Bremser, Olfers, Bojanus, Creplin, Gurlt, Owen (Art. Entoz.)

*Fasciola hepatica*, Bloch, Jördens, Bose.

*F. lanceolata*, Rudolphi.

*Planaria latiuscula*, Goeze.

*Hab.* Usually occupies the gall-bladder and biliary ducts of the liver, and sometimes, accidentally, the intestine of domesticated ruminants.

It has been found or noticed in *Cervus Elephas* by Rudolphi, in *C. Dama* by Schaeffer, in *Lepus Cuniculus* by Bremser, in *L. timidus* by Zeder, by Goeze in the Stag. Bueholz records an instance of its presence in the human subject; and another case (about which, however, there is some doubt) is noticed by Chabert and Mehlis.

The last-named authority was the first to draw attention to the non-identity of this and the common fluke, and, but for the circumstance of these animals being so frequently found in the same *host*, the specific differences could not have been so long overlooked.

2. DISTOMA CRASSUM (Cobbold).—*Corpus planum, oblongum, utrinque obtusatum, inermatum. Os terminale, orbiculare. Acetabulum ore majus, superum ad colli basin, apertura circulari. Longit. 3-3½ unc.; latit. ½-¾ unc.*

*D. Buskii*, Lankester (non descriptum); in Appendix B to his translation of the 2nd edit. of Küchenmeister's 'Parasiten,' p. 437.

*Hab.* At the suggestion of the original discoverer, I have applied the above title to this interesting species. Fourteen specimens of this worm were found by Professor Busk in the duodenum of a Lascar in 1843, and it is worthy of remark that there were no examples either in the gall-bladder or biliary ducts. Although undescribed hitherto,

publicity was early given to its existence by Dr. Budd in the second edition of his well-known treatise on "Diseases of the Liver." My attention having been directed to this worm by Professor Busk during the delivery of his lectures at the Royal College of Surgeons in the summer of 1857, I have given the above description for the most part in accordance with the specimen then and there exhibited. Von Siebold has applied the term *crassum* to a trematode infesting *Hirundo urbana*, but the species has, I believe, never yet been described.

3. *DISTOMA HETEROPHYES* (Siebold).—*Corpus* ovato-oblongum, sub-tus planum, supra leviter convexum. *Collum* continuum. *Os* sub-apicale terminale. *Acetabulum* ore majus, ventrale paululum ante medium situm, globosum. *Porus* genitalis post acetabulum ventrale situs. Longit.  $\frac{1}{75}-\frac{1}{50}$  unc.; latit.  $\frac{1}{100}$  unc.

*Distomum heterophyes*, Bilharz and Siebold, *Zeitsch. für Wissenschaft. Zool.* vol. iv. 1852, p. 62 and p. 455; also by Küchenmeister with details and figs.; Diesing, *Revis.* p. 28.

*Hab.* Dr. Bilharz of Cairo, in April 1851, discovered this minute trematode in the small intestine of a boy, and again on a second occasion under similar circumstances, when he collected several hundred specimens. The part infested displayed a multitude of reddish points, due to the presence of dark-coloured ova in the interior of the worms.

4. *DISTOMA OPHTHALMOBIUM*, Diesing.

*D. oculi humani*, Gescheidt.

*D. ophthalmobium*, Diesing, Küchenmeister, i. p. 222.

*Hab.* Gescheidt found four individuals in the eye of a child five months old, born with lenticular cataract. They were situated between the lens and its capsule, and could be recognized as so many dark spots on the surface of the lens. These are the only specimens that have ever been seen.

5. *DISTOMA LANCEA*, Diesing.

*D. lancea*, Diesing, *Syst. Helm.* i. p. 334; et in *Denkschrift. der k. Akad. der Wissensch.* x. p. 64, cum figs.

*Hab.* Natterer found numerous examples of this elegant worm in the biliary ducts of a male *Delphinus Tachuschi* in December 1833, at Barra do Rio Negro in Brazil.

6. *DISTOMA RUBENS*, Dujardin.

*D. rubens*, Dujardin, *Hist. Nat. des Helminthes*, p. 411; Diesing.

*D. exasperatum?* Rudolphi.

*Hab.* Found by Dujardin in the intestine of *Sorex fodiens* (*Daubentoni*) in October, and in *Sorex tetragonurus* in April. If Rudolphi's fluke be identical, as is probable, Bremser originally discovered this species in the Square-tailed Shrew.

7. *DISTOMA TENUICOLLE*, Rudolphi.

*D. tenuicalle*, Rudolphi, Dujardin, Diesing.



*Hab.* In April 1788, Treutler found numerous examples in the liver of *Phoca barbata*.

8. *DISTOMA ORBICULARE*, Diesing.

*D. orbiculare*, Diesing, i. p. 349; et in Denkschrift. der k. Akad. d. Wien. für 1855, p. 64, cum figs.

*Hab.* Natterer discovered this species in the small intestine of a Brazilian monkey (*Cebus trivirgatus*), on one occasion at Eugenho do Cap Gama in October, and on another at Matogrosso, early in the month of June.

9. *DISTOMA CHILOSTOMUM*, Mehlis.

*D. chilostomum*, Mehlis, Diesing.

*D. noctulæ*, Rudolphi.

*Hab.* Recorded as found in the intestines of *Vespertilio noctula* by Bremser; in *V. auritus* by Siebold; in *V. Nattereri*, *murinus*, *Daubentoni*, *mystacinus*, *serotinus*, *Leisleri*, and *discolor*, by Mehlis.

10. *DISTOMA LIMA*, Rudolphi.

*D. Lima*, Rudolphi, Dujardin, Creplin, Mehlis, Diesing.

*D. Vespertilionis*, Zeder.

*Fasciola picta*, Rudolphi.

*Planaria Vespertilionis*, Goeze.

*Hab.* Has been found at all seasons in the intestines of *Vespertilio auritus*, by Müller, Goeze, Weigel, and Bremser; in *V. murinus*, by Bremser and Rudolphi. It has been also obtained from *V. discolor*, *V. noctula*, and *V. Pipistrellus*; from *Rhinolophus Ferrum-equinum* by Bremser; in *Molossus nasutus* and *M. rufus*, in Brazil in the month of November by Natterer.

11. *DISTOMA FLEXUOSUM*, Rudolphi.

*D. flexuosum*, Rudolphi, Dujardin, Diesing.

*Hab.* Found in the intestines and abdominal cavity of *Talpa europæa*. Out of seventy-four Moles dissected by Dujardin, only nine were infested. It has also been obtained by Hildenbrand and others.

12. *DISTOMA PUSILLUM*, Zeder.

*D. pusillum*, Zeder, Dujardin, Rudolphi, Diesing.

*Fasciola pusilla*, Rudolphi.

*Planaria pusilla*, Braun.

*Hab.* Infests the common Hedgehog (*Erinaceus europæus*). Braun found it under the skin in May, Creplin in the subcutaneous cellular tissue in July, and Dujardin in the mesentery in March. It is usually encysted.

13. *DISTOMA RUDE*, Diesing.

*D. rude*, Diesing.

*Hab.* Discovered by Natterer at Matagrosso, Brazil, in September, in a female otter (*Lutra brasiliensis*). There were fourteen individuals arranged in pairs and occupying seven cysts, the latter being enclosed in a fibro-osseous substance.

14. *DISTOMA ACUTUM*, Leuckart.*D. acutum*, Leuckart, Dujardin, Diesing.*Hab.* Infests the frontal sinuses and cellular cavities of the ethmoid bone in *Mustela Putorius*. Found during the month of November.15. *DISTOMA SACCUS*, Molin.*D. Saccus*, Molin, Diesing, Revis. der Myzelminth. p. 37.*Hab.* Found by Molin in Batavia in the stomach of *Mustela plebeius*, in the month of November.16. *DISTOMA LACINIATUM*, Dujardin.*D. laciniatum*, Dujardin, Diesing.*Fasciola Maimonis*, De Blainville.*Hab.* Brongniart detected this curious form in the pancreas of a mandril (*Simia Maimon*) which died at Paris.17. *DISTOMA TRUNCATUM*, Leuckart.*D. truncatum*, Leuckart, Dujardin, Diesing.*Hab.* Two examples were found by Leuckart in the kidney of Dautenton's Shrew (*Sorex fodiens*).18. *DISTOMA INSTABILE*, Dujardin.*D. instabile*, Dujardin, Diesing.*Hab.* This species, which likewise infests the intestinal canal of *Sorex fodiens*, was found by Dujardin in the month of October.19. *DISTOMA HETEROFORUM*, Dujardin.*D. heteroporum*, Dujardin, Diesing.*Hab.* Found by Dujardin very abundant in the intestines of *Vespertilio Pipistrellus*.20. *DISTOMA BLANCHARDII*, Cobbold.*D. linguæforme*, Diesing.*Brachylæmus Erinacei*, Blanchard.*Hab.* Discovered by Blanchard at Paris, in the intestines of the common hedgehog (*Erinaceus europæus*).21. *DISTOMA CONJUNCTUM* (Cobbold).—*Corpus* planum, oblongum, antrorsum sensim angustatum utrinque obtusum. *Collum* continuum. *Acetabulum*, ore paulo majus, ad colli basin. *Aperturæ* genitales supra et pone acet. Longit.  $\frac{1}{4}$  unc. ; crass.  $\frac{1}{12}$  unc.*D. conjunctum* (nov. spec.), Cobbold (MS.).*Hab.* I found numerous examples of this fluke in the biliary ducts of an American Red Fox (*Canis fulvus*) which died in the Zoological Society's Gardens, Regent's Park. Two of the worms were in copulation.22. *DISTOMA GOLIATH*, Van Beneden.*D. Goliath*, Van Beneden, Diesing, Revis. p. 32.*Hab.* Discovered by Eschricht in the liver of the *Balanoptera rostrata*.23. *DISTOMA ELEPHANTIS*, Jackson.

*D. Elephantis*, Jackson (non descriptum), Diesing, Revis. p. 50 (species inquirenda.)

*Hab.* Recorded by Jackson as occurring in the biliary ducts and in the intestine of *Elephas indicus*.

24. *DISTOMA PUTORII*, Molin.

*D. Putorii*, Molin (non descriptum), Diesing, Revis. p. 50 (species inquirendæ).

*Hab.* Found by Molin in cysts attached to the jugular veins within the thoracic cavity of *Mustela Putorius*.

25. *DISTOMA SORICIS*, Pontallié.

*D. Soricis*, Diesing, Revis. der Myzelminth. p. 50 (species inquirendæ).

*Hab.* Found by Pontallié in the gall-bladder of *Sorex araneus*.

26. *DISTOMA RECURVUM*, Dujardin.

*D. recurvum*, Dujardin, Diesing.

*Hab.* Found by Dujardin in the intestines of *Mus sylvaticus*.

27. *DISTOMA MIGRANS*, Dujardin.

*D. migrans*, Dujardin, Diesing.

*Hab.* Found by Dujardin in the intestines of *Sorex araneus* and *S. leucodon*.

B. *In corpore avium.*

1. *DISTOMA OVATUM*, Rudolphi.

*D. ovatum*, Rudolphi, Mehlis, Hugi, Tschudi, Creplin, Siebold, Dujardin, Wedl, Diesing, Revis. p. 29.

*Hab.* This species has been observed outside the intestine of the domestic goose (*Anas Anser*) by Müller, and in the Bursa of Fabricius in the following species:—in *A. clypeata* by Rudolphi; in *A. clangula*, *A. ferina*, *A. glacialis*, *A. marila*, and *A. musica*, by Creplin; in *Fulica atra* by Wedl and others; in *Corvus Pica* by Rudolphi; in *C. frugilegus* by Meyer; in *C. Cornix*; in *Falco subbuteo*; in *F. nisus*; in *F. Buteo*; in *Strix brachyotus*; in *Scolopax Gallinago* by Wedl, and in *S. rusticola* and *Podiceps suberistatus* by Mehlis; in *Turdus viscivorus*; in *Gallinula chloropus* and *G. Porzana* by Siebold; in *Otis tarda* by Otto; in *Ardea Grus* by Wedl; in *Lanius minor*; in *Fringilla cælebs*; in *F. montana* by Creplin; in *Numenius arcuatus*; in *Vanellus cristatus*; in *Larus canus* and *Uria Grylle* by Creplin: it has likewise been recorded by Otto in the oviduct of *Phasianus Gallus*, and in the egg itself by Hanow, Purkinje, Eschscholtz, and Schilling.

2. *DISTOMA CUNEATUM*, Rudolphi.

*D. cuneatum*, Rudolphi, Creplin, Dujardin, Diesing.

*Hab.* Discovered by Rudolphi in the intestinal canal of *Otis tarda*. It has been subsequently seen by Gurlt in the oviduct of *Paro cristatus*.

3. *DISTOMA MARGINATUM*, Molin.

*D. marginatum*, Molin, Diesing, Revis. der Myzelminth. p. 29.

*Hab.* Found by Molin in the intestines of *Anas crecca* in the month of November.

4. *DISTOMA HIANS*, Rudolphi.

*D. hians*, Rudolphi, Nathusius, Gurlt, Dujardin, Wagener, Diesing, Revis. p. 29.

*Hab.* Found in the œsophagus of *Ciconia nigra* by Rudolphi, and also by Nathusius, Dujardin, and Diesing; in *C. alba*, by Gurlt.

5. *DISTOMA COMPLANATUM*, Rudolphi.

*D. complanatum*, Rudolphi, Dujardin, Diesing.

*Hab.* Found by Rosenthal in the œsophagus of *Ardea cinerea* in the month of April.

6. *DISTOMA LEIDYI*, Cobbold.

*Distomum dubium*, Diesing, Revis. der Myzelminth. p. 32.

*Clinostomum dubium*, Leidy.

*Hab.* Discovered by Leidy in the intestines of *Scolopax minor*, at Philadelphia, U.S.

7. *DISTOMA PONTALLIÉI*, Cobbold.

*D. du Blongios*, Pontallié.

*D. cladocalium*, Diesing, Revis. p. 50 (spec. inquirend.).

*Hab.* Found by Pontallié in the gall-bladder and biliary ducts of *Ardea minuta*.

8. *DISTOMA CUCUMERINUM*, Rudolphi.

*D. cucumerinum*, Rudolphi, Diesing.

*Hab.* Stated by Rudolphi, on the authority of Rousseau, to infest the trachea of several sea-birds.

9. *DISTOMA DELICATULUM*, Rudolphi.

*D. delicatulum*, Rudolphi, Dujardin, Diesing.

*Hab.* Found by Braun very abundant in the gall-bladder of *Anas sponsa*.

10. *DISTOMA HETEROSTOMUM*, Rudolphi.

*D. heterostomum*, Rudolphi, Dujardin, Diesing, i. p. 353.

*Hab.* Found in the œsophagus of *Ardea purpurea* by Jurine, and in the mouth of the same bird by Rosa.

11. *DISTOMA DIMORPHIUM*, Diesing.

*D. dimorphum*, Diesing, Syst. i. p. 353, et in Neunzehn Arten von Trem. p. 65, et in Rev. der Myzelminth. p. 34.

*D. marginatum*, Rudolphi, Dujardin.

*Hab.* This remarkable species was first discovered by Olfers in Brazil, adhering to the sides of the tongue of *Ardea Cocoi*. There are, however, two well-marked forms, the *D. marginatum* being the same trema-

tode. The last-named is shorter, also broader, and oval; it exists abundantly in different parts of the bodies of several Brazilian fresh-water fishes, and assumes its adult specific characters only when transferred into the alimentary canal of marsh-frequenting birds. Thus Natterer found the younger form in such fishes as *Carapus brachyurus*, *Hydrolinus scomberoides*, *Geophagus Pappaterra*, *Chaetobranchus flavescens*, *Crenicichla Johanna*, and *C. lepidota*; and in the following birds, *Ardea Cocoi*, *Ciconia americana*, and *C. mycteria*.

## 12. DISTOMA GLOBULUS, Rudolphi.

*D. Globulus*, Rudolphi, Dujardin, Creplin, Bellingham, Diesing, Revis. p. 37.

*Hab.* This species has been found in *Anas fuligula* by Rudolphi; also in the intestines of *A. glacialis*, *A. acuta*, and *Mergus merganser*; in *Alca torda*, by Creplin.

## 13. DISTOMA LUCIPETUM, Rudolphi.

*D. lucipetum*, Rudolphi, Bremser, Dujardin, Diesing.

*Hab.* Found by Bremser beneath the nictitating membrane of the eye of *Larus glaucus* and *L. fuscus*, in April and May.

## 14. DISTOMA HOLOSTOMUM, Rudolphi.

*D. holostomum*, Rudolphi, Dujardin, Diesing.

*D. Ralli*, Rudolphi.

*Hab.* Recorded by Bremser in the intestines of *Rallus aquaticus*, and found by Siebold in the Spotted Crake (*Crex pozana*).

## 15. DISTOMA FUSCATUM, Rudolphi.

*D. fuscatum*, Rudolphi, Dujardin, Diesing.

*Hab.* Discovered by Rudolphi in the intestine of *Tetrao Coturnix*.

## 16. DISTOMA CONCAVUM, Creplin.

*D. concavum*, Creplin, Dujardin, Diesing, i. p. 340.

*Hab.* Found by Creplin and Schilling in the cæcum and rectum of *Colymbus rufogularis*, in November; in *Podiceps cristatus* by Mehlis; in the cæca and small intestine of *Anas Hornschuchii*, in May, and in *A. clangula*, by Creplin; in *A. glacialis*, *A. marila*, *A. fusca*, by Schilling; in *Mergus serrator* and *M. merganser* by Mehlis; in the intestines of *Alca tordu* by Creplin.

## 17. DISTOMA LINGUA, Creplin.

*D. Lingua*, Creplin, Diesing.

*Hab.* Infests *Larus maximus* and *L. marinus*, according to Creplin, in November; also found by Mehlis in *L. argenteus*.

## 18. DISTOMA MACROURUM, Rudolphi.

*D. macrourum*, Rudolphi, Creplin, Diesing.

*D. longicauda*, Rudolphi.

*D. attenuatum*, Dujardin.

*Hab.* Found by Jurine and Bremser in *Corvus Cornix*; by Mehlis in

- Anthus arboreus*; by Dujardin in the liver and gall-bladder of *Turdus Merula*.
19. DISTOMA OXYURUM, Creplin.  
*D. oxyurum*, Creplin, Dujardin, Diesing.  
*Hab.* Found by Creplin in *Anas marila* and *A. Tadorna*; in the intestines of *A. clangula*, by Mehlis; in *A. fuligula*, *A. glacialis*, and *A. nigra*, by Schilling.
20. DISTOMA OXYCEPHALUM, Rudolphi.  
*D. oxycephalum*, Rudolphi, Creplin, Bellingham, Diesing, Revis. p. 31.  
*D. inerme*, Nitzsch.  
*Fasciola appendiculata*, Froelich.  
*Hab.* Found by Froelich and Nitzsch in the intestines of *Anas Boschas*; in *A. querquedula* by Bremser; in *A. Tadorna* by Creplin; in *A. Anser*, *A. ferina*, *A. albifrons* and *Mergus Merganser*, by Mehlis.
21. DISTOMA LINEOLA, Diesing.  
*D. Falconis rufi*, Rudolphi.  
*D. Lineola*, Diesing.  
*Hab.* Stated to infest the intestines of *Falco rufus*, but probably only accidentally transferred thither, as Diesing suggests.
22. DISTOMA GRANDE, Rudolphi.  
*D. grande*, Rudolphi, Dujardin, Diesing.  
*Hab.* Natterer found this in the intestines of *Platalea Ajaja* at Brazil, in the months of April, August, and November.
23. DISTOMA DEFLECTENS, Rudolphi.  
*D. deflectens*, Rudolphi, Dujardin, Diesing.  
 Discovered by Natterer in the intestines of *Thryothorus hypoxanthus*, at Brazil.
24. DISTOMA ALBICOLLE, Rudolphi.  
*D. albicolle*, Rudolphi, Bremser, Dujardin, Diesing.  
*Hab.* Recorded by Bremser as infesting the liver and gall-bladder of *Falco pennatus*.
25. DISTOMA ELEGANS, Rudolphi.  
*D. elegans*, Rudolphi, Mehlis, Creplin, Dujardin, Diesing.  
*Hab.* Infests the intestines, and has been found abundant in *Fringilla domestica* by Rudolphi, Creplin, and others; also by Bremser in *F. Linaria*.
26. DISTOMA NANUM, Rudolphi.  
*D. nanum*, Rudolphi, Dujardin, Diesing.  
*Fasciola nana*, Rudolphi.  
*Hab.* Rudolphi discovered two specimens in the intestine of *Scolopax Gallinula*, in the month of July.
27. DISTOMA CIRRATUM, Rudolphi.  
*D. cirratum*, Rudolphi, Dujardin, Diesing.

*Fasciola cirrata*, Rudolphi.

*Hab.* Found by Rudolphi in the large intestine of *Corvus Monedula* and *C. Pica*.

28. *DISTOMA MACULOSUM*, Rudolphi.

*D. maculosum*, Rudolphi, Dujardin, Moulinié, Diesing, Revis. p. 33.

*D. Hirundinum*, Zeder.

*Fasciola Hirundinis*, Froelich.

*F. maculosa*, Rudolphi.

In statu larvæ.

*Cercaria (Acanthocephala) Virgula*, Diesing, Revision der Cercarieen, p. 24.

*C. (Eucercaria) Virgula*, Diesing.

*C. Virgula*, Filippi, Moulinié.

*Hab.* Found by Froelich in the intestines of *Cypselus Apus*; in *Hirundo urbica* by Zeder in August; in *H. rustica* by Rudolphi in May, and also by him in *Caprimulgus europæus* in September, and in the same bird also by Diesing in May; in *Hirundo riparia* by Bremser.

The larvæ have been described by Filippi, and have been found by him in the viscera of *Valvata piscinalis* and *Paludina impura*, also in the abdominal cavity of *Perlidae*, and the larvæ of various other aquatic insects. According to the observations of Filippi, the embryonal condition is that of the infusorial animalcule familiarly known as *Bursaria*.

29. *DISTOMA GLOBOCAUDATUM*, Creplin.

*D. globocaudatum*, Creplin, Dujardin, Diesing, Revis. p. 33.

*Hab.* Creplin has found this species in the intestines of *Corvus Cornix* and *C. glandarius*.

30. *DISTOMA TRIANGULARE*, Diesing.

*D. triangulare*, Diesing.

*D. Meropis*, Rudolphi.

*Hab.* Found by Rudolphi in the intestines of *Merops Apiastër*.

31. *DISTOMA INVOLUTUM*, Rudolphi.

*D. involutum*, Rudolphi, Diesing.

*D. fusiforme*, Zeder.

*Fasciola Upupæ*, Schrank.

*Hab.* Found by Zeder and Schrank in the intestinal canal of *Upupa epops*.

32. *DISTOMA MICROCOCCUM*, Rudolphi.

*D. micrococcum*, Rudolphi, Dujardin, Diesing.

*Hab.* Found by Rudolphi, and also by Bremser, in the intestines of *Glareola austriaca*.

33. *DISTOMA COCHLEARIFORME*, Rudolphi.

*D. cochleariforme*, Rudolphi, Dujardin, Diesing.

- Hab.* Discovered by Natterer in Brazil in the intestines of *Pelicanus Aquila*.
34. *DISTOMA DIESINGII*, Cobbold.  
*D. Cochlear*, Diesing.  
*D. cochleariforme Sternæ*, Rudolphi.  
*Hab.* Discovered by Natterer in Brazil in the intestines of *Sterna cautica* and *S. minuta*.
35. *DISTOMA MACROSTOMUM*, Rudolphi.  
*D. macrostomum*, Rudolphi, Bremser, Dujardin, Diesing.  
*D. erraticum*, Rudolphi.  
*D. ringens*, Rudolphi, Dujardin.  
*D. Philomelæ*, Rudolphi.  
*Fasciola macrostoma*, Rudolphi.  
*Hab.* Found by Bremser and others in the intestine of *Philomela nisoria* and *P. fluviatilis*, in *Parus cæruleus*, *P. major*, *P. palustris*, *P. pendulinus*, and in *Picus tridactylus*; by Rudolphi in *Motacilla flava*, *M. alba*, *Sylvia cinerea*, and *S. Luscinia*.
36. *DISTOMA MESOSTOMUM*, Rudolphi.  
*D. mesostomum*, Rudolphi, Diesing.  
*Hab.* Rudolphi discovered this species in *Turdus iliacus* at Griefswald, and it has also been obtained from *Pyrrhula vulgaris*, *Fringilla Chloris*, and *F. Coccothraustes*.
37. *DISTOMA CAUDALE*, Rudolphi.  
*D. caudale*, Rudolphi, Dujardin, Diesing.  
*D. Caryocatactis*, Zeder.  
*Hab.* Diesing first noticed this in *Corvus Caryocatactis*. It has since been observed in the rectum of *C. glandarius* and *C. Pyrrhocorax*.
38. *DISTOMA ÆQUALE*, Dujardin.  
*D. æquale*, Dujardin, Diesing.  
*Hab.* Dujardin discovered many examples in the intestine of *Strix flammea* in March. I have also found it in the American Barn Owl (*Strix perlata*).
39. *DISTOMA BREVICOLLE*, Creplin.  
*D. brevicolle*, Creplin, Dujardin, Diesing, i. p. 363.  
*Hab.* Creplin found six individuals in the large intestine of *Hematopus ostralegus* in September.
40. *DISTOMA MINUTUM*, Cobbold.  
*D. minuta*, Cobbold. Linn. Trans. vol. xxii. pt. 4, p. 364, tab. 63, figs. 4 & 5.  
*Hab.* Found by me very abundant in the intestinal mucus of a specimen of *Hematopus ostralegus*, which died in the Zoological Society's Gardens, Regent's Park.



41. *DISTOMA ARENULA*, Creplin.

*D. Arenula*, Creplin, Dujardin, Diesing.

*Hab.* Infests abundantly the intestinal canal of *Fulica atra*. According to Creplin, it is invisible to the naked eye.

42. *DISTOMA FILUM*, Dujardin.

*D. Filum*, Dujardin, Diesing.

*Hab.* Eight examples were discovered by Dujardin in the intestines of *Fringilla domestica*.

43. *DISTOMA ARCUATUM*, Dujardin.

*D. arcuatum*, Dujardin, Diesing.

*Hab.* Discovered by Dujardin in *Corvus glandarius*, who found it present in six instances out of nineteen dissections.

44. *DISTOMA COLLURIONIS*, Zeder.

*D. Collurionis*, Zeder, Rudolphi, Diesing.

*Hab.* This doubtful form is stated by Schrank to infest the intestines of *Lanius Collurio*.

45. *DISTOMA CLATHRATUM*, Deslongchamps.

*D. clathratum*, Deslongchamps, Dujardin, Diesing.

*Hab.* Found by Deslongchamps in the gall-bladder of *Cypselus Apus* in the month of May.

46. *DISTOMA COMMUTATUM*, Diesing.

*D. commutatum*, Diesing, Revis. der Myzelminth. p. 35.

*D. dimorphum*, Wagener.

*Hab.* Discovered by Wagener in the intestinal cæca of *Phasianus Gallus* in March.

47. *DISTOMA XANTHOSOMUM*, Wagener.

*D. xanthosomum*, Creplin? Wagener, Diesing, Revis. der Myzelminth. p. 51 (non descriptum).

*Hab.* Removed by Wagener from the gall-bladder of *Podiceps minor*.

48. *DISTOMA CRASSIUSCULUM*, Rudolphi.

*D. crassiusculum*, Rudolphi, Dujardin, Creplin, Wedl, Diesing, Revis. p. 49.

*D. felleum Falconi Chrysaëte*, Viborg.

*D. bilis*, Zeder.

*Fasciola bilis*, Gmelin.

*Planaria bilis*, Braun.

*Hab.* Found by Abildgaard and Braun in *Falco chrysaëtos*; by Creplin in *F. albicilla*; by Wedl in *F. Buteo*. The extremely minute papillæ or teeth described by Wedl all round the oral orifice are not homologous with the papillary eminences attached to the oral sucker in the genus *Crossodera*.

C. *In corpore reptilium.*1. *DISTOMA CYGNOIDES*, Zeder.

*D. cygnoides*, Zeder, Rudolphi, Siebold, Miescher, Valentin, Dujardin,

Leidy, Moulinié, Cobbold, Pagenstecher, Wagener, Diesing, Revis. der Myzelminth. p. 30.

*D. Hylæ*, Rudolphi.

In statu larvæ.

*C. (Xiphid:ocercaria) macrocerca*, Filippi, Diesing, Revis. der Cercarien, p. 19.

*C. (Acanthocephala) macrocerca*, Filippi, Diesing, Revis. der Myzelminth. p. 30.

*Hab.* This fluke is abundant in Frogs. Its development has recently been investigated with great success by Wagener and Pagenstecher. The adult form was originally discovered in *Rana esculenta* by Losche, Zeder, Rudolphi, and Pagenstecher. It has also been found in *R. temporaria* by Mehlis, myself, and others; in *Bombinator igneus* by Gäde; in *Dendrohyas viridis*; also in America, by Leidy, in *Rana pipiens*, *R. palustris*, *R. halecina*, *Salamandra maculata*, *S. (Amblyostoma) rubra* and *S. salmonea*, in the urinary bladder.

In the above indicated larval state it has been found by Filippi attached to the branchiæ of *Cyclas cornea*, and by Wagener attached to various other species of *Cyclas* and *Pisidium*, in the mouths of July, August, and September. Pagenstecher, however, believes that the true larva of this *Distoma* is the *Cercaria duplicata* of Moulinié, or, in other words, the *Rhopalocerca tardigrada* of Diesing.

## 2. DISTOMA CLAVIGERUM, Rudolphi.

*D. clavigerum*, Rudolphi, Dujardin, Bellingham, Cobbold, Pagenstecher, Van Beneden, Diesing, Revis. der Myzelminth. p. 34.

*Fasciola Ranæ*, Froelich.

In statu larvæ.

*Cercaria (Acanthocephala) ornata*, Diesing, Revis. der Cerc. p. 19.

*Cerc. ornata*, La Valette, Pagenstecher.

*C. armata*, Van Beneden (ex parte).

*Hab.* This species is likewise abundant in frogs, and has been found by Froelich, Bremser, and Dujardin, in *Rana (Pelophylax) esculenta*, *Dendrohyas viridis*, and in *Phryne vulgaris*; in the intestines of *Bufo viridis* by Olfers; in *Rana temporaria* by Bellingham, Pagenstecher, myself, and others.

The larvæ have been found by La Valette and Van Beneden in *Planorbis corneus*; by Pagenstecher in *Hydrachna concharum*, and by Van Beneden in *Lymneus stagnalis*.

## 3. DISTOMA CRYSTALLINUM, Rudolphi.

*D. crystallinum*, Rudolphi, Dujardin, Pagenstecher, Diesing, Revis. p. 34.

*Hab.* Rudolphi discovered this in a cyst attached to the heart of *Pelias Berus*. It has been indicated also in *Rana temporaria*, *R. esculenta*, *Bufo viridis*, and *Bombinator igneus* by Gäde, Pagenstecher, and others. It is usually encysted.

4. *DISTOMA CYLINDRACEUM*, Zeder.

*D. cylindraceum*. Zeder, Rudolphi, Meyer, Erdl, Siebold, Dujardin, Cobbold, Pagenstecher, Diesing, Revis. p. 47.

*Brachylæmus cylindraceus*, Blanchard.

*Fasciola subclavata*, Pallas.

*Planaria cylindrica*, Gocze.

*Hab.* Also very abundant in frogs. Originally noticed by Braun and Zeder in *Rana esculenta*; by Rudolphi, Dujardin, myself, and others in *R. temporaria*; in *Dendrobates viridis* by Bremser; in *R. oxyrrhinus* by Siebold, and *R. platyrrhinus* by Siebold and Pagenstecher. It usually infests the lungs.

5. *DISTOMA VARIEGATUM*, Rudolphi.

*D. variegatum*, Rudolphi, Creplin, Mehlis, Dujardin, Pagenstecher, Wagener, Meissner, Cobbold, Leidy, Diesing, Revis. p. 35.

*Brachylæmus variegatus*, Blanchard.

*Hab.* This is somewhat less abundant in Batrachians than the foregoing. Rudolphi, Creplin, Diesing, Pagenstecher, and others have noticed it in *Rana esculenta*. Leidy has found it in *R. pipiens*.

6. *DISTOMA ENDOLOBUM*, Dujardin.

*D. endolobum*, Dujardin, Pagenstecher, Diesing, Revis. p. 45.

In statu larvæ.

*Cercaria (Xiphidiocercaria) armata*, Siebold.

*C. armata*, Victor Carns, La Valette, Pagenstecher, Van Beneden (ex parte), Diesing, Revis. der Cercarien, p. 15.

*Hab.* Originally discovered by Dujardin in *Rana esculenta* and *Salamandra maculosa*. Since found in the intestines of *Rana temporaria* by Pagenstecher.

The larvæ have been found free in fresh water by Wagener; in sporocysts and also free in *Planorbis corneus* by Siebold and Steenstrup; in *Lymnæus stagnalis* by Pagenstecher, Siebold, Steenstrup, and La Valette; by the last-named observer, also in *Paludina impura*. Van Beneden, however, appears to consider his two kinds of *Cercaria armata* as producing *D. clavigerum* and *D. retusum*!

7. *DISTOMA TETRACYSTIS*, Gastaldi.

*C. tetracystis*, Biagio Gastaldi, Filippi, Diesing, Revis. der Myzelmint. p. 44.

In statu larvæ.

*Cercaria (Xiphidocerc.) microcotyla*, Filippi.

*C. (Acanthocephala) microcotyla*, Filippi, Moulinié, Wagener, Diesing, Revis. der Cercarien, p. 17.

*Cerc. pugnax*, La Valette, Pagenstecher.

*Hab.* Discovered by Gastaldi among the muscles of *Rana esculenta*, enclosed in small cysts, in the month of August. At present known only in an imperfectly developed state.

The larvæ have been found free and in sporocysts by Filippi, La Valette, and Pagenstecher, in *Paludina achatina* and *Rana esculenta*.

8. *DISTOMA RETUSUM*, Dujardin.

*D. retusum*, Dujardin, Leidy, Diesing, Revis. p. 44, Van Beneden, Mém. sur les Vers Intest. p. 92.

*D. clavigerum*, Rudolphi (ex parte?).

*D. Ranae esculentæ*, Valentin.

In statu larvæ.

*Cercaria armata*, Van Beneden (ex parte).

*Hab.* Discovered by Dujardin at Rennes in *Rana temporaria*, and considered by him as distinct from *D. clavigerum*. It has been also recorded by Leidy in the intestines of *R. hulecina* at Philadelphia, U.S.

Van Beneden states (Mém. sur les Vers Intest. p. 93) that there are two distinct scolex-forms in *Planorbis corneus* usually confounded under the title of *Cercaria armata*, and that one of these is the larval state of *Distoma retusum*, and the other referable to *D. clavigerum*.

9. *DISTOMA WEDLII*, Cobbold.

*D. Pelophylaxis esculenti*, Wedl (non descriptum), Diesing, Revis. der Myzelminth. p. 51 (species inquirenda).

*Hab.* Wedl found this form in the brain of *Rana esculenta*, but its specific distinctness is to a certain extent doubtful.

10. *DISTOMA DIFFUSOCALCIFERUM*, Gastaldi.

*D. diffusocalciferum*, Gastaldi, Diesing, Revis. der Myzelminth. p. 32.

*Hab.* Discovered by Gastaldi encysted in the muscles, under the skin, in the liver and in the lungs of *Rana esculenta* in August.

11. *DISTOMA ACERVOCALCIFERUM*, Gastaldi.

*D. acervocalciferum*, Gastaldi, Diesing, Revis. der Myzelminth. p. 36.

*Hab.* Found in abundance by Gastaldi enclosed in cysts connected with the nervous trunks of the brachial plexus in *Rana esculenta*.

12. *DISTOMA CRASSICOLLE*, Rudolphi.

*D. crassicolle*, Rudolphi, Dujardin, Creplin, Pontallié, Diesing.

*D. Salamandræ*, Zeder.

*Fasciola Salamandræ*, Froelich.

*Hab.* Found by Froelich and Bremser in *Salamandra atra*; in *S. maculosa* by Rudolphi and Dujardin; in *Triton alpestris* and *Lissotriton punctatus* by Mehlis; by Pontallié in cysts among the muscles and under the skin of *Triton marmoratus* in the month of February.

13. *DISTOMA LINGUATULA*, Rudolphi.

*D. Linguatula*, Rudolphi, Dujardin, Diesing.

*Hab.* Olfers originally detected this entozoon in a Brazilian Frog. It has been since found by Natterer in *Cystignathus pachypus*, in *Doxydophryna aqua*, and *Ceratophrys varia*.

14. *DISTOMA CYMBIFORME*, Rudolphi.

*D. cymbiforme*, Rudolphi, Dujardin, Diesing.

*Hab.* Rudolphi found nine examples in the urinary bladder of *Hali-chelys atra*.

15. *DISTOMA LONGICOLLE*, Cobbold.

*D. pulmonale Colubri Natricis*, Viborg, Rudolphi.

*D. Naja*, Rudolphi, Dujardin, Diesing.

*Fasciola longicollis*, Abildgaard.

*Hab.* Found by Abildgaard, Rudolphi, Bremser, and Dujardin in the lungs of *Tropidonotus Naja* in spring, summer, and autumn.

16. DISTOMA BOSCHI, Cobbold.

*Fasciola Colubri*, Bose (non descriptum).

*Distoma Colubri Americani*, Rudolphi, Diesing (species inquirendæ).

*Distoma Boschi*, Cobbold, Linn. Trans. vol. xxii. part iv. p. 364, tab. 63, figs. 6, 7.

*Hab.* Like Bose, I have succeeded in procuring this well-marked species from the buccal cavity of an American Serpent, the specific name of the latter being unknown to me. The Snake from which I obtained this worm died at the London Zoological Society's Gardens. The lungs were also infested.

17. DISTOMA MONAS, Rudolphi.

*D. Monas*, Rudolphi, Dujardin, Diesing.

*Hab.* Found by Natterer in the intestine of *Siphonops annulatus* in Brazil.

18. DISTOMA MENTULATUM, Rudolphi.

*D. mentulatum*, Rudolphi, Dujardin, Diesing, Revis. p. 35.

*D. Colubri Natricis intestinale*, Rudolphi.

*D. Colubri tessellati*, Rudolphi.

*D. Lacertæ*, Rudolphi.

*Hab.* Originally found by Holstein Beek in *Tropidonotus Natrix*, and noticed in the same species by Rudolphi, and more recently by Wedl; in *T. tessellatus* by Bremser; in *Podarcis Merremii* by Rudolphi; in *Lacerta agilis* by Goede.

19. DISTOMA REPANDUM, Rudolphi.

*D. repandum*, Rudolphi, Dujardin, Diesing, i. p. 355.

*Hab.* Natterer discovered this in the intestines of *Cystignathus pachypus* in Brazil.

20. DISTOMA CLAVA, Diesing.

*D. Clava*, Diesing, Revis. p. 35.

*Hab.* Discovered by Natterer at Matogrosso and Cuyaba in *Euneetes scytale*, *Hydroscopus plumbeus*, *Coluber flaviventris*, and *Cloelia fasciata*.

21. DISTOMA GELATINOSUM, Rudolphi.

*D. gelatinosum*, Rudolphi, Dujardin, Diesing.

*Hab.* Rudolphi found nine examples in *Halichelys atra* at Rimini. It has been found also by Natterer in Brazil in *Podocnemis expansa*.

22. DISTOMA PYXIDATUM, Bremser.

*D. pyxidatum*, Bremser, Rudolphi, Dujardin, Diesing.

*Hab.* Found by Natterer in Brazil in the intestines of *Champsia* (*Crocodilus*) *sclerops*.

23. *DISTOMA IRRORATUM*, Rudolphi.

*D. irroratum*, Rudolphi, Dujardin, Diesing.

*Hab.* Rudolphi discovered thirteen examples in the stomach of *Chelonia midas*.

24. *DISTOMA ALLOSTOMUM*, Diesing.

*D. colubri murorum*, Rudolphi.

*D. allostomum*, Diesing.

*Hab.* Stated by Diesing to infest the intestines of *Tropidonotus Natrix*.

25. *DISTOMA ARRECTUM*, Dujardin.

*D. arrectum*, Dujardin, Diesing.

*Hab.* Found by Dujardin in the intestine of *Lacerta viridis*.

26. *DISTOMA ASSULA*, Dujardin.

*D. Assula*, Dujardin.

*Hab.* Dujardin discovered this species in the intestine of *Tropidonotus Natrix*.

27. *DISTOMA SIGNATUM*, Dujardin.

*D. signatum*, Dujardin, Wedl, Diesing.

*Hab.* Originally found by Dujardin in the œsophagus of *Tropidonotus* (*Coluber*) *Natrix*, and recently by Wedl in the same serpent.

28. *DISTOMA INCIVILE*, Leidy.

*D. incivile*, Leidy, Diesing, Revis. p. 46.

*Hab.* Found by Leidy in the intestines of *Leiostomus obliquus* at Philadelphia, U.S.

29. *DISTOMA HORRIDUM*, Leidy.

*D. horridum*, Leidy, Diesing, Revis. p. 51 (species inquirendæ).

*Hab.* Discovered by Leidy in the renal excretory duct of *Boa Constrictor*.

D. *In corpore piscium.*

1. *DISTOMA APPENDICULATUM*, Rudolphi.

*D. appendiculatum*, Rudolphi, Mayer, Creplin, Siebold, Dujardin, Bel-  
lingham, Diesing, Revis. p. 38.

*D. crenatum*, Rudolphi.

*D. clupeæ rhenanæ*, Rudolphi.

*D. clupeæ*, Zeder.

*D. varium* (ex parte), Eysenhardt.

*Apobolema appendiculatum*, Blanchard.

*Fasciola crenata*, Rudolphi.

*F. appendiculata*, Rudolphi.

*F. clupeæ*, Sehrank.

*F. Alosæ*, Hermann.

*Hab.* This species infests the stomach and more rarely the intestines of various fishes. It has been recorded in *Alosa vulgaris* by Hermann;

in *Rhombus maximus*, *Solea vulgaris*, *Torpedo marmorata*, *Acipenser Sturio*, *Ophridium barbatum*, *O. Vassalli*, *Capros Aper*, *Trigla Hirudo*, *T. lineata*, *Saurus saurus*, and *Gasterosteus aculeatus* by Rudolphi and others; in *Scomber scombrus* and *Labrax Lupus* by Dujardin; in *Platessa flesus*; in *Cottus scorpio*, *Clupea Harengus*, *Perca fluviatilis*, *Esox lucius*, *Anguilla vulgaris*, *Gadus callarius* and *Lota communis* by Creplin.

## 2. DISTOMA TERETICOLLE, Rudolphi.

*D. tereticolle*, Rudolphi, Jurine, Bremser, Siebold, Kölliker, Dujardin, Van Beneden, Leidy, Wagener, Diesing, Revis. p. 36.

*D. truncatum*, Abildgaard?

*D. Lucii*, Zeder.

*D. rosarum*, Nordmann.

*Fasciola tereticollis*, Rudolphi.

*F. longicollis*, Bloch.

*F. Lucii*, Müller, Schmalz, Schrank.

*Planaria Lucii*, Goeze.

*Hab.* This is very common in some parts of Europe in the stomach of *Esox lucius*, while it has been found by Lesueur at Philadelphia, U.S., in the stomach of an American Pike, *Esox reticulatus*. It is also recorded in *Salmo Fario* and *S. Hucho* by Bremser, and in *S. Trutta* by Jurine.

## 3. DISTOMA CLAVATUM, Rudolphi.

*D. clavatum*, Rudolphi, Owen, Dujardin, Diesing.

*D. coryphææ*, Rudolphi.

*Fasciola clavata*, Menzies.

*F. fusca*, Bosc.

*F. Sombri Pelamidis*, Tilesius.

*Hirudinella*, Garsin, Planque.

*Hab.* Discovered in the stomach of *Pelamys Sarda* by Tilesius; seen by Pohl in *Thynnus vulgaris*; in the intestines and also adhering to the branchia of *Coryphæna Stippuris* by Bosc, and in the liver of the same by Natterer.

## 4. D. GLOBIPORUM, Rudolphi.

*D. globiporum*, Rudolphi, Nordmann, Burmeister, Siebold, Ehrenberg, Dujardin, Creplin, Wagener, Molin, Diesing, Revis. p. 30.

*D. Bramæ*, Zeder.

*D. carinatum*, Zeder.

*D. cyprinaceum*, Zeder.

*Fasciola globipora*, Rudolphi,

*F. Bramæ*, Müller, Schrank, Gmelin.

*F. longicollis*, Froelich.

*F. lanceolata*, Schrank.

*Hab.* Recorded in *Tinca chrysitis* by Moder; in *Cyprinus Carpio* by Zeder and Froelich; in *Abramis Bramæ* and *Leuciscus erythrophthal-*

*mus* by Rudolphi; in *L. Meidingeri* by Diesing, and in *L. Scardapha* by Molin; in *Chondrostoma Nasus* by Bremser; in *Abramis Blicca*, *A. Vimbra*, *Aspius alburnus*, *Leuciscus Jeses*, and *L. rutilus* by Creplin; in *Phoxinus laevis* by Mehlis; in *Perca fluviatilis* by Zeder.

5. *DISTOMA CARNOSUM*, Rudolphi.

*D. carnosum*, Rudolphi, Dujardin, Diesing.

*Hab.* Discovered by Rudolphi in the intestines of *Dentex vulgaris* in abundance.

6. *DISTOMA DENDRITICUM*, Rudolphi.

*D. dendriticum*, Rudolphi, Dujardin, Diesing.

*Hab.* Spedalieri found this form in great quantity in the intestines of *Xiphias Gladius*.

7. *DISTOMA TUBULATUM*, Rudolphi.

*D. tubulatum*, Rudolphi, Dujardin, Diesing.

*Hab.* Found by Olfers in Brazil in a species of *Muræna*.

8. *DISTOMA PULCHELLUM*, Rudolphi.

*D. pulchellum*, Rudolphi, Dujardin, Diesing.

*Hab.* Discovered by Rudolphi in the intestines of *Labrus Cynædus*.

9. *DISTOMA INCISUM*, Rudolphi.

*D. incisum*, Rudolphi, Dujardin, Diesing.

*D. Anarrhichæ Lupi*, Rathke.

*Hab.* Rathke discovered this species in the stomach of *Anarrhichas Lupus*.

10. *DISTOMA TRANSVERSALE*, Rudolphi.

*D. transversale*, Rudolphi, Dujardin, Diesing.

*Fasciola transversale*, Rudolphi.

*Hab.* Recorded by Rudolphi in *Acanthopsis (Cobitis) fossilis* and *Cobitis Pænie*.

11. *DISTOMA TUMIDULUM*, Rudolphi.

*D. tumidulum*, Rudolphi, Dujardin, Bellingham, Diesing, Revis. p. 29.

*Hab.* Found by Bellingham and others in *Syngnathus acus*; also recorded in *Hippocampus guttatus*.

12. *DISTOMA CAUDIPORUM*, Rudolphi.

*D. caudiporum*, Rudolphi, Dujardin, Diesing.

*D. varium*, Eysenhardt.

*Hab.* Rudolphi discovered only a single specimen in the intestines of *Zeus Faber*. Diesing regards it as a distinct species. Eysenhardt states that it is only a form of *D. appendiculatum*, and he unites these with *D. rufoviride* and *D. grandiporum*, all into a single species—his *D. varium*. See his paper in *Verhandl. der Gesellsch. naturf. Freunde in Berlin*, vol. i. p. 148.

13. *DISTOMA RUFOVIRIDE*, Rudolphi.



- D. rufoviride*, Rudolphi, Dujardin, Bellingham, Molin, Diesing, Revis. p. 38.
- D. varium*, Eysenhardt.
- Hab.* Found by Rudolphi, Dujardin, Bellingham, and Molin in the stomach and œsophagus of *Conger vulgaris*.
14. DISTOMA GRANDIPORUM, Rudolphi.
- D. grandiporum*, Rudolphi, Dujardin, Diesing.
- D. dimidiatum*, Creplin, Mehlis, Dujardin.
- D. varium*, Eysenhardt.
- Hab.* Found by Rudolphi in *Muræna Helena*; by Creplin in *Acipenser Sturio*. Dujardin and Eysenhardt regard this as indistinguishable from the preceding species.
15. DISTOMA POLYMORPHUM, Rudolphi.
- D. polymorphum*, Rudolphi, Dujardin, Wedl, Stein, Diesing, Revis. p. 29.
- D. Anguillula*, Abildgaard, Zeder.
- Fasciola polymorpha*, Rudolphi.
- F. Anguillulæ*, Gmelin.
- Hab.* This species appears to have first attracted the notice of Leeuwenhoek, and to have been subsequently described by Abildgaard and Rudolphi. It infests the Eel (*Anguilla vulgaris*). Wedl and Carus have recently figured it.
16. DISTOMA FOLIUM, Olfers.
- D. Folium*, Olfers, Rudolphi, Dujardin, Wagener, Diesing, Revis. p. 31.
- Hab.* Found by Olfers in the urinary bladder of the Common Pike (*Esox lucius*).
17. DISTOMA SERIALE, Rudolphi.
- D. seriale*, Rudolphi, Dujardin, Diesing.
- D. Umblæ*, Zeder,
- Fasciola Umblæ*, Fabricius.
- Hab.* Discovered by Fabricius in Greenland in the kidneys of *Salmo Umbla*.
18. DISTOMA DIVERGENS, Rudolphi.
- D. divergens*, Rudolphi, Dujardin, Diesing.
- D. Blennii*, Zeder.
- Fasciola Blennii*, Müller.
- Hab.* Found in *Blennius viviparus* by Zoega and O. F. Müller; in *B. gattorugine* and *B. tentacularis* by Rudolphi.
19. DISTOMA FASCIATUM, Rudolphi.
- D. fasciatum*, Rudolphi, Dujardin, Diesing.
- D. Labri*, Rudolphi.
- Hab.* Recorded by Rudolphi as infesting the intestines of *Crenilabrus Tinca*, *C. melops*, and *Serranus Cabrilla*. It is also found in *Ctenolabrus rupestris*.
20. DISTOMA FULVUM, Rudolphi.

*D. fulvum*, Rudolphi, Dujardin, Bellingham, Diesing, Revis. p. 31;  
Cobbold, Linn. Trans. vol. xxii. p. 157.

*D. simplex*, Rudolphi, Dujardin, Cobbold, Diesing.

*Fasciola Bramæ*, Müller.

*D. Wachniæ*, Tilesius, Diesing (species inquirenda).

*Hab.* Found by Rudolphi in *Lota molva*, and by Bellingham in *Raia Batis*. It has also been seen in *Gadus Mediterraneus*; by Dujardin and myself in *Motella quinquecirrata*.

21. DISTOMA MÜLLERI, Cobbold.

*D. Eglefini*, Zeder.

*Fasciola Eglefini*, Müller, Cobbold.

*Hab.* Discovered by O. F. Müller in the intestines of *Gadus Eglefinus*.

22. DISTOMA MICROCEPHALUM, Baird.

*D. microcephalum*, Baird, Diesing, Revis. p. 31.

*Hab.* Discovered by Dr. Baird in the stomach of the Spinous Shark (*Acanthus vulgaris*).

23. DISTOMA CLINOSTOMUM, Cobbold.

*D. gracile*, Diesing, Revis. p. 32.

*Clinostomum gracile*, Leidy.

*Hab.* Found by Leidy in the intestines of a Pike, and also in cysts attached to the gills of *Pomotis vulgaris*.

24. DISTOMA LONGUM, Leidy.

*D. longum*, Leidy, Diesing, Revis. p. 36.

*Hab.* Found by Spencer F. Baird in the pharynx of *Esox Estor*.

25. DISTOMA INSIGNE, Diesing.

*D. insigne*, Diesing, Revis. p. 31; Creplin.

*D. Scimma*, Risso.

*Hab.* Discovered by Risso in the stomach of *Echinorhinus spinosus*.

26. DISTOMA MEGASTOMUM, Rudolphi.

*D. megastomum*, Rudolphi, Eysenhardt, Bremser, Kuhn, Dujardin, Wedl, Diesing, Revis. p. 35.

*Hab.* Found by Rudolphi in *Galeus Canis*; by Eysenhardt in *Mustelus vulgaris*; by Kuhn and Wedl in the stomach of *Scyllium Catulus*.

27. DISTOMA OBESUM, Diesing.

*D. obesum*, Diesing, Revis. p. 37.

*Hab.* Found by Natterer in Brazil in the gall-bladder of *Salminus brevidens*, *Leporinus Friderici*, and *Xiphostoma Cuvieri*.

28. DISTOMA VARICUM, Zeder.

*D. varicum*, Zeder, Rudolphi, Dujardin, Bellingham, Diesing, Revis. p. 38.

*Fasciola varica*, Müller, Rudolphi.

*Hab.* Found by Müller, Rudolphi, and Bellingham in the stomach of *Salmo Salar*.

29. DISTOMA REFLEXUM, Creplin.

*D. reflexum*, Creplin, Dujardin, Bellingham, Diesing, Revis. p. 38.

*Hab.* Found by Fabricius, Creplin, and Bellingham in the intestines of *Cyclopterus lumpus*.

30. *DISTOMA EXCISUM*, Rudolphi.

*D. excisum*, Rudolphi, Bremser, Dujardin, Bellingham, Diesing, Revis. p. 38.

*Hab.* Found by Rudolphi, Dujardin, and Bellingham in the stomach of *Scomber Scombrus*; also by the original discoverer in *S. Colias*.

31. *DISTOMA MICROCOTYLE*, Diesing.

*D. microcotyle*, Diesing, Revis. p. 36.

*D. Pleuronectis maximi*, Bellingham.

*Hab.* Discovered by Bellingham in the intestines of *Rhombus maximus*.

32. *DISTOMA ANONYMUM*, Diesing.

*D. anonyum*, Diesing, Revis. p. 37.

*D. Gadi Æglefini*, &c., Bellingham.

*Hab.* Found by Bellingham in the intestines of *Gadus æglefinus*, *Merlangus carbonarius* and *M. vulgaris*.

33. *DISTOMA CALCEOLUS*, Molin.

*D. Calceolus*, Molin, Diesing, Revis. p. 38.

*Hab.* Discovered by Molin in the small intestine of *Conger vulgaris*.

34. *DISTOMA MACROPOCULUM*, Cobbold.

*D. macrocotyle*, Diesing, Revis. p. 38.

*D. Orthogorisci Mola*, Bellingham.

*Hab.* Found by Bellingham in the intestines of *Orthogoriscus Mola*.

35. *DISTOMA AURICULATUM*, Wedl.

*D. auriculatum*, Wedl, Diesing, Revis. p. 39.

*Hab.* Found by Wedl in the intestines of *Acipenser rutheus*.

36. *DISTOMA RACHION* (Cobbold).—*Corpus* compressum, spinulis armatum, utrinque obtusum. *Collum* continuum. *Os* subterminale, orbiculare. *Acetabulum* vix magnitudine oris, subcentrale, apertura circulari. *Porus* genitalis amplus inter os et acetabulum. Longit.  $\frac{1}{4}$  unc.

*D. rachion*, Cobbold, Linn. Trans. vol. xxii. p. 158.

*Hab.* Found by me in the intestines of *Morrhua æglefinus*.

37. *DISTOMA SINUATUM*, Rudolphi.

*D. sinuatum*, Rudolphi, Dujardin, Diesing.

*Hab.* Found by Rudolphi in the intestines of *Fierasfer imberbe* in the mouth of July.

38. *DISTOMA VELIPORUM*, Creplin.

*D. veliporum*, Creplin, Dujardin, Diesing.

*Fasciola Squali grisei*, Risso, Rudolphi.

*Hab.* Found by Risso, Otto, and Grohman in the alimentary canal of *Prionodon Milberti* and *Hexarchus griseus*.

39. *DISTOMA PALLENS*, Rudolphi.*D. pallens*, Rudolphi, Dujardin, Diesing.*Hab.* Found by Rudolphi in the intestines of *Chrysophrys auratu* in the month of August.40. *DISTOMA AREOLATUM*, Rudolphi.*D. areolatum*, Rudolphi, Dujardin, Diesing.*D. Platessæ*, Zeder.*Fasciola Platessæ*, Müller.*Hab.* Found by O. F. Müller in *Platessa vulgaris*, and by Rudolphi in *Pleuronectes mancus*.41. *DISTOMA CAPITELLATUM*, Rudolphi.*D. capitellatum*, Rudolphi, Dujardin, Diesing.*Hab.* Found by Rudolphi in the gall-bladder of *Uranoscopus scaber*.42. *DISTOMA MICROSTOMUM*, Rudolphi.*D. microstomum*, Rudolphi, Dujardin, Diesing.*Hab.* Recorded by Rudolphi in the intestines of *Solea vulgaris*.43. *DISTOMA SOLEÆFORME*, Rudolphi.*D. soleæforme*, Rudolphi, Dujardin, Diesing.*D. Triglæ Gurnardi*, Rathke.*Hab.* Discovered by Rathke in the stomach of *Trigla Gurnardus*.44. *DISTOMA HYALINUM*, Rudolphi.*D. hyalinum*, Rudolphi, Dujardin, Diesing.*D. Eriocis*, Zeder.*Fasciola Eriocis*, Müller.*Hab.* Found by O. F. Müller in the intestines of *Salmo Eriox*.45. *DISTOMA ROSACEUM*, Nordmann.*D. rosaceum*, Nordmann, Diesing.*D. tereticolle*, var. *rosaceum*, Dujardin.*Hab.* Discovered by Nordmann attached to the palate of *Lota communis*.46. *DISTOMA EMBRYO*, Olfers.*D. Embryo*, Olfers.*D. longicolle*, Creplin, Dujardin, Diesing.*Hab.* Found by Olfers and Creplin enclosed in cysts in the liver and peritoneum of *Aceria vulgaris*.47. *DISTOMA INFLEXUM*, Rudolphi.*D. inflexum*, Rudolphi, Dujardin, Diesing.*D. carinatum*, Zeder.*Fasciola inflexa*, Rudolphi.*Fasciola Jesis*, Gmelin.*Hab.* Found by Rudolphi in the intestines of *Leuciscus Jesis*.

48. *DISTOMA GRANULUM*, Rudolphi.*D. granulum*, Rudolphi, Dujardin, Diesing.*D. Scorpii*, Zeder.*Fasciola Scorpii*, Müller.*Hab.* Found by Zoega and Müller in the intestines of *Cottus Scorpio*.49. *DISTOMA PACHYSOMUM*, Eysenhardt.*D. pachysoma*, Eysenhardt, Diesing.*Hab.* Discovered by Eysenhardt in the small intestine of *Mergil auratus*.50. *DISTOMA INCONTUM*.*D. incontum*, Rudolphi, Dujardin, Diesing.*Hab.* Found by Olfers in Brazil in the intestines of a species of *Chatodon*.51. *DISTOMA GENU*, Rudolphi.*D. Genu*, Rudolphi, Dujardin, Diesing.*Hab.* Found by Rudolphi in the intestines of *Labrus luscus* in the month of June.52. *DISTOMUM VENTRICOSUM*, Rudolphi.*D. ventricosum*, Rudolphi, Dujardin, Diesing.*Hab.* Found by Rudolphi in the intestines of *Alosa vulgaris* in April.53. *DISTOMA BACCIGERUM*, Rudolphi.*D. baccigerum*, Rudolphi, Dujardin, Diesing.*Hab.* Found by Rudolphi in the intestines of *Atherina Hepsetus* in June.54. *DISTOMA LABIATUM*, Rudolphi.*D. labiatum*, Rudolphi, Dujardin, Diesing.*Hab.* Found by Rudolphi in the liver of *Syngnathus pelagicus* in July.55. *DISTOMA APERTUM*, Rudolphi.*D. apertum*, Rudolphi, Dujardin, Diesing.*Hab.* Found by Rudolphi in the intestines of *Apogon Rex Mullorum* in June and July.56. *DISTOMA MICROSOMUM*, Rudolphi.*D. microsomum*, Rudolphi, Dujardin, Diesing.*Hab.* Found by Rudolphi in the intestines of *Serranus Cabrilla* in the month of June.57. *DISTOMA AFFINE*, Rudolphi.*D. affine*, Rudolphi, Diesing.*Hab.* Found by Rudolphi in the intestines of *Scorpena cirrhosa*.58. *DISTOMA OCREATUM*, Rudolphi.*D. ocreatum*, Rudolphi, Dujardin, Diesing.*D. halecis*, Zeder.*Fasciola ochreata*, Rudolphi.*F. halecis*, Gmelin.*Hab.* Found by Læwenhoek and Rudolphi in the intestines of *Clupea Harengus* in May.

59. *DISTOMA TORNATUM*, Rudolphi.*D. tornatum*, Rudolphi, Dujardin, Diesing.*D. coryphænæ*, Rudolphi.*Fasciola coryphænæ*, Tilesius, Bose.*F. caudata*, Bosc.*Hab.* Found by Bose, Tilesius, and Natterer attached to the gills and in various viscera of *Coryphæna hippuris*; by Olfers in the stomach of *C. equisetus*; also by Natterer in the stomach of *Megalops cyprinoides*.60. *DISTOMA GIGAS*, Nardo.*D. Gigas*, Nardo, Diesing.*Hab.* Discovered by Nardo in the stomach of *Lugarus imperialis* in September.61. *DISTOMA TORULOSUM*, Rudolphi.*D. torulosum*, Rudolphi, Dujardin, Diesing.*Hab.* Found by Rudolphi in the intestines of *Silurus Glanis* in October.62. *DISTOMA TUBARIUM*, Rudolphi.*D. tubarium*, Rudolphi, Dujardin, Diesing.*Hab.* Found by Rudolphi in the intestines of *Umbrina vulgaris*.63. *DISTOMA FILIFORME*, Rudolphi.*D. filiforme*, Rudolphi, Dujardin, Diesing.*Hab.* Found by Rudolphi in the intestines of *Cepola rubescens* in April.64. *DISTOMA RAYNERIANUM*, Nardo.*D. Raynerianum*, Nardo, Diesing.*Hab.* Found by Rudolphi in the intestines of *Lugarus imperialis* in September.65. *DISTOMA PUNCTUM*, Zeder.*D. punctum*, Zeder, Rudolphi, Bremser, Dujardin, Diesing.*Hab.* Found by Zeder and Bremser in the intestines of *Barbus communis* in July and in autumnal months.66. *DISTOMA ANNULIGERUM*, Nordmann.*D. annuligerum*, Nordmann, Gescheidt, Dujardin, Diesing.*Hab.* Discovered by Nordmann and Gescheidt enclosed in cysts in the vitreous humour of the eye of *Perca fluviatilis*.67. *DISTOMA FRACTUM*, Rudolphi.*D. fractum*, Rudolphi, Dujardin, Diesing.*Hab.* Found by Rudolphi in the intestines of *Box Salpa* in June and July.68. *DISTOMA GIBBOSUM*, Rudolphi.*D. gibbosum*, Rudolphi, Dujardin, Diesing.*Hab.* Found by Rudolphi in the stomach of *Belone Acus* in May and June.

69. *DISTOMA FURCATUM*, Bremser.

*D. furcatum*, Bremser, Eysenhardt, Dujardin, Diesing.

*Hab.* Infests *Mullus surmuletus* and *M. barbatus*; found also in *M. rubescens* and *Lota molva*, by Rudolphi, in the months of April and June; and by Natterer in Brazil, in the intestines of *Coryphæna Hippuris*, in August.

70. *DISTOMA DISTICHUM*, Zeder.

*D. distichum*, O. F. Müller, Zeder, Rudolphi, Diesing.

*Hab.* Found by Zoega in the intestines of various fishes. Probably it has been described under some other name.

71. *DISTOMA BINODE*, Zeder.

*D. binode*, Zeder, Rudolphi, Diesing.

*Fasciola binodis*, O. F. Müller, Gmelin, Schrank.

*Hab.* Also found by Zoega in the intestines of various fishes.

72. *DISTOMA ANGULATUM*, Dujardin.

*D. angulatum*, Dujardin, Diesing.

*Hab.* Found by Dujardin in the intestines of *Anguilla vulgaris*.

73. *DISTOMA RECEPTACULUM*, Cobbold.

*D. Labracis*, Dujardin, Diesing (species inquirendæ).

*Hab.* Discovered by Dujardin in the intestine of *Labrax Lupus*.

74. *DISTOMA DUJARDINII*, Cobbold.

*D. Soleæ*, Dujardin, Diesing (species inquirendæ).

*Hab.* Found on several occasions by Dujardin in the intestines of *Solea vulgaris*.

75. *DISTOMA CONTORTUM*, Rudolphi.

*D. contortum*, Rudolphi, Drumond, Dujardin, Diesing, Bellingham.

*Hab.* Found by Rudolphi and Bellingham attached to the gills of *Orthogoriscus Mola*.

76. *DISTOMA NIGROFLAVUM*, Rudolphi.

*D. nigroflavum*, Rudolphi, Drumond, Dujardin, Diesing.

*Schisturus paradoxus*, Rudolphi.

*Hab.* Found by Rudolphi in the stomach of *Orthogoriscus Mola*; it has been found in the intestines of the same fish by Bellingham, Gervais, Van Beneden, and Goodsir.

77. *DISTOMA PERLATUM*, Nordmann.

*D. perlatum*, Nordmann, Creplin, Dujardin, Owen, Diesing.

*D. globiferum Tinca*, Rudolphi.

*Fasciola Tinca*, Modeer.

In statu larvæ.

*Cercariæum Paludina* *impuræ*, Diesing, Moulinié, Filippi.

*C. P. imp. inerme*, Diesing, Revis. der Cerc. p. 44.

*Distoma P. imp. iner.*, Filippi.

*Hab.* Found by Modeer, Nordmann, and Dujardin in *Tinca chrysis*; in the larval state by Filippi in *Paludina impura*.

78. *DISTOMA ATOMON*, Rudolphi.

*D. atomon*, Rudolphi, Dujardin, Diesing, Cobbold (Linn. Trans. *loc. cit.*).

*Fasciola atomon*, Rudolphi.

*Hab.* Found by Rudolphi in the stomach of *Platessa flesus*.

79. *DISTOMA LUTEUM* (Wagener), *Status juvenilis*.—*Corpus* ovatum,

marginibus perparce papillis tectum, retrorsum attenuatum. *Collum* nullum. *Acetabulum* ore duplo majus, subcentrale, apertura circulari.

Longit.  $\frac{1}{50}$  unc.

*D. luteum*, La Valette, Pagenstecher, Wagener.

*Heterostomum ovatum*, Diesing.

In statu larvæ.

*Cercariæum ovatum*, Diesing, Revis. der Cere. p. 43.

*Hab.* Wagener states that he has seen a mature specimen in the intestines of *Esox lucius*. Found in the young and larval state by Baer,

La Valette, Pagenstecher, and Wagener in *Paludina vivipara*.

80. *DISTOMA HOMEOSTOMUM*, Diesing.

*D. Trigla Pini*, Bellingham.

*D. homeostomum*, Diesing, Revis. p. 39.

*Hab.* Found by Bellingham in the stomach of *Trigla cuculus*.

E. *In corpore animalium evertibratorum.*1. *DISTOMA ISOSTOMUM*, Rudolphi.

*D. isostomum*, Rudolphi, Creplin, Dujardin, Diesing.

*D. cirrigerum*, Baer?

*Hab.* Found by Carus, Otto, Creplin, and Baer in various viscera and tissues of *Astacus fluviatilis*.

2. *DISTOMA KÖLIKERII*, Cobbold.

*D. Pelagiæ*, Kölliker, Diesing.

*Hab.* Found by Krohn and Kölliker attached to the lips of *Argonauta Argo*, and in the stomach and tissues of *Pelugia noctiluca*.

3. *DISTOMA MEGACOTYLE*, Diesing.

*D. Veಲ್ಲæ*, Filippi.

*Hab.* Found by Filippi in the stomach of *Veಲ್ಲa spirans*.

4. *DISTOMA GENICULATUM*, Diesing.

*D. Physophoræ*, Filippi.

*Hab.* Found by Filippi in the stomach of *Physophora tetrasticha* in January.

Genus 4. *BILHARZIA* (Cobbold).

*Sexus discretus*. *Corpus maris* lineare, retrorsum in canalem *gynæcophorum* productum. *Os* acetabuliforme, subtriangulare. *Acetabulum* ventrale prominens, subpedicellatum. *Apertura genitalis* inter acetabulum et initium canalis *gynæcophori*. *Corpus femineæ* filiforme, gracile. *Apertura genitalis* ad acetabuli marginem posteriorem.



In a paper read before the Linnean Society January 20, 1859, and since printed in Linn. Trans. vol. xxii. p. 363, I ventured to establish this genus, employing for that purpose the name of the original discoverer of this singular helminthic type. Since that paper was read I have received Diesing's 'Revision der Myzelminthen,' and find that he also has separated the same forms of entozoa into a distinct genus, under the title of *Gynæcophorus*. For the present, therefore, I feel justified in retaining the term previously employed.

1. *BILHARZIA HÆMATOBIA*, Cobbold.

*Distomum hæmatobium*, Bilharz, Küchenmeister, Moulinié.

*Gynæcophorus hæmatobius*, Diesing, Revis. p. 52.

*Hab.* Discovered by Dr. Bilharz of Cairo in the portal system of blood-vessels of Egyptians; also subsequently observed by him, Griesinger, Reinhard, and Lautner in the veins of the mesentery, bladder, and other parts, giving rise to a formidable and very prevalent disease. In 363 dissections of the human body Griesinger found this entozoon present 117 times.

2. *BILHARZIA MAGNA*, Cobbold.

*B. magna*, Cobbold (*loc. cit.*).

*Hab.* I discovered a solitary male specimen of this worm in the portal vein of *Cercopithecus fuliginosus*.

Genus 5. *KÖLLIKERIA*. (*Cobbold.*)

*Sexus discretus.* *Corpus maris* filiforme, antrosum clavatum, retrorsum sensim attenuatum. *Os* acetabuliforme, orbiculare. *Acetabulum* ventrale sessile. *Apertura genitalis* inter os et acetabulum. *Corpus femineæ* antrosum filiforme, clavatum, retrorsum subito increescens, reniforme. *Apertura genitalis* inter os et acetabulum.

The considerations which have induced me to separate the preceding species into a new genus apply almost equally to the helminth here regarded as the type of another group; while its peculiar habits also render it worthy of distinction.

1. *KÖLLIKERIA FILICOLLIS*, Cobbold.

*Distoma Okenii*, Kölliker, Diesing.

*D. filicolle*, Van Beneden, Mém. sur les Vers. Intest. p. 104.

*Monostoma filicolle*, Rudolphi, Dujardin.

*Hab.* Found in *Brama Raii* by Rudolphi, Kölliker, and Van Beneden. This species inhabits open follicles in the branchial cavity; two individuals—male and female—being found in each cyst.

Genus 6. *CROSSODERA*.

Although closely allied to the typical distomes in respect of general structure, the presence of a variable number of prominent papillæ or fleshy lobes surrounding the mouth very properly induced Dujardin

to associate these species in a separate sub-genus under the above title, which I have retained.

1. *CROSSODERA NODULOSA*, Dujardin.

*Distoma nodulosum*, Zeder, Rudolphi, Bremser, Creplin, Mehlis, Siebold, Dujardin, Moulinié, Wagener, Diesing, Revis. p. 39.

*D. Luciopercæ*, Zeder (fortasse), Filippi.

*D. Planorbis carinati*.

*Fasciola nodulosa*, Froelich.

*F. Luciopercæ*, Müller, Gmelin.

*F. Percæ cernua*, Müller.

*F. percina*, Sehrank.

In statu larvæ.

*F. Cercariæni (Planorbis) carinati* (fortasse), Diesing.

*Hab.* Found by Rudolphi and Dujardin in *Perca fluviatilis*; by Zeder and Zoega in *Acerina vulgaris*; by Sehrank in *Aspro vulgaris*; it has also been observed in *A. Zingel*; in *Leioperca Sandra* by Rudolphi; in *Esox lucius* by Creplin; by Dujardin in *Barbus communis*.

2. *CROSSODERA CAMPANULA*, Dujardin.

*Distoma campanula*, Dujardin, Wedl, Diesing.

*D. nodulosum* (partim), Diesing.

*Hab.* Found by Dujardin and Wedl in the intestines of *Esox lucius*.

3. *CROSSODERA LAUREATA*, Dujardin.

*Distoma laureatum*, Zeder, Rudolphi, Dujardin, Diesing.

*Fasciola laureata*, Rudolphi.

*F. Farionis*, O. F. Müller, Froelich.

*F. Truttae*, Froelich.

*Hab.* Found by Zeder and Froelich in *Salmo Trutta*; by Rudolphi and Froelich in *S. Fario*; it has also been observed in *S. Umbla* and *Thymallus vexillifer*.

4. *CROSSODERA PAPPILLOSA*, Cobbold.

*Distoma Beroës*, Will.

*D. papillosum*, Diesing.

*Hab.* Discovered by Will in the water-vessels of *Beroë rufescens*.

5. *CROSSODERA LINEARIS*, Cobbold.

*Distoma lineare*, Zeder, Rudolphi, Dujardin, Diesing.

*Fasciola linearis*, Rudolphi.

*Hab.* Found by Rudolphi in the large intestine of the domestic Coek, *Phasianus Gallus*.

GENUS 7. *ECHINOSTOMA*. (Cobbold.)

I entertain no doubt as to the propriety of elevating Dujardin's sub-genus *Echinostoma* into a separate genus. The remarkable form of the anterior sucker, and the accompanying double series of marginal spines, associated with the conspicuous dermal spicules, are sufficiently characteristic.

A. *In corpore mammalium.*

1. ECHINOSTOMA TRIGONOCEPHALUM, Dujardin.  
*Distoma trigonocephalum*, Rudolphi, Dujardin, Creplin, Bellingham, Molin, Diesing, Revis. p. 40.  
*D. armatum*, Zeder.  
*D. Melis*, Zeder.  
*Fasciola trigonocephala*, Rudolphi.  
*F. armata*, Rudolphi.  
*F. Melis*, Rudolphi, Schrank.  
*F. Putorii*, Rudolphi, Schrank.  
*Planaria Melis*, Goeze.  
*P. Putorii*, Goeze.  
*Hab.* Found by Rudolphi, Bremser, and Bellingham in *Erinaceus Europæus*; by Goeze, Zeder, Rudolphi, Bremser, and Molin in *Mustela Putorius*, and by the four first-named of these observers in *Meles Taxus*; by Rudolphi in *Mustelus vulgaris*; in *M. Foina* by Treutler; in *M. Lutreola* by Otto; in *Canis Vulpes* by Creplin; it has also been observed in the intestines of *Lutra vulgaris*.
2. ECHINOSTOMA ACANTHOIDES, Dujardin.  
*Distoma acanthoides*, Rudolphi, Dujardin, Diesing.  
*Hab.* Found by Rudolphi in the intestines of *Phoca vitulina*.
3. ECHINOSTOMA SPICULATOR, Dujardin.  
*Distoma spiculator*, Dujardin, Diesing.  
*Hab.* Found in the small intestines of *Mus decumanus*.
4. ECHINOSTOMA INCRASSATUM, Cobbold.  
*Distoma incrassatum*, Diesing, Revis. p. 46.  
*Hab.* Found by Natterer in the stomach and intestines of *Lutra solitaria* in Brazil.

B. *In corpore avium.*

1. ECHINOSTOMA ECHINATUM, Dujardin.  
*Distoma echinatum*, Zeder, Rudolphi, Bremser, Nathusius, Creplin, Dujardin, Bellingham, Wedl, La Valette; Diesing, Revis. p. 40; Van Beneden.  
*D. excavatum* (*Nycticoracis*), Rudolphi.  
*D. radiatum*, Dujardin?  
*D. Anatis*, Zeder.  
*D. Gruis*, Zeder.  
*D. Cygni Otoris*, Bellingham?  
*Fasciola Anatis*, Gmelin.  
*F. Gruis*, Gmelin.  
*Festucaria Anatis*, Schrank.  
*F. Boschadis*, Schrank.  
*Planaria teres poro simplici*, Goeze.  
*Cucullanus conoideus*, Bloch.

In statu imperfecto.

*Distoma echiniferum*, La Valette.

In statu larvæ.

*Cercaria (Homocercaria) echinata*, Siebold, Diesing.

*C. (Nephrocephala) echinata*, Siebold, Diesing, Revis. p. 24.

*C. echinata*, Siebold, Van Beneden, La Valette, Moulinié, Wagener.

*C. (Homocercaria) echinatoides*, Filippi, Diesing.

*C. (Nephrocephala) echinatoides*, Filippi, Diesing (*loc. cit.*).

*C. echinatoides*, Filippi, Moulinié.

*C. echifera*, La Valette, Wagener.

*C. brunnea?* Van Beneden.

*Hab.* In the adult form this species has been observed in *Anas Boschas* by Bloch, Goeze, Zeder and La Valette; in *A. fuligula* and *A. clangula* by Mehlis; in the last named and in *A. Penelope* by Bellingham; in *A. moschata* by Dujardin; in *A. Tadorna* and *A. Cygnus* by Creplin, also in the latter by Bellingham, as well as in *A. Olor* and *Podiceps cristatus*; in *Carbo Cormoranus* by Wedl; in *Ardea Nycticorax* and *A. Grus* by Bremser; in *Ardea pavonia* by Diesing; and in *A. Gardeni* by Natterer in Brazil; it has also been observed in *Ardea comata*, *Carbo pygmaeus*, *Podiceps minor*, in *Anas Marila*, *A. Nyroca*, *A. strepera*, *A. ferina*, *A. clypeuta*, and *A. Anser*.

In the young state (if Pagenstecher's view of the identity of this form with *Distoma echinatum* be correct) it has been seen by La Valette in *Fringilla domestica*, *F. montana*, and *Columba domestica*, also in *Lepus Cuniculus* (!) and *Anas Boschas*.

The larval condition has been noticed in *Paludina vivipara*, and *P. achatina*, *Planorbis corneus*, and *Lymnæus stagnalis*.

## 2. ECHINOSTOMA MILITARE, Dujardin.

*Distoma militare*, Rudolphi, Bojanus, Hemprich and Ehrenberg, Dujardin, Diesing, Bellingham; Van Beneden, Mém. sur les Vers Intest. p. 86.

*Fasciola mililaris*, Rudolphi.

In statu larvæ.

*Cercaria echinata?* Von Siebold.

*C. fallax*, Diesing, Pagenstecher, Filippi.

*C. (Eucercaria) fallax*, Diesing.

*C. (Gymnocephala) fallax*, Diesing, Revis. der Cercarien, p. 11.

*C. pacifica*, Steenstrup.

*Hab.* Found in the adult condition by Rudolphi and Bellingham in *Numenius arcuatus*; by Bremser in *Scolopax Gallinago* and *Crex porzana*; in *Scolopax Gallinula* by Hildebrandt.

The larval *Cercariæ* occur in *Lymnæus stagnalis* and *Paludina vivipara*, according to Baer, Pagenstecher, and Van Beneden.

## 3. ECHINOSTOMA ECHINOCEPHALUM, Dujardin.

*Distoma echinocephalum*, Rudolphi, Dujardin, Diesing.

*D. Milvi*, Zeder.

*Fasciola Milvi*, Zeder, Rudolphi.

*Planaria latiuscula*, Goeze.

*Hab.* Found by Goeze and Treutler in the large intestines of *Falco Milvus* in August.

## 4. ECHINOSTOMA DILATATUM, Cobbold.

*Distomum dilatatum*, Miram, Diesing.

*Hab.* Found by Miram in the large intestine of *Phasianus Gallus* in September.

## 5. ECHINOSTOMA UNCINATUM, Dujardin.

*Distoma uncinatum*, Zeder, Rudolphi, Dujardin, Diesing.

*D. Chloropodis*, Zeder.

*Fasciola crenata*, Froelich.

*Hab.* Found by Froelich and Zeder in the large intestine of *Gallinula Chloropus* in May and July.

## 6. ECHINOSTOMA LEPTOSOMUM, Dujardin.

*Distoma leptosomum*, Creplin, Mehlis, Dujardin, Diesing.

*Hab.* Found by Schilling in *Tringa variabilis* in October, and by Mehlis in the intestines of *Chalidris arenaria*.

## 7. ECHINOSTOMA BILOBUM, Rudolphi.

*Distoma bilobum*, Rudolphi, Dujardin, Diesing, Wedl (Anat. Beobacht. über Tremat. p. 8).

*Hab.* Found by Bremser and Wedl in *Ibis falcinellus*; by Diesing and Wedl (sometimes imperfectly developed) in *Platalea leucoridea*, and by the latter also in *Fulica atra*.

## 8. ECHINOSTOMA SERRATUM, Cobbold.

*Distomum serratum*, Diesing, Neunzehn Arten von Tremat. p. 9, tab. 3. figs. 14-17.

*Hab.* Found by Natterer in Brazil in the intestines of *Aranus scolopaceus*.

## 9. ECHINOSTOMA APICULATUM, Dujardin.

*Distoma apiculatum*, Rudolphi, Dujardin, Diesing.

*D. Stridulæ*, Reich.

*Fasciola apiculata*, Rudolphi.

*Hab.* Found by Reich in *Strix Aluco*, and by Rudolphi in the large intestine of *S. flammea*.

## 10. ECHINOSTOMA CINCTUM, Dujardin.

*Distoma cinctum*, Rudolphi, Dujardin, Diesing.

*D. Tringæ helveticæ*, Rudolphi.

*Fasciola cincta*, Rudolphi.

*Hab.* Found by Weigel in *Vanellus cristatus*, and by Bremser in the intestines of *V. melanogaster*.

## 11. ECHINOSTOMA FEROX, Dujardin.

*Distoma ferox*, Zeder, Rudolphi, Bremser, Nathusius, Dujardin, Diesing.

*D. Ardeæ stellaris*, Rudolphi.

*D. Ardeæ*, Zeder.

*Fasciola ferox*, Rudolphi.

*F. Ardeæ*, Gmelin.

*Planaria*, Goeze.

*Echinorhynchus Ardeæ nigra*, Braun.

*Hab.* Found by Rudolphi, Dujardin, and Bremser in *Ciconia alba*; by Rudolphi, Bremser, and Braun in *C. nigra*; by Goeze in *Ardea stellaris*.

12. ECHINOSTOMA NEPHROCEPHALUM, Cobbold.

*Distomum nephrocephalum*, Diesing.

*D. Turdi*, Rudolphi.

*Hab.* Infests the intestines of *Turdus saxatilis*.

13. ECHINOSTOMA BACULUS, Cobbold.

*Distomum Baculus*, Diesing.

*D. Mergi*, Rudolphi.

*Hab.* Infests the intestines of *Mergus albellus*.

14. ECHINOSTOMA SPINULOSUM, Dujardin.

*Echinostoma spinulosum*, Cobbold (Linn. Trans. vol. xxii.).

*Distoma spinulosum*, Rudolphi, Dujardin, Creplin, Diesing, Bellingham, Molin.

*Hab.* Found by Rudolphi in *Colymbus septentrionalis*; by Bremser and Molin in *Podiceps cristatus*; by Mehlis in *Anas Querquedula* and *Uria Grylle*; it has also been obtained from *Carbo Graculus*, *Larus argentatus*, *L. capistranus*; by myself from *L. glaucus*; by Bellingham from *L. ridibundus*, also from *Anas Clangula* and *Numenius arcuatus*.

15. ECHINOSTOMA DENTICULATUM, Dujardin.

*Distoma denticulatum*, Rudolphi, Dujardin, Diesing.

*Fasciola denticulata*, Rudolphi.

*Hab.* Found by Rudolphi in *Sterna Hirundo*; it has also been obtained from the intestines of *S. nigra* and *S. Cantiaca*.

### C. *In corpore piscium.*

1. ECHINOSTOMA ANNULATUM, Cobbold.

*Distomum annulatum*, Diesing, Revis. p. 43.

*Hab.* Found by Natterer in Brazil in the intestines of *Gymnotus electricus*.

2. ECHINOSTOMA PRISTIS, Dujardin.

*Distoma Pristis*, Deslongchamps, Dujardin, Diesing.

*Hab.* Found by Deslongchamps in the intestines of *Merlangus communis*.

3. ECHINOSTOMA HISPIDUM, Cobbold.

*Echinostoma hispidum* Cobbold (Linn. Trans. *loc. cit.*).

*Distoma hispidum*, Abildgaard, Rudolphi, Viborg, Creplin, Mehlis, Dujardin, Diesing.

*D. Sturionis*, Rudolphi.

*Hab.* Found by Abildgaard, Rudolphi, Bremser, Creplin, and myself in *Acipenser Sturio*; by Diesing in *A. glaber*, *A. Ruthenus*, and *A. stellatus*.

## 4. ECHINOSTOMA FALLAX, Dujardin.

*Distoma fallax*, Rudolphi, Dujardin, Diesing.*Hab.* Found by Rudolphi in the stomach of *Uranoscopus scaber*.

## 5. ECHINOSTOMA SCABRUM, Dujardin.

*Distoma scabrum*, Zeder, Rudolphi, Dujardin, Bellingham, Diesing.*Fasciola scabra*, O. F. Müller.*Hab.* Found by Rudolphi in the intestines of *Lota molva*; by Müller in the stomach of *Gadus Morrhua*.

## 6. ECHINOSTOMA CRISTATUM, Dujardin.

*Distoma cristatum*, Rudolphi, Dujardin, Diesing.*Hab.* Found by Rudolphi in the stomach of *Stromaleus Fiatola*.

## 7. ECHINOSTOMA DUJARDINII, Cobbold.

*Distomum Histrix*, Dujardin, Diesing.*Hab.* Discovered by Dujardin enclosed in cysts attached to the gills and in the pharyngeal mucus of *Pleuronectes maximus*; also in *P. Platessa*.GENUS 8. GASTEROSTOMA. (*Von Siebold.*)

## 1. GASTEROSTOMA FIMBRIATUM, Siebold.

*G. fimbriatum*, Siebold, Wagener, Diesing, Revis. p. 57.*Hab.* Found by Siebold in the intestines of *Perca fluviatilis* and *Lucio-perca Sandra*; by Wagener in *Esox Lucius*.

## 2. GASTEROSTOMA MINIMUM, Wagener.

*G. minimum*, Wagener.*Rhipidocotyle minima*, Diesing, Revis. p. 57.*Hab.* Found by Wagener in the duodenum of *Trigla microlepidota* in October.

## 3. GASTEROSTOMA GRACILESCENS, Wagener.

*G. gracilescens*, Wagener.*Rhipidocotyle gracilescens*, Diesing, Revis. p. 57.*Distoma gracilescens*, Rudolphi, Bremsler, Dujardin, Diesing, Cobbold (Linn. Trans. vol. xxii. pt. 3, p. 161, tab. 32. figs. 33, 34).*Hab.* Found by Rudolphi, Wagener, and myself, in great abundance in the intestines of *Lophius piscatorius*. Dr. Wagener represents the ventral acetabulum as much smaller than the oral sucker; but I did not find this to be the case. His other details throw much light upon its anatomy.

## 4. GASTEROSTOMA ARMATUM, Molin.

*G. armatum*, Molin; Diesing, Nacht. und Verbess. zur Revis. der Myzelm. p. 18.*Hab.* Found by Molin in the intestines of *Conger Conger*.GENUS 9. WEDLIA. (*Cobbold.*)

Dr. Guido Wagener has described, in Troschel's 'Archiv für Naturgeschichte,' a remarkable form of Trematode previously discovered by Wedl.

Such is the general similarity in the structure and habits of this worm to the form I have noticed under the generic title of *Kællikeria*, that at first sight we might be tempted to associate them. The absence, however, of a ventral sucker (without taking into account its assumed androgynous character) points to a closer alliance with the Monostomes, from which also it is, nevertheless, evidently distinct. I strongly suspect the sexes will be found separate.

*Corpus* inerme, reniforme, lobatum; aliquando antrorsum attenuatum, apice incrassatum, clavatum, retrorsum subito increscens. *Os* terminale, acetabuliforme. *Acetabulum* ventrale nullum. *Androgynum* (?), apertura genitali infra os. *Oviparum*, ovulis non operculatis. Avium incola, et in cavo branchiorum piscium marinarum geminatim in folliculis inclusa.

1. WEDLIA BIPARTITA, Cobbold.

*Monostoma bipartitum*, Wedl, Wiener Akademie-Berichte, Bd. xvi. p. 38;

Wagener, Archiv für Naturg. 1858, Bd. i. p. 252; Diesing, Revis. p. 23.

*Hab.* Found by Wedl and Wagener in cysts connected with the gills and pharyngeal mucous membrane of *Thynnus vulgaris*.

2. WEDLIA FABA, Cobbold.

*Monostoma Faba*, Bremser, Dujardin, Creplin, Diesing.

*M. bijugum*, Miescher, Siebold.

*Globularia*, Rolando.

*Hab.* Found by Miescher in *Fringilla Spinus*, and by Inhof in *F. domestica*; by Schinz in *F. canaria*; by Rolando in *Sturnus vulgaris*; by S. T. Soemmering in *Parus major*; by Bremser and Diesing in *Sylvia sibilatrix*; by Creplin in *S. Trochilus*; by Fischer in *Motacilla Boarula*.

Genus 10. MONOSTOMA. (Zeder.)

A. *In corpore mammalium.*

1. MONOSTOMA LENTIS, Nordmann.

*M. lentis*, Nordmann (non descript.); Gescheidt; Diesing (species inquirendæ); Küchenmeister.

*Distoma Ammon?*

*Hab.* Found by Jünken and Nordmann in the lens of the human eye.

2. MONOSTOMA SQUAMMULA, Diesing.

*M. Squammula*, Diesing.

*Distoma Squammula*, Rudolphi, Bremser, Dujardin.

*Hab.* Found by Dujardin and Bremser in the intestines of *Mustela putorius*.

3. MONOSTOMA HIPPOCREPIS, Diesing.

*M. Hippocrepis*, Diesing, Revis. p. 22.

*Hab.* Found by Natterer in Brazil in the large intestines of *Hydrocharus Capybara*.



## 4. MONOSTOMA KUHNII, Cobbold.

*M. Leporis*, Kuhn ; Diesing (species inquirendæ).

*Hab.* Found by Kuhn attached to the peritoneum of *Lepus Cuniculus*.

## 5. MONOSTOMA NOCTULÆ, Cobbold.

*M. Vespertilonis*, Rudolphi, Diesing (species inquirendæ).

*Hab.* Infests the intestines of *Vespertilio Noctula*.

## 6. MONOSTOMA OCREATUM, Zeder.

*M. ocreatum*, Zeder, Rudolphi, Bremser, Dujardin, Bellingham ; Diesing, Revis. p. 24.

*Distoma Lorum*, Dujardin.

*Fasciola ocreata*, Goeze.

*Cucullanus ocreatus*, Schrank.

*C. Talpæ*, Müller.

*Hab.* Found by Zeder, Goeze, Bremser, Dujardin, and Bellingham in the intestines of *Talpa europæa*.

## 7. MONOSTOMA BLAINVILLEI, Cobbold.

*M. Delphini*, Blainville, Diesing (species inquirendæ).

*Hab.* Found by De Blainville encysted in the fatty tissues of *Delphinus Dalei*.

## 8. MONOSTOMA PLICATUM, Creplin.

*M. plicatum*, Creplin, Dujardin, Diesing.

*Hab.* Found by Holthoff in the œsophagus and intestines of *Balæna borealis*.

B. *In corpore avium.*

## 1. MONOSTOMA MUTABILE, Zeder.

*M. mutabile*, Zeder, Rudolphi, Mehlis, Siebold, Lenckart, Dujardin ; Diesing, Revis. p. 21 ; Desor ; Van Beneden, Mém. sur les Vers Intest. p. 70 ; La Valette, Wagener.

*M. microstomum*, Creplin, Mehlis.

*M. Himantopodis*, Rudolphi.

*M. Vanelli*, Rudolphi.

*Distoma Calidris*, Rudolphi.

*Hab.* Infests different parts of the body, especially the infra-orbital sinuses, of various water-birds. It has been found by Diesing, Siebold, and La Valette in *Anas Anser* ; by Nitzsch in *A. Clangula* ; by Bremser and Diesing in *Himantopus melanopterus* ; by Natterer in *H. Wilsoni* ; by Diesing in *Totanus fuscus* ; by Natterer in *T. flavipes* ; by Van Beneden in *T. Calidris* ; by Zeder in *Gallinula chloropus* ; by Siebold and Barkow in *Fulica atra* ; by Natterer in *F. armillata* ; by Laurer in *Ardea Grus* ; by Hermann in *Numenius arcuatus* ; by Siebold in *Rallus aquaticus* ; it also occurs in *Crax Alector* and *Vanellus cristatus* ; by Natterer in *Falco hamatus* and *F. milvoides*.

## 2. MONOSTOMA FLAVUM, Mehlis.

*M. flavum*, Mehlis, Siebold, Dujardin, Diesing, Wagener, La Valette.

In statu larvæ.

*Cercaria flava*, La Valette.

*E. ephemera*, Siebold, Stenstrup, Dujardin, Moulinié, Filippi, Pagenstecher.

*Glenocercaria flava*, Diesing, Revis. der Cere. p. 8.

*Histrionella ephemera*, Siebold.

*Hab.* Infests various aquatic birds. Found by Siebold in *Mergus Serrator*, and by Mehlis in *Anas fuliginosa*; it has also been noticed in *A. fusca*, *A. mollissima*, *A. Marila*, and *Mergus albellus*.

The larvæ have been found by Siebold, Pagenstecher, and La Valette in *Planorbis corneus*.

3. **MONOSTOMA ATTENUATUM**, Rudolphi.

*M. attenuatum*, Rudolphi, Dujardin, Bellingham, Creplin, Diesing.

*Hab.* Found by Creplin in *Anas Anser*, *A. ferina*, *A. Marila*; by Braun in *A. clypeata*; by Mehlis in *A. fusca*, *A. glacialis*, *A. Clangula*, *A. Fuligula*, *A. musica*, *A. Tadorna*; by Bellingham in the latter, in *A. Penelope*, and *A. albifrons*; by Mehlis also in *Mergus Merganser* and *M. Serrator*; by Rudolphi in *Scolopax Gallinago*.

4. **MONOSTOMA ALVEATUM**, Mehlis.

*M. alveatum*, Mehlis (non descriptum); Creplin, Diesing, Revis. p. 331 (spec. inquirendæ).

*Hab.* Found by Mehlis and Creplin in *Anas fusca*; by Creplin and Laurer in *A. Marila*; by Schilling in *A. glacialis*, *A. mollissima*, *A. musica*, and *A. Penelope*.

5. **MONOSTOMA PETASATUM**, Deslongchamps.

*M. petasatum*, Deslongchamps, Diesing (species inquirendæ).

*Hab.* Found by Deslongchamps in the intestinal cæca of *Hæmatopus Ostralegus*.

6. **MONOSTOMA LANCEOLATUM**, Wedl.

*M. lanceolatum*, Wedl, Anat. Beobacht. über Tremat. p. 13; Diesing, Revis. p. 21.

*Hab.* Found by Wedl in the abdominal cavity of *Himantopus melanopterus*.

7. **MONOSTOMA CYMBIUM**, Diesing.

*M. Cymbium*, Diesing.

*Hab.* Found by Natterer in Brazil in the œsophagus of *Himantopus Wilsonii*.

8. **MONOSTOMA EXPANSUM**, Creplin.

*M. expansum*, Creplin, Dujardin, Diesing.

*Hab.* Found by Creplin in the small intestines of *Falco haliæetus*.

9. **MONOSTOMA PRISMATICUM**, Zeder.

*M. prismaticum*, Zeder, Rudolphi, Dujardin.

*Hab.* Found by Zeder in the intestines of *Corvus frugilegus*.

10. **MONOSTOMA VENTRICOSUM**, Rudolphi.

*M. ventricosum*, Rudolphi, Dujardin, Diesing.

*Fasciola ventricosa*, Rudolphi.

*Hab.* Found by Rudolphi in the abdominal cavity of *Sylvia Luscinia* in May.

11. MONOSTOMA CRENULATUM, Rudolphi.

*M. crenulatum*, Rudolphi, Dujardin, Diesing.

*Hab.* Found by Rudolphi in the intestines of *Sylvia Phenicurus* in May.

12. MONOSTOMA MACROSTOMUM, Rudolphi.

*M. macrostomum*, Rudolphi, Dujardin, Diesing (species inquirendæ).

*Hab.* Found by Rudolphi in the intestines of *Larus ridibundus* in July.

C. *In corpore reptilium.*

1. MONOSTOMA ELLIPTICUM, Rudolphi.

*M. ellipticum*, Rudolphi, Bremser, Dujardin, Diesing.

*M. Bombynae*, Zeder.

*Hab.* Found by Gæde, Zeder, Bremser, and Diesing in *Bufo igneus*.

2. MONOSTOMA SULCATUM, Diesing.

*M. sulcatum*, Rudolphi, Dujardin, Diesing.

*Hab.* Found in the intestines of *Asterodactylus Pipa* by Rudolphi.

3. MONOSTOMA ORNATUM, Leidy.

*M. ornatum*, Leidy, Diesing, Revis. p. 22.

*Hab.* Found by Leidy in the abdominal cavity of *Rana pipiens*.

4. MONOSTOMA HISTRIX, Molin.

*M. Histrix*, Molin, Diesing, Revis. p. 24.

*Hab.* Found by Molin in the intestines of *Pelophylax esculentus*.

5. MONOSTOMA TRIGONOCEPHALUM, Rudolphi.

*M. trigonocephalum*, Rudolphi, Dujardin, Bellingham, Diesing.

*M. rubrum et album*, Kuhl, Van Hasselt.

*Planaria Midæ*, Braun.

*Hab.* Found by Rudolphi, Natterer, Braun, Kuhl, and Van Hasselt in the alimentary canal of *Halichelys atra*; by Bellingham in *Chelonia imbricata*.

6. MONOSTOMA DELICATULUM, Diesing.

*M. delicatulum*, Diesing.

*Distoma Testudinis*, Rudolphi.

*Hab.* Infests the intestines of *Halichelys atra* and *Emys europæa*.

7. MONOSTOMA SPIRALE, Diesing.

*M. spirale*, Diesing, Revis. p. 22.

*Hab.* Found by Natterer in the intestines of *Chelonoides tabulatus*, *Podocnemis Tracaxa*, and *Hypsilophus tuberculatus*.

8. MONOSTOMA RENICAPITE, Leidy.

*M. renicapite*, Leidy.

*M. nephrocephalum*, Diesing, Revis. p. 25.

*Hab.* Found by Agassiz in America, in the intestines of *Spargus coriacea*.

9. MONOSTOMA MOLLE, Leidy.

*M. molle*, Leidy ; Diesing (species inquirendæ), Revis. p. 24.

*Hab.* Found by Leidy in the lungs of *Sternotherus odoratus* at Philadelphia, U.S.

10. *MONOSTOMA INCOMMUDUM*, Leidy.

*M. ? incommudum*, Leidy, Diesing, Revis. p. 25.

*Hab.* Found by Bailey in the throat of *Alligator mississippiensis* in Florida, U.S.

11. *MONOSTOMA GURLTI*, Cobbold.

*Monostoma*, (sp.) Gurlt.

*M. Lacertæ*, Diesing, Revis. p. 25.

*Dithyridium Lacertæ*, Valenciennes, Creplin.

*D. Lacertæ viridis* et *D. L. muralis*, Rudolphi.

*Petrathyryus obesus*, Creplin.

*Piestocystis Dithyridium*, Diesing, Syst. Helm. i. p. 469.

*Hab.* Found in *Lacerta agilis* by Gurlt ; by Bremser and Valenciennes in *L. viridis*, *Zacholus austriacus*, and *Podarcis muralis*.

#### D. *In corpore piscium.*

1. *MONOSTOMA FOLIACEUM*, Rudolphi.

*M. foliaceum*, Rudolphi, Bremser, Dujardin, Diesing (Revis. p. 20), Wedl, Molin.

*Amphilina foliacea*, Wagener, Archiv für Naturg. 1858, p. 244.

*Hab.* Found by Rudolphi and Wedl in *Acipenser Sturio* ; by Molin in *A. Nasus* ; by Diesing in *A. stellatus* and *A. glaber*.

2. *MONOSTOMA CAPITELLATUM*, Rudolphi.

*M. capitellatum*, Rudolphi, Dujardin, Diesing (Revis. p. 23), Wagener.

*Hab.* Found by Rudolphi and Wagener in *Box Salpa* ; it also occurs in *Scomber Scombrus*.

3. *MONOSTOMA ORBICULARE*, Rudolphi.

*M. orbiculare*, Rudolphi, Dujardin, Diesing.

*Hab.* Found by Rudolphi in the intestines of *Box Salpa*.

4. *MONOSTOMA LIGULOIDEUM*, Diesing.

*M. liguloideum*, Diesing.

*Hab.* Found by Natterer in the abdominal cavity of *Vastres Cuvieri*.

5. *MONOSTOMA CONSTRICTUM*, Diesing.

*M. constrictum*, Diesing.

*Hab.* Found by Diesing in the anterior chamber of the eye of *Abramis Brama*.

6. *MONOSTOMA PRÆMORSUM*, Nordmann.

*M. præmorsum*, Nordmann, Dujardin, Diesing.

*Hab.* Found by Nordmann in the branchial cavity of *Abramis Brama*.

7. *MONOSTOMA FILUM*.

*M. Filum*, Dujardin, Diesing (Revis. p. 24), Wagener.

*Hab.* Found by Dujardin in the intestines of *Exocetus exsiliens* ; in the

embryonic condition by Wagener in the liver and orbits of the same fish in July.

8. *MONOSTOMA GALEATUM*, Rudolphi.

*M. galeatum*, Rudolphi, Dujardin, Diesing.

*Hab.* Found by Rudolphi in the intestines of *Lichia glauca* in August.

9. *MONOSTOMA ECHINOSTOMUM*, Diesing.

*Distoma planicolle*, Rudolphi, Dujardin.

*Hab.* Found by Natterer in *Cathartes Aura* in February, and in the intestines of *Sula fusca*, in Brazil.

10. *MONOSTOMA CARYOPHYLLINUM*, Zeder.

*M. caryophyllum*, Zeder, Rudolphi, Bremser, Gurlt, Creplin, Dujardin, Diesing (species inquirendæ), Cobbold (Linn. Trans.).

*Hypostoma caryophyllum*, Blainville.

*Festucaria caryophyllina*, Rudolphi.

*Hab.* Found by Rudolphi and myself in *Gasterosteus aculeatus*.

11. *MONOSTOMA BRAUNII*, Cobbold.

*M. Murænula*, Rudolphi, Diesing.

*Hab.* Discovered by Braun in follicles attached to the stomach of *Coregonus Murænula*.

12. *MONOSTOMA COCHLEARIFORME*, Rudolphi.

*M. cochleariforme*, Rudolphi, Dujardin, Diesing.

*Hab.* Found by Schrank in the intestines of *Barbus communis*.

13. *MONOSTOMA WEDLII*, Cobbold.

*M. Rhombi lævis*, Wedl (non descript.); Diesing, Revis. p. 25 (species inquirendæ).

*Hab.* Found by Wedl in follicles of the intestinal mucous membrane, and also adhering to the fin-rays of *Rhombus lævis*.

14. *MONOSTOMA GRACILE*, Rudolphi.

*M. gracile*, Rudolphi, Dujardin, Diesing (species inquirendæ).

*Hab.* Found by Acharius in the abdominal cavity of *Osmerus Eperlanus*.

15. *MONOSTOMA DUBIUM*, Cobbold.

*Corpus* planum, oblongum, antrorsum attenuatum, retrorsum truncatum.

*Os* subterminale, orbiculare exiguum. *Penis* longus filiformis, apice bifurcatus. Longit.  $\frac{1}{2}$  unc.

*M. dubium*, Cobbold, Linn. Trans. vol. xxii. pt. 3, p. 256. tab. 31, figs. 4 & 5.

*Hab.* Found in a cyst attached to the subperitoneal surface of the ovary of *Gasterosteus Spinachia*.

Genus 11. *NEMATOBOTHRUM*. (*Van Beneden*.)

1. *NEMATOBOTHRUM FILARINA*, Van Beneden.

*Corpus* planum, cylindricum, filiforme, in nodum collectum, antice nunc diverse acuminatum, tunc rotundatum, postice obtusatum. Longitudo ad 40 unc.; crassities  $\frac{1}{3}$  unc.

*N. filarina*, Van Beneden, Mém. sur les Vers Intestinaux, p. 109, pl. xiii. figs. 1-12.

*Hab.* Infests the branchial cavity of *Sciæna aquila*.

Genus 12. CODONOCEPHALUS. (*Diesing.*)

In the absence of any original examination of this Trematode, I am unwilling to set aside Diesing's generic distinctions, but I find Wedl who has recently contributed several careful papers on Entozoology, remarking in his "Anatomische Beobachtungen über Trematoden," that, in his opinion, this genus can scarcely be legitimately maintained. In a group of such numerous and closely-allied forms as the Trematodes present, one is almost necessitated to employ as generic, characters which have only a subgeneric value; yet, at the same time, it is essential to avoid as far as possible the splitting up of groups.

1. CODONOCEPHALUS MUTABILIS, Diesing.

*C. mutabilis*, Diesing, Revis. p. 19; B. Gastaldi.

*Holostoma urnigerum*, Wedl.

*Amphistoma urnigerum*, Rudolphi, Westrumb, Creplin, Bremser, Dujardin.

*Hab.* Found by Creplin, Bremser, and Wedl in *Pelophylax (Rana) esculentus*. It lives enclosed in cysts occupying various parts of the body of the host.

Genus 13. EUSTEMMA. (*Diesing.*)

1. EUSTEMMA CARYOPHYLLUM, Diesing.

*E. Caryophyllum*, Diesing, Revis. p. 19.

*Hab.* This singular flower-shaped entozoon was discovered by Natterer in the intestines of *Falco pileatus* in Brazil in May.

Genus 14. HOLOSTOMA. (*Holostomum*) Nitzsch.

A. *In corpore avium.*

1. HOLOSTOMA VARIABLE, Nitzsch.

*H. variable*, Nitzsch; Wedl; Diesing, Revis. p. 16.

*H. macrocephalum*, Creplin, Dujardin.

*Amphistoma macrocephalum*, Rudolphi, Westrumb, Bremser, Bellingham.

*Fasciola Strigis*, Gmelin.

*Festucaria Strigis*, Schrank.

*Planaria teres poro simplici*, Goeze.

*Strigia*, sp. Abildgaard.

*Hab.* Found by Abildgaard in *Strix brachyotus*; by Rudolphi in *S. Bubo*, *S. flammea*, and *S. otus*; in the last named also by Bremser; by Creplin in *S. nyctea*; by Otto in *S. pygmaea*; it has also been found in *S. aluco*, *S. passerina*, and *S. Tengmalmi*; by Wedl in *Ardea cinerea*; by Bellingham in *Falco rufus* and *F. peregrinus*; by Froelich in *F. tinunculus*; by Rudolphi and Bremser in *F. apivorus*; it has also been procured from *F. Buteo*, *F. Lagopus*, *F. cineraceus*, *F. albicilla*, *F. gallicus*, *F. pennatus*, *F. naevius*, *F. haliæetus*, *F. imperialis*, *F. rufipes*, and *F. cyaneus*.

## 2. HOLOSTOMA LAGENA, Molin.

*H. Lagena*, Molin; Diesing, Revis. p. 16.

*Hab.* Found by Molin in the small intestines of *Strix passerina* in December.

## 3. HOLOSTOMA SERPENS, Nitzsch.

*H. serpens*, Nitzsch, Dujardin, Diesing.

*Amphistoma serpens*, Rudolphi.

*Hab.* Found by Nitzsch in the intestines of *Falco Halicætos* in September.

## 4. HOLOSTOMA TENUICOLLE, Diesing.

*H. tenuicolle*, Diesing.

*Amphistoma tenuicolle*, Westrumb.

*Hab.* Found by Bremser in the intestines of *Falco rufus*.

## 5. HOLOSTOMA BELLINGHAMII, Cobbold.

*H. Falconum*, Diesing, Revis. p. 18 (species inquirendæ).

*Amphistoma*, Bellingham.

*Hab.* Found by Bellingham in the intestines of *Falco nisus* and *F. rufus*.

## 6. HOLOSTOMA SPHÆRULA, Dujardin.

*H. Sphærule*, Dujardin, Creplin, Diesing, Molin.

*Amphistoma Sphærule*, Rudolphi, Westrumb, Bellingham.

*Hab.* Found by Rudolphi and Bremser in *Corvus Coruix*; by Creplin in *C. coronæ*; by Bellingham in *C. frugilegus*; in *C. glandarius* by Molin.

## 7. HOLOSTOMA WESTRUMBII, Cobbold.

*H. sphærocephalum*, Diesing.

*Amphistoma sphærocephalum*, Westrumb.

*Hab.* Found by Natterer in the intestines of *Coracina scutata* at Brazil.

## 8. HOLOSTOMA MICROSTOMUM, Dujardin.

*H. microstomum*, Dujardin, Diesing.

*Amphistoma microstomum*, Rudolphi.

*Hab.* Found by Rudolphi in the duodenum of *Corvus Caryocatactes*.

## 9. HOLOSTOMA DUBIUM, Cobbold.

*H. Coronæ*, Diesing, Revis. p. 11 (spec. inquirendæ).

*Amphistoma Corvi Coronæ*, Bellingham (non descript.).

*Hab.* Found by Bellingham in the small intestines of *Corvus Coronæ*.

## 10. HOLOSTOMA CORNU, Nitzsch.

*H. Cornu*, Nitzsch, Dujardin, Leidy, Wedl; Diesing, Revis. p. 17.

*Amphistoma Cornu*, Rudolphi, Westrumb, Bellingham.

*Monostoma Cornu*, Rudolphi, Dujardin, Diesing.

*Hab.* Found by Nitzsch and Bellingham in *Ardea cinerea*; by Leidy in *A. Herodias*, in America; by Bremser in *A. Garzetta*; by Wedl in *A. stellaris*; it has also been obtained from *A. purpurea*, *A. Nycticorax*, and *Ciconia alba*.

## 11. HOLOSTOMA LONGICOLLE, Dujardin.

*H. longicolle*, Dujardin, Diesing, Revis. p. 17.

*Amphistoma longicolle*, Rudolphi, Westrumb, Bremser, Bellingham, Creplin.

*Hab.* Found by Hübner in *Ardea alba*; by Bellingham in *Larus argentatus*; it likewise infests *L. canus* and *L. ridibundus*, and *Ardea stellaris*.

12. HOLOSTOMA GRACILE, Dujardin.

*H. gracile*, Dujardin, Creplin, Diesing.

*Amphistoma gracile*, Rudolphi, Westrumb, Creplin, Bellingham.

*Hab.* Found by Mehlis in *Anas Clangula*, *A. fusca*, and *A. albifrons*; by Creplin in *A. nigra*; by Bellingham in *Colymbus glacialis*; by Schilling in *Mergus Serrator*; it also infests *M. Merganser* and *M. albellus*.

13. HOLOSTOMA ERRATICUM, Dujardin.

*H. erraticum*, Dujardin, Creplin; Diesing, Revis. p. 16.

*H. macrocephalum*, Creplin (ex parte).

*Amphistoma erraticum*, Rudolphi, Westrumb.

*A. isostomum*, Rudolphi, Dujardin, Bellingham.

*A. Anatis Tadornæ*, Rudolphi.

*Strigia Anatis Tadornæ*, Viborg.

*S. candida*, Abildgaard.

*Hab.* Found by Creplin in *Anas ferina*; by Bellingham in *A. Boschas fera*; it also infests *A. Cygnus*, *A. Clangula*, *A. Marita*, *A. glacialis*, *A. Tadorna*, *A. fusca*, *A. mollissima*; by Creplin in *Alca Pica*, *A. Torda*, and *Colymbus balticus*; by Rudolphi in *C. septentrionalis*; by Bremser in *C. arcticus*, and *Scolopax rusticola*; by Rudolphi in *S. Gallinago*; it also occurs in *Mergus albellus* and *Vanellus cristatus*.

14. HOLOSTOMA PLATYCEPHALUM, Dujardin.

*H. platycephalum*, Dujardin, Diesing.

*Amphistoma platycephalum*, Creplin.

*Hab.* Found by Schilling and Creplin in *Colymbus rufo-gularis* and *Larus argentatus*; by the latter also in *L. ridibundus* and *Podiceps cristatus*; by Schilling and Siebold in *L. fuscus*, and also by the latter in *L. canus* and *Carbo cormoranus*. It usually occupies the bursa of Fabricius.

15. HOLOSTOMA VARIEGATUM, Dujardin.

*H. variegatum*, Dujardin, Diesing.

*Amphistoma variegatum*, Dujardin.

*Hab.* Found by Schilling in *Larus argentatus*, *L. Marinus*, *L. maximus*, and *Alca Torda*; by Creplin in *Uria troile*.

16. HOLOSTOMA PILEATUM, Dujardin.

*Holostoma pileatum*, Dujardin, Creplin, Diesing.

*Amphistoma pileatum*, Westrumb, Rudolphi.

*Monostoma pileatum*, Zeder, Rudolphi.

*Fusciola pileata*, Rudolphi.

*Hab.* Found by Rudolphi in *Sterna Hirundo*; by Creplin in *S. macroura*; by Bremser in *S. cantiaea*.

17. HOLOSTOMA MULTILOBUM, Cobbold.



*H. cornutum*, Dujardin, Diesing (spec. inquirendæ).

*Amphistoma cornutum*, Rudolphi.

*Hab.* Found by Rudolphi in the intestines of *Charadrius pluvialis*, in October.

18. HOLOSTOMA CRENULATUM, Cobbold.

*H. Anatis (Oidemia) nigræ*, Bellingham; Diesing, Revis. p. 18 (spec. inquirendæ.).

*Hab.* Found by Bellingham in the small intestines of *Anas nigra*.

B. *In corpore reptilium.*

1. HOLOSTOMA NITIDUM, Leidy.

*H. nitidum*, Leidy; Diesing, Revis. p. 17.

*Hab.* Found by Leidy in the small intestines of *Rana pipiens* at Philadelphia, U.S.

C. *In corpore piscium.*

1. HOLOSTOMA CLAVUS, Molin.

*H. Clavus*, Molin; Diesing, Revis. p. 18.

*Hab.* Found by Molin in the large intestines of *Gadus Merluccius* in January.

Genus 15. HEMISTOMA. (Diesing.)

A. *In corpore mammalium.*

1. HEMISTOMA ALATUM, Diesing.

*H. alatum*, Diesing.

*Holostomum alatum*, Nitzsch, Creplin, Mehlis, Gurlt, Dujardin, Blanchard.

*Distoma alatum*, Zeder, Rudolphi, Miram.

*D. vulpina*, Abildgaard.

*Fasciola alata*, Rudolphi.

*F. Vulpis*, Gmelin.

*Alaria Vulpis*, Schrank.

*Festucaria alata*, Schrank.

*Planaria alata*, Goeze.

*Hab.* Found by Zeder and Goeze, Rudolphi, and Miram in *Canis Vulpes*; by Rudolphi and Dujardin in *C. Lupus*; by Creplin in *C. familiaris*; by Natterer in Brazil in *C. Azaræ*.

2. HEMISTOMA CORDATUM, Diesing.

*H. cordatum*, Diesing, Revis. p. 15.

*Hab.* Found by Diesing in the intestines of *Felis Catus (ferus)* in November.

3. HEMISTOMA CLATHRATUM, Diesing.

*H. clathratum*, Diesing, Revis. p. 14.

*Hab.* Found by Natterer in the stomach and intestines of *Lutra Braziliensis* at Matogrosso in August.

4. HEMISTOMA PEDATUM, Diesing.

*H. pedatum*, Diesing, Revis. p. 15.

*Hab.* Found by Natterer in *Didelphis myosurus* in May and June, and in *D. cancrivorus* in December, in Brazil.

B. *In corpore avium.*

1. HEMISTOMA SPATULA, Diesing.

*H. Spathula*, Diesing, Revis. p. 15, Wedl; Cobbold, Linn. Trans. (*loc. cit.*) p. 164.

*Holostomum Spatula*, Creplin, Mehlis, Dujardin.

*Amphistoma macrocephalum*, Bremser.

*A. m. (Falconis Milvi)*, Rudolphi.

*A. Falconis palumbarii*, Rudolphi.

*Strigia Falconis palumbarii*, Viborg.

*Hab.* Found by Mehlis, Wedl, and Creplin in *Falco Nisus*; by the latter also in *F. Buteo*, and, as well as Mehlis, in *F. ater*, who also obtained it from *F. palumbarius*; by Schilling in *F. lagopus*; it also occurs in *F. Milvus*, *F. Albicilla*, *F. Chrysætos*, *F. Lithofalco*, *F. rufus*, *F. Subbuteo*, *F. peregrinus*, *F. naevius*, *F. cyaneus*, *F. lanarius*, and *F. Gallicus*. It has likewise been procured by Dujardin from *Strix Aluco*, and by myself from *S. otus*.

2. HEMISTOMA PODOMORPHUM, Diesing.

*H. podomorphum*, Diesing.

*Holostoma podomorphum*, Nitzsch, Dujardin.

*Hab.* Found by Nitzsch in the intestines of *Falco Haliætos*.

3. HEMISTOMA AURITUM, Diesing.

*H. auritum*, Diesing (species inquirendæ).

*Holostoma auritum*, Dujardin.

*Hab.* Found by Dujardin in the intestines of *Strix flammea*.

4. HEMISTOMA DENTICULATUM, Diesing.

*H. denticulatum*, Diesing.

*Holostoma denticulatum*, Dujardin.

*Amphistoma denticulatum*, Rudolphi.

*Hab.* Found by Bremser and Dujardin in the intestines of *Alcedo ispida*.

5. HEMISTOMA COMMUTATUM, Diesing.

*H. commutatum*, Diesing.

*Amphistoma pileatum*, Bremser, non Rudolphi.

*Hab.* Found by Diesing in abundance in the intestines of *Sterna Caspica* in June.

6. HEMISTOMA TRILOBUM, Diesing.

*H. trilobum*, Diesing, Wedl.

*Distoma trilobum*, Rudolphi, Dujardin.

*Hab.* Found by Wedl and others in the intestines of *Carbo Cormoranus*.

7. HEMISTOMA SPATHACEUM, Diesing.

*H. spathaceum*, Diesing.

*Holostoma spathaceum*, Dujardin, Creplin.

*Distoma spathaceum*, Rudolphi.

*Amphistoma Lari glauci*, Rudolphi.

*Hab.* Found by Bremser in *Larus argentatus*; by Schilling in *L. argentatoides*; by Mehlis in *L. tridactylus*; by Creplin in *L. canus*; by Natterer in *L. marinus*. It infests the intestines in all.

### 8. HEMISTOMA EXCAVATUM, Diesing.

*H. excavatum*, Diesing.

*Distoma excavatum*, Nitzsch, Mehlis, Nathusius, Dujardin.

*Fasciola excavata*, Rudolphi.

*Hab.* Found by Rudolphi and Bremser in *Ciconia alba*; by Nathusius in *C. nigra*.

### Genus 16. DIPLOSTOMA (*Diplostomum*), Nordm.

Were it possible even with only a moderate degree of accuracy to refer to their true adult representatives the several individuals here associated together, I should be glad to cast aside this genus entirely; but, while accepting in a general sense the view of those who maintain that the Diplostomes are merely larval or immature Holostomes, how, I ask, are we to allocate under their proper specific titles even those forms which have been most frequently subjected to investigation? The differing views of Steenstrup, Siebold, Aubert, Wagener, Claparède, and others, are at present irreconcilable, and the difficulty is still further enhanced by the surprising results of Leuckart's researches among the Pentastomata, where he finds that even the presence of well-developed reproductive organs affords no safe criterion of the adult state, for, in these crustaceoid parasites they exist in the pupa condition. As this obtains in the Pentastomes, may not the evidence equally apply to the digenetic flukes? Without at present entering into the discussion, I think it advisable, if only for the sake of convenience, to retain this genus until some one shall have more conclusively established the affinities and alternating relations in the cycle of development, as they affect, at least, a proportion of the so-called species.

#### 1. DIPLOSTOMA RHACHÆUM, Henle.

*D. rhachæum*, Henle, Dujardin, Leydig, Claparède.

*Tylodelphys rhachidis*, Diesing, Revis. p. 12; Pagenstecher.

*Ent. dubium Ranarum*, Rudolphi.

*Hab.* Found by Henle, Caldani, Leydig, Claparède, Pagenstecher, and others, in the spinal canal of *Rana temporaria* and *Pelophylax esculentus*.

#### 2. DIPLOSTOMA CLAVATUM, Nordmann.

*D. clavatum*, Nordmann, Gescheidt, Dujardin, Claparède.

*Tylodelphys clavata*, Diesing, Revis. p. 12.

*Hab.* Found by Nordmann in the eyes of *Perca fluviatilis*, *Acerina vulgaris*, and *Lucioperca Sandra*; by Dujardin in *Esox Lucius*.

#### 3. DIPLOSTOMA CRANIARIUM, Cobbold.

*Tylodelphys? craniaria*, Diesing, Revis. p. 12.

*Trematodum*, sp. Leydig.

*Hab.* Found in abundance by Leydig in the cranial cavity of *Cobitis fossilis*.

4. DIPLOSTOMA, MÜLLERI, Cobbold.

*D. Petromyzi fluviatilis*, Müller.

*D. rachiaum*, Müller?

*Tylodelphys*? Diesing, Revis. p. 12.

*Hab.* Found by Müller in abundance in the cerebral cavity of *Petromyzon fluviatilis*.

5. DIPLOSTOMA CUTICOLA, Diesing.

*D. cuticola*, Diesing, Revis. p. 13; Leidy.

*Holostomum cuticola*, Nordmann, Gescheidt, Dujardin, Creplin, Siebold, Wigham.

*Hab.* Found by Nordmann in *Leuciscus Idus*, *L. erythrophthalmus*, and *L. rutilus*; also by Wigham and Siebold in the last-named species; by Siebold likewise in *L. Dobula*, *Phoxinus lævis*, and *Gobio vulgaris*; by Nordmann in *Cyprinus Carpis*, *Abramis Brama*, and *A. Blicca*; by Creplin in *A. Vimba*; by Kollar in *Chondrostoma nasus*; by Leidy in America in *Pomotis vulgaris*. It generally occurs encysted beneath the skin and internal mucous surfaces; Leidy found it in the liver. According to Von Siebold, this species arrives at maturity in the intestinal canal of certain Water-birds.

6. DIPLOSTOMA VOLVENS, Nordmann.

*Diplostomum volvens*, Nordmann, Gescheidt, Dujardin, Creplin, Aubert, Claparède, Diesing; Revis. p. 13.

*Hab.* Found by Nordmann, and others, in the eyes of *Acerina vulgaris*, *Perca fluviatilis*, *Lucioperca Sandra*, *Leuciscus erythrophthalmus*, and *Lota communis*; by Creplin in *Lota communis* and *Leuciscus rutilus*.

According to Steenstrup, this form, *D. cuticola* and *D. clavatum*, are identical; yet no one of the three species can with certainty be regarded as a mature trematode, the true adult representative having still to be sought among the *Holostomata*.

7. DIPLOSTOMA BREVICAUDATUM, Diesing.

*D. brevicaudatum*, Diesing.

*Holostomum brevicaudatum*, Nordmann, Gescheidt, Dujardin.

*Hab.* Found by Nordmann free in the vitreous humour of *Barbus communis*.

8. DIPLOSTOMA GRANDE, Diesing.

*D. grande*, Diesing, Revis. p. 14.

*Hab.* Found by Natterer in Brazil in the intestines of *Ardea Leuce* and *A. Agami*.

We are surely entitled to regard this species as an adult form, after consulting Diesing's description and figures as given in his 'Neunzehn

Arten von Trematoden.' It must be allowed that the large elliptical orange-coloured eggs would scarcely be expected in a larval Holostome!

GENUS 17. RHOPALOPHORUS. (*Diesing.*)

1. RHOPALOPHORUS CORONATUS, Diesing.

*R. coronatus*, Diesing, Revis. p. 53.

*Hab.* Found by Natterer at Matogrosso in the stomach and intestines of *Didelphis cancrivora*, *D. Myosurus*, *D. Guica*, and *D. palmata*.

2. RHOPALOPHORUS HORRIDUS, Diesing.

*R. horridus*, Diesing, Revis. p. 53.

*Hab.* Found by Natterer in *Didelphis Myosurus* in May, and in *D. Philander* in September at Ypanema.

GENUS 18. AMPHISTOMA. (*Rudolphi.*)

A. *In corpore mammalium.*

1. AMPHISTOMA CONICUM, Rudolphi.

*A. conicum*, Rudolphi, Westrumb, Gurlt, Nitzsch, Laurer, Creplin, Diesing, Miram, Dujardin, Blanchard.

*Monostoma conicum*, Zeder.

*Fasciola hepatica*, Müller.

*F. Elaphi*, Gmelin.

*F. Cervi*, Sehrank.

*Festucaria Cervi*, Zeder.

*Hab.* Infests various ruminants, having been found by Rudolphi, Daubenton, Gurlt, Miram, Treutler, Zeder, Bremser, Creplin, Nitzsch, Siebold, Natterer, and others, in the following:—*Bos Taurus*, *B. T. indicus*, *B. urus*, *Cervus Elaphus*, *C. Capreolus*, *C. alces*, *C. dama*, *C. campestris*, *C. dichotomus*, *C. rufus*, *C. Nambi*, *C. simplicornis*, *Antilope Dorcas*, *Capra Aries*, and *C. Hircus*.

2. AMPHISTOMA EXPLANATUM, Creplin.

*A. explanatum*, Creplin.

*Hab.* Found by Gurlt in the hepatic ducts and gall-bladder of *Bos Taurus indicus*.

3. AMPHISTOMA CRUMENIFERUM, Creplin.

*A. crumeniferum*, Creplin.

*Hab.* Found by Gurlt in the rumen of *Bos Taurus indicus*.

4. AMPHISTOMA PYRIFORME, Diesing.

*A. pyriforme*, Diesing, Dujardin.

*Hab.* Found by Natterer in the cæcum of *Tapirus americanus* in March and September.

5. AMPHISTOMA ASPERUM, Diesing.

*A. asperum*, Diesing, Dujardin.

*Hab.* Found by Natterer in the cæcum of *Tapirus americanus* with the above.

## 6. AMPHISTOMA GIGANTEUM, Diesing.

*A. giganteum*, Diesing, Dujardin.*Hab.* Found by Natterer in the cæcum of *Dicotyles torquatus* and *D. albirostris* in July and August.

## 7. AMPHISTOMA FABACEUM, Diesing.

*A. fabaceum*, Diesing, Dujardin.*Hab.* Found by Natterer in the cæcum of *Manatus exunguis* in January and April.

## 8. AMPHISTOMA EMARGINATUM, Diesing.

*A. emarginatum*, Diesing, Dujardin.*Hab.* Found by Natterer in the intestines of *Cebus trivirgatus*.

## 9. AMPHISTOMA SUBTRIQUETRUM, Rudolphi.

*A. subtriquetrum*, Rudolphi, Bojanus, Westrumb, Bremser, Diesing, Dujardin.*Distoma amphistomoides*, Bojanus.*Hab.* Found by Rudolphi, Bremser, Bojanus, and Walter in the intestines of *Castor Fiber*.

## 10. AMPHISTOMA CONUS, Cobbold.

*A. truncatum*, Rudolphi, Westrumb, Diesing, Dujardin.*Distoma Conus*, Creplin, Dujardin, Wagener, Diesing.*Hab.* Found by Rudolphi, Creplin, Siebold and Wagener in *Felis Catus*; by Rudolphi and Otto in *Phoca vitulina*; by Giesecke in *P. grælandica*; by Creplin in *Canis Vulpes*.B. *In corpore avium.*

## 1. AMPHISTOMA UNCIFORME, Rudolphi.

*A. unciforme*, Rudolphi, Westrumb, Diesing, Dujardin.*Hab.* Found by Natterer in the intestines of *Oriolus (Icterus) cristatus*.

## 2. AMPHISTOMA HIRUDO, Diesing.

*A. Hirudo*, Diesing, Dujardin.*Hab.* Found by Natterer in the cæcum of *Palamedea cornuta*.

## 3. AMPHISTOMA LUNATUM, Diesing.

*A. lunatum*, Diesing, Dujardin.*Hab.* Found by Natterer in Brazil in the cæcum of *Anas melanotos*, *A. Ipecutiri*, *A. moschata*, and *Himantopus Wilsoni*.C. *In corpore reptilium.*

## 1. AMPHISTOMA SCLEROPORUM, Creplin.

*A. scleroporium*, Creplin, Diesing.*Hab.* Found by Otto in the stomach and intestines of *Halichelys atra*.

## 2. AMPHISTOMA GRANDE, Diesing.

*A. grande*, Diesing, Dujardin.*A. (?) Chelonia imbricata*, Bellingham; Diesing, Revis. p. 54.

*Hab.* Found by Natterer in the stomach and intestines of *Chelys fimbriata*, *Phrynos Geoffroyanus*, *P. gibbus*, *P. Miliusii*, *Peltocephalus Dumerilianus*, *Podocnemis erythrocephala*, *P. expansa*, *P. Tracaxa*, and *Rhinemys nasuta*; by Bellingham in *Chelonia imbricata*.

### 3. AMPHISTOMA SUBCLAVATUM, Rudolphi.

*A. subclavatum*, Rudolphi, Zeder, Nitzsch, Westrumb, Bremser, Dujardin, Blanchard, Siebold, Filippi, Pagenstecher; Van Beneden, Mém. sur les Vers Intest. p. 81.

*A. unguiculatum*, Rudolphi, Westrumb.

*Diplodiscus subclavatus*, Diesing, Siebold, Creplin, Leidy, Wagener.

*D. unguiculatus*, Diesing, Revis. p. 56.

*Distoma subclavatum*, Zeder.

*Fasciola subclavata*, Sehrank.

*Planaria subclavata*, Goeze.

*Hirudo Tuba*, Braun.

In statu larvæ et Sporotherii.

*Diplocotyle mutabilis*, Diesing, Revis. der Myzelminth. p. 56, et Revis. der Cerc. p. 36.

*Diplodiscus*, Wagener.

*D. Diesingii*, Filippi.

*Cercaria Diesingii*, Moulinié.

*C. diplocotylea*, Pagenstecher.

*Hab.* Infests the intestines of various frogs. It has been found by Goeze, Zeder, Rudolphi, Bremser, Creplin, Filippi, Pagenstecher, and others in *Pelophylax esculentus*, *Rana temporaria*, *Dendrohyas viridis*, *Phryne vulgaris*, *Bufo viridis*, *Bombinator igneus*, and *Lissotriton punctatus*; by Natterer in Brazil in *Leptodactylus sibilatrix*; by Leidy in *Rana pipiens* at Philadelphia, U.S. The larvæ have been found by Filippi and Pagenstecher free on the surface of the body of *Planorbis nitidus*, *P. vortex*, and *P. marginatus*; by Van Beneden in various species of *Cyclas*.

### D. *In corpore piscium.*

#### 1. AMPHISTOMA NATTERERI, Cobbold.

*A. Cornu*, Diesing, Dujardin.

*Hab.* Found by Natterer in Brazil in *Callichthys* (*Cataphractus* or *Doras*) *vucu*.

In Diesing's *Systema Helminthum* there are three Trematodes described respectively under the titles of *Monostoma Cornu*, *Amphistoma Cornu*, and *Holostoma Cornu*!

#### 2. AMPHISTOMA MEGACOTYLE, Diesing.

*A. megacotyle*, Diesing, Dujardin.

*Hab.* Found by Natterer in the intestines of *Ageneiosus militaris*.

#### 3. AMPHISTOMA FERRUM-EQUINUM, Diesing.

*A. Ferrum-equinum*, Diesing, Dujardin.

*Hab.* Found by Natterer in Brazil in *Doras* (*Cataphractus*) *murica* and *D. corone*.

4. AMPHISTOMA CYLINDRICUM, Diesing.

*A. cylindricum*, Diesing, Dujardin.

*Hab.* Found by Natterer in the intestines of *Doras murica*.

5. AMPHISTOMA ATTENUATUM, Diesing.

*A. attenuatum*, Diesing, Dujardin.

*Hab.* Found by Natterer in the intestines of *Miletes bidens*.

6. AMPHISTOMA OXYCEPHALUM, Diesing.

*A. oxycephalum*, Diesing, Dujardin.

*Hab.* Found by Natterer in Brazil in *Silurus* (*Pimelodus*) *megacephalus*, *Salminus brevidens*, *Miletes aureus*, and *M. bidens*.

#### Genus 19. AMPHIPTYCHES. (*Grube et Wagener*.)

1. AMPHIPTYCHES URNA, Grube et Wagener.

*A. Urna*, Diesing, Revis. p. 55.

*Gyrocotyle amphiptyches*, Wagener.

*Hab.* Found by Grube and Wagener attached to the branchiæ and in the intestines of *Chimæra monstrosa*, in July, at Nice.

2. AMPHIPTYCHES RUGOSA, Cobbold.

*Gyrocotyle rugosa*, Diesing, Wagener, Archiv. fur Naturg. 1858, p. 247.

*Hab.* Found by Gueinzus at Port Natal in the large intestines of *Autilope pygargus*.

#### *Ordo generum et specierum precedentium.*

1. FASCIOLA : hepatica ; gigantea.

2. CAMPULA : oblonga.

3. DISTOMA : *In corpore mammalium* :—lanecolatum ; erassum (Buskii) ; heterophyes ; ophthalmobium ; Lancea ; rubens ; tenuicolle ; orbiculare ; chilostomum ; Lima ; flexuosum ; pusillum ; rude ; acutum ; Soccus ; laeniatum ; truncatum ; instabile ; heteroporum ; Blanchardii (linguæforme) ; conjunetum ; Goliath ; Elephantis ; Putorii ; Soricis ; recurvum ; migrans.

—————*In corpore avium* :—ovatum ; cuneatum ; marginatum ; bians ; complanatum ; Leidy (dubium) ; Pontalliéi ; (cladocalium) ; cucumerinum ; delicatulum ; heterostomum ; dimorphum ; globulus ; lucipetum ; holostomum ; fuscum ; coneavum ; Lingua ; macrorum ; oxyurum ; oxycephalum ; Lineola ; grande ; deflectens ; albicolle ; elegans ; nanum ; cirratum ; maculosum ; globocaudatum ; triangulare ; involutum ; micrococcum ; cochleariforme ; Diesingii (Cochlear) ; macrostomum ; mesostomum ; caudale ; æquale ; brevicolle ; minutum ; Arenula ; Filum ; arcuatum ; Collurionis ; clathratum ; commutatum ; xanthosomum ; crassiusculum.



**DISTOMA:** *In corpore reptilium*:—cygnoides; clavigerum; crystallinum; cylindraceum; variegatum; endolobum; tetracystis; retusum; Wedlii (Pelophylacis); diffusocalciferum; acervocalciferum; crassicolle; Linguatula; cymbiforme; longicollis (Naja); Bosci (Colubri); monas; mentulatum; repandum; Clava; gelatinosum; pyxidatum; irroratum; allostomum; arrectum; Assula; signatum; ineivile; horridum.

———*In corpore piscium*:—appendiculatum; tereticolle; clavatum; globiporum; carnosum; dendriticum; tubulatum; pulchellum; incisum; transversale; tumidulum; caudiporum; rufoviride; grandiporum; polymorphum; Folium; seriale; divergens; fasciatum; fulvum; Mülleri (Æglefini); microcephalum; clinostomum (gracile); longum; insigne; megastomum; obesum; varicum; reflexum; excisum; microcotyle; anonymum; Calceolus; macropoculum (macrocotyle); auriculatum; rachion; sinuatum; veliporum; pallens; areolatum; capitellatum; microstomum; soleæforme; hyalinum; rosaceum; embryo; inflexum; granulum; pachysomum; incomtum; Genu; ventricosum; baccigerum; labiatum; apertum; microsomum; affine; ocreatum; tornatum; Gigas; torulosum; tubarium; filiforme; Raynerianum; punctum; annuligerum; fractum; gibbosum; furcatum; distichum; binode; angulatum; receptaculum (Labracis); Dujardinii (Soleæ); contortum; nigro-flavum; perlatum; atomon; luteum; homostomum.

———*In corpore animalium evertibratorum*:—isostomum; Koellikerii (Pelagiæ); megacotyle; geniculatum.

4. **BILHARZIA:** hæmatobia; magna.

5. **KOELLIKERIA:** filicollis.

6. **CROSSODERA:** nodulosum; campanula; laureatum; papillosum; lineare.

7. **ECHINOSTOMA:** *In corpore mammalium*:—trigonocephalum; acanthoides; spiculator; incrassatum.

———*In corpore avium*:—echinatum; militare; echinocephalum; dilatatum; uncinatum; leptosomum; bilobum; serratum; apiculatum; cinetium; ferox; nephrocephalum; Baculus; spinulosum; denticulatum.

———*In corpore piscium*:—annulatum; Pristis; hispidum; fallax; scabrum; cristatum; Dujardinii.

8. **GASTEROSTOMA:**—fimbriatum; minimum; gracilescens; armatum.

9. **WEDLIA:**—bipartita; Faba.

10. **MONOSTOMA:**—*In corpore mammalium*:—lentis; squammula; Hippocrepis; Kuhnii (Leporis); Noctulæ (Vespertilionis); ocreatum; Blainvillei (Delphini); plicatum.

———*In corpore avium*:—mutabile; flavum; attenuatum; alveatum; lanceolatum; cymbrium; expansum; prismaticum; ventricosum; crenulatum; macrostomum.

MONOSTOMA : *In corpore reptilium* :—ellipticum ; sulcatum ; ornatum ; Histrix ; trigonocephalum ; delicatulum ; spirale ; renicapite (nephrocephalum) ; molle ; incommodum ; Gurltii.

—————*In corpore piscium* :—foliaceum ; capitellatum ; orbiculare ; liguloideum ; constrictum ; præmorsum ; Filum ; galeatum ; echinostomum ; caryophyllum ; Braunii (Murænulæ) ; cochleariforme ; Wedlii (Rhombi) ; gracile ; dubium.

11. NEMATOBOTHRUM :—filarina.

12. CODONOCEPHALUS :—mutabilis.

13. EUSTEMMA :—Caryophyllum.

14. HOLOSTOMA : *In corpore avium* :—variabile ; Lagenæ ; serpens ; tenuicollis ; Bellinghamii (Falconum) ; Sphærule ; Westrumbii (sphærocephalum) ; microstomum ; dubium (Corones) ; Cornu ; longicollis ; gracile ; erraticum ; platycephalum ; variegatum ; multilobum (cornutum) ; crenulatum (Anatis).

—————*In corpore reptilium* :—nitidum.

—————*In corpore piscium* :—Clavus.

15. HEMISTOMA : *In corpore mammalium* :—alatum ; cordatum ; clathratum ; pedatum.

—————*In corpore avium* :—Spathula ; podomorphum ; auritum ; denticulatum ; commutatum ; trilobum ; spathaceum ; excavatum.

16. DIPLOSTOMA :—rhachium ; clavatum ; cranarium ; Mülleri (Petromyzi) ; cuticola ; volvens ; brevicaudatum ; grande.

17. RHOPALOPHORUS :—coronatus ; horridus.

18. AMPHISTOMA : *In corpore mammalium* :—conicum ; explanatum ; crumeniferum ; pyriforme ; asperum ; giganteum ; fabaceum ; emarginatum ; subtriquetrum ; Conus (truncatum).

—————*In corpore avium* :—unciforme ; Hirudo ; lunatum.

—————*In corpore reptilium* : scleroporium ; grande ; subclavatum.

—————*In corpore piscium* :—Nattereri ; megacotyle ; Ferrum-equinum ; cylindricum ; attenuatum ; oxycephalum.

19. AMPHIPTYCHES :—Urna ; rugosa.

[NOTE.—Since the above was written, I have received Diesing's "*Nachträge und Verbesserungen zur Revision der Myzelminthen*," in which a few additional forms are indicated. The publication of this Synopsis having already been accidentally delayed, I have added only one species (*Gasterostoma armatum*), as this could be effected without materially altering the type. I may observe that Diesing provisionally places the singular genus *Nematobothrium* among the Monostomata ; its characters, however, are so distinctive, that I see no reason to doubt the propriety of Van Beneden's arrangement.—T. S. C.]

Descriptions of New Species of Hymenopterous Insects collected by Mr. A. R. Wallace at Celebes. By FREDERICK SMITH, Esq., Assistant in the Zoological Department of the British Museum. Communicated by W. W. SAUNDERS, Esq., F.R.S., V.P.L.S.

[Read November 3, 1859.]

THE present paper contains descriptions of upwards of 100 species of Hymenoptera new to science, which form part of the second collection made by Mr. Wallace at Celebes. Perhaps the most interesting species described belongs to the genus *Dolichurus*, a genus which previously contained only a single species, and that indigenous to Europe; the discovery of a second may be regarded as one of the most valuable additions which Mr. Wallace has made to this order of insects. The addition of a new species to the genus *Methoca* is also extremely interesting; of the previously known species, one is European, a second from Cuba, a third from Canada, and a fourth from Northern India, showing the extensive geographical range of this rare genus of solitary Heterogyna.

The two collections of Hymenoptera from Celebes contain no less than 164 new species, a number far exceeding that which I have found in any similar collection, made in any part of the New World.

Fam. AULACIDÆ, *Shuck.*

1. TRYGNALYS PICTIFRONS. *T. nitidus, niger, distincte punctatus*; capite pedibusque albo maculatis; alis hyalinis, apice fuscis.

*Female.* Length 5 lines. Black; head and thorax with coarse, shallow, confluent punctures; the mesothorax with two oblique longitudinal impressed lines, which enclose, in the middle, one-third of the disk, the lateral portions being irregularly striated longitudinally; the scutellum with a central depression, the metathorax rounded. The face with an ovate spot outside the insertion of the antennæ, two at the base of the clypeus, and an oblong one at the inner margin of the mandibles, white; the head a little wider than the thorax. Thorax: the tubercles, the anterior tibiæ in front, and the intermediate and posterior pairs at their base, white; wings hyaline and iridescent, with a dark fuscous cloud at the apex, commencing at the stigma. Abdomen shining, more finely punctured than the head and thorax, the base with a central longitudinal depression; beneath, more delicately and not quite so closely punctured.

*Male.* Length  $3\frac{3}{4}$  lines. Closely resembles the female, but rather more finely punctured; the extreme base of the femora and apex of the trochanters are pale, there is also a pale spot on each side of the scutellum and of the postsutellum; the second segment of the abdomen

has an ovate spot on each side at its apical margin, and the third segment a very minute one; beneath, the apical margin of the second segment is produced into a stout, obtuse, flattened spine.

*Hab.* Makassar.

Fam. EVANIADÆ, *Leach*.

Gen. EVANIA, *Fabr.*

1. EVANIA STRIATA. Tota nigra; facie argenteo-sericea; thorace punctato.

*Female.* Length  $3\frac{1}{4}$  lines. Black; the clypeus and lower portion of the cheeks longitudinally strongly striated, and covered with glittering cinereous pubescence; the antennæ longer than the body and obscurely fulvous beneath. Thorax coarsely punctured; the sides and truncated portion of the metathorax covered with cinereous pubescence; the anterior and intermediate tibiæ and tarsi as well as the apical portion of the anterior femora rufo-testaceous; the wings hyaline and iridescent, the nervures black; the lower posterior angle of the marginal cell rounded. Abdomen: the petiole two-thirds of the length of the thorax, the base striated.

*Hab.* Makassar.

Gen. FENATOPUS, *Smith*.

The head globose; the antennæ elongate, half the length of the body.

The prothorax elongated into a narrow neck; the wings with an angulated marginal cell, *the submarginal and discoidal cells obsolete*; the posterior tibiæ incrassate, with two or three stout teeth beneath, which have a number of finer denticulations between them. Abdomen elongate; the first segment formed into a long petiole.

This genus is characterized and formed for the reception of those species of *Megischus* in which the submarginal and discoidal cells are obsolete; all the species possess the characters of the genus *Megischus*, differing only in the neuration of the wings. Mr. Westwood described a species of this subdivision in his monograph of the family, under the name *Megischus indicus*. I am acquainted with six or seven species, inhabitants of Malacca, Borneo, and Port Natal.

1. FENATOPUS RUFICEPS. *F. niger*; capite ferrugineo; thorace abdominisque segmento primo rugosis; femoribus posticis denticulo armatis; alis hyalinis.

*Female.* Length  $6\frac{1}{2}$  lines, the ovipositor  $5\frac{1}{2}$  lines. Black; the head red, the vertex and clypeus black; the front and the vertex rugose; the cheeks smooth and shining. Thorax coarsely rugose; the anterior and intermediate legs ferruginous, with the base of the tibiæ and first joint of the tarsi white; the wings hyaline; the posterior femora

armed with three stout teeth, which have a number of small ones between them; the tibiæ reddish outside; the tarsi pale testaceous, with the claw-joint rufo-fuscous.

*Hab.* Makassar.

Gen. MEGISCHUS, *Brullé*.

1. MEGISCHUS DUCALIS, *Westw. Trans. Ent. Soc.* iii.

*Hab.* Celebes; Java.

Fam. ICHNEUMONIDÆ, *Leach*.

Gen. ICHNEUMON, *Linn.*

1. ICHNEUMON INSULARIS. *I. niger*; antennis medio scutelloque et abdominis apice albis; alis subhyalinis.

*Male.* Length  $4\frac{1}{4}$  lines. Black and shining; the anterior and intermediate legs dark rufo-piceous; the coxæ and articulations pale testaceous; the antennæ white in the middle. The wings slightly coloured, with the nervures dark fuscous; the scutellum white. Abdomen finely and closely punctured, the apical margins of the segments rufo-piceous, the apex white.

*Hab.* Makassar.

2. ICHNEUMON PRÆDATORIUS. *I. rufescenti-flavus*; alis hyalinis; tibiis posticis fuscis.

Length  $5\frac{1}{2}$  lines. Pale ferruginous, beneath yellowish; the antennæ white above in the middle; the posterior tarsi fuscous; the wings hyaline and iridescent, the nervures ferruginous; smooth, shining, and impunctate; the metathorax with two short spines.

*Hab.* Makassar.

3. ICHNEUMON EPHIPIIUM. *I. ferrugineus*; capitis vertice, mesothorace, tarsisque posticis nigris.

*Female.* Length 6 lines. Ferruginous, with the vertex and mesothorax black; the orbits of the eyes, the face, mandibles, and body beneath, luteo-testaceous; the palpi paler; the antennæ fuscous, with several joints towards the apex white above. The mesothorax smooth and shining; the metathorax traversed by six longitudinal carinæ, the inner division on each side crossed in the middle by a transverse one, the enclosed spaces rugose; the wings hyaline and iridescent, the nervures testaceous; the posterior tarsi black.

*Hab.* Makassar.

Gen. TROGUS, *Grav.*

1. TROGUS BRUNNEIPENNIS. *T. niger, opacus*; antennis pedibusque obscure ferrugineis; alis fuscis, stigmatè nigro.

Length 9 lines. Black, finely shagreened, and subopaque; the face, scape in front, and the anterior legs in front, pale testaceous-yellow;

the flagellum fulvous beneath; the mandibles, palpi, and cheeks testaceous; the intermediate legs in front and the posterior tibiæ in front rufo-testaceous, the coxæ and trochanters more obscure; the wings fuscous; the scutellum very convex and obscure rufo-testaceous. Abdomen: the three apical segments finely punctured and shining; the apical margins of the segments narrowly rufo-piceous.

*Hab.* Makassar.

Gen. MESOSTENUS, *Brullé*.

1. MESOSTENUS INSIDIATOR. *M. niger*; capite thoraceque flavo variis; pedibus ferrugineis flavo lavatis; segmentis abdominalibus flavo marginatis; alis hyalinis.

*Female.* Length 10 lines. Black and shining; the orbits of the eyes, the clypeus, mandibles, and a spot on the scape of the antennæ, yellow; the joints of the antennæ, from the fourth to the fifteenth, white. Thorax: the posterior margin of the prothorax, two large spots beneath the wings, two on the metathorax above, the scutellum, postscutellum, and a large patch on each side, as well as the tegulæ, yellow; the legs pale ferruginous, the anterior femora beneath, the tibiæ in front, the intermediate and posterior tibiæ and tarsi, as well as the coxæ, yellowish-white; the posterior coxæ black beneath. Abdomen: the basal segment forming a smooth shining petiole, the two following segments opaque, and the rest shining black, the five basal segments margined with yellow; the ovipositor one-third longer than the body.

*Hab.* Makassar.

Gen. TRYPHON, *Grav.*

1. TRYPHON LUTORIUS. *T. niger*, luteo varius; alis hyalinis iridescentibus.

Length  $6\frac{1}{4}$  lines. Black; the scape, tibiæ, tarsi, tegulæ, scutellum, and three basal segments of the abdomen, luteous; the flagellum fulvous beneath and fuscous above; the anterior and intermediate coxæ and trochanters luteous; the anterior femora luteous, with a dark stain behind; the intermediate femora luteous at their base and apex; the wings hyaline, faintly clouded towards their apex; the body smooth and shining, with the sides of the metathorax covered with cinereous pubescence.

*Hab.* Makassar.

Gen. CRYPTUS, *Fabr.*

1. CRYPTUS OPACUS. *C. niger*; antennis medio albis; alis fuscis, apice albo; pedibus ferrugineis.

*Female.* Length  $5\frac{1}{2}$  lines. Black and opaque, with the basal segment of the abdomen shining. The clypeus, a heart-shaped spot above it, and the joints of the antennæ above from the seventh to the eleventh, white. Thorax coarsely rugose; the scutellum with a white spot at

its apex; wings dark brown, with their tips white; the legs ferruginous, with the posterior coxæ fuscous. Abdomen petiolated, the petiole shining black, the following segments opaque, the apical one white.

*Hab.* Makassar.

2. *CRYPTUS SPOLIATOR*. *C. niger*; abdominis marginibus, fasciis albis; alis hyalinis.

*Female*. Length  $6\frac{1}{2}$  lines. Black; the head with a number of deep striæ on the front between the ocelli and the insertion of the antennæ; the clypeus, labrum, mandibles and palpi pale testaceous. Thorax: the sides and the metathorax, except its base, striated, the latter transversely so; a pale testaceous spot on the scutellum and post-scutellum, a larger spot on each side of the latter, and the margin of the truncation of the metathorax, pale testaceous-yellow; wings hyaline, faintly coloured towards their apex; the anterior and intermediate legs pale testaceous, and stained with brown above; the posterior legs dark fusco-ferruginous, with the tarsi white, except the base of the first joint; the three basal segments margined with white, the apical one entirely so. The abdomen pale beneath and spotted with black; the ovipositor the same length as the abdomen.

*Hab.* Makassar.

3. *CRYPTUS ALBO-PICTUS*. *C. niger*; metathorace bispinoso; antennis medio scutelloque et abdominis fasciis tribus albis; alis hyalinis fusco fasciatis.

*Female*. Length  $4\frac{1}{2}$  lines. Black; the antennæ in the middle, the anterior and intermediate coxæ, their trochanters, a spot on the posterior coxæ, and a fascia on the apical margin of the first and second segments of the abdomen, as well as the apical segment above, white; the metathorax rugose, and with a transverse carina near its base, the spines on each side pale testaceous; the wings hyaline, the anterior pair with a transverse fuscous fascia, their tips also fuscous; the posterior tibiæ with a white spot at their base; the anterior pair with a white line in front.

*Hab.* Makassar.

4. *CRYPTUS VARIEGATUS*. *C. niger*; antennis medio tarsisque posticis albis; capite, thorace abdomineque flavo variegatis; alis hyalinis.

*Female*. Length  $4\frac{1}{2}$  lines. Black; the inner orbit of the eyes, the front below the antennæ, the cheeks and mandibles, ochraceous. Thorax: the margin of the prothorax, a central spot on the mesothorax, the tegulæ, the scutellum, postscutellum, the apex of the metathorax and two spots at its base, the legs, and three spots on the sides of the thorax, ochraceous; the wings hyaline and iridescent; the posterior tarsi white, with the claw-joint and tip of the fourth black. Abdomen: the apical margin of all the segments with an ochraceous fascia; the ovipositor shorter than the abdomen.

*Hab.* Makassar.

5. *CRYPTUS PETIOLATUS*. *C. niger*; antennis medio albis; thorace pedibusque flavo variegatis; alis hyalinis.

*Female*. Length  $4\frac{1}{2}$  lines. Black, smooth and shining; the anterior margin of the clypeus, the mandibles, palpi, the anterior and intermediate legs, the tegulæ, scutellum, postscutellum, the apical margin of the first and second segments, and the apical segment entirely, yellow; the eighth to the twelfth joints of the antennæ white; the wings hyaline and iridescent. The abdomen petiolated.

*Hab.* Makassar.

#### Gen. ISCHNOCERUS, *Grav.*

1. *ISCHNOCERUS MACULIPENNIS*. *I. niger*; abdomine longitudinaliter striato; pedibus ferrugineis; alis hyalinis, fasciis duabus fuscis.

*Female*. Length 4 lines. Black; the head and thorax coarsely punctured. The abdomen longitudinally irregularly striated. Antennæ fusco-ferruginous; the palpi testaceous. Wings hyaline; the anterior pair with a broad dark-brown fascia, which extends from the middle of the stigma nearly to the apex of the marginal cell, a narrower fascia crosses the wings at the apex of the externo-medial cell; the tips of the posterior wings brown; the legs ferruginous, with the coxæ and claw-joint of the tarsi black.

*Hab.* Makassar.

#### Gen. METOPIUS, *Panz.*

1. *METOPIUS CRASSIPES*. *M. niger*, rude punctatus et flavo variegatus; pedibus rufo-testaceis; alis hyalinis, apice fuscatis; abdomine flavo subinterrupte fasciato.

Length 6 lines. Black, and coarsely punctured; the front yellow, with a fuscous stain in the middle; the antennæ obscurely fulvous beneath; the scape yellow in front. Thorax: the wings hyaline, with a fuscous cloud extending from the middle of the marginal cell to the apex of the wings, the nervures dark brown; the legs rufo-testaceous, with the anterior and intermediate tibiæ and tarsi yellow; the posterior coxæ and base of the femora dark rufo-fuscous, also the claw-joint of the tarsi fuscous; the posterior legs incrassate. Abdomen yellow beneath; the three basal segments with narrow interrupted yellow marginal fasciæ.

*Hab.* Makassar.

#### Gen. GLYPTA, *Grav.*

1. *GLYPTA MACULIPENNIS*. *G. nigra*; capite nitido; pedibus abdomineque fasciis ferrugineis; alis hyalinis, maculis duabus fuscis.

*Female*. Length 7 lines. Black; the head smooth and shining; the clypeus, labrum, and a broad stripe behind the eyes luteo-testaceous; the antennæ setaceous, of a yellowish-white, the ninth, tenth, and three apical joints black; the scape luteous in front and fusco-ferruginous



above. Thorax rugose; the sides and beneath covered with cinereous pubescence; the mesothorax with a smooth shining space on each side; the scutellum, and a subquadrate space on each side of the metathorax above, shining; the legs ferruginous; the anterior and intermediate tibiæ in front and the posterior pair at their base yellowish-white; the posterior tarsi white and the tibiæ fuscous: the wings hyaline; the anterior pair with a transverse fuscous spot in the middle, and a second spot halfway between that and the apex of the wing, which is slightly clouded. Abdomen: the three basal segments finely rugose, with deep transverse waved depressions; the first and second with the basal half ferruginous, the third narrowly and obscurely so; the following segments smooth, with their apical margins more or less white.

*Hab.* Makassar.

2. *GLYPTA IRIDIPENNIS*. *G.* capite thoraceque nigris; pedibus abdomineque pallide ferrugineis; alis hyalinis et pulcherrime iridescentibus.

*Female.* Length  $5\frac{3}{4}$  lines. The head and thorax black; abdomen and legs pale ferruginous. Head smooth and shining; the scape of the antennæ, the clypeus, mandibles and palpi pale ferruginous; the flagellum fulvous beneath. The thorax opaque; the posterior margin of the prothorax, the tegulæ, scutellum, and legs, of a reddish-yellow; the wings hyaline and iridescent. Abdomen pale ferruginous; the second, third, and fourth segments with a longitudinal oblique impressed line on each side; the ovipositor the same length as the abdomen.

*Hab.* Makassar.

#### Gen. *PIMPLA*, *Fabr.*

1. *PIMPLA INFIRMA*. *P.* rufescenti-flava; antennis et ovipositore nigris; alis flavo-hyalinis, apice fuscis.

*Female.* Length  $7\frac{1}{2}$  lines. Of a reddish-yellow; the legs paler than the body; the antennæ ferruginous beneath. Thorax smooth and shining; the mesothorax with two longitudinal impressed lines; wings flavo-hyaline, the apical margins with a broad dark-fuscous border, the nervures pale ferruginous. Abdomen subopaque and closely punctured; the second and three following segments with a strongly impressed curved line; the apical margins of the fourth and fifth segments narrowly black.

*Hab.* Makassar.

2. *PIMPLA UNICOLOR*. *P.* flavo-rufa; antennis apice fuscis; alis hyalinis.

*Female.* Length  $4\frac{1}{4}$  lines. Reddish-yellow; the head, anterior and intermediate legs, as well as the posterior tibiæ and the scape of the antennæ, yellow; the apical portion of the antennæ fuscous. Wings

hyaline, with the nervures fuscous, becoming pale ferruginous at the base of the wings; legs incassate. Abdomen: the segments with strong transverse impressed lines; the ovipositor short and black.

*Hab.* Makassar.

3. *PIMPLA INSOLENS*. *P. flavo-ferruginea*; vertice strigisque tribus mesothoracis nigris; abdomine nigro, marginibus apicalibus segmentorum flavo fasciatis.

*Female*. Length  $5\frac{1}{4}$  lines. Reddish-yellow; the head behind, and a spot enclosing the ocelli, black; a fuscous spot on the clypeus, and a prominent tubercle below the insertion of the antennæ. Thorax beneath, the sides, the base of the metathorax and three longitudinal stripes on the mesothorax, black; the scutellum elevated, with an acute tubercle at its base; the coxæ and femora beneath black, or dark rufo-fuscous; the wings hyaline, the nervures ferruginous. Abdomen nigro-piccons, with the apical margins of the segments flavo-testaceous; the abdomen thinly covered with a fine silky cinereous pile.

*Hab.* Makassar.

4. *PIMPLA MODESTA*. *P. ferruginea*; antennis et vertice nigris; alis hyalinis.

*Female*. Length  $5\frac{1}{4}$  lines. Ferruginous; the vertex and antennæ black, the face and thorax yellowish. Thorax: the wings hyaline, the nervures black, becoming yellowish at the base of the wings. Abdomen finely punctured, the two apical segments smooth and shining; the ovipositor black, and half the length of the body.

*Hab.* Celebes.

5. *PIMPLA VIRIDIPENNIS*. *P. capite, thorace, pedibus anticis et intermediis, femoribus posticis ferrugineis; alis fuscis, cupreo submicantibus.*

*Male*. Length 6 lines. Head, thorax, and legs ferruginous, the posterior tibiæ and tarsi fuscous; wings brown with a coppery effulgence; the antennæ fusco-ferruginous, with the scape ferruginous in front. The head and thorax smooth and shining, the abdomen closely punctured and subopaque; margins of the segments constricted.

*Var. a.* The basal segment of the abdomen red.

*Hab.* Makassar.

#### Gen. ANOMALON, *Grav.*

1. *ANOMALON FALCATOR*. *A. nigrum*; abdomine pedibusque rufo-ferrugineis; alis hyalinis.

Length  $7\frac{1}{4}$  lines. Head, thorax and antennæ black; the inner orbit of the eyes, a line behind them, the face and scape in front, reddish yellow; the flagellum black; the abdomen and legs ferruginous, the anterior legs yellowish. The thorax rugose; the metathorax produced at the apex, forming a blunt tubercle, which has a cavity above, in which the abdomen is inserted.

*Hab.* Makassar.

Fam. BRACONIDÆ, *Westw.*Gen. BRACON, *Fabr.*

1. BRACON DECEPTOR. *B. flavo-rufus*; antennis, pedibus posticis et abdominis dimidio posteriore nigris; alis fuscis, dimidio basali flavo-hyalinis.

*Female.* Length 5 lines. Black; the head, thorax, anterior and intermediate legs, the posterior femora and basal half of the abdomen, of a reddish yellow; the scape ferruginous. Thorax shining; the wings with the basal half flavo-hyaline, the apical portion brown, with a transverse hyaline spot at the base of the stigma; the posterior tibiae and tarsi black and pubescent. Abdomen: the basal segment with two deeply impressed longitudinal lines; the two following segments with oblique lines, the space between which is obliquely striated from the centre, on the third segment not continued to the apical margin; the following segments smooth and shining.

2. BRACON BELLICOSUS. *B. capite, thorace, pedibus anticis et femoribus intermediis ferrugineis*; metathorace supra nigro; alis nigro-fuscis.

*Female.* Length 7 lines. Black; the head, scape, the anterior legs, the intermediate femora, and the pro- and mesothorax ferruginous; the wings dark fuscous with a small hyaline spot below the angle of the first submarginal cell. Abdomen: the first and second segments and the basal half of the third strongly sculptured with central and lateral oblique deeply impressed lines; the posterior legs densely pubescent; the ovipositor the length of the insect.

*Hab.* Makassar.

3. BRACON COMBUSTUS. *B. capite, thorace, pedibus anterioribus et intermediis ferrugineis*; alis fuscis; metathorace nigro; abdomine apice pallide ferrugineo.

*Female.* Length 6 lines. Black; the head, scape of the antennæ, pro- and meso-thorax, anterior and intermediate legs, and the four apical segments of the abdomen ferruginous; wings dark fuscous, with a narrow hyaline streak across the first submarginal cell; the posterior legs dark rufo-fuscous. Abdomen: the three basal segments rugose, with deep oblique depressions, their apical margins smooth and shining; the ovipositor nearly twice the length of the insect.

Gen. CENOCÆLIUS, *Halid.*

1. CENOCÆLIUS CEPHALOTES. *C. capite, thorace, pedibus anticis et intermediis ferrugineis*; metathorace nigro; alis fuscis.

*Female.* Length 5 lines. Black; the head, thorax, anterior and intermediate legs, as well as the two basal joints of the antennæ, ferruginous; the metathorax black; the palpi pale testaceous; the antennæ with a fulvous annulus near its apex; wings fuscous. The head as wide as

the thorax, quadrate, strongly punctured, with the vertex smooth and shining. Thorax coarsely punctured and produced anteriorly into elevated tubercles; the scutellum elevated; the metathorax coarsely punctured. Abdomen smooth and shining.

The male exactly agrees with the female in colour and form, but has more red joints at the base of the antennæ, and has no annulus at their extremity; the posterior legs are rufo-fuscous.

*Hab.* Makassar.

Gen. AGATHIS, *Latr.*

1. AGATHIS PENETRANS. *A.* flavo-ferruginea; antennis nigris; alis flavo-hyalinis, apice fuscis.

*Female.* Length  $4\frac{1}{2}$  lines. Reddish yellow, with the eyes, flagellum, and ovipositor black; the scape ferruginous; the face finely punctured, with a deep fossulet on each side of the clypeus. The thorax with two oblique lines on the mesothorax, which meet at the base of the scutellum—between these are two longitudinal grooves; the scutellum prominent; the metathorax coarsely reticulated; the posterior tibiæ and tarsi wanting; wings yellowish hyaline, slightly fuscous towards their apex, and brilliantly iridescent, the nervures pale testaceous, the costa ferruginous. Abdomen smooth and shining.

2. AGATHIS RUGIFRONS. *A.* nigra; palpis, pedibus anterioribus et intermediis ferrugineis; alis fuscis, basi hyalinis.

*Male.* Length  $3\frac{1}{2}$  lines. Black; the labrum, mandibles, palpi, anterior and intermediate legs, pale ferruginous; the face coarsely punctured, with a deep fossulet on each side of the clypeus; the vertex and thorax anteriorly with large, deep punctures; the metathorax with three central broad grooves which have a few transverse carinæ; the sides of the metathorax, and the posterior legs, densely covered with short glittering hoary pubescence; the wings fuscous, with their base hyaline, the nervures and stigma black. The abdomen smooth and shining.

Fam. CHRYSIDIDÆ, *Leach.*

Gen. STILBUM, *Spin.*

1. Stilbum splendidum, *Fabr. Syst. Piez.* p. 170, 1.

*Hab.* Celebes; Arn; Java; Bengal; Madagasear; Senegal; Gambia; Cape of Good Hope, Port Natal.

Gen. CHRYSIS, *Latr.*

1. CHRYSIS APRICANS. *C.* viridi-eyanea, purpureo variegata; capite thoraceque confertissime punctatis; abdominis segmentis apicalibus dentibus sex armatis.

Length 5 lines. The head and thorax green, the former with the front blue and a black stain between the ocelli; the thorax with dashes of

blue; the abdomen blue, with tints of purple; the head and thorax coarsely punctured; the abdomen delicately so, the extreme base strongly punctured; beneath bright metallic green; wings slightly fuscous; the apical segment of the abdomen armed with six teeth.

*Hab.* Makassar.

2. *CHRYSIS OBSCURA*. *C. viridis*, *purpureo variegata*; capite thoraceque confertissime punctulatis, segmentis abdominis delicatule punctatis, apice sex-dentato; alis subhyalinis.

Length 5 lines. Green, with shades of blue and blue-black; beneath entirely of a brilliant green; the vertex with a large blue-black macula, which encloses the ocelli. The prothorax with a transverse black dash, and three on the mesothorax, the central one crosses the scutellum; the wings fuscous, the marginal cell enclosed. Abdomen blue-black with the apical margins of the segments bright green, the apex armed with six equal acute teeth; the postscutellum rounded.

*Hab.* Makassar.

This species is apparently most closely allied to the *C. Schödtei* of Dahlbom, but it is much less brilliant in colour and has no vestige of a golden macula on the second segment of the abdomen; the teeth at the apex are very different, being of equal size and at equal distance from each other.

3. *CHRYSIS FUMIPENNIS*. *C. læte purpurea*; capite thoraceque fortiter, abdomine delicatule punctatis; alis fusco-hyalinis.

Length  $4\frac{3}{4}$  lines. Opake purple-blue; the legs and two basal joints of the antennæ bright green; the abdomen green beneath, the vertex with a large triangular black macula; the postscutellum produced into a triangular acute tooth. Abdomen: the segments darkest at their base; the apical margin of the terminal segment rounded, and armed with four minute acute teeth.

*Hab.* Makassar.

This species is distinguished by a much broader and more depressed form than is usual in the genus.

4. *CHRYSIS SEDUCTA*. *C. viridis*, *nitens*, *cæruleo variegata*, *punctatissima*; ano tridentato.

Length  $3\frac{1}{4}$  lines. Opake green; head and thorax with strong separate punctures; the abdomen with much finer confluent punctures; the antennæ black; the tarsi fuscous, the basal joint green outside; the abdomen beneath and the legs smooth brilliant green; the wings hyaline, the nervures brown; the postscutellum rounded; the lateral angles of the metathorax acute. Abdomen: the segments blue-green, with the apical portion of each bright green, the margin of the apical one tridentate.

*Hab.* Makassar.

This species is closely allied to the *C. Bohemanni* of Dahlbom; but it is larger, more robust, and the apical segment of the abdomen is not

acutely angular in the middle, but produced into a distinct acute tooth.

Gen. HOLOPYGA, *Dahlb.*

1. HOLOPYGA PURPUREA. *H. purpurea*, nitens, violaceo variegata; metathorace crasse punctatissimo; abdominis marginis apicali arcuato, integerrimo; alis subhyalinis.

Length  $3\frac{3}{4}$  lines. Dark blue, with tints of bright purple and green; the head, pro-, and mesothorax finely punctured, the prothorax with large coarse punctures at the sides; the metathorax with large deep fossulets at the sides; wings light brown, with their base hyaline. Abdomen delicately punctured, smooth and shining; the body brilliant green beneath.

*Hab.* Makassar.

Gen. FORMICA, *Linn.*

1. Formica smaragdina, *Fabr. Spec. Ins.* p. 488 ♂.

*Hab.* Celebes; Borneo; Malacca; Sumatra; Philippine Islands.

2. Formica pallida, *Smith, Proc. Linn. Soc.* vol. ii. p. 57 (*worker major*).

The insect described in a former paper was the worker (*major*). The small worker, and also the female, have been received from Celebes. The female is of a blackish brown, with the flagellum, prothorax, scutellum, scale of the peduncle, legs, and sides of the thorax pale ferruginous; the wings hyaline, with the nervures pale testaceous; the apical margins of the segments of the abdomen pale; the scale of the peduncle rounded above. The *worker minor* is pale ferruginous, with the head a little darker and the abdomen blackish brown; the head a little wider than the thorax; the thorax compressed, and very narrow behind.

*Hab.* Celebes; Sarawak.

3. Formica gracilipes, *Smith, Proc. Linn. Soc.* vol. ii. p. 55. ♀.

*Hab.* Celebes; Singapore.

4. FORMICA FAMILIARIS. *F. rufo-flava*, lævis, nitida; alis subhyalinis, nervuris pallide testaceis; abdomine cinereo micante vestito.

*Female.* Length  $4\frac{1}{4}$  lines. Entirely of a pale reddish-yellow. Head: the sides behind the eyes straight; the posterior angles rounded, the hinder margin of the vertex slightly emarginate; the ocelli large and prominent; the elypeus and mandibles very smooth and shining, the latter with a row of black teeth on their inner margin. Thorax ovate, smooth and shining; wings subhyaline, the nervures pale testaceous, the discoidal cells obsolete. Abdomen wider than the thorax, covered with a thin, changeable, sericeous pile; the peduncle minute, obliquely inclined and fitting into a cavity at the base of the abdomen.

*Hab.* Makassar.

This insect bears a strong resemblance to *F. flava* of Europe.

Gen. TAPINOMA, *Foerster*.

1. TAPINOMA THORACICA. *T. nigra*, subnitida; capite abdomineque glabris; thorace rugoso; antennis pedibusque ferrugineis.

*Worker*. Length 2 lines. Black and slightly shining; the antennæ and legs obscure ferruginous. Thorax rugose above, deeply stragulated between the meso- and metathorax, the latter abruptly concave truncate; the peduncle of the abdomen inclining forwards, rounded in front; flat and oblique behind; abdomen ovate, produced anteriorly, and overhanging the peduncle.

*Hab.* Makassar.

2. TAPINOMA NITIDA. *T. nigra*, lævis, nitida; alis hyalinis, nervuris pallide testaceis.

*Female*. Length  $4\frac{1}{4}$  lines. Shining black; the antennæ and the head, before their insertion, ferruginous. Thorax oblong-ovate; the legs dark ferruginous, the tarsi palest; the wings hyaline, the nervures pale testaceous; the discoidal cell triangular. The scale of the peduncle inclining forwards and overhung by the base of the abdomen; the latter oblong-ovate, very smooth and shining.

*Hab.* Makassar.

Gen. POLYRHACHIS, *Smith*.

1. POLYRHACHIS PHYLLOPHILUS. *P. opacus*, niger; thorace spinis duabus acutis antice et postice armato; abdominis squamula spinis duabus arcuatis armata.

*Worker*. Length 4 lines. Opaque black, with the abdomen of an obscure rusty red; the palpi elongate and pale testaceous; eyes prominent; the two carinæ on the front, at the sides of which the antennæ are inserted, very much elevated and acute. Thorax: the spines on the prothorax long, acute, and diverging outwards; the metathorax compressed, the upper surface slightly concave, with the lateral margins raised, the carinæ continued into two long parallel spines which project over the peduncle of the abdomen; the legs slightly shining, destitute of spines and hairs, the calcaria pale. Abdomen obscurely red and slightly pilose; the peduncle armed above with two long acute curved spines, which project over the base of the abdomen.

*Hab.* Makassar.

2. POLYRHACHIS COMPRESSICORNIS. *P. niger* et vestitus pube cinerea; thorace spinis duabus acutis antice armato; abdominis squamula spinis duabus brevibus armata; pedibus ferrugineis.

*Female*. Length  $5\frac{1}{2}$  lines. Black and densely clothed with cinereous pile, which has a silvery brightness in certain lights; the mandibles shining black, and longitudinally striated; the antennæ inserted at the sides of two prominent carinæ; the scape compressed, much broader than usual, with the apex widest and thinly covered with short pale glittering pubescence. Thorax: the spines at the lateral angles of

the prothorax short, stout, and acute; the mesothorax very convex, with an abbreviated shining carina in the middle anteriorly; the metathorax transverse, abruptly truncated, slightly concave in the middle above; the legs ferruginous, with their articulations and tarsi fuscons. Abdomen ovate; the peduncle subtriangular, a stout, short, acute spine at the lateral angles.

*Worker.* Length  $4\frac{1}{4}$  lines. Only differs in having the thorax flattened above, with the lateral margins slightly raised; the scape of the antennæ compressed, as in the female.

3. *POLYRHACHIS RUGIFRONS.* *P.* capite thoraceque subopacis; abdomine sericeo vestito; thorace spinis duabus longis acutis antice et postice armato, squamis bispinosis.

*Female.* Length 7 lines. Black; the head oblong, rugose, and narrowed behind the eyes; the palpi pale testaceous. Thorax: the prothorax armed on each side with a short, stout, acute spine, directed outwards; the mesothorax with a short abbreviated carina in the middle anteriorly, where it is rugose; the metathorax less rugose and with a fine cinereous pile, at each lateral angle is a short, stout, acute spine, pointed outwards; the legs slightly pilose. Abdomen covered with a fine, shining, changeable silky pile, which has a faint golden lustre; the peduncle armed above on each side with a stout, acute, slightly curved spine which is directed outwards.

*Hab.* Makassar.

This species is of the same size as, and closely resembles, *P. sex-spinosus*, but differs in not having the head armed posteriorly with spines, and also in the length and direction of the spines on the thorax and peduncle; it is also much more strongly sculptured. The worker only differs in having the thorax narrower, the sides being more parallel, but rather wider anteriorly; the sculpture is the same, as well as the pilosity.

4. *POLYRHACHIS SCULPTURATUS.* *P.* capite, thorace abdomineque delicatule acieulatis; thorace spinis duabus elongatis acutis antice armato; abdominis squamula spinis duabus longis acutis, utraque ad basin minute unispinulosa.

*Female.* Length  $4\frac{3}{4}$  lines. Black, and very finely striated longitudinally; the eyes as well as the front of the head prominent; the mandibles shining and longitudinally striated. Thorax short and very convex above, armed in front with two stout acute spines; the wings fusco-hyaline, the nervures rufo-testaceous, the stigma black. The peduncle of the abdomen with two stout, upright, acute spines; at the base of each, outside, is a short minute spine. The entire insect thinly covered with erect black pubescence, which is most dense on the abdomen; the abdomen has also a thin covering of shorter pale pubescence.

*Worker.* Length 4 lines. Closely resembling the female, but with



the thorax flat above, the lateral margins being slightly notched at the divisions between the pro-, meso- and metathorax; otherwise like the female.

*Hab.* Makassar.

5. *POLYRHACHIS NUDATUS*. *P. capite thoraceque opacis; abdomine nitido, lævissimo; thorace spinis duabus longis acutis antice et postice armato; squama spinis duabus longis curvatis.*

*Worker.* Length 4 lines. Black; the head finely rugose; the mandibles stout and shining; the palpi fuscous. Thorax oblong, with two very stout conical spines in front, which curve obliquely outwards; the metathorax has also two similar spines, but rather longer, which diverge and are bent slightly downwards; the thorax rounded above; the legs shining black. The peduncle of the abdomen incrassate, quadrate, and armed above with two stout, long, curved, acute spines, which are directed backwards, and curve to the shape of the base of the abdomen.

*Hab.* Makassar.

6. *POLYRHACHIS PEREGRINUS*. *P. niger, pallide aureo-sericeo vestitus; thorace spinis acutis antice et postice armato; abdominis squama spinis duabus longis acutis ad basin minute unispinulosis instructa.*

*Female.* Length 4 lines. Black, and clothed with pale golden silky pubescence; anterior margin of the clypeus rounded; mandibles shining black; the palpi pale testaceous. Thorax: the prothorax with two acute spines in front, which are directed outwards; the metathorax has two longer spines, also pointing obliquely outwards. Abdomen ovate; the peduncle armed with two long, stout, slightly curved spines, which have at their base, within, a minute acute spine.

*Hab.* Makassar.

This species is easily distinguished by the minute spines within the long lateral ones.

7. *POLYRHACHIS VESTITUS*. *P. niger, aureo-sericeo vestitus; thorace spinis duabus acutis antice armato; squama integra.*

*Worker.* Length 6 lines. Black, and clothed with a pale golden sericeous pile; the legs naked; the mandibles stout, finely striated, the striæ interspersed with punctures; the front of the head very prominent. Thorax flattened above, the margins acute and slightly raised; the pro-, meso- and metathorax separated by strongly marked sutures; the prothorax armed at its anterior angles with a stout acute spine, which is compressed and broad at its base. Abdomen: the peduncle unarmed, its margin rounded.

*Hab.* Makassar.

This species is nearly three times the size of *P. inermis*, which it resembles in form, but is covered with silvery pile.

8. *POLYRHACHIS SÆVISSIMUS*. *P. niger, tibiis ferrugineis; thorace spinis duabus acutis antice et postice armato; squama subquadrata, spinis duabus longis curvatis; abdomine lævigato, nitido.*

*Worker.* Length 3 lines. Black, with the abdomen smooth and shining; the head and thorax subopaque, and thinly covered with cinereous pile; mandibles shining black; the palpi pale testaceous. Thorax armed in front with two stout acute spines, the metathorax with two, more slender and longer diverging spines; the peduncle has two long spines which curve round the base of the abdomen; the tibiæ ferruginous, but more or less obscure at their base.

*Hab.* Makassar.

Gen. PSEUDOMYRMA, *Guér.*

1. *Pseudomyrma læviceps*, *Smith, Proc. Linn. Soc.* 1859, iii. p. 145.

*Hab.* Celebes; Aru.

The specimens from Makassar are smaller than those from Aru, but I can detect no specific difference.

Fam. PONERIDÆ.

Gen. ODONTOMACHUS, *Latr.*

1. *Odontomachus simillimus*, *Smith, Cat. Hym. Ins. Form.* p. 80, pl. 5. figs. 8, 9.

This species closely resembles *O. hæmatodes*, but may be known by the following differences: the mandibles are distinctly serrated throughout the entire length on the inner margin; the head narrower and the antennæ shorter in the worker; in the female the neuration of the wings is different.

*Hab.* Celebes (Makassar); Fidjee Islands; Ceylon.

Gen. PONERA, *Latr.*

1. *Ponera geometrica*, *Smith, Proc. Linn. Soc.* ii. p. 67.

*Hab.* Celebes (Makassar). Singapore.

2. *Ponera læviceps*, *Smith, Proc. Linn. Soc.* ii. p. 69.

*Hab.* Celebes (Makassar); Borneo (Sarawak).

The specimen from Celebes has a few indistinct traces of sculpture on the crown of the head and prothorax, but so closely agrees in all other respects, that I cannot see a good specific difference.

3. **PONERA TRUNCATA.** *P. nigra*; *antennis, mandibulis, pedibus, abdominisque apice ferrugineis.*

*Female.* Length  $2\frac{1}{2}$  lines. Black; the clypeus, antennæ, mandibles, legs, the apex of the metathorax and of the abdomen ferruginous; the eyes placed forward at the sides of the head, near the base of the mandibles; the head, thorax, and abdomen thinly covered with a fine, short, downy pile, which renders the body sub-opaque; the truncated portion of the metathorax very smooth and shining; the mesothorax with an obscure rufous tinge. The apical margins of the two basal

segments of the abdomen rufo-testaceous, the following segments entirely so.

*Hab.* Makassar.

4. *PONERA UNICOLOR*. *P. ochracea*; antennis subfuscis, alis hyalinis; tibiis tarsisque fuscis.

*Male.* Length 4 lines. Entirely ochraceous, with the antennæ and legs slightly fuscous; the mesothorax with two oblique impressed lines meeting in the middle of its disk; the wings hyaline and iridescent, the nervures and stigma rufo-fuscous. The node of the peduncle subglobose; a deep constriction between the first and second segments of the abdomen, and a slighter one between the second and third; the node of the peduncle with a tooth at its base beneath.

*Hab.* Makassar.

5. *PONERA PALLIDICORNIS*. *P. obscure rufo-fusca*; antennis pedibusque pallide testaceis; alis hyalinis.

*Male.* Length 3 lines. Shining rufo-fuscous; the head impunctate; the antennæ, mandibles, and palpi pale rufo-testaceous. The thorax delicately punctured; the scutellum prominent, smooth, and shining; the wings hyaline and iridescent, with the nervures colourless; the stigma pale testaceous; the legs rufo-fuscous, with the articulations and tarsi pale. Abdomen: the segments slightly constricted; the node of the peduncle conical, and with a tooth at its base beneath.

*Hab.* Makassar.

6. *PONERA PALLIDIPENNIS*. *P. nigra opaca*; abdomine lævigato, nitido, chalybeo-iridescente; antennis pedibusque obscure ferrugineis.

*Male.* Length 3 lines. Black; the head and thorax finely rugose and opaque, the metathorax coarsely rugose; the scape and basal joint of the flagellum bright ferruginous, the following joints obscurely so. Wings colourless, with the nervures pale testaceous, the stigma pale brown; the legs fusco-ferruginous, with the articulations and the tarsi pale rufo-testaceous. Abdomen smooth and shining, with a blue iridescence, the tip pale testaceous.

*Hab.* Makassar.

#### Gen. MYRMICA, Latr.

1. *Myrmica molesta*, Say, *Bost. Journ. Nat. Hist.* i. 293. 6.

I have carefully examined several individuals of the worker of this species from Makassar, and compared them with specimens obtained from North America, Brazil, and from houses in London, and can detect no specific difference; the examples from Celebes are paler at the apex of the abdomen; beyond this, I see no difference. I consider *M. molesta* a cosmopolitan species, which has been carried in merchandize to all parts of the world.

2. *MYRMICA GRACILESCENS*. *M. rufo-ferruginea*, *gracilescens*; *lævissima* et *politissima*.

*Worker*. Length 1 line. Rufo-ferruginous, smooth and shining; the tarsi and the basal joints of the flagellum pale rufo-testaceous; the club of the antennæ 3-jointed; the antennæ nearly as long as the body. The metathorax with two short acute spines. Abdomen ovate; the basal node of the peduncle petiolated, and elevated above the second node, which is ovate-conical, the first being conical.

*Hab.* Makassar.

This elegant little ant closely resembles the *Myrmica lippula* of Europe.

#### Gen. CREMATOGASTER, *Lund*.

1. *CREMATOGASTER LÆVISSIMUS*. *C. pallide castaneo-rufus*, *lævis nitidusque*; *alis hyalinis iridescentibus*.

*Female*. Length 3 lines. Pale rufo-castaneous, highly polished, smooth, and impunctate. The antennæ and legs very pubescent; the head anteriorly and the mandibles slightly pubescent. Thorax oblong-ovate; the wings colourless and brilliantly iridescent, the nervures scarcely distinguishable. Abdomen oblong-ovate, the first node of the peduncle petiolate, the second subglobose.

*Hab.* Makassar.

#### Fam. ATTIDÆ, *Smith*.

#### Gen. SOLENOPSIS, *Westw*.

1. *SOLENOPSIS TRANSVERSALIS*. *S. ferruginea*, *capite oblongo-ovato longitudinaliter striato*, *postice transverse striato*; *abdomine nitido*.

*Worker major*. Length 2 lines. Ferruginous, with the head and abdomen darkest, the latter palest at the base, and smooth and shining. Head: oblong, subquadrate, the sides slightly rounded, longitudinally striated, and with a central longitudinal smooth impressed line; the vertex transversely striated and slightly emarginate. Thorax: deeply strangled between the meso- and metathorax, the latter armed with two minute spines; the first node of the peduncle petiolated, conical, and elevated above the second node, which is globose.

*Hab.* Makassar.

#### Gen. PHEIDOLE, *Westw*.

✓ 1. *PHEIDOLE MILITARIS*. *P. ferruginea*; *capite maximo*, *antice fusco*.

*Worker major*. Length 3 lines. Ferruginous, smooth and shining; the head oblong-quadrate, more than twice the width of the abdomen, deeply emarginate behind, and with a central longitudinal impressed line; the head transversely wrinkled posteriorly, and with a few longitudinal short striæ at the anterior angles at the base of the mandibles; the angles, as well as the mandibles, dark fusco-ferruginous;

the mandibles with a single notch at their apex, not toothed; eyes very minute. The thorax, legs, and abdomen, paler than the head; the thorax much narrowed behind; the metathorax armed with two short acute spines; the intermediate and posterior tibiæ not spined at their apex.

*Worker minor.* Differs only in the form of the head, which is more rounded at the sides, and the mandibles are armed with two stout teeth at the apex, and with several smaller ones behind.

*Hab.* Makassar.

Fam. CRYPTOCERIDÆ, *Smith.*

Gen. ECHINOPLA, *Smith.*

1. *Echinopla striata*, *Smith, Proc. Linn. Soc. ii.* 80. 2 ♂.

*Hab.* Celebes; Malacca.

Fam. MUTILLIDÆ.

Gen. MUTILLA, *Linn.*

1. *Mutilla unimaculata*, *Smith, Cat. Hym. pt. iii.* p. 138 ♀.

The male has the head and abdomen black and shining; the thorax blood-red; the inner margin of the eyes notched; the vertex strongly punctate-striate. The thorax strongly punctured; the metathorax with larger and more distant punctures; the tegulæ red; the wings fuscohyaline. Abdomen rather distantly punctured; the apical margin of the second and third segments thickly fringed with white pubescence; the following segments fringed with black.

*Hab.* Makassar.

The sexes of this species were taken *in coitu*.

2. *Mutilla Sibylla*, *Smith, Cat. Hym. Borneo, Proc. Linn. Soc. ii.* p. 86. 11 ♀.

*Mutilla suspiciosa*, *Smith, Cat. Hym. Borneo, Proc. Linn. Soc. ii.* p. 84. 5 ♂.

The sexes of this species were taken *in coitu*.

3. **MUTILLA MAURA.** *M. nigra pubescens*; alis fuscis; abdominis segmentis pube alba fasciatis.

*Male.* Length  $5\frac{3}{4}$  lines. Entirely black and shining; the head and thorax with large scattered punctures; the face and cheeks with a loose silvery pubescence; that on the vertex, and on the disk of the thorax, fuscous; the metathorax covered with large shallow punctures, and covered with short cinereous pubescence, having at the base, in the centre, a smooth, shallow, longitudinal channel extending half its length; the wings fuscous. Abdomen: campanulate, smooth, shining, and distantly punctured, with a scattered cinereous pubescence on the three basal segments, and with black on the four apical

ones; the apical margin of the second and third segments ciliated with glittering white hairs.

*Hab.* Celebes.

Resembling *Mutilla volatilis*, but at once distinguished by the channel at the base of the metathorax, by the longer and narrower basal segment of the abdomen, and by the latter being much more delicately punctured.

4. *MUTILLA FACILIS*. *M.* capite abdomineque nigris; thorace sanguineo; alis subhyalinis.

*Male.* Length  $3\frac{1}{4}$  lines. The head and thorax closely and finely punctured; the scape of the antennæ, the basal joint of the flagellum, and the mandibles, rufo-piceous. The metathorax covered with large shallow punctures; the wings fusco-hyaline, with the third submarginal cell obsolete; the legs rufo-testaceous. Abdomen blue-black, with the extreme base red; the apical margin of the second and following segments pale rufo-testaceous; very shining and delicately punctured, and with a number of scattered silvery-white hairs.

*Hab.* Celebes (Makassar).

5. *MUTILLA THORACICA*. *M.* thorace dorsoque sanguineis; alis fuscis.

*Male.* Length  $4\frac{1}{2}$  lines. Head and thorax strongly punctured and pubescent; the tops of the mandibles rufescent; the eyes slightly notched within. The metathorax with large shallow punctures, and covered with short cinereous pubescence; the wings fusco-hyaline and iridescent. Abdomen: the basal segment narrow and campanulate; the third segment with a band of thin white pubescence on its apical margin; the first and second segments with a few scattered white hairs; those on the third and following segments black.

*Hab.* Celebes (Makassar).

6. *MUTILLA NEGLECTA*. *M.* capite thoraceque rude punctatis; alis fusco-hyalinis; abdominis segmentis pube fulva fasciatis.

*Male.* Length  $7\frac{1}{2}$  lines. Black and punctured, the punctures on the disk of the thorax confluent, and running into striæ; the clypeus covered with long loose silvery pubescence; the head, thorax, and legs with a thin fulvous pubescence; the third and fourth joints of the antennæ bright orange-yellow beneath; the eyes slightly notched. The wings slightly fuscous, with their apical margins more deeply coloured; the nervures rufo-testaceous; the metathorax with a short cinereous pubescence, and covered with large shallow punctures. Abdomen very glossy and finely punctured; the basal segment narrow and campanulate; the apical margins of all the segments with a fringe of fulvous pubescence; the apex bright ferruginous.

*Hab.* Celebes (Makassar).

7. *MUTILLA FERVIDA*. *M.* capite thoraceque nigris; abdomine ferrugineo basi nigro; alis fuscis.

*Female.* Length 4-5 lines. Head and abdomen black; thorax red; the

legs black; the thorax roughly punctured, oblong-quadrate, with the metathorax obliquely truncate; the mandibles ferruginous in the middle. Abdomen with two ovate spots towards the base, and an interrupted band at the base of the third segment, of white pubescence; the apical segment longitudinally striated, and fringed at the sides with glittering yellowish-white hairs.

*Male.* Length 9 lines. The head and thorax coarsely punctured; the sides of the face anteriorly, and the base of the mandibles covered with silvery-white pubescence; the wings dark brown and shining. The first, base of the second, and the apical segment of the abdomen, black; the two former strongly punctured, beyond which it is finely and distantly punctured; the second and four following segments with a fringe of bright fulvous pubescence on their apical margins.

The female very closely resembles *Mutilla Sibylla*, but may be distinguished from it by its having the tubercles on which the antennæ are inserted black; in *M. Sibylla* they are ferruginous. The male resembles the same sex of *M. Sibylla*, but in that insect the segments of the abdomen are fringed with white pubescence.

#### Gen. METHOCA, Latr.

1. METHOCA GRACILIS. *M. nigra, nitida, immaculata; alis hyalinis.*

*Male.* Length  $3\frac{3}{4}$  lines. Shining black, slightly villose; the head closely and finely punctured, sparingly so on the vertex; the tips of the mandibles ferruginous. The prothorax smooth, the mesothorax punctured, and the metathorax coarsely rugose; the wings hyaline and splendidly iridescent; the legs rufo-piceous. Abdomen smooth and shining; the basal segment subpetiolate, and with a central longitudinal channel; the base of the segments much depressed, their margins constricted; the apical one with an acute upturned spine.

2. METHOCA INSULARIS. *M. nigra; antennis, mandibulis, pedibusque ferrugineis; abdomine rufo-piceo cingulato.*

*Female.* Length 3 lines. Black, smooth and shining; the antennæ, anterior margin of the clypeus, the mandibles, and palpi, ferruginous; a deeply impressed line runs from the base of the clypeus up to the anterior ocellus. Thorax: a deep constriction between the pro-, meso-, and metathorax; the apex of the latter rufo-piceous. Abdomen with a short petiole; the apical margin of the first and second segments, and the apical segment, entirely rufo-piceous.

*Hab.* Makassar.

Probably the female of *M. gracilis*; but I do not feel justified in uniting them.

#### Gen. SCLERODERMA, Latr.

1. SCLERODERMA BICOLOR. *S. capite thoraceque rufo-testaccis; abdomine nigro nitido.*

*Female.* Length  $1\frac{1}{2}$  line. The head oblong, rufo-piceous, smooth, and

shining; the antennæ and legs pale rufo-testaceous. Thorax pale ferruginous, with the metathorax flavo-testaceous. Abdomen smooth, shining black.

*Hab.* Makassar.

### Tribe FOSSORES, *Latr.*

#### Fam. SCOLIADÆ.

##### Gen. TIPHIA, *Fabr.*

1. *TIPHIA CARBONARIA*. *T. nitida*, atra, punctata; linea intermedia elevata metathoracis lineam transversam non attingente.

*Female*. Length 5 lines. Shining jet-black; the head, pro- and mesothorax strongly punctured; the clypeus truncated in the middle of its anterior margin; the antennæ obscurely fuscous beneath. The metathorax smooth and shining, truncate posteriorly; the margin of the truncation carinated, with three elevated longitudinal lines on its superior surface, the two lateral ones extending from the base to the verge of the truncation, the intermediate one extending only halfway from the base; the wings subhyaline, with a fuscous cloud below the stigma; the latter as well as the stigma, black; the anterior tibiæ ferruginous beneath. Abdomen: the two basal segments with fine scattered punctures; the following segments, each in succession more closely and strongly punctured, the apical one coarsely so.

*Hab.* Makassar.

#### Fam. POMPILIDÆ.

##### Gen. POMPILUS, *Fabr.*

1. *POMPILUS CONFORMIS*. *P. niger*, pube cinerea vestitus; alis hyalinis unifasciatis.

*Female*. Length  $7\frac{1}{2}$  lines. Black, with a silky, silvery, changeable pile, which is most dense on the face, coxæ, and sides of the metathorax; the anterior margin of the clypeus rounded, slightly elevated, and very smooth and shining; the mandibles pilose at the base, smooth and polished at their apex, which is ferruginous, with their tips black. The posterior margin of the prothorax curved; the metathorax opaque, with shining silvery pile at the sides; the wings hyaline, with a fuscous band crossing them at the apex of the stigma, nearly as wide as the marginal cell; a slight fuscous stain at the base of the second discoidal-cell. Abdomen subpetiolate; the apical margins of the segments shining, not pilose.

*Hab.* Makassar.

2. *POMPILUS LIMBATUS*. *P. obscure* cæruleo-niger; prothoracis margine postica flava; alis fuscis basi subhyalinis.

*Male*. Length 7 lines. Obscure blue-black, the abdomen brightest;



the lower portion of the inner orbits of the eyes, the sides of the clypeus, and mandibles, testaceous-yellow; the apex of the latter ferruginous; the palpi pale; the antennæ fulvous beneath. The posterior margin of the prothorax testaceous-yellow; wings fuscous, palest towards their base; the intermediate and posterior tibiæ and the basal joint of their tarsi with long acute spines; the inner calcar at the apex of the tibiæ nearly as long as the basal joint of the tarsi. Abdomen elongate and slightly shining.

*Hab.* Makassar.

3. *POMPILUS NIGRO-CÆRULEUS*. *P.* obscure cæruleo-niger; alis fuscis, viridi et violaceo micantibus.

*Female*. Length 9-10 lines. Of an obscure blue-black; the face and clypeus slightly silvery, the anterior margin of the latter slightly emarginate; the mandibles obscurely ferruginous in the middle. The posterior margin of the prothorax subangular; the metathorax short, convex, and shining; wings dark fuscous, with a slight purple iridescence; the tibiæ and tarsi with strong sharp spines. Abdomen slightly shining, with bright blue tints in certain lights; the extreme apex ferruginous; the apical segment with rigid black hairs.

*Hab.* Makassar.

4. *POMPILUS INCERTUS*. *P.* ater; facie et thorace postice pube argentato-alba dense vestitis; alis hyalinis apice fuscis.

*Male*. Length 5 lines. Black: the face and clypeus covered with silvery pile, the anterior margin of the latter rounded; the tips of the mandibles rufo-testaceous; an impressed line running from the anterior ocellus to the base of the clypeus. Thorax: the posterior margin of the prothorax subangular; the metathorax with a thin silvery pile, on its sides and on the coxæ the pile is more dense and glittering; wings hyaline and iridescent, their apex fuscous beyond the stigma; the inner calcar at the apex of the intermediate and posterior tibiæ nearly as long as the basal joint of the tarsi. Abdomen shining, with a thin silky pile.

*Hab.* Makassar.

#### GEN. PRIOCNEMIS, *Schiodte*.

1. *PRIOCNEMIS FLAVIPENNIS*. *P.* niger; facie, antennis, tibiis, tarsisque ferrugineis; alis flavo-hyalinis.

*Female*. Length 10 lines. Black: the head and thorax opaque, the abdomen slightly shining; the front between the insertion of the antennæ and the ocelli, the tibiæ, tarsi, and tips of the femora ferruginous, the claw-joint of the tarsi fuscous; the intermediate and posterior tibia with a double row of serrations; all the tarsi strongly spinose; the wings clear reddish yellow, not bordered with fuscous; the metathorax transversely striated. Abdomen immaculate, thinly sprinkled with

long black hairs towards the apex; the apical segment punctured, and with short ferruginous pubescence at the tip.

*Hab.* Makassar.

This species resembles *P. ruffrons*, but is distinguished by its transversely striated metathorax, its wings not bordered with fuscous, and its entirely black abdomen.

Gen. AGENIA, *Schödte*.

1. *Agenia Atalanta*, *Smith, Hym. Borneo, &c. ; Journ. Proc. Linn. Soc.* p. 94.

*Hab.* Celebes (Makassar); Borneo; Singapore.

2. AGENIA HONESTA. *A. atra*, pube argentata vestita; pedibus ferrugineis; alis hyalinis.

*Female.* Length 5 lines. Black, and covered with a thin silvery-white silky pile, which is most dense on the metathorax; the face silvery; the scape in front, the anterior margin of the clypeus narrowly, and the mandibles of a testaceous yellow, the tips of the latter ferruginous; the flagellum beneath, the palpi and legs, pale ferruginous. The posterior margin of the prothorax narrowly testaceous; the wings hyaline and iridescent, the nervures rufo-fuscous, the tegulæ pale testaceous. Abdomen shining; the apical margins of the segments rufo-piceous; a short petiole at the base of the first segment.

*Hab.* Makassar.

3. AGENIA ASSIMILIS. *A. nigra*; alis hyalinis fasciis duabus fuscis ornatis; pedibus nigro-piceis.

*Female.* Length 3 lines. Black and slightly shining; the antennæ slightly or obscurely fulvous beneath, the scape palest; tips of the mandibles ferruginous. The metathorax with a slight central longitudinal channel, which becomes deepest towards the apex; legs very obscurely piceous; the anterior tibiæ in front, their tarsi and the tips of the joints of the intermediate and posterior legs rufo-testaceous, the calcaria testaceous; wings hyaline and iridescent, with a broad fuscous fascia which nearly crosses the anterior wings beyond the stigma, and a much narrower one at the base of the first and second discoidal cells. Abdomen with a short petiole; the apical margins of the segments obscurely rufo-piceous.

*Hab.* Makassar.

This species closely resembles the European *Pompilus bifasciatus*.

4. AGENIA NITIDIVENTRIS. *A. atra*; capite thoraceque subopacis; abdomine nitido, alis hyalinis plaga nigro-fusca.

*Female.* Length 4 lines. Black: the face with a slight silvery pubescence; the clypeus emarginate anteriorly, forming a short tooth at the angles of the emargination; the tips of the mandibles ferruginous. Thorax: the posterior margin of the prothorax arched; the metathorax

transversely and finely rugose-striate; wings hyaline and iridescent, the nervures fusco-ferruginous, a dark stain beneath the stigma, entering the third discoidal cell. Abdomen shining black, with a very thin short downy pile, and with a short petiole at its base.

*Hab.* Makassar.

5. *AGENIA AGITATA*. *A. atra*; antennis subtus, mandibulis pedibusque pallide ferrugineis; alis hyalinis.

*Female*. Length  $4\frac{1}{4}$  lines. Black: the clypeus and face with a shining silvery pubescence; a narrow yellow line at the lower portion of the inner orbit of the eyes; the scape in front and the mandibles of a testaceous yellow; the flagellum beneath, the femora, tibiæ, and tarsi pale ferruginous; the posterior margin of the prothorax arched; the wings hyaline and iridescent, the tegulæ rufo-testaceous. Abdomen petiolated, smooth and shining.

*Hab.* Makassar.

This species is very closely allied to *A. honesta*, but it is much less pilose, the coxæ are black, the antennæ stouter, and the second submarginal cell shorter.

6. *AGENIA GRACILIPES*. *A. atra*; faciei lateribus, clypeo, palpisque testaceis; alis hyalinis; pedibus elongatis; abdomine petiolato.

*Male*. Length  $3\frac{3}{4}$  lines. Black: the clypeus, sides of the face, scape in front and the palpi yellowish-white; the face and clypeus silvery; the flagellum fulvous beneath. The thorax with a fine silvery white pile, which is most dense and glittering on the metathorax; the legs ferruginous, the posterior tibiæ and tarsi dusky; the wings clear hyaline and splendidly iridescent. Abdomen petiolated, the petiole with a pale testaceous ring in the middle; the tip of the abdomen white.

*Hab.* Makassar.

7. *AGENIA INGENUA*. *A. atra*; pedibus rufo-testaceis; abdomine petiolato; alis hyalinis.

*Female*. Length  $4\frac{1}{2}$  lines. Black: the face silvery; the clypeus produced into a blunt joint anteriorly; the tips of the mandibles ferruginous; the palpi testaceous; the antennæ obscurely fulvous beneath. Thorax: the posterior margin of the prothorax arched; the wings hyaline and iridescent; the tegula testaceous; the metathorax transversely and finely rugose-striate, and with a central longitudinal impressed line; the legs obscure rufo-testaceous. Abdomen petiolated, slightly pilose, and having an obscure rufo-testaceous tinge in certain lights.

8. *AGENIA FACILIS*. *A. nigra*, pilis sericeis vestita; alis hyalinis.

*Female*. Length  $7\frac{1}{4}$  lines. Black: the abdomen with an obscure blue tinge, thinly covered with cinereous pile; the face silvery; the anterior margin of the clypeus rounded; the tips of the mandibles rufo-

piceous. The posterior margin of the prothorax curved; the wings hyaline, faintly yellow, with the nervures ferruginous; the marginal cell triangular, the inferior angle at the apex of the second submarginal cell; the metathorax finely rugose and covered with short cinereous pubescence. Abdomen with a short petiole at its base, slightly shining; the apical segment smooth and shining in the middle.

*Hab.* Makassar.

9. *AGENIA NASUTA*. *A. atra*; alis hyalinis bifasciatis.

*Female.* Length  $6\frac{1}{2}$  lines. Black: covered with a thin cinereous pile; the face with silvery-grey pubescence; the anterior margin of the clypeus produced in the middle, forming a short blunt rufo-piceous beak or nose. The posterior margin of the prothorax arched; the wings hyaline; the anterior pair with a broad fuscous band at the apex of the stigma as wide as the second and third submarginal cells, an angulated band at the apex of the externo-medial cells; tips of the wings milky-white; the metathorax with a slight transverse rugose striation. Abdomen: the basal segment with a short petiole; the apical segment very smooth and shining.

*Hab.* Makassar.

10. *AGENIA JUCUNDA*. *A. atra*; capite thoraceque pube aurea vestitis; antennis, tibiis, tarsisque anticis et intermediis ferrugineis; alis hyalinis apice fuscis.

*Female.* Length 9 lines. Black; the face and clypeus covered with silvery pubescence, that on the head above the insertion of the antennæ of a pale golden colour; the antennæ and palpi pale ferruginous. Thorax: clothed above with a fine pale golden pubescence; on the metathorax it becomes silvery, as it is also on the sides and beneath; the posterior margin of the prothorax, the anterior and intermediate tibiæ, tarsi and apex of the femora, ferruginous; the apex of the posterior tibiæ and femora, and the tarsi beneath, ferruginous; wings flavo-hyaline, with a large dark fuscous spot at the apex of the anterior pair. Abdomen subpetiolate, covered with a fine thin changeable silvery downy pile; the apex rufo-testaceous.

*Hab.* Makassar.

#### GEN. MYGNIMIA, *Smith*.

1. *MYGNIMIA FERVIDA*. *M. capite thoraceque nigris*; abdomine pedibusque ferrugineis; alis obscure fuscis.

*Female.* Length 9 lines. The head, thorax, and coxæ black; the antennæ, labrum, mandibles, and palpi ferruginous; the clypeus emarginate. The prothorax transverse, its anterior lateral angles prominent; the metathorax transversely striated; wings dark fuscous or brown-black, with a bright violet iridescence, a semi-transparent lunate macula in the second discoidal cell at its base; the tibiæ and tarsi with

a number of short spines. Abdomen immaculate, ferruginous, with the extreme base fuscous.

*Male.* Length 6 lines. Differs in having the antennæ black above, the metathorax delicately striated, and the legs much less spinose.

*Hab.* Makassar.

Fam. SPHEGIDÆ, *Smith.*

Gen. AMPULEX, *Jurine.*

1. AMPULEX REGALIS. *A. fulgide purpureus*; abdomine viridi variegato; alis anticis obscure unifasciatis.

*Female.* Length 10 lines. Brilliant purple, with shades of violet and green; the anterior femora and tibiæ in front, and the intermediate and posterior femora, ferruginous; the anterior wings with a faint cloud crossing them beyond the stigma; the vertex, pro- and mesothorax finely and very sparingly punctured; the metathorax with fine longitudinal carinæ, the intermediate spaces transversely striated; the abdomen tinged with green at the apex.

*Hab.* Makassar.

This species so closely resembles *Ampulex compressus* that perhaps it will be regarded by some persons as only a local variety; I have separated it for the following reasons: in the first place, the head is rounded behind, whereas in *A. compressus* it is transverse with the angles obtuse, and the eyes are more closely approximate than in that species; the second lateral carina on the metathorax is simple, while in *A. compressus* it becomes double towards the apex: all the specimens from Makassar are brilliant purple in both sexes.

Gen. TRIROGMA, *Westw.*

1. TRIROGMA CÆRULEA.

*Trirogma cærulea*, *Westw. Trans. Ent. Soc. Lond.* iii. 225 ♂; *Arcana Ent.* ii. 66 ♀.

*Hab.* India (Madras, Northern India), Singapore; Celebes (Makassar).

Gen. DOLICHURUS, *Latr.*

1. DOLICHURUS ABDOMINALIS. *D. niger*, capite thoraceque nitidis, pedibus ferrugineis, abdomine rude punctato.

*Male.* Length  $3\frac{1}{2}$  lines. Head: strongly punctured before the ocelli, and smooth and shining behind them; the front with a semicircular, flattened appendage, above the insertion of the antennæ, which is concave above; the antennæ fulvous beneath; the mandibles ferruginous at their apex; the palpi pale testaceous; the antennæ as long as the body. Thorax: the posterior angles of the prothorax tuberculate; the mesothorax shining, with two deeply impressed longitudinal lines; the metathorax rugose, with an enclosed horseshoe-shaped

space at its base; wings hyaline and iridescent; the legs obscure ferruginous. Abdomen coarsely rugose and subopake, with the margins of the segments deeply depressed.

*Hab.* Makassar.

Fam. LARRIDÆ, *Leach.*

Gen. LARRADA, *Smith.*

LARRADA DUCALIS. *L. nigra*, nitida; metathorace opaco; facie aureo-pilosa; alis nigro-fuscis violaceo-iridescentibus.

*Female.* Length 10-13 lines. Black; the head slightly shining, impunctate; the sides of the face, the base of the mandibles and the lower portion of the cheeks with golden pubescence; the mandibles blunt at their apex, and not notched at their base beneath. Thorax slightly shining, with the metathorax subopake and transversely striated; wings dark brown, with a slight violet iridescence. Abdomen with a faint blue iridescence in certain lights; the apical segment with a short fulvous velvety pubescence.

*Hab.* Makassar.

This fine species is the largest I have seen of the genus.

Fam. CRABRONIDÆ, *Leach.*

Gen. TRYPOXYLON, *Latr.*

1. TRYPOXYLON EXIMIUM, *Smith, Journ. Proc. Linn. Soc.* iii. p. 161.

*Hab.* Makassar; Key Island.

2. TRYPOXYLON ELEGANTULUM. *T. capite thoraceque nigris nitidis; abdomine pedibusque pallide ferrugineis.*

*Female.* Length 7 lines. Head smooth and shining; the clypeus, face as high as the sinus of the eyes and the cheeks, densely covered with glittering silvery pubescence; the antennæ pale ferruginous; the clypeus anteriorly, and the mandibles of a reddish-yellow, the tips of the latter ferruginous; the palpi white. Thorax smooth and shining; the hinder margin of the prothorax, the tegulæ, tubercles, and legs, pale rufo-testaceous; the wings hyaline and iridescent, the nervures ferruginous; the metathorax with silvery pubescence on its sides, and having in the centre of its base a slight longitudinal channel which joins a deeply impressed one at the verge of the oblique truncation, the latter continuing to its apex. Abdomen with a long slender petiole, and immaculate ferruginous.

*Hab.* Makassar.

3. TRYPOXYLON FERON. *T. nigrum nitidum, petiolo gracili elongato; antennis, pedibus, et abdomine ferrugineis, apice nigris.*

*Female.* Length 6 lines. Head and thorax shining black; the antennæ, anterior margin of the clypeus, mandibles, legs, and tubercles pale ferruginous; the abdomen of a darker red than the legs, with the two

apical segments black; the palpi white. The sinus of the eyes, clypeus, and cheeks, clothed with silvery pubescence; a deep channel runs from the anterior ocellus to the base of the clypeus; the front very convex on each side of it. The thorax beneath, as well as the sides, with silvery pubescence; the metathorax with a central longitudinal impressed line, extending from the base to the apex; the wings hyaline and iridescent, the nervures dark fuscous.

*Hab.* Makassar.

Although the differences which separate this and the two preceding species are apparently slight, still they are, in my opinion, of full specific value; *T. ferox* is distinguished from *T. elegantulum* by the deeply impressed line down the centre of the metathorax, and by the dark nervures and stigma of the wings, and the latter may be at once known from *T. gracilescens* by the deep channel down the centre of the metathorax, and by its longer and black petiole.

4. *TRYPOXYLON GRACILESCENS*. *T. nigrum*, læve, nitidum; antennis pedibusque pallide ferrugineis; abdomine ferrugineo, petiolo nigro.

*Female.* Length  $6\frac{1}{2}$  lines. Head, thorax, and petiole of the abdomen, shining black; the antennæ, anterior margin of the clypeus, mandibles, and legs pale ferruginous; abdomen, except the petiole, ferruginous. The face and clypeus, the sinus of the eyes, and the cheeks, covered with silvery pubescence. The posterior margin of the prothorax narrowly pale testaceous and fringed with short silvery hairs; the sides of the metathorax and the pectus silvery; the metathorax with a deeply impressed central longitudinal line extending from the base to the apex; wings hyaline and iridescent, the nervures and tegulæ pale rufo-testaceous.

*Hab.* Makassar.

#### Gen. *PSEN*, *Latr.*

1. *PSEN ERRATICUS*. *P. ater*; pedibus abdomineque ferrugineis, petiolo nigro.

*Female.* Length 5 lines. Head, thorax, and petiole of the abdomen black; the abdomen and legs ferruginous, the latter palest. The head and thorax covered with short silvery-white pubescence; the mandibles and antennæ pale ferruginous, the latter fuscous above, becoming black towards the apex; the scape yellowish in front. The wings hyaline and brilliantly iridescent; the nervures and stigma pale ferruginous; the coxæ fuscous above. Abdomen shining and impunctate; the petiole wider at its extremity than at its base, curved, and very smooth and shining.

*Hab.* Makassar.

The discovery of a species of *Psen* in Celebes is highly interesting; previously only a single species from Brazil had been discovered out of Europe.

## Tribe DIPLOPTERA.

## Group 1. Solitary Wasps.

## Gen. EUMENES.

## 1. EUMENES ESURIENS.

*Eumenes esuriens*, *Fabr. Syst. Piez.* 286. 7.

*Eumenes gracilis*, *Sauss.* (var.) *Mon. Guêpes Sol.* 56. 40. t. 11. f. 2.

*Hab.* India; Persia; Africa (Sierra Leone); Senegal; Egypt; New Guinea (Triton Bay).

2. EUMENES PICTIFRONS. *E. nigra*; capite flavo-variegato; alis subhyalinis et iridescentibus.

*Female.* Length 13-14 lines. Shining black; the head transverse-quadrate above, covered with fine confluent punctures; the base of the clypeus yellow, forming a transverse broad lunate spot, and two indistinct spots near the apical margin, a stripe behind the eyes, and another in their sinus, a pear-shaped spot between the antennæ, with a narrow line running upwards from it to the anterior ocellus, and a minute spot at the side of each of the superior ocelli, yellow; the antennæ ferruginous beneath. The prothorax strongly punctured, the meso- and metathorax finely and sparingly so; the tips of the anterior femora beneath, the tibiæ and tarsi, the intermediate femora at their apex beneath, and the apex of the two posterior pair of tibiæ with a yellow stripe outside; wings subhyaline, the anterior margin of the superior pair fulvous. Abdomen: the petiole gradually thickened from the base to the apex, and with a central longitudinal slightly impressed line; the following segments finely punctured.

*Hab.* Makassar.

This and the two following species belong to the first division of Saussure's monograph of the genus *Eumenes*, div. *Pareumenes*, in which the mandibles are short and blunt, with two or three teeth, and the petiole of the abdomen regularly widened from the base to its apex.

3. EUMENES ARTIFEX. *E. niger*; capite thoraceque flavo-variegatis; pedibus ferrugineis; alis subhyalinis et iridescentibus.

*Female.* Length 7-8 lines. Black, punctured, and slightly shining; the clypeus, a spot between the antennæ, another in the sinus of the eyes, a minute one at the base of the mandibles, the scape in front, and a short line behind the eyes, yellow; a pear-shaped black spot on the clypeus. A spot on each side of the prothorax, the tegulæ, a minute spot behind, and a short narrow stripe in front of them on the mesothorax, the scutellum and postscutellum with a spot on each side, and a triangular one beneath the wings, yellow; the legs ferruginous, with the coxæ, trochanters, and extreme base of the femora, more or less ferruginous; wings subhyaline, with a slight violet iridescence. Abdomen: the basal segment clavate; the apical margin of the second



segment with a narrow subinterrupted yellow fascia, not continued beneath.

*Hab.* Makassar.

4. *EUMENES LABORIOSUS*. *E.* niger; clypeo, prothoracis margine, scutello, punctisque duabus, flavis; alis subhyalinis et iridescentibus.

*Female*. Length  $6\frac{1}{2}$  lines. Black, punctured, and shining; the clypeus, a spot above, and a narrow line emanating from it and extending to the anterior ocellus, a spot in the sinus of the eyes, and a minute one behind them, and also the scape in front, yellow; the mandibles ferruginous, their extreme base black; the flagellum fulvous beneath. Thorax: the anterior margin of the prothorax, the tegulæ, a minute spot behind them and two on the scutellum, a narrow abbreviated line on each side of the insertion of the abdomen, and a spot beneath the wings, yellow; legs ferruginous, the posterior tibiæ above, and the intermediate and posterior tarsi above, slightly fuscous; wings as in the preceding species. Abdomen: the first segment clavate; an interrupted, indistinct, narrow fascia on the apical margin of the second segment; the following segments with a thin cinereous pile.

*Hab.* Makassar.

Closely resembling the preceding species, but with the basal segment longer and much narrower; the abdomen is finely punctured in this species, but strongly so in the preceding.

5. *EUMENES TRICOLOR*. *E.* niger; clypeo basi flavo; pedibus thoraceque ferrugineo-variegatis; alis subhyalinis et iridescentibus.

*Female*. Length 8 lines. Black, strongly and closely punctured; the base of the clypeus, a pear-shaped spot above, and its extreme apex, yellow; a yellow spot in the sinus of the eyes, and a short narrow line behind them; the mandibles ferruginous. Thorax: a broad stripe on the anterior margin of the prothorax, a narrow one on its posterior margin, a spot beneath the wings, the tegulæ, an oblique line in front of them on the mesothorax, two ovate spots on the scutellum, the postscutellum, and the lateral margins of the metathorax, ferruginous; the legs ferruginous, with the intermediate and posterior tarsi fuscous; the wings subhyaline and iridescent. Abdomen: a narrow yellow fascia at the apex of the petiole.

*Hab.* Makassar.

This species, as well as the following, belongs to Saussure's division *Alpha*, in which the petiole is more or less elongate and campanulate.

#### GEN. ODYNERUS, *Latr.*

1. *ODYNERUS IGNOBILIS*. *O.* capite thoraceque rude punctatis, et flavo-variegatis, abdomine delicatule punctato; alis hyalinis apice fusco maculatis; pedibus ferrugineis.

*Female*. Length  $4\frac{1}{2}$  lines. Black; the margins of the clypeus, a spot above, the sinus of the eyes, a spot behind them, and the mandibles,

reddish-yellow; the clypeus produced, forming a kind of beak, truncate at the apex; the terminal joints of the flagellum fulvous beneath. The prothorax anteriorly, the tegulæ, a spot beneath the wings, the scutellum, and a spot at the sides of the metathorax, reddish-yellow; the wings subhyaline, with a dark fuscous spot in the marginal cell; legs ferruginous. Abdomen: the first segment short, transverse, and bell-shaped, its posterior margin, as well as that of the following segment, yellow, the latter continued beneath, the anterior margin of the yellow border waved, the margins of the two following segments narrowly rufo-piceous.

*Hab.* Makassar.

This species belongs to Saussure's fifth division, in which the metathorax is rounded at the sides, and the clypeus more or less pyriform; the second submarginal cell is much narrowed towards the marginal.

2. *ODYNERUS FACILIS*. *O. niger*, capite thoraceque flavo-variegatis; pedibus flavis; abdomine flavo-fasciato.

*Male*. Length  $4\frac{1}{2}$  lines. Black; the mandibles, clypeus, an elongate spot above nearly extending to the anterior ocellus, the sinus of the eyes, and a narrow line behind them, and also the scape in front, yellow; the flagellum ferruginous, slightly fuscous above. The prothorax anteriorly, two spots beneath the wings, the tegulæ, a narrow line at the base of the scutellum, the postscutellum and sides of the metathorax, yellow; the legs yellow, with a few ferruginous stains; the wings subhyaline, their apical margins clouded with a darker stain in the marginal cell. Abdomen: a yellow fascia at the *basal margin* of the first segment, a similar fascia near the base of the second, and a very narrow one on the *apical margins* of the two following segments.

*Hab.* Makassar.

This species belongs to the subgenus *Ancistrocerus* of Wesmæl; the metathorax is truncate, its sides a little rounded; it is readily distinguished by the fasciæ at the base of the first two segments.

3. *ODYNERUS CIRCUMSPECTUS*. *O. niger*, flavo et aurantio variegatus; alis hyalinis apice nigra unimaculatis.

*Female*. Length 5 lines. Black; the clypeus, a spot above it, the scape in front, a line at the lower margin of the sinus of the eyes, and a line behind them, yellow; the flagellum fulvous beneath; the mandibles ferruginous. The anterior margin of the prothorax with a narrow yellow line, and a large ferruginous spot on each side; a red and yellow spot beneath the wings, the tegulæ yellow; the metathorax red at the sides, with the edge of the truncation yellow; the postscutellum yellow, and the legs red; the wings subhyaline with a dark fuscous spot in the marginal cell. Abdomen: the first segment ferruginous, with the base and a central line black, its apical margin as well as that of the second segment with a yellow fascia.

*Hab.* Makassar.

This species also belongs to the subgenus *Ancistrocerus*.

4. *ODYNERUS PETULANS*. *O. niger, punctatus*; capite thoraceque flavo-guttatis; abdomine fasciis duabus flavis ornato.

*Female*. Length 5 lines. Black; the clypeus yellow with a transverse biarcuate black line a little before the apex, which is produced and bidentate in front; the mandibles, scape beneath, the sinus of the eyes, a spot between the antennæ, and another behind the eyes, yellow; the tips of the mandibles ferruginous. Thorax: the anterior margin of the prothorax, a spot beneath the wings, another on the tegulæ behind, two minute spots on the scutellum, and one on each side of the metathorax, yellow; the anterior and intermediate femora towards their apex outside, the tibiæ, and the posterior pair at their base outside, yellow; the tarsi rufo-fuscous; the wings subhyaline, with their margins narrowly fuscous, a dark fuscous cloud occupying the marginal cell and passing a little beyond. Abdomen: the first segment very much narrower than the second, campanulate and with a short petiole; its apical margin, as well as that of the following segment, with a narrow yellow fascia; a subovate yellow spot on each side of the second segment near its base.

*Hab.* Makassar.

Gen. *ISCHNOGASTER*, *Guérin*.

1. *ISCHNOGASTER PICTUS*. *I. niger, flavo et ferrugineo variegatus*; cellulis prima secundaque submarginalibus æquis, tertia brevior et ad cellulam marginalem angustata.

*Female*. Length 8 lines. Black; the clypeus, mandibles, and antennæ, ferruginous, the hinder margin of the vertex obscurely so; the clypeus produced in front, terminating in an acute spine, and with its lateral margin yellow. Thorax globose; the sides of the prothorax ferruginous above, and the legs also ferruginous; the posterior margin of the prothorax, a spot on the tegulæ in front, the scutellum, post-scutellum, a spot at the insertion of the petiole and the anterior and intermediate tibiæ outside, yellow; wings hyaline with a dark cloud in the marginal cell. Abdomen ferruginous, the segments more or less fuscous in the middle; an elongate spot on each side of the third segment at its basal margin, a smaller one at the extreme lateral margin of the second, and two longitudinal stripes on the same beneath, yellow; the petiole one-third longer than the head and thorax.

*Hab.* Makassar.

2. *ISCHNOGASTER AGILIS*. *I. niger flavo variegatus*; cellulis prima secundaque submarginalibus æquis, tertia quadrata.

*Male*. Length  $10\frac{1}{2}$  lines. Black; the clypeus and two oblique subquadrate spots above nearly touching the eyes, yellow; the clypeus produced into an acute point; the tops of the mandibles and the antennæ beneath ferruginous. Thorax: the posterior margin of the prothorax, a pear-shaped spot beneath the wings, a large lunate one on the sides

of the pectus, the anterior tibiæ outside, a spot on the tegulæ, two ovate ones on the scutellum, the post-scutellum and the sides of the metathorax, yellow; the legs ferruginous, with the coxæ yellow behind; the tarsi and posterior tibiæ dusky above. Abdomen: the petiole beneath and towards the base above ferruginous; the following segments with a fine blue changeable iridescence; a transverse yellow spot at the base of the segment next the petiole, and an elongate one on each side of the following segment at the sides of its base; beneath the first and second segments with a yellow spot on each side; the wings are slightly coloured, beautifully iridescent, and faintly clouded at their apical margins.

*Hab.* Makassar.

Gen. POLYBIA, *Sauss.*

1. POLYBIA ARTIFEX. *P.* rufo-ferruginea, flavo multum decorata; alis hyalinis, margine antice obscurato.

*Female.* Length 6 lines. Rufo-ferruginous; the head behind the eyes, a line on their inner orbits extending from the clypeus to their sinus, the clypeus, scape in front and the mandibles, yellow; a fusco-ferruginous pear-shaped spot on the clypeus, which terminates at its apex in an acute point. The anterior and posterior margin of the prothorax, a spot beneath the wings, the inner margin of the tegulæ, a line behind them, the extreme base of the scutellum, the postscutellum, and two oblong central spots on the metathorax, yellow; the legs variegated with yellow; the wings hyaline, the nervures and stigma ferruginous. Abdomen petiolate and slightly swollen at the apex; a yellow line on each side of the apical portion which unites with a transverse one at the end, and a yellow transverse spot on each side of the second segment, with also two beneath.

*Hab.* Makassar.

2. POLYBIA MATHEMATICA. *P.* ferruginea, flavo ornata; abdominis secundo segmento maculis duabus flavis ornato, et ad apicem fascia tenui flava marginato.

*Female.* Length 5 lines. Ferruginous, with the pectus and second segment of the abdomen more or less fuscous. The sides of the clypeus and the mandibles yellow, the latter produced into an acute point at the apex. Thorax: the anterior margin of the prothorax, the scutellum, post-scutellum, a large oblong-quadrangle spot in the middle of the metathorax and a broad stripe at its lateral margins, yellow; the anterior and intermediate coxæ beneath and the posterior pair outside, yellow; wings hyaline, the nervures ferruginous, the stigma yellow, and a dark fuscous cloud in the marginal cell. Abdomen: a large ovate spot on each side of the second segment at its base, and the apical margin with a narrow yellow fascia; beneath, immaculate.

*Hab.* Makassar.

Tribe IV. ANTHOPHILA, *Latr.*Fam. 1. ANDRENIDÆ, *Leach.*Gen. HALICTUS, *Latr.*

1. HALICTUS FRATERNUS. *H. æneus*, metathorace cærulescente; alis hyalinis iridescentibus.

*Female.* Length  $2\frac{1}{2}$  lines. Head and thorax brassy-green, shining and impunctate; antennæ slightly fulvous towards their apex beneath. The metathorax blue-green; at the base is a finely rugose semicircular space which is enclosed by a smooth shining limb; wings hyaline and brilliantly iridescent; the legs obscure rufo-fuscous, with the tarsi pale testaceous. Abdomen black, smooth and shining, and with a few glittering silvery hairs at its apex.

*Hab.* Makassar.

This species very closely resembles the British species *Halictus morio*, but it is not punctured on the head and thorax, the clypeus is much less produced, and the base of the metathorax has no striation in the enclosed space.

Gen. NOMIA, *Latr.*

1. NOMIA CONCINNA. *N. nigra*; capite thoraceque punctatis subopacis; abdomine nitido, segmentis ad marginem apicalem albo fasciatis.

*Female.* Length 5 lines. Black; the face densely clothed with silvery-white pubescence; the head behind and the cheeks more thinly covered; the scape, two basal joints of the flagellum, the anterior margin of the clypeus and the mandibles rufo-fulvous. Thorax: the posterior margin of the prothorax, as well as that of the postsutellum, fringed with short pale fulvous pubescence; the sides of the thorax and the legs covered with a pale fulvous pubescence; the legs pale ferruginous; the wings hyaline, shining and iridescent, the tegulæ pale rufo-testaceous. Abdomen shining and finely punctured, the apical margins of the segments white, the two basal fasciæ yellowish.

The *Male* is rather smaller, and has the scape black, and the flagellum fulvous beneath; the mandibles ferruginous at their apex; the apical portion of the wings clouded, the femora and tibiæ rufo-fuscous; the abdomen ferruginous beneath and obscurely so above, brightest towards the base; the segments with white fasciæ, which are covered with white pubescence.

*Hab.* Makassar.

## Fam. 2. APIDÆ.

Gen. CTENOPLECTRA, *Smith.*

1. *Ctenoplectra chalybea*, *Smith, Journ. Proc. Linn. Soc.* ii. 45.

*Hab.* Celebes (Makassar). Malacca (Mount Ophir).

Gen. CÆLIOXYS, *Latr.*

1. CÆLIOXYS INTRUDENS. *C. atra*; scutello utrinque dentato, marginis postico rotundato; abdomine conico segmentis fascia marginatis flavo-albida.

*Female.* Length  $4\frac{1}{4}$  lines. Black; the head and thorax covered with coarse confluent punctures; the face densely clothed with short yellowish-white pubescence; the posterior margin of the prothorax and the base of the scutellum with a narrow line of short yellowish-white pubescence; a similar line over the tegulæ; the thorax and femora beneath clothed with similar pubescence. Abdomen: the apical margin of all the segments, with a fascia of short white pubescence which is continued beneath; above, the fasciæ are narrowest in the middle, the basal segment has the fascia continued up the sides.

*Hab.* Makassar.

Gen. CERATINA, *Latr.*

1. CERATINA PICTIFRONS. *C. atra*; capite thoraceque flavo-pictis; abdomine fasciisque flavo-testaceis; pedibus rufo-pallidis.

*Female.* Length 5 lines. Head: the inner orbit of the eyes with a broad stripe, the clypeus, scape, labrum, mandibles and the head behind the eyes, yellow; the face punctured and with a broad deep sulcation in front of the ocelli; the base of the flagellum fulvous. The thorax yellow, with the mesothorax above and the base of the metathorax black; the mesothorax with a yellow stripe over the tegulæ, and two narrower ones in the middle of the disk; a fuscous patch on each side of the pectus; wings hyaline, the nervures ferruginous. Abdomen: the basal segment entirely of a reddish yellow, and the apical margins of the four following segments rufo-testaceous; above delicately punctured, beneath more strongly so.

*Hab.* Makassar.

Gen. ANTHOPHORA, *Latr.*

1. ANTHOPHORA VIGILANS. *A. nigra*, pube fulva vestita, pedibus ferrugineis.

*Female.* Length  $6\frac{1}{2}$  lines. Black; the clypeus, face on each side, labrum and mandibles, pale rufo-testaceous; the clypeus with two oblong black maculæ not extending to its apex; the tips of the mandibles, rufo-piccous; the flagellum fulvous beneath; the cheeks clothed with white pubescence. Thorax clothed above with fulvous pubescence, which on the sides and beneath is paler; the legs ferruginous and clothed with short fulvous pubescence; wings subhyaline, their apical margins faintly clouded, the nervures fusco-ferruginous, the tegulæ rufo-testaceous. Abdomen thinly clothed with short fulvous pubescence, the pubescence paler and denser on the apical margins of the segments, which are pale rufo-testaceous; the apical

segment with ferruginous pubescence; beneath naked, finely punctured and shining, with the apical margins of the segments pale testaceous.

*Hab.* Makassar.

Gen. APIS, *Linn.*

1. APIS NIGRO-CINCTA. *A.* capite thoraceque nigris; abdomine pallide ferrugineo, segmentis fasciis nigris; scutello pedibusque pallidis.

*Worker.* Length 5 lines. Head and thorax black; the scape of the antennæ, the clypeus, labrum, and mandibles pale ferruginous. Thorax: the scutellum and legs pale ferruginous, with the tibiæ and tarsi fuscous, the intermediate and posterior tibiæ pale in the middle; wings hyaline, the nervures ferruginous. Abdomen pale ferruginous, with the apical margins of the segments dark fuscous; beneath entirely pale.

*Hab.* Makassar.

This species most closely resembles the *A. socialis* of Latreille, but it is quite distinct, as I have ascertained by a comparison with and an examination of the typical specimen in Mr. Westwood's possession.

Catalogue of Hymenopterous Insects collected by Mr. A. R. WALLACE in the Islands of Bachian, Kaisaa, Amboyna, Gilolo, and at Dory in New Guinea. By FREDERICK SMITH, Esq., Assistant in the Zoological Department, British Museum. Communicated by W. W. SAUNDERS, Esq., V.P.L.S.

[Read May 3, 1860.]

OF the various collections of *Hymenoptera* which Mr. Wallace has formed in the Indian Archipelago, none has exceeded that whose contents are described in the present paper, in the beauty and variety of the species, as well as in the interest attached to their geographical distribution. Amongst the *Formicidæ* many new and remarkable forms are both described and figured. I would particularly call attention to the two forms of the *worker* of *Pheidole notabilis*. Though convinced that nothing is created in vain, and that every modification of form has its design, adapting it to the fulfilment of conditions necessary in the economy of the particular species, I feel quite unable even to conjecture the purpose of the enormously enlarged head of the *worker major* of that species.

Another very interesting Ant is a new species of Erichson's genus *Amblyopone*; the previously described species are either from Tasmania or Australia; that here described is from Bachian.

Two remarkable species are added to the *Cryptoceridæ*, and a new genus described, which has partly the characters of *Cryptocerus*, and partly those of *Ponera*.

The most interesting insect, in a geographical point of view, is undoubtedly a species of *Thynnus* from Bachian; this is the most northern range of the genus from its metropolis, Australia, with which I am acquainted. Amongst the *Apidæ*, however, will be found the gem of the collections; this is a species of *Megachile*. Not only is it equal in size to the largest known species of *Xylocopa*, but it is twice the size of the largest previously known species of the genus to which it belongs, and ten times the size of the smallest. This is certainly the finest addition which Mr. Wallace has made to our knowledge of the family *Apidæ*.

In this paper 191 species are enumerated, of which 132 are new to science, and 59 have been previously described. This fine collection of *Hymenoptera* is the property of William Wilson Saunders, Esq.

Fam. FORMICIDÆ, *Leach*.

Gen. FORMICA, *Linn*.

1. *Formica lævissima*, *Smith, Proc. Linn. Soc.* 1859, ii. 138.

*Hab.* Bachian; Aru.

2. *Formica pallida*, *Smith, Proc. Linn. Soc.* 1857, ii. 57.

*Hab.* Bachian, Borneo, Sumatra.

3. FORMICA SUBTILIS. Capite, thorace, pedibusque rufo-testaceis; abdomine nigro. (*Worker major*) pallide testacea lævis nitida; pedibus elongatis (*Worker minor*).

*Worker major.* Length  $3\frac{1}{2}$  lines. Head rather darker than the thorax and legs; wider than the abdomen, elongate-ovate and shining; the mandibles stout, their inner edge with short acute blackish teeth. The thorax much compressed and narrowed behind. Abdomen ovate, black with an æneous tinge, and sprinkled with pale glittering hairs; the scale of the peduncle narrow, with its upper margin rounded.

*Worker minor.* Length 2 lines. Of a paler colour than the preceding; the antennæ very slender, and longer than the body; the legs very long, the posterior pair nearly twice the length of the body; the scale of the peduncle conical.

*Hab.* Bachian.

4. FORMICA VITREA. *F. nigra*, nitida; mandibulis tarsisque rufo-pallidis; squama quadrata.

*Worker.* Length 2 lines. Jet black, smooth and shining; head a little wider than the thorax; eyes ovate, placed rather high on the sides of the head; the antennæ longer than the thorax, the flagellum slightly thickened towards the apex; the mandibles pale rufo-testaceous. Thorax narrow, compressed behind and strangulated at the base of the metathorax; the scale of the abdomen compressed, quadrate, and



slightly notched above. Abdomen wider than the head, subglobose; the apical margins of the segments narrowly pale testaceous.

*Hab.* Bachian.

This species is found on trees, running in numbers up and down the trunks, probably in search of Aphides.

5. *FORMICA CRUDA.* *F.* pallide testacea, lævis, nitida, sparse pilosa; abdomine fusco.

*Worker.* Length 2 lines. The head, thorax, scale of the peduncle, and the legs pale testaceous yellow; the mandibles and head anteriorly sometimes of a slight ferruginous colour; the abdomen fuscous or fusco-testaceous, and covered with a fine thin short silky pubescence; the head heart-shaped; the eyes black, round, and placed forwards and inwards; the mandibles stout and triangular, their inner margin with a row of acute ferruginous teeth. Thorax much narrower than the head, strangulated at the base of the metathorax, which is oblique behind. Abdomen wider than the thorax, but not so wide as the head.

*Hab.* Bachian.

This insect varies in size, but the form and colouring is the same in all the workers, the smallest of which is about one line long. "Found beneath bark and about fern-roots."

6. *FORMICA LACTARIA.* *F.* nigra; antennis pedibusque pallide ferrugineis.

*Worker.* Length  $1\frac{1}{2}$  line. Black; the head and abdomen smooth and shining, the thorax rugose; the antennæ and legs rufo-testaceous, the apical joints of the tarsi palest; the mandibles pale ferruginous; the head ovate. The thorax narrow, compressed behind, deeply strangulated between the meso- and metathorax, the latter abruptly truncate behind; the abdomen ovate, the scale of the peduncle ovate.

*Hab.* Bachian.

This species varies in colour; some specimens are obscurely ferruginous, having the appearance of immaturity. Mr. Wallace says of this insect, "Found in numbers, milking Aphides on blades of grass."

7. *FORMICA INCURSOR.* *F.* nigra; capite antice obscure ferrugineo; squama ovata.

*Worker.* Length 2 lines. Black, smooth and shining; the head subovate, narrowed anteriorly, the margin of the vertex rounded; the eyes rather large, ovate, and placed high on the sides of the head; before the insertion of the antennæ obscurely ferruginous; the mandibles and apical joints of the tarsi rufo-testaceous. The thorax narrowed behind, with a deep strangulation between the meso- and metathorax. Abdomen ovate and thinly sprinkled with pale glittering hairs; the scale of the peduncle ovate, rounded above.

*Hab.* Bachian.

8. *FORMICA RUFIFRONS.* *F.* nigra; capite oblongo, antice ferrugineo; antennis tarsisque rufo-ferrugineis.

*Female.* Length  $3\frac{1}{4}$  lines. Black, smooth and shining; the head obliquely truncate before the insertion of the antennæ; the truncated portion, the mandibles and head beneath, obscurely ferruginous; the eyes ovate, placed high on the sides of the head; the ocelli in a triangle wide apart on the vertex; the flagellum fusco-ferruginous. The thorax oblong-ovate, the metathorax truncate, the margins of the truncation rounded; the legs obscure rufo-fuscous, with the tips of the tarsi paler; the wings fuscous. Abdomen ovate; the scale of the peduncle narrow, thickened and obtusely rounded above.

*Worker.* Length  $2\frac{3}{4}$  lines. Closely resembling the female, but the head not shining; ferruginous before the eyes and rugose; the antennæ ferruginous, with the apex of the scape and first joint of the flagellum blackish. Thorax and abdomen smooth and shining, the former compressed behind; the anterior tibiæ in front and the apical joints of all the tarsi rufo-testaceous. Abdomen ovate; the scale of the peduncle narrow, its superior margin rounded.

*Hab.* Bachian.

This species, although bearing a close resemblance to *F. mutilata* from Aru, and also to the *F. truncata* of Europe, is quite distinct from both those species.

9. FORMICA PAVIDA. *F. nigerrima*, mandibulis tarsorumque articulo apicali ferrugineis; alis fulvo-hyalinis.

*Female.* Length 4 lines. Jet black, smooth and shining; the head oblong-quadrate; the antennæ fusco-ferruginous, the base of the scape and of the flagellum paler; the mandibles and anterior margin of the clypeus ferruginous; the inner edge of the mandibles with four or five acute teeth. The thorax oblong-ovate; the metathorax with a central smooth longitudinal channel; the wings fulvo-hyaline, the nervures ferruginous; the apical joints of the tarsi ferruginous. Abdomen oblong-ovate; the scale of the peduncle incrassate and obtuse above.

*Hab.* Bachian.

10. FORMICA FAMILIARIS. *F. pallide testacea*; capite thoraceque postice fusco-nigris.

*Worker.* Length  $\frac{3}{4}$  line. Pale testaceous, semi-transparent; the thorax at the sides, and behind, more or less dusky; the head dark fuscous, with the mandibles white.

*Hab.* Bachian.

This minute Ant is found in houses. Mr. Wallace says that, when living, its body, legs, and antennæ are transparent.

11. FORMICA DORYCUS. *F. nigra*, elongata et gracilis; capite postice in collum angustato; pedibus elongatis; abdominis nodo supra acuto.

*Worker.* Length 6 lines. Black, smooth and shining; head elongate, widest in front, slightly narrowed towards the eyes, and abruptly so behind them, forming a sort of neck; the scape of the antennæ fus-

cous, the flagellum pale rufo-testaceous; the tips of the mandibles ferruginous, their inner margin with three or four short acute teeth, their apex forming a long stout acute tooth. Thorax elongate, narrowest behind and slightly compressed; the legs elongate, slender, ferruginous and slightly pubescent. Abdomen ovate, the apical margins of the segments rufo-piceous; the node of the peduncle wedge-shaped and pointed above.

*Hab.* Dory.

This species resembles the *worker* of *F. gigas*, which is found in India, Malacca, Singapor, Borneo, &c., but the head is different in form, the colour is different, and the form of the scale of the peduncle differs too much, I think, for the insect to be considered as a form of *F. gigas*; it must, however, be one of the largest known species of the *Formicidæ*.

12. FORMICA DESECTA. *F. nigra nitida*; capite antice truncato.

*Female.* Length  $4\frac{1}{4}$  lines. Jet black, shining; the head wider than the thorax, truncate anteriorly; the truncation and sides of the head rugose; the mandibles rugose; the ocelli placed wide apart in a triangle, the posterior pair situated on the hinder margin of the vertex; the eyes ovate, placed very high on the sides of the head; the antennæ reaching to the insertion of the wings, the flagellum rufo-testaceous. Thorax, oblong-ovate, very smooth and shining; the wings hyaline and iridescent, the nervures pale rufo-testaceous. Abdomen oblong-ovate; the node of the peduncle incrassate, truncate above.

*Hab.* Dory.

#### GEN. TAPINOMA, *Foerst.*

1. TAPINOMA PRATENSIS. *T. capite, thorace, pedibusque pallide ferrugineis*; abdomine fusco-nigro.

*Worker.* Length  $1\frac{1}{4}$  line. Head and thorax pale ferruginous, smooth and shining; the antennæ and legs pale testaceous. Abdomen dark fuscous and sub-opaque; the scale of the peduncle ovate, hidden beneath the base of the abdomen.

*Hab.* Bachian.

#### GEN. POLYRHACHIS, *Smith.*

1. *Polyrhachis bihamatus*, *Drury, Ins. ii. pl. 38. f. 8. ♀.*

*Hab.* India; Borneo; Sumatra; Bachian.

The curved spines or hooks with which this remarkable species is armed vary greatly in different individuals, not only in being more or less curved or elongate, but the two spines which rise from the peduncle of the abdomen, on a short base, are sometimes widely divergent; in other individuals, they are continued nearly parallel, only curving apart, outwardly, at their summit; in the specimens from Bachian the spines are shorter and stouter than in any I have previously examined,—but I can only regard this as a local variety of the Indian species.

2. *Polyrhachis marginatus*, *Smith, Proc. Linn. Soc.* 1859, iii. 139.  
*Hab.* Aru; India; Philippine Islands; Bachian.
3. *Polyrhachis dives*, *Smith, Proc. Linn. Soc.* 1857, ii. 64.  
*Hab.* Malacca; Bachian.
4. *Polyrhachis sericatus*, *Smith, Append. Cat. Form.* p. 200; *Proc. Linn. Soc.* iii. 139.  
*Formica sericata*, *Guér. Voy. Coq. Zool.* ii. 203; *Atlas, Ins.* pl. 8. f. 2.  
*Hab.* Dory; New Hebrides; Aru.
5. *Polyrhachis sexspinosus*, *Latr. Hist. Nat. Fourm.* p. 126. pl. 4. f. 21. ♀  
*Hab.* Dory; Aru; Philippine Islands; Java.
6. **POLYRHACHIS CHARAXUS.** *P. capite thoracque nigris; antennis pedibusque ferrugineis; abdomine castaneo-rufo; squama spinis duabus acutis armatis.*  
*Worker.* Length  $2\frac{1}{4}$  lines. Head and thorax black, the head shining, very finely and closely punctured; the clypeus anteriorly, the mandibles and antennæ ferruginous, the latter palest towards the apex. The thorax flattened and finely rugose above, the lateral margins raised; the metathorax obliquely truncate, with two minute acute spines at the verge of the truncation; the legs ferruginous, the apical joints of the tarsi palest. Abdomen globose, chestnut red; the scale of the peduncle armed with two acute spines. (Plate I. fig. 14.)  
*Hab.* Bachian.  
Taken in a small ovate papery nest on the underside of a leaf.
7. **POLYRHACHIS BUSIRIS.** *P. niger, lævis, nitidusque; thorace inermi; petioli squamula quadrispinosa.*  
*Worker.* Length 3 lines. Jet-black, smooth and shining. Thorax rounded above, obliquely truncate behind. Abdomen globose; the node of the peduncle armed with four short acute teeth. (Plate I. fig. 15.)  
*Hab.* Dory; Bachian.
8. **POLYRHACHIS ACANTHA.** *P. niger, pube cinereo-sericca vestitus; thorace spinis acutis antice et postice armato; squama spinis duabus longis curvatis.*  
*Worker.* Length  $2\frac{3}{4}$  lines. Black: clothed with a thin silky cinereous pile; the disk of the thorax rounded; the spines in front short, stout, and acute; those on the metathorax long, divergent, and slightly curved inwards; the spines on the peduncle are stout, acute, and curved to the shape of the base of the abdomen. The abdomen globose. (Plate I. fig. 16.)  
*Hab.* Bachian.
9. **POLYRHACHIS MEROPS.** *P. niger, lævis, nitidus; thorace antice spinis duabus longis acutis armato; femoribus et pedunculo ferrugineis.*  
*Worker.* Length  $3\frac{1}{2}$  lines. Black, smooth, shining and very thinly covered with a changeable pile; the mandibles shining black, longi-

tudinally striated and denticulate on their inner margin; the face covered with silvery white pubescence. Thorax flattened above and at the sides, armed anteriorly on each side with an acute spine; the metathorax truncate; the thorax, viewed laterally, is quadrate; the femora and scale of the peduncle ferruginous; the latter is emarginate above with the angles oblique, the angles of the emargination produced into short acute spines. Abdomen globose, the red colour of the femora reflecting on its changeable pile. (Plate I. fig. 17.)

*Hab.* Bachian.

10. POLYRHACHIS ITHONUS. *P. niger*, pube argentea vestitus, prothorace bispinoso; petioli squamula quadrispinosa, pedibus ferrugineis.

*Female.* Length 4 lines. Black, and covered with a glittering silvery pile; the mandibles shining black, longitudinally finely striated, and armed on their inner edge with a row of short acute teeth. The prothorax rounded and with a sharp spine at the lateral angles; the sides slightly rounded; the metathorax truncate; the legs ferruginous, with the tarsi black. Abdomen globose; the node of the peduncle slightly emarginate above, the lateral angles acute with a sharp spine outside. The *Worker* has the spines on the thorax longer and acute, the sides and disk of the thorax flattened, the divisions between the pro-, meso- and metathorax notched at the sides. The peduncular scale has the lateral angles of the emargination above produced into acute spines, the outer spines not being longer than in the female. (Plate I. fig. 18.)

*Hab.* Bachian.

11. POLYRHACHIS EUDORA. *P. niger* et vestitus pube pallide aurea; prothorace bispinoso; petioli squamula trispinosa.

*Female.* Length 4 lines. Black, and densely clothed with fine silky pale golden pile; the mandibles shining black, with four or five acute teeth on their inner edge. The thorax rounded anteriorly, with an acute spine at the lateral angles; the sides slightly rounded; the metathorax truncate behind, the lateral margins above, carinate; the legs and antennæ naked. The abdomen globose; the node of the peduncle has its superior margin rounded, with an acute spine at the lateral angles, and one in the centre. The *Worker* resembles the female, but has the sides of the thorax flat, the anterior spines longer, and has no ocelli, which are prominent in the female; the spines on the peduncular node are also longer. (Plate I. fig. 19.)

*Hab.* Bachian.

This species closely resembles *P. vigilans* from China, but differs in the form of the head and scale of the peduncle.

12. POLYRHACHIS METELLA. *P. niger* et vestitus pube pallide aurea; metathorax petiolique squamula bispinosis pedibus obscure ferrugineis.

*Worker.* Length 4 lines. Black, and thinly covered with a changeable golden pile; head nearly oblong-quadrate; the palpi elongate and

pale ferruginous; thorax flattened above, the margins acute and slightly elevated; the metathorax oblique and armed with two long acute spines, directed backwards; the femora ferruginous, the tibiæ and tarsi very obscurely so, not pubescent. Abdomen: ovate, the node of the peduncle with two acute spines, shorter than those on the metathorax; antennæ as long as the body. (Plate I. fig. 20-21.)

*Hab.* Dory.

Most of the species belonging to this genus are, when in fine condition, covered with glossy pile, but it is easily abraded. This is the case, I suspect, in the majority of specimens.

13. *POLYRHACHIS ATROPOS.* *P. niger*, capite thoraceque striatis; thorace spinis duabus acutis antice et duabus postice armato; abdominis squama bispinosa.

*Worker.* Length 2 lines. Black: the head longitudinally striated, very prominent in the middle before the eyes; the sides of the face depressed and flattened. The thorax flattened above, longitudinally striated, the lateral margins raised, the anterior angles short, stout, and acute, the division between the pro- and mesothorax deeply impressed; the metathorax obliquely truncate, armed with two acute spines which are directed backwards. Abdomen: globose and thinly clothed with short pale glittering pile; the peduncle has the node armed with two curved spines directed horizontally backwards round the base of the abdomen. (Plate I. fig. 22.)

*Hab.* Dory.

14. *POLYRHACHIS ACATA.* *P. niger*, pube cinereo-sericea vestitus; thorace antice posticeque abdominisque squama spinis duabus longis acutis armatis; pedibus ferrugineis, femoribus apicis tarsisque nigris.

*Worker.* Length  $3\frac{1}{4}$  lines. Black, and thinly clothed with silky cinereous pile. Thorax rounded above: the anterior spines are short, stout, and acute; those on the metathorax are twice as long, stout and slightly divergent; those on the peduncle are long, acute, and curved backward, corresponding to the form of the base of the abdomen; the tibiæ and femora ferruginous, the tips of the latter black. (Plate I. fig. 23.)

*Hab.* Bachian.

This insect, Mr. Wallace says, "constructs a coarse papery nest in a rolled leaf;" all the species of this genus, as far as I have ascertained, form small nests of some papyraceous material, affixing them to leaves: I have received such from Calcutta.

15. *POLYRHACHIS ALPHENUS.* *P. niger* pube cinereo-sericea vestitus; thorace spinis duabus minutis antice et postice armato; squama quadrata spinis duabus crassis acutis armata, flagello apice ferrugineo.

*Female.* Length 4 lines. Black, and thinly covered with cinereous pile. The mandibles, palpi, and six apical joints of the antennæ, ferruginous. Thorax subovate, with two minute spines in front and two rather

longer and stouter on the metathorax; the scale of the peduncle quadrate, armed above with two short spines; the abdomen globose. (Plate I. fig. 24.)

*Hab.* Bachian.

16. *POLYRHACHIS LABELLA*. *P. niger*; thorace spinis duabus acutis antice armato; abdominis squamula spinis duabus longis acutis armata; tibiis pallide ferrugineis.

*Worker.* Length 3 lines. Black: the head and thorax covered with fine silky cinereous pubescence; the thorax flattened above and longitudinally striated; the lateral margins raised and produced anteriorly into flat acute spines; the divisions between the pro-, meso-, and metathorax strongly impressed; the metathorax truncate behind; the tibiæ, except their extreme base, ferruginous; the claws of the tarsi ferruginous. The abdomen smooth and shining; the node of the peduncle with two long, stout, erect, slightly curved spines, with an acute angle outside their base. (Plate I. fig. 25.)

*Hab.* Bachian.

17. *POLYRHACHIS FERVENS*. *P. capite abdomineque nigris*, thorace femoribusque obscure ferrugineis; thorace quadrispinoso; petioli squamula bispinosa.

*Worker.* Length 3 lines. Head and antennæ black, the face thinly covered with short, glittering, pale pubescence; the thorax, peduncle, and femora obscure ferruginous, the tips of the latter black; the thorax flattened above, the margins acute and raised; the division between the pro- and mesothorax strongly impressed; the prothorax with two acute, stout, flattened spines; the metathorax has also two acute, bent spines, which are slightly divergent, their tips black; the spines on the node of the peduncle long, acute, and curved to the form of the base of the abdomen; the latter black, and covered with a thin silky changeable pile. (Plate I. fig. 26.)

*Hab.* Amboyna.

#### Gen. *ŒCOPHYLLA*, *Smith*.

*Head* small; *eyes* ovate, of moderate size, placed laterally about the middle of the head; *ocelli* three in a triangle in the males and females, obsolete in the workers; *antennæ* geniculated, filiform, as long as the head and thorax in the males and females, as long as the body in the workers: 12-jointed in the females and workers, 13-jointed in the males: mandibles porrect, acute, and crossing at their apex, their inner margin denticulate; *labial palpi*, 4-jointed, very minute, the basal joint a little longer than the two following, the apical one much shorter; *maxillary palpi* 5-jointed, stout, short, and having joints of nearly equal length, except the apical, which is minute. Thorax ovate in the males and females, elongate and very slender in the workers, which sex has the legs elongate and very slender; *wings* ample, having

one marginal and one submarginal cell; the discoidal cells obsolete. *Abdomen* ovate, the node of the peduncle incrassate and subquadrate in the females, in the workers forming a longish petiole clavate at the apex; females and workers furnished with a sting. (Details, Pl. I. figs. 11, 12, 13.)

The characters here given will show the propriety of separating this insect from the genus *Formica*, in which it has been hitherto included; in my general catalogue on the *Formicidæ* I suggested the probability of this being found necessary. There are apparently two species belonging to the genus,—one *F. smaragdina* of Fabricius, the second *F. virescens* of that author; the differences between them are slight, but permanent; the first species inhabits India, most of the islands in the Archipelago, and thence southward into the Moluccas; the second apparently distinct species is found in Australia and South Africa; these are the green Ants which build in trees. Their nest is formed by drawing together a number of green leaves, which they unite with a fine web. Some nests are a foot in diameter; they swarm, says Mr. Wallace, in hilly forests in New Guinea; their sting is not very severe. This genus forms a link between the genera *Formica* and *Myrmica*; it agrees with the former in having a single node to the peduncle, and with the latter in having the ocelli obsolete in the workers, and in being furnished with a sting.

1. *Cecophylla smaragdina*, *Smith* (gen.).

*Formica smaragdina*, *Fabr. Syst. Prez.* p. 397.

*Hab.* Dory; Borneo; Aru; Celebes; Sumatra; Philippine Islands; India; Java.

#### Subfam. PONERIDÆ, *Smith*.

##### Gen. ODONTOMACHUS, *Latr.*

1. ODONTOMACHUS SÆVISSIMUS, *Smith*. *O. ferrugineus*, *lævis*, *nitidus*; capite antice longitudinaliter striato; thorace oblongo, transversim striato.

*Female.* Length 8 lines. Ferruginous: the head foveolate anteriorly and delicately striated longitudinally; the mandibles with two long stout, acute teeth at their apex, and with their inner margin serrated. Thorax elongate; the pro- and metathorax delicately striated transversely; legs elongate and slender. Abdomen ovate, very smooth and shining; of a rather deeper colour than the head and thorax. The *worker* differs in having the thorax transversely striated throughout its entire length, and narrowest in the middle; in the female it is widest. (Plate I. fig. 9.)

*Hab.* Badian; Ceram.

This species was first captured by Madame Ida Pfeiffer at Ceram; the female is here first described.

2. ODONTOMACHUS ANIMOSUS. *O. ferrugineus*; margine interno mandibulorum serrato; thorace transversim striato.



*Worker.* Length 5 lines. Ferruginous; the head very slightly narrowed posteriorly; the hinder portion of the sulcation of the head in front with divergent striæ opposite, and before the eyes it is smooth and shining; from the sulcation to the posterior margin of the head runs a deeply-impressed channel; the head is faintly striated obliquely behind the sulcation, there is also an oblique depression on each side; the mandibles with a row of short teeth on their inner margin, and terminating in two incurved long, stout, blunt teeth. Thorax very delicately and closely striated transversely. Abdomen smooth and shining; the node of the petiole with a long, acute, upright spine.

*Hab.* Dory.

3. ODONTOMACHUS NIGRICEPS. *O. ferrugineus*; capite nigro, supra longitudinaliter striato; lateribus lævibus nitidis, thorace transversim striato.

*Worker.* Length  $6\frac{1}{2}$  lines. Ferruginous; the head black, smooth and shining; the anterior portion longitudinally striated, the striation terminating at the oblique smooth ridges behind the eyes, which meet in the middle of the head, whence a deep longitudinal channel runs to the hinder margin; the antennæ and mandibles ferruginous, the latter denticulate on their inner margin, and terminating in two long incurved blunt teeth, which have a minute tooth in the middle of their fork. The prothorax smooth and shining, with a slight transverse striation on its neck in front; the meso- and metathorax finely striated transversely. The node of the peduncle unispinose, and, as well as the abdomen, smooth and shining. (Pl. I. fig. 9.)

*Hab.* Dory.

#### Gen. PONERA, *Latr.*

1. *Ponera læviceps*, *Smith, Proc. Linn. Soc.* ii. 69.

*Hab.* Bachian; Borneo.

2. PONERA SOLITARIA. *P. pallide testacea*; antennis elongatis; alis hyalinis; capite postice angustato; abdominis nodo conico.

*Male.* Length  $4\frac{3}{4}$  lines. Pale rufo-testaceous, smooth and shining; antennæ longer than the body; the legs elongate; the posterior tarsi longer than the tibiæ and femora; the wings hyaline, and brilliantly iridescent, the nervures ferruginous; the node of the peduncle conical; the abdomen constricted between the first and second segments.

*Hab.* Bachian.

3. PONERA VAGANS. *P. nigra*; capite, thorace, abdominisque basi striatis; antennis, capite antice, mandibulis pedibusque ferrugineis.

*Worker.* Length 4 lines. Black: the clypeus, mandibles, antennæ, and legs, ferruginous; the head finely striated longitudinally; eyes prominent and ovate. The prothorax with a rugose circular striation; the metathorax with an even oblique striation. The node of the peduncle has an even curved striation, and two acute spines behind; the basal segment of the abdomen with an irregular fine curved striation; the

apical margins of the third and fourth segments and the fifth entirely obscure ferruginous; the insect thinly covered with a silvery glittering pubescent pile, which is very bright on the femora and sides of the thorax.

*Hab.* Bachian.

4. *PONERA STRIATA*. *P. æneo-nigra*; capite, thorace, abdominisque basi profunde striatis; nodo spinis duabus acutis armato.

*Worker.* Length 6 lines. Black, with a bluish-green tinge; the head closely, deeply, and evenly, striated longitudinally; the mandibles shining black, their apex rufo-piceous, with their inner margins furnished with a row of short acute teeth. The prothorax with a circular striation, that on the metathorax being oblique; the tarsi and articulations of the legs rufo-piceous. The abdomen densely covered with a fine silky glittering white pubescence; the basal segment with an even curved transverse striation; the apical margins of the third and fourth segments, and the fifth entirely, ferruginous; the node of the peduncle with transverse grooved striæ, and armed behind with two acute spines; the insect has a scattered erect thin pale pubescence.

*Hab.* Bachian.

This species has a strong general resemblance to *P. geometrica* from Singapore, but is very distinct; in the latter species the grooving on the prothorax is transverse and straight; that on the metathorax is circular, and has its centre in the middle of its disk, and the head is much narrower behind the eyes, which is not the case in the present species.

5. *PONERA SIMILLIMA*. *P. nigra*; capite elongato aciculato; abdomine lævi nitido.

*Worker.* Length 3 lines. Black; head and thorax subopaque, the abdomen smooth and shining; the head oblong and longitudinally aciculate; the anterior margin of the clypeus, the mandibles, flagellum, tarsi, and articulations of the legs, rufo-testaceous. The thorax subrugose, with the oblique truncation of the metathorax transversely striated. The abdomen very smooth and shining with the apex obscurely rufo-piceous; the node of the peduncle quadrate.

*Hab.* Bachian.

This species very closely resembles *P. læviceps*, from Borneo.

6. *PONERA CUPREA*. *P. nigra*, cupreo variegata; capite, thorace, abdominisque basi profunde striatis, nodo spinis duabus acutis armato.

*Worker.* Length 5 lines. Black, with an obscure coppery tinge; the mandibles and legs obscurely ferruginous; the extreme apex of the flagellum pale rufo-testaceous. The head deeply striated, longitudinally, the clypeus and mandibles very finely so; the head narrowed behind the eyes. The thorax transversely striated, above the sides obliquely so; the legs slightly pubescent. Abdomen: the basal segment transversely striated, the striæ curved forwards; the node of

the peduncle incrassate, rounded anteriorly and truncate behind, with two acute upright spines; the striation curves round the node in front and is transverse behind; the apical margins of the second and following segments narrowly pale testaceous.

*Hab.* Dory.

This species resembles *P. geometrica*, but is very distinct. We are now acquainted with more than a dozen of these striated species of *Ponera*, all differing in the direction and depth of the striation, which is in each extremely beautiful.

7. *PONERA SIMILLIMA*. *P. fusco-brunnea*; capite postice fusco-nigro; oculis ovalibus, hirtulis; ocellis distinctis; alis hyalinis; abdomine elongato, apice pallide testaceo.

*Worker*. Length  $1\frac{2}{3}$  line. Darkish brown, some individuals reddish-brown; the head dark fuscous and semi-opaque above the insertion of the antennæ; the head anteriorly, the mandibles, antennæ, and legs ferruginous; the eyes ovate, placed in the middle at the sides of the head. Thorax oblong-ovate, the metathorax obliquely truncate. Abdomen: the scale of the peduncle incrassate, vertical; its superior margin slightly emarginate; a constriction between the first and second segments; the apex pale testaceous.

*Hab.* Dory.

This minute species very closely resembles the *P. contracta* of Europe; it differs principally in having the eyes situated in the middle of the sides of the head, in the European insect they are smaller and placed forward at the base of the mandibles; the form of the scale is different, and the body is finely pubescent; there is a species from Brazil, *P. ruficornis*, very like it.

#### GEN. AMBLYOPONE, *Erichs.*

1. *AMBLYOPONE CASTANEUS*. *A. ferrugineus*, nitidus punctatus; capite antice longitudinaliter striato; margine interno mandibularum confertim dentato.

*Worker*. Length  $4\frac{1}{2}$  lines. Ferruginous; head wider than the thorax, slightly rounded at the sides, and emarginate behind, finely and distinctly punctured above, anteriorly it is longitudinally striated; the anterior margin fuscous; the antennæ short and stout; the flagellum clavate; the mandibles with a row of short, stout, acute teeth on their inner margin; the head has a few scattered erect hairs. Thorax: the prothorax subglobose, strongly punctured in front; the mesothorax short and transverse; the metathorax oblong, parallel, and punctured; the apex transversely striated; the legs short, stout, and pubescent. Abdomen: the basal segment strongly punctured, the second and following segments delicately and very sparingly so; the first and second segments deeply constricted at their margins; the apex pointed and pubescent, the pubescence ferruginous. (Plate I. fig. 6.)

*Hab.* Bachian.

This insect, which I place in Erichson's genus *Amblyopone*, differs from the type in the antennæ being short and stout, with the flagellum club-shaped; in *A. australis* they are rather slender, and the flagellum is very slightly thickened at the apex; in every other particular they agree.

Gen. PSEUDOMYRMA, Guér.

1. PSEUDOMYRMA LÆVICEPS, *Smith, Proc. Linn. Soc.* iii. 145. ♂.

*Hab.* Dory; Am.

2. PSEUDOMYRMA MODESTA. *P. rufo-pallida*, lævis, nitida; abdomine nigro.

*Worker.* Length  $1\frac{3}{4}$  line. Pale rufo-testaceous; the head oblong; the eyes large and ovate; the flagellum clavate; the club three-jointed. Thorax oblong, narrowed posteriorly, with the metathorax compressed above; the legs short and stout. Abdomen black and ovate; the first node of the peduncle petiolated, the second pear-shaped, both of a pale rufo-testaceous colour.

*Hab.* Bachian.

3. PSEUDOMYRMA NITIDA. *P. nigra*, nitidiuscula; antennis, tibiis, tarsisque pallide testaceis.

*Worker.* Length  $1\frac{3}{4}$  line. Jet-black, smooth and shining; eyes very large, ovate, and about half the length of the head; the antennæ and mandibles pale testaceous; a faintly-impressed line extends from the insertion of the antennæ to the vertex. The thorax narrowed posteriorly, and deeply strangulated between the pro-, meso-, and metathorax; the tibiæ and tarsi pale testaceous. Abdomen ovate: the first node of the peduncle petiolated, the second subglobose.

*Hab.* Bachian.

Gen. MESOXENA, *Smith.*

*Head* suborbiculate, a little wider than the thorax; *eyes* round, prominent, situated in the middle at the sides of the head; *ocelli* obsolete in the worker; *antennæ* geniculated, the scape one-third shorter than the flagellum; the flagellum 11-jointed, gradually increasing in thickness from the basal to the apical joint, the latter pointed at its apex; the *maxillary palpi* 6-jointed, the first joint minute, the rest elongate. *Thorax* oblong, the sides nearly parallel, the anterior and posterior margins slightly rounded; the divisions between the pro-, meso-, and metathorax not perceptible, or monomeric; legs of moderate length, the calcaria at the apex of the intermediate and posterior tibiæ very short. *Abdomen* subovate; the basal segment very large, nearly concealing the following ones; the peduncle with a single node, the node incrassate, nearly as wide as the thorax, truncate anteriorly and rounded behind.

The characters laid down for this remarkable genus are drawn

from a worker or neuter insect. I have been unable to trace the labial palpi, and had only a single individual for examination. It will be seen that *Mesoxena* partakes of the characters of two very distinct families, the *Poneridæ* and the *Cryptoceridæ*; of the former, in the character, or form of the head, thorax, and peduncular node; and of the latter, in the enlargement of the basal segment of the abdomen.

1. *MESOXENA MISTURA*. *M. nigra*; antennis apice, femoribus basi, et tarsis pallide ferrugineis.

*Worker*. Length 2 lines. Black, subopaque, smooth and impunctate; the antennæ nearly as long as the thorax; the apical half of the flagellum rufo-testaceous; the eyes very prominent. Thorax oblong, the sides very slightly contracted in the middle, slightly rounded in front and behind; the tip of the coxæ, the trochanters, the extreme base of the femora and tarsi, rufo-testaceous. Abdomen subovate; the node of the peduncle subglobose, truncate in front, and rounded behind. (Plate I. fig. 10.)

*Hab.* Bachian.

Fam. MYRMICIDÆ, *Smith*.

Gen. MYRMICA, *Latr*.

1. *MYRMICA OBLONGA*. *M. rufo-fusea*; abdomine fusciscente, apice pallido; metathorace declivi, mutico.

*Worker*. Length  $1\frac{3}{4}$  line. Obscure ferruginous, with the antennæ, head anteriorly, mandibles, legs, and the apex of the abdomen, pale ferruginous. The head oblong and delicately striated; the eyes small and placed forward at the sides of the head. Thorax smooth and shining, with a few delicate scattered punctures anteriorly. Abdomen oblong-ovate, the apex pointed; thinly sprinkled with pale glittering hairs.

*Hab.* Bachian.

2. *MYRMICA PONEROIDES*. *M. fusco-nigra*, sparse pallide pilosula; mandibulis, antennis pedibusque ferrugineis; capite et thorace longitudinaliter striatim rugulosis.

*Female*. Length 2 lines. Dark fuscous, approaching blackness; the head and thorax subopaque, the nodes of the peduncle and the abdomen smooth and shining; the antennæ, clypeus, mandibles, and legs, ferruginous; the club of the flagellum three-jointed. The head and thorax covered with an irregular longitudinal rugose striation; a smooth shining line runs from the anterior stemma to the base of the clypeus, and a similar line divides the thorax down the middle. Abdomen oblong-ovate, the apex with glittering pale pubescence.

*Hab.* Bachian.

This species has the general appearance of a *Ponera*, and, were it not

that it has two nodes in the peduncle, would be mistaken for a species of that genus. I strongly suspect this to be the female of *M. oblonga*; they have a close specific resemblance.

3. *MYRMICA PUNCTATA*. *M. rufo-ferruginea*; capite thoraceque profunde punctatis; antennis pedibusque pallide ferrugineis.

*Worker*. Length  $1\frac{1}{4}$  line. Reddish-brown, with the antennæ and legs pale rufo-testaceous; the antennæ nearly as long as the body; the head and thorax covered with large deep punctures; the metathorax with two slender acute spines; the abdomen globose, and very smooth and shining.

*Hab.* Bachian.

4. *MYRMICA MODESTA*. *M. rufo-pallida*; capite, thorace, et petiolo longitudinaliter punctato-striatis; metathorace spinis duabus acutis; abdomine fusciscente, basi pallido.

*Worker*. Length 2 lines. Pale rufous; the head, thorax, and nodes of the petiole, coarsely striated longitudinally, the striæ with regular, large shallow punctures; the mandibles, antennæ, and legs, rather paler than the thorax and head; the metathorax with two short acute spines. Abdomen ovate and fuscous, with the extreme base pale; slightly pubescent, and very smooth and shining.

*Hab.* Bachian.

5. *MYRMICA LÆVISSIMA*. *M. pallide flavescens, lævis, nitida*; antenarum clava flagelli biarticulata; metathorace mutico; abdomine nitido, apice fusciscente.

*Worker*. Length  $1\frac{3}{4}$  line. Pale yellow, very smooth and shining; thinly sprinkled with erect pale hairs; the first node of the peduncle distinctly petiolated. Abdomen pale ferruginous, with the apical half fuscous.

*Hab.* Bachian.

Found in houses.

6. *MYRMICA POLITA*. *M. obscure ferruginea, lævis, tota nitidissima, nuda*; mandibulis, flagellis, pedibusque pallide ferrugineis.

*Worker*. Length  $1\frac{1}{2}$  line. Obscurely ferruginous, entirely smooth, shining, and impunctate; the mandibles, flagellum, and legs rufo-testaceous; the scape of the antennæ fusco-ferruginous. The metathorax armed with two acute spines. Abdomen ovate, truncate at the base; the first node of the peduncle petiolated; both the nodes and the apex of the abdomen pale rufo-testaceous.

*Hab.* Bachian.

7. *MYRMICA CÆCA*. *M. pallide flavescens, lævis, nitida, clava flagelli triarticulata*; metathorace declivi, mutico.

*Worker*. Length  $1\frac{3}{4}$  line. Pale yellow, entirely smooth and shining; the mandibles ferruginous; the antennæ a little longer than the head;

the eyes and ocelli obsolete; the thorax strangulated in the middle; the nodes of the peduncle transverse, rounded above; abdomen subovate, pointed at the apex.

*Hab.* Dory.

This small species, probably, is not a true *Myrmica*. I endeavoured to extract the palpi, but did not succeed; I must therefore retain it in the genus *Myrmica* until other specimens can be obtained for examination.

Gen. CREMATOGASTER, *Lund.*

1. CREMATOGASTER LABORIOSUS. *C.* pallide ferrugineus, lævis et nitidus; alis hyalinis iridescentibus; abdominis segmentorum marginibus fuscis.

*Female.* Length  $3\frac{1}{2}$  lines. Pale ferruginous, smooth and shining; thorax oblong-ovate; the wings hyaline and iridescent, the nervures colourless. Abdomen oblong-ovate, with the apical margins of the segments fuscous; the nodes of the peduncle compressed and subovate.

*Hab.* Bachian.

2. CREMATOGASTER BICOLOR. *C.* pallide flavescens, lævis, nitidus; abdomine nigro.

*Worker.* Length  $1\frac{1}{4}$  line. Honey-yellow; the abdomen black, the nodes of the peduncle yellow; very smooth and shining, the eyes black; the thorax flattened above; the metathorax with two acute spines. The abdomen heart-shaped, the peduncle attached to the basal segment above.

*Hab.* Bachian.

3. CREMATOGASTER OBSCURUS. *C.* pallide testaceus, lævis et nitidus; abdomine fusco.

*Worker.* Length  $1\frac{1}{4}$  line. Pale testaceous, smooth and shining; the eyes black; the abdomen fuscous, slightly testaceous at the base; the thorax flattened above; the metathorax oblique, the lateral angles of the verge of the truncation subdentate. The abdomen heart-shaped, the apex pointed and recurved upwards.

*Hab.* Bachian.

4. CREMATOGASTER IRRITABILIS. *C.* castaneo-rufus, lævis nitidusque; abdomine nigerrimo, nitido; spinis metathoracis longis acutis.

*Worker.* Length 2 lines. Head, thorax, and legs chestnut-red; the metathorax, in some specimens blackish, very smooth and shining, with two stout, acute spines. Abdomen black, heart-shaped, pointed, recurved upwards at the apex; the first node of the peduncle petiolated, rather widest at the base and grooved in the middle, the second node subglobose.

*Hab.* Dory.

Gen. HEPTACONDYLUS, *Smith*.

1. HEPTACONDYLUS RUGOSUS. *H.* obscure fusco-ferrugineus; capite thoraceque longitudinaliter striatim rugulosis.

*Worker.* Length  $2\frac{1}{4}$  lines. Dark fusco-ferruginous; the mandibles, flagellum, and apical joints of the tarsi paler. The head and thorax longitudinally striated, the former much more finely so than the latter; the flagellum six-jointed. The metathorax armed with two long acute spines; the legs pubescent. Abdomen ovate, smooth and shining, truncate at the base; the first node of the peduncle petiolated; both the nodes ovate and striated.

*Hab.* Bachian.

This species closely resembles *H. carinatus*, but the latter has the antennæ thicker and more pubescent, the head is smooth and shining, with a few irregular longitudinal carinæ; in the present species the head is closely striated.

Gen. PODOMYRMA, *Smith*.

1. Podomyrma basalis, *Smith, Proc. Linn. Soc.* iii. 147.

*Hab.* Amboyna; Arn; Dory.

2. PODOMYRMA NITIDA. *P.* obscure ferruginea, thorace abdomineque lævissimis lucidisque; capite longitudinaliter striato; femoribus medio incrassatis, basi tenuibus.

*Worker.* Length  $2\frac{1}{2}$  lines. Obscurely ferruginous; the antennæ, mandibles, legs, and nodes of the peduncle clear ferruginous; the head longitudinally and delicately striated; the femora compressed and broadly dilated in the middle, very much attenuated at their base; the metathorax obliquely truncate, its sides longitudinally striated. Abdomen oblong-ovate, attenuated at the base and tapering to a point at the apex; the petiole elongate, the nodes oblong.

*Hab.* Dory.

3. PODOMYRMA SILVICOLA. *P.* ferruginea; capite thoraceque longitudinaliter striatim rugulosis; femoribus valde incrassatis, basi tenuissimis; abdomine nitido.

*Worker.* Length 4 lines. Rufo-ferruginous; the head and thorax with longitudinal grooves or striæ, those at the sides of the head punctured; the antennæ, mandibles, articulations of the legs and the tarsi pale ferruginous; the anterior margin of the thorax rounded, with the lateral angles produced into short spines; the femora incrassate in the middle, very much attenuated at the base. Abdomen with a beautiful silky gloss, caused by an extremely delicate aciculation, visible under a high magnifying power; the apical segments smooth and shining; the first node of the peduncle distinctly petiolated, with a small acute tooth above, the second node globose. (Plate I. fig. 8.)

*Hab.* Bachian.

Found by Mr. Wallace running on trunks of trees in a dry forest.



4. *PODOMYRMA SIMILLIMA*. *P. fusco-ferruginea*; abdominis basi pallide testacea; femoribus medio valde incrassatis, basi tenuissimis.

*Worker*. Length  $3\frac{1}{2}$  lines. Ferruginous; the head and thorax with coarse longitudinal grooves or striæ, those at the sides of the head punctured; the scape in front, the anterior tibiæ in front, and the intermediate and posterior tibiæ at their base in front pale ferruginous; the articulations of the legs and the apical joints of the tarsi bright ferruginous. The lateral margins of the thorax above raised; the anterior margin rounded, with the angles produced into short acute spines. Abdomen shining, the basal half pale testaceous, and very delicately longitudinally aciculate; the first node of the peduncle oblong, with a minute tooth at its base above, the second subovate.

*Hab.* Bachian.

This species very closely resembles *P. basalis* from Aru; it differs only in being larger, in having the legs dark, and the abdomen of a much more oblong form: it is probably a mere climatal variety.

#### Gen. PHEIDOLE, *Westw.*

1. *PHEIDOLE NOTABILIS*. *P. rufo-ferruginea*; capite maximo, in medio sulcato et punctato; metathorace spinis duabus acutis armato.

*Worker major*. Length 2 lines. Dark ferruginous; the head at least six times the size of the abdomen, subquadrate, with the angles rounded, strongly but not closely punctured, divided in the middle by a deeply-impressed longitudinal line; the mandibles very stout, curved, and edentate. The thorax hidden beneath the head; the metathorax with two acute long spines. Abdomen ovate, of a darker colour than the head.

*Worker minor*. Of the same colour as the worker major; the head of the ordinary size, and covered, as well as the thorax, with large semi-confluent punctures. The thorax armed with two long straight spines in front, and two curved ones on the metathorax. Abdomen rather narrower than the head, and very smooth and shining.

*Hab.* Bachian.

This is a most remarkable species: several are known to have workers with largely developed heads, but this surpasses every species, in that particular, with which I am acquainted; neither the large nor small workers have toothed mandibles; we have given a figure of each kind of worker. (Plate I. figs. 3, 4.)

2. *PHEIDOLE RUBRA*. *P. rufo-ferruginea*; capite maximo, longitudinaliter aciculato; antennis pedibusque pallide testaceis.

*Worker major*. Length 2 lines. Rufo-ferruginous, with the legs and antennæ pale testaceous; the head wider than the abdomen, longitudinally aciculate, the vertex transversely so; the eyes small and placed forward at the sides; the mandibles stout, with acute teeth on their inner margin; the club of the antennæ three-jointed. Thorax

short, narrowed behind, and deeply constricted in the middle. Abdomen much wider than the thorax.

*Worker minor.* Scarcely 1 line in length; of the same colour as the larger worker, entirely smooth and shining; the head much smaller in proportion than in the large worker, but still wider than the abdomen.

*Hab.* Baehian.

This species was found under rotten bark.

3. *PHEIDOLE PLAGIARIA.* *P. ferruginea*; capite maximo, in medio sulcato; abdomine apice fusco.

*Worker major.* Length 2 lines. Ferruginous, with the apical joints of the flagellum and the tarsi pale testaceous. Head very large, at least four times the size of the abdomen, longitudinally striated and deeply notched behind; the clypeus and mandibles smooth and shining. Thorax narrowest behind; the prothorax produced at the sides and subdentate; the femora incrassate in the middle, much narrowed at their base and apex; the metathorax armed with two short, acute spines. Abdomen fusco-ferruginous; with the extreme base pale.

*Worker minor.* One line in length, of the same colour as the large worker, but entirely smooth and shining; the antennæ and legs much more slender and elongate; the head much smaller in proportion; the eyes larger, and placed in the middle of the sides.

*Hab.* Baehian.

Found on a dead tree, pulling White Ants out of their holes, and carrying them away alive.

4. *PHEIDOLE PABULATOR.* *P. rufo-brunnea*; capite maximo, lævi et nitido; metathoracis spinis minutissimis; abdomine apice fusco.

*Worker major.* Length 3 lines. Reddish brown; the head very large, smooth, and shining, emarginate behind, with an impressed line in the centre running to the base of the clypeus; the face anteriorly and the mandibles pale ferruginous; the hinder portion of the head transversely striated, the anterior portion longitudinally so; the legs and antennæ paler than the body. The thorax narrowed behind, with two short, acute spines on the metathorax. Abdomen globose, in some specimens nearly black, smooth, and shining.

*Worker minor.* Length 1-1½ line. Of the same colour as the *worker major*, but entirely smooth and shining; the head a little wider than the abdomen; the flagellum and legs pale ferruginous, and more elongate than in the large worker.

*Hab.* Baehian.

Taken crossing a pathway in the forest, the giant specimens surrounded by small ones, and often dragged along by them: the small ones sting.

5. *PHEIDOLE MEGACEPHALA.* *P. obscure ferruginea*; capite maximo in medio sulcato; metathorace bispinoso, abdomine ovato.

*Worker.* Length 6½ lines. Dark ferruginous; head very large, sub-

quadrate, with the posterior angles rounded, deeply emarginate behind: a longitudinal channel runs from the emargination to the base of the clypeus, and in it, exactly opposite the eyes, is a single ocellus; the head longitudinally striated anteriorly, not extending beyond the ocellus; the hinder portion of the vertex is transversely striated, in front of which the head is delicately aciculate; mandibles very stout, black at their margins, and armed with two stout teeth at their apex. Thorax transversely irregularly striated and rugose; the scutellum prominent; the metathorax with two acute spines. Abdomen ovate; the apical half of the segments dark fusco-ferruginous.

*Hab.* Bachian.

Workers 4 lines long, apparently of this species, differ from the larger form in wanting the ocellus.

#### Gen. SOLENOPSIS, *Westw.*

1. *Solenopsis cephalotes*, *Smith, Proc. Linn. Soc.* iii. 149 (workers, major and minor).

All the sexes of this species were taken by Mr. Wallace from an underground nest. The large workers have the head enormously developed, and subquadrate; their mandibles short, very stout, and curved, and their inner edge is perfectly smooth, without teeth; the small workers have the head much smaller in proportion, being only a little wider than the abdomen; their mandibles have a row of acute teeth. The female is of a pale ferruginous colour, with the head of the ordinary size, the mandibles toothed, the wings colourless. Thorax oblong-ovate; the abdomen oblong-ovate, with the apical half fuscous. The club of the flagellum in this genus is composed of two joints; the flagellum of the male tapering to a point.

*Hab.* Bachian.

This species, Mr. Wallace remarks, has a fiery sting.

#### Subfam. CRYPTOCERIDÆ, *Smith.*

##### Gen. ECHINOPLA, *Smith.*

1. *ECHINOPLA PRÆTEXTA*. *E. nigra*; capite, thorace, et abdomine punctatis; thorace oblongo, subquadrato; pedunculo transverso; mandibulis, antennis, pedibusque ferrugineis.

*Worker.* Length  $2\frac{1}{2}$  lines. Black; the head and abdomen shining, not so strongly punctured as the thorax, which is subopaque, and has a short, pale downy pubescence; the head is also slightly pubescent on the vertex. The legs, antennæ, and mandibles ferruginous, the latter stout, and armed on their inner edge with acute teeth; the antennæ longer than the thorax; the scape two-thirds of the length of the flagellum, which is very slightly thickened towards the apex, the tip acute. The thorax oblong-quadrate, and as wide as the head; the divisions between the pro-, meso-, and metathorax not discernible

above; the anterior angles acute, the posterior ones rounded. Abdomen ovate; the scale of the peduncle transverse, each extremity armed with four short teeth.

*Hab.* — ?

I place this very curious Ant in the genus *Echinopla* with some hesitation; it possesses, however, all the external characters of that genus, the form of the antennæ, mandibles, abdomen, and the scale of its peduncle resembling those of *Echinopla*. I have given a figure of this very interesting addition to the Cryptoceridæ. (Plate I. fig. 5.)

Gen. CATAULACUS, *Smith.*

1. CATAULACUS SETOSUS. *C. niger*; capite postice recto marginibus crenulatis; thorace aspere sculpto, spinis duabus acutis postice armato; abdomine ovato, basi emarginato.

*Worker.* Length 2 lines. Black; the head, thorax, and nodes of the peduncle rugose, the latter very coarsely so; the head with irregular longitudinal coarse striæ; the anterior margin of the clypeus widely but slightly emarginate, the lateral angles acute; the scape of the antennæ and tip of the flagellum rufo-testaceous. Thorax: the sides slightly narrowed to the base of the metathorax, and with a number of short acute denticulations; the two spines which arm the metathorax are stout, acute, and curved slightly inwards. Abdomen delicately shagreened, opaque, and sprinkled with short, erect, white setæ. The anterior tibiæ and tarsi, the intermediate tarsi, and apical joints of the posterior pair, rufo-testaceous; the femora rugose, and with a number of erect, short, rigid setæ. (Plate I. fig. 7.)

*Hab.* Bachian.

Gen. THYNNUS, *Fabr.*

1. THYNNUS ERRATICUS. *T. niger*, orbitis oculorum mandibulisque flavis; pedibus ferrugineis; alis fuseo-hyalinis.

*Male.* Length 10 lines. Black; the head and thorax closely punctured; the scutellum and abdomen shining, and much more finely and distantly punctured; a line on the inner orbit of the eyes, a spot in the middle of the clypeus, and a V-shaped mark above it, yellow; the labrum and mandibles reddish-yellow; the clypeus truncate in front. Thorax: a widely interrupted yellow line on the collar; the mesothorax with four deeply-impressed longitudinal lines; the wings fuseo-hyaline, darkest at their anterior margin and along the course of the nervures; the tibiæ, femora, and base of the anterior tarsi ferruginous. Abdomen conical, shining, and finely punctured.

*Hab.* Bachian.

Fam. MUTILLIDÆ, *Leach.*

1. *Mutilla suspiciosa*, *Smith. Linn. Proc. Soc.* ii. 84 ♂.

*Hab.* Borneo; Makassar; Amboyna; Bachian.

2. *MUTILLA MEROPS*. *M. capite abdomineque nigris; thorace rubro; abdominis segmento tertio fascia argenteo-pubescente ornato; maris alis cæruleo violaceoque splendide micantibus.*

*Female*. Length  $6\frac{1}{2}$  lines. Black; the head rugose. Thorax oblong-quadrate, coarsely rugose; legs black, spinose, and thinly covered with pale glittering hairs, the tarsi most densely so. Abdomen intense velvety-black; the third segment covered above with short silvery-white hairs; the sides of the apical segment with a mixture of white and pale brownish hairs.

The *male* closely resembles the female, but has the eyes more deeply notched, the thorax shorter, and the wings dark fuscous with a violet lustre.

*Hab.* Bachian.

3. *MUTILLA IANTHEA*. *Femina.* *M. nigra; thorace rufo; abdominis segmentis argenteo pubescentibus, secundo maculis duabus albis signato, tertio fasciato.*

*Mas.* Thorace supra et abdomine rubris; alis fuscis, basi hyalinis.

*Female*. Length 4 lines. Black; the thorax blood-red, oblong-quadrate, closely and strongly punctured; the metathorax obliquely truncate; the mandibles ferruginous in the middle; the cheeks, legs, and sides with a glittering silvery-white pubescence. Abdomen covered with short black pubescence, the second segment with two minute snow-white spots, and the third with a basal band of the same colour.

*Male*. Length  $7\frac{1}{4}$  lines. Black; the thorax above and the abdomen ferruginous; the wings brown, with their base hyaline; the three apical segments of the abdomen and the metathorax black.

*Hab.* Bachian.

4. *MUTILLA ANTHYLLA*. *M. nigra, pubescens; alis fascis; abdomine ferrugineo, apice nigro.*

*Male*. Length 6 lines. Head, thorax, and legs black, coarsely punctured; the metathorax covered with large shallow punctures, with a groove in the centre of its base; the face covered with long cinereous pubescence; the tips of the mandibles ferruginous. The thorax and legs with a scattered cinereous pubescence; wings dark fuscous; the base of the posterior pair pale. Abdomen ferruginous and shining, with the apical margin of the fifth segment, and the sixth and seventh entirely, black.

*Hab.* Bachian.

5. *MUTILLA ZEBINA*. *M. capite abdomineque nigris; thorace sanguineo-rubro; abdominis segmenti secundi baseos maculis tribus ovatis fasciaque segmenti tertii albo pubescentibus.*

*Female*. Length  $3\frac{1}{2}$  lines. Black; thorax and legs blood-red; the coxæ also red; the base of the mandibles and the tubercles at the insertion of the antennæ red. The head and thorax coarsely punctured, the latter oblong-quadrate; the antennæ, cheeks, and legs with

glittering silvery-white hairs. Abdomen: the base red; the second segment with three ovate maculæ, and the third with a fascia, of silvery-white pubescence; the fourth segment with a widely interrupted fascia; the apical segment shining and longitudinally striated.

*Hab.* Bachian.

6. *MUTILLA PENTHEUS*. *M.* capite abdomineque nigris; thorace pedibusque rubris, tibiis tarsisque fuscis; abdomine fascia argenteo-pubescente decorato.

*Female.* Length 3 lines. Head and abdomen black; the thorax and legs red; the coxæ, tips of the femora, tibiæ, and tarsi fuscous; the tubercles at the insertion of the antennæ, the apex of the scape, and the mandibles, rufo-testaceous; the head and thorax covered with deep, coarse, confluent punctures, and thinly sprinkled with pale glittering hairs; the thorax oblong-quadrate. Abdomen covered with short black pubescence; the third segment with a fascia of silvery-white pubescence; the apical segment longitudinally striated; the apex ferruginous.

*Hab.* Bachian.

7. *MUTILLA DORICHA*. *M.* nigra, pubescens; mandibulis pedibusque ferrugineis; abdominis segmenti secundi basi maculis duabus ovatis, tertii fasciæque argenteo-pubescentibus.

*Female.* Length 4 lines. Black: the legs ferruginous; the coxæ, tips of the femora, and apical joints of the tarsi black; the mandibles ferruginous at their base; the head and thorax covered with coarse confluent punctures, the latter oblong-quadrate; the hinder portion of the vertex thinly covered with short white pubescence. Abdomen: the second segment with an ovate spot of snow-white pubescence on each side at its base; the third segment with a fascia of the same colour; the apical segment longitudinally striated.

*Hab.* Dory.

#### Gen. SCOLIA, *Fabr.*

DIV. I. *The anterior wings with two submarginal cells, and one recurrent nervure.*

1. *Scolia quadriceps*, *Smith, Proc. Linn. Soc.* iii. 153.

*Hab.* Bachian; Aru.

2. *Scolia nitida*, *Smith, Proc. Linn. Soc.* iii. 152.

*Hab.* Bachian; Aru; Amboyna; Dory.

3. *Scolia fulgidipennis*, *Smith, Proc. Linn. Soc.* ii. 152.

*Hab.* Bachian; Aru.

4. *SCOLIA NIGERRIMA*. *S.* nitida, nigra; abdomine prismatico; alis fuscis violacco iridescentibus.

*Female.* Length 11 lines. Black; the head and thorax slightly shining;

the former punctured on the vertex and impunctate before the ocelli; the hinder margin of the vertex fringed with a mixture of fuscous and griseous hairs, the cheeks and sides of the face with whitish hair; the mandibles slightly rufo-piceous in the middle. The wings fuscous and with a violet iridescence, darkest along the anterior margin of the superior pair; the thorax is smooth above, except at the anterior margin of the mesothorax; the truncation of the metathorax covered with shining grey pile; the spine at the apex of the anterior tibiæ bent and pale testaceous, those on the posterior pair spatulate and pale at their apex; the legs very spinose. The abdomen very sparingly punctured, and with a beautiful blue and violet iridescence.

*Hab.* Dory.

5. *SCOLIA CULTA*. *S. nigra*, ferrugineo-hirta; alis flavo-hyalinis; tibiis tarsisque ferrugineis; abdomine fasciis tribus ochraceis.

*Female.* Length 13 lines. Black; the head and thorax strongly punctured. The scape, anterior margin of the clypeus, and the mandibles ferruginous, the latter with their margins and apex fuscous; the clypeus with several longitudinal impressions at its anterior margin; the head, thorax, and legs with long ferruginous pubescence. Thorax: the wings flavo-hyaline; the nervures ferruginous; the tegulæ rufo-testaceous; a slight fulvous cloud beyond the marginal cell; the tibiæ and tarsi ferruginous, strongly spinose; the inner spine at the apex of the posterior tibiæ spatulate; the posterior tibiæ black at their base beneath. Abdomen opaque: the first, second, and third segments with broad ochraceous fasciæ on their apical margins, that on the second widest, slightly emarginate in the middle, and with an indistinct fuscous spot on each side; the fourth segment has a narrow interrupted line on its apical margin, and the apical segment is entirely ochraceous; all the segments, except the basal one, fringed with rigid ferruginous pubescence; beneath shining, with a row of strong punctures near the apical margin of the segments, which are fringed with pale ferruginous pubescence.

*Hab.* Dory.

This fine species closely resembles *Tiphia radula* of Fabricius, with which probably *Elis Tasmaniensis* is synonymous, but those species belong to another division of the genus *Scolia*, in which the anterior wings have two recurrent nervures.

Div. II. *The anterior wings with two submarginal cells and two recurrent nervures.*

6. *Scolia aureicollis*, *St. Farg. Hym.* iii. 499. ♀.

*Hab.* Bachian; Silhet; Ceylon; Philippine Islands.

7. *Scolia aurulenta*, *Smith, Cat. Hym. Ins.* pt. iii. 102. ♀.

*Hab.* Bachian; Philippine Islands; Celebes.

Div. III. *The anterior wings with three submarginal cells and one recurrent nervure.*

8. *SCOLIA MOROSA*. *S. nigra*, subnitida; abdomine nitido, alis fuscis viridi et violaceo micantibus.

*Female*. Length 15 lines. Black: the head and thorax subopaque, the head impunctate with the clypeus rugose, its anterior margin narrowly and obscurely rufo-piceous. The mesothorax sparingly punctured on the disk; wings very dark, and brilliantly adorned with prismatic colours; the legs covered with rigid spines. Abdomen: shining black, punctured, the middle of the segments very sparingly and finely so; the apical segment longitudinally strigose, the apical margin pale testaceous.

*Hab.* Amboyna.

9. *SCOLIA DUCALIS*. *S. nigra* nitida, capite supra basin antennarum flavo; alis nigris, violaceo micantibus.

*Female*. Length 14 lines. Shining, jet-black; the head, between the emargination of the eyes, and the posterior margin of the vertex, yellow: from the ocelli a small forked macula is directed forwards; the emargination of the eyes and the scapes of the antennæ shining and impunctate; the face and clypeus punctured and rugose; the scutellum and mesothorax not closely or strongly punctured, the latter with two impressed lines which run forward from the lateral angles of the scutellum, and terminate before reaching the anterior margin; a central line passes from the anterior margin and terminates at the middle of the disk, which is shining impunctate; the metathorax subopaque, closely punctured, and fringed laterally with black pubescence; the wings very dark and splendidly iridescent. Abdomen: the segments sparingly punctured in the middle, the apical margins fringed with black pubescence.

*Hab.* Kaisaa.

This species is closely allied to *S. Alecto* from Makassar, but is certainly a distinct species.

Div. IV. *The anterior wings with three submarginal cells and two recurrent nervures.*

10. *SCOLIA DIMIDIATA*, Guér. *Voy. Coq. Zool.* ii. pt. 2. p. 247. ♂.

*Hab.* Bachiian; Celebes; Amboyna; Isle of Bourou.

In this species the two recurrent nervures unite and pass in a single nervure into the second submarginal cell.

Gen. TIPHIA, Fabr.

1. *TIPHIA CARBONARIA*. *T. nitida* atra punctata, linea intermedia metathoracis lineam transversam excurrente; alis subhyalinis, stigmatate atro.



*Female.* Length 7 lines. Jet-black and shining; the head strongly punctured; the face and cheek with a thin glittering silvery-white pubescence, the scape with a floecus of the same colour at the apex beneath; the mandibles dark ferruginous, with their apex black. The pro- and mesothorax strongly punctured; the metathorax smooth and shining, with three longitudinal carinæ, all of which extend from the base to the verge of the truncation; the latter opaque; the wings fusco-hyaline, with the nervures and stigma black. Abdomen: sparingly and delicately punctured, rather more strongly so towards the apex; the apical segment rugose, with the apical margin pale testaceous.

*Hab.* Bachian.

Fam. POMPILIDÆ, *Leach.*

Gen. POMPILUS, *Fabr.*

1. *Pompilus analis*, *Fabr. Syst. Piez.* p. 111. ♀.

*Hab.* Bachian; India; Java; Ceylon; Celebes.

2. *Pompilus Peleterii*, *Guér. Voy. Coq. Zool.* ii. 257; *Atlas Ins.* no. 9. f. 2. ♀.

*Hab.* Amboyna.

3. POMPILUS DEPRÆDATOR. *P. niger*, vertice, tibiis tarsisque ferrugineis, alis flavo-hyalinis; abdominis segmento secundo et tertio fasciis basalibus ferrugineis.

*Female.* Length  $8\frac{1}{2}$  lines. Black, the head above the insertion of the antennæ, the scape and two basal joints of the antennæ, the middle of the mandibles, and the palpi ferruginous; the vertex black. Thorax covered with very short black pubescence; the wings yellow, orange towards their base, the apical margins of the superior pair with a narrow fuscous border; the tibiæ, tarsi, and tips of the femora, ferruginous. Abdomen: the basal margins of the second and third segments, and a longitudinal stripe on the apical segment, ferruginous.

*Male.* Length  $6\frac{1}{2}$  lines. Very closely resembles the female, but has the outer orbit of the eyes, the face and mandibles entirely yellow; the antennæ thicker with the joints sub-areuate; the scutellum and postscutellum yellow; the collar yellow; the abdomen with an additional fascia and a yellow spot on the basal segment.

*Hab.* Bachian.

4. POMPILUS FULGIDIPENNIS. *P. cæruleo-niger*; abdomine iridescente; alis cæruleo violaceoque splendide micantibus.

*Female.* Length  $8\frac{1}{4}$  lines. Blue-black, very bright in certain lights; the abdomen with changeable violet tints; the head with an impressed line running from the base of the clypeus to the anterior ocellus. The prothorax subquadrate, about the same length as the metathorax; the latter truncate, or slightly hollowed out behind to the form of the base

of the abdomen; the legs blue, the claw-joint of the tarsi black; wings very dark brown, with a splendid coppery and violet effulgence.

*Hab.* Bachian.

5. *POMPILUS OPULENTUS*. *P. ater*, capite, thorace, abdomineque argenteo maculatis; alis fuscis, apice nigro-fuscis.

*Female*. Length 5 lines. Black and shining; the face and cheeks covered with silvery pile; the mandibles rufo-piceous. Thorax: a spot on each side before the wings, another behind them, a line on each side of the metathorax, the pectus, trochanters beneath, and a spot on the sides beneath the wings, covered with a bright silvery pile; the tibiæ and tarsi pilose; the wings fuscous, with their apical margins darkest. Abdomen: the second and following segments with a silvery spot on each side at their basal margins.

*Hab.* Bachian.

#### Gen. AGENIA, *Schödte*.

1. *Agenia Atalanta*, *Smith, Proc. Linn. Soc.* ii. 94.

*Hab.* Bachian; Singapore.

2. *Agenia Amalthea*, *Smith, Proc. Linn. Soc.* iii. 155.

*Hab.* Bachian; Aru.

3. *AGENIA LUCILLA*. *A. obscure cyanea*, pube argenteo-albida; abdomine sub-petiolato; alis hyalinis iridescentibus.

*Female*. Length 5 lines. Obscure blue-black, with a thin silvery-white pubescence; the face with a dense silvery pile; the tips of the mandibles ferruginous. Thorax: the metathorax transversely striated, most strongly so towards the apex; wings colourless-hyaline and iridescent; the legs not spinose. Abdomen: covered with a bright changeable silvery pile, which is most dense towards the apex; the extreme apex pale testaceous, and the apical segment with a central longitudinal carina.

*Hab.* Amboyna.

#### Gen. PRIOCNEMIS (*Schödte*).

1. *Priocnemis fervidus*, *Smith, Proc. Linn. Soc.* iii. 156.

*Hab.* Dory; Aru.

The specimen from Dory differs from the Aru specimens in having the basal segment of the abdomen ferruginous, in addition to the red head, thorax, and legs; in all other particulars they are identical.

2. *Priocnemis flavipennis*, *Smith, Proc. Linn. Soc.* v. 79.

*Hab.* Bachian; Makassar (Celebes).

3. *PRIOCNEMIS CONFECTOR*. *P. niger*; abdomine pube aurea vestito, alis fuscis cupreo iridescentibus.

*Female*. Length 12 lines. Black; the head and thorax with a thin, long, black pubescence; the clypeus widely emarginate in front; the

wings dark brown with a bright coppery and violet iridescence, the base of the wings with tints of blue; the legs elongate, the posterior tibiae strongly serrated exteriorly. Abdomen: the apical margin of the basal segment, and the whole of the following segments, densely clothed with short bright golden pubescence.

*Hab.* Bachian.

Gen. MYGNIMIA, *Smith.*

1. *Mygnimia Aspasia*, *Smith, Proc. Linn. Soc.* iii. 157.

*Hab.* Dory; Aru; Amboyna.

2. *Mygnimia ichneumoniformis* (*Pompilus*), *Guér. Voy. Coq. Zool.* ii. p. 258.

*Hab.* Dory; Amboyna.

3. MYGNIMIA FERRUGINEA. *M. ferruginea*; alis obscure fuscis purpureo iridescentibus.

*Female.* Length 14 lines. Ferruginous: the mandibles black at their apex. The pectus and two obscure longitudinal lines on the mesothorax fuscous; the wings dark brown with a purple iridescence, their base ferruginous; the metathorax transversely striated and truncate posteriorly; the legs spinose. Abdomen shining, and thinly covered with a silky sericeous pile.

*Hab.* Dory.

4. MYGNIMIA LACÆNA. *M. capite, thorace pedibusque ferrugineis; metathorace et abdomine nigris; alis flavo-hyalinis.*

*Female.* Length 8 lines. Black; the head, antennæ, pro- and mesothorax above, the femora, tibiae, and tarsi ferruginous, the coxæ ferruginous at their apex beneath; the tips of the mandibles black; the metathorax transversely striated; the wings flavo-hyaline; the abdomen shining black, with the apical segment ferruginous.

*Hab.* Amboyna.

5. MYGNIMIA THIONE. *M. capite thoraceque nigris; abdomine ferrugineo; alis obscure fuscis, purpureo iridescentibus.*

*Female.* Length  $6\frac{1}{2}$  lines. Head and thorax black; the antennæ, clypeus anteriorly, the mandibles, and palpi ferruginous; the femora, tibiae, and tarsi ferruginous; wings dark fuscous with a violet iridescence. Abdomen ferruginous and thinly covered with a fine silky pile.

*Hab.* Amboyna.

Fam. SPHEGIDÆ, *Leach.*

Gen. SPHEX, *Fabr.*

1. *Sphex argentata*, *Dahlb. Hym. Europ.* i. 25.

*Hab.* India; Sumatra; Java; Aru; Celebes; Congo; Sierra Leone; Bachian.

2. *Sphex diabolicus*, *Smith, Proc. Linn. Soc.* ii. 100.

*Hab.* Bachian; Borneo.

3. *Sphex sericea*, *Fabr. Syst. Piez.* 211.

*Hab.* Bachian; Aru; Malacca; Borneo; Java; Philippines.

4. *Sphex formosa*, *Smith, Cat. Hym. Ins.* iv. 254.

*Hab.* Bachian; Amboyna; Ceram.

The specimens from Ceram have the face and thorax clothed with golden pubescence, those from Amboyna agree with them in that particular; whilst the Bachian examples have the pubescence silvery with a golden tinge.

5. *SPHEX TYRANNICA.* *S. nigra*; capite thoraceque pube nigra vestitis; alis brunneis cupreo iridescentibus.

*Female.* Length 13–14 lines. Black; the head and thorax clothed with short black pubescence, the vertex and the scutellum naked and shining; the anterior margin of the clypeus rounded; the mandibles stout, and acute at their apex, with an acute tooth about the middle of their inner margin; the legs stout, the tibiæ and tarsi spinose; wings dark brown, their apical margins with a darker border. Abdomen smooth and shining; the petiole short.

*Hab.* Bachian; Kaisaa.

6. *SPHEX JACULATOR.* *S. nigra*; facie pube argentea vestita; alis fuscis; abdomine nigro-cæruleo.

*Male.* Length 7 lines. Black; the head and thorax with a thin griseous pubescence; the face covered with silvery pile; the mandibles pale rufo-testaceous, their tips black. Thorax slightly shining on the disk; the legs shining; the wings fuscous, the nervures black. The abdomen black with a blue tinge; the extreme base of the first segment at its point of attachment to the petiole rufo-piceous.

*Hab.* Bachian.

7. *SPHEX MOROSA.* *S. nigra*; abdomine nigro-cæruleo, lævigato, nitido; alis brunneis cupreo iridescentibus.

*Male.* Length 10 lines. Black; the face covered with silvery pile and thickly clothed with rigid black hairs; the vertex shining and thinly sprinkled, as well as the cheeks, with black pubescence. The wings dark brown with a coppery iridescence; the thorax thinly covered with black pubescence; the claws bidentate beneath; the abdomen blue-black, its petiole nearly as long as the first and second segment.

*Hab.* Bachian.

8. *SPHEX VOLATILIS.* *S. nigra*; facie pube aurea vestita; alis flavo-hyalinis; abdomine nigro-cæruleo, pedibus ferrugineis.

*Male.* Length 9 lines. Black, the femora, tibiæ, and tarsi ferruginous, with the tips of the claws black. The face covered with golden pile and sprinkled with black hairs; the scape of the antennæ ferruginous at its apex in front. Thorax slightly shining on the disk and thinly clothed with black pubescence; the wings flavo-hyaline, the nervures

ferruginous, the tegulae rufo-testaceous. Abdomen black with a blue tinge; the petiole the length of the second segment, and slightly curved.

*Hab.* Bachian.

Gen. PELOPÆUS, *Latr.*

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

*Hab.* Amboyna; Malabar; Madras; Nepaul; Bengal.

2. Pelopæus lætus, *Smith, Cat. Hym. Ins.* iv. 229, pl. 7. fig. 1.

*Hab.* Bachian; Ceram; Australia (Swan River; Macintyre River).

3. PELOPÆUS FABRICATOR. *P. cæruleo-viridis*, abdomine viridescenti; alis fuscis, basi subhyalinis.

*Female.* Length 9 lines. Green, with shades of blue in different lights; the vertex and abdomen smooth and shining, with purple tints; the face covered with silvery-white pubescence; the thorax transversely striated and with a thin cinereous pubescence; wings fuscous with a coppery effulgence, their base subhyaline. Abdomen smooth and shining with a beautiful prismatic lustre.

*Hab.* Bachian.

4. PELOPÆUS UNIFASCIATUS. *P. niger*, clypeo scapoque antice flavis; scutello et segmento secundo fascia apicali flava; alis hyalinis; pedibus ferrugineis.

*Female.* Length  $8\frac{1}{2}$  lines. Black; the scape in front and a transverse spot on the clypens, yellow; the tips of the mandibles and the legs ferruginous; the thorax transversely striated; a narrow line on the collar, the tubercles, and a transverse line on the scutellum yellow; the wings subhyaline, with their apical margins fuscous. Abdomen obscurely chalybeous, with a yellow ovate spot in the middle of the basal segment, and a yellow fascia on the apical margin of the third segment.

*Hab.* Bachian.

Fam. LARRIDÆ, *Leach.*

Gen. LARRADA, *Smith.*

1. Larrada aurulenta, *Fabr. Mant.* i. 274.

*Liris aurata*, *Fabr. Syst. Piez.* p. 228.

*Hab.* Bachian; India; Java; Sumatra; Celebes; Philippine Islands; China; Cape of Good Hope; Gambia.

2. Larrada modesta, *Smith, Proc. Linn. Soc.* iii. 159.

3. LARRADA VINDEX. *L. nigra*; facie mesothoracis metathoracisque aurato pubescentibus, abdominis marginibus argentato pilo fasciatis; alis subhyalinis.

*Female.* Length 9 lines. Black; the face and thorax above clothed with golden-coloured pubescence; the legs black, with the posterior

tibiæ clothed with golden pubescence outside; wings fulvo-hyaline, the nervures black. Abdomen: the apical margins of the segments with fasciæ of silvery pile.

*Hab.* Bachian.

The specimen described is one that had been long exposed when taken, the wings being ragged and most of the golden pubescence rubbed off.

4. LARRADA TARSATA. *L. nigra*, antennis, mandibulis pedibusque rufis; alis fuscis.

*Female.* Length  $7\frac{1}{2}$  lines. Black; the face with golden pubescence, the antennæ, mandibles, palpi, and legs ferruginous; the coxæ, trochanters, and three apical joints of the tarsi black; the five apical joints of the flagellum fuscous above; the spines on the tibiæ and tarsi black; wings fuscous, the posterior pair palest. Abdomen shining.

*Hab.* Bachian.

I suspect this insect, if in fine condition, would have a pale golden pubescence on the thorax, and that the abdomen would have silvery pile on the apical margins of the segments.

#### Gen. TACHYTES, *Panz.*

1. TACHYTES SEDULUS. *T. niger*; abdominis segmentorum marginibus argentatis.

*Female.* Length 6 lines. Black; the face covered with silvery pile and sprinkled with long white hairs, the cheeks having also a silvery pile; the mandibles ferruginous, their apex piceous. Thorax closely and finely punctured, the collar and tubercles silvery; the wings hyaline, their nervures testaceous; the costæ and tegulæ piceous; the tibiæ and tarsi with rufo-testaceous spines; the metathorax thinly clothed with cinereous pubescence. Abdomen shining, with a blue iridescence in certain lights; the apical margins of the segments with interrupted silvery fasciæ.

*Hab.* Kaisaa.

#### Gen. LARRA, *Fabr.*

1. LARRA MODESTA. *L. nigra*; abdomine pulchre prismatico, maculis fasciisque variis flavis ornato.

*Female.* Length  $3\frac{3}{4}$  lines. Black; a silvery-white pubescence on the face and clypeus, that on the vertex tawny; an abbreviated white line on the inner orbit of the eyes, which curves round beneath the insertion of each antenna, the scape white in front, the flagellum fulvous beneath. Thorax slightly shining; a narrow line on the collar, the tubercles, a spot in front on the tegulæ, and an interrupted line behind them, which runs down the side and along the base of the scutellum, yellow; a line on the anterior and intermediate femora beneath, the anterior tibiæ in front, the intermediate and posterior pair at their

base outside, and the anterior tarsi, yellow: the outside of the basal joint of the latter black. Abdomen: smooth and shining, reflecting prismatic colours in different lights; the apical margins of the first and three following segments with narrow yellow fasciæ.

*Hab.* Bachian.

Fam. BEMBICIDÆ, *Westw.*

Gen. BEMBEX, *Fabr.*

1. *Bembex melancholica*, *Smith, Cat. Hym. Ins.* iv. 328. 47.

*Hab.* Bachian; Aru; Sumatra; Singapore; Madras.

Fam. CRABRONIDÆ, *Leach.*

Gen. TRYPOXYLON, *Latr.*

1. TRYPOXYLON PROVIDUM. *T. nigrum*; clypeo argentato-pubescente; alis hyalinis iridescentibus.

*Female.* Length 10 lines. Black, smooth and shining; the clypeus, face, and emargination of the eyes with bright silvery pubescence; the clypeus produced and rounded anteriorly; the mandibles ferruginous, with their base yellow. The thorax covered with long silvery-white pubescence beneath and on the sides; the metathorax with a sub-enclosed space at its base, which has a central longitudinal shallow groove transversely wrinkled; at the verge of the enclosed space is a deep fossulet which narrows and runs to the insertion of the petiole of the abdomen; the wings hyaline and iridescent; the anterior tibiæ fulvous in front, and the tarsi pale testaceous; the basal joint of the intermediate tarsi pale. Abdomen covered with a thin fine changeable silvery pile; the petiole elongate.

*Hab.* Bachian.

Gen. GORYTES, *Latr.*

1. GORYTES BASALIS. *G. niger*; abdominis basi, mandibulis pedibusque ferrugineis; alis hyalinis, marginibus anterioribus fuscis.

*Female.* Length  $4\frac{1}{2}$  lines. Black; the head delicately punctured; the clypeus rugose; the sides of the face and the cheeks with a silvery pile; the mandibles ferruginous in the middle, longitudinally striated, and bidentate at the apex; the antennæ obscurely fulvous beneath. Thorax: closely punctured and thinly covered with cinereous pile; the metathorax coarsely rugose, the enclosed space at its base longitudinally striated; the wings hyaline, with a dark cloud in the marginal cell; the legs ferruginous, with the intermediate and posterior coxæ black behind. Abdomen smooth, shining, and covered with a changeable silvery pile; the first segment and base of the second above ferruginous: both entirely red beneath.

*Hab.* Amboyna.

Genus CERCERIS, *Latr.*

1. CERCERIS PRÆDATA. *C. nigra*, flavo-variegata; abdomine fasciis duabus flavis; pedibus flavo-ferrugineis.

*Female.* Length  $4\frac{1}{4}$  lines. Black, punctured and shining; the head before the insertion of the antennæ, the scape and mandibles, yellow; the latter black at the apex. Thorax: two ovate spots on the prothorax, the tegulæ, and postscutellum, yellow; the wings subhyaline, with a fuscous cloud at the apex of the superior pair; the legs ferruginous, with yellow stains. Abdomen: the first segment with a narrow yellow band on its apical margin, the second with a transverse macula at the base, and a waved narrow yellow line at its apical margin, the third and fifth yellow, the sides and apical margin of the fourth narrowly reddish yellow, the fifth with a triangular black spot at its base, the sixth ferruginous; beneath reddish yellow, the margins of all the segments rufo-piceous.

*Hab.* Bachian.

## Group Solitary Wasps.

Fam. EUMENIDÆ, *Westw.*Gen. EUMENES, *Latr.*

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

*Hab.* Bachian; Kaisaa; Celebes; Sumatra; India; Java.

2. *Eumenes arcuatus*, *Fabr. Syst. Piez.* p. 287.

*Hab.* Bachian; Australia; New Guinea (Dory and Triton Bay); Key Island; Singapore; Siam.

3. *Eumenes Praslina*, *Guér. Voy. Coq. Zool.* ii. 267, pl. 9. fig. 7. ♀.

*Hab.* Gilolo; Kaisaa; New Ireland (Port Praslin); Key Island; Amboyna.

I agree with M. Saussure in considering *Eumenes Praslina* and *E. Blanchardi* most probably merely more highly coloured varieties of *E. arcuatus*.

4. *Eumenes esuriens*, *Fabr. Syst. Piez.* p. 286.

*Hab.* Bachian; Sierra Leone; Gambia; Senegal; Egypt; New Guinea; Australia; India (Mysore); China.

5. *Eumenes tricolor*, *Smith, Proc. Linn. Soc.* vol. v. p. 87.

*Hab.* Bachian; Makassar (Celebes).

6. EUMENES EXIMIUS. *E. niger*, flavo pictus; mesothoracis fasciis duabus flavis; alis flavescentibus.

*Female.* Length  $10\frac{1}{2}$  lines. Black; the clypeus, a line behind the eyes, another at their inner orbit, terminating in their emargination, the scape in front, a line between the antennæ, and a minute spot outside of the posterior ocelli, yellow. Thorax: a line on the collar, two longitudinal ones on the mesothorax, a triangular spot beneath the



wings, two spots on each tegula, two small ones on the scutellum, and another on each side of the metathorax, at its base, yellow; the wings flavo-hyaline, the nervures ferruginous; the tarsi and tibiæ ferruginous, the latter yellow in front. Abdomen: the petiole as long as the thorax, with two minute yellow spots at its apex; the apical margins of all the segments with a narrow reddish-yellow border, and two yellow spots at the base of the second segment.

*Hab.* Bachian.

This species belongs to the division *Parumenes* of Saussure, and resembles the *E. quadrispinosus* of that author; but the petiole is considerably longer, and the four spines which characterize that species are wanting on the metathorax.

7. *EUMENES AGILIS*. *E. niger*; capite thoraceque flavo variegatis; abdomine nitido.

*Female.* Length 7 lines. Black; a trifurcate spot at the base of the clypeus, an oblong spot between the antennæ, a narrow line on the lower margin of the sinus of the eyes, and an abbreviated line behind them, yellow; the clypeus produced and notched at its apex. Thorax: the anterior margin of the prothorax, an oblique line on each side of the mesothorax, a small spot beneath the wings, a minute spot behind the tegulæ, two on the scutellum, the postscutellum and the metathorax behind, yellow; wings fuscous, darkest along their anterior margins, and having a purple iridescence; legs and abdomen totally black.

*Hab.* Amboyna.

8. *EUMENES BLANDUS*. *E. niger*, flavo-fulvo variegatus; capite thoraceque dense punctatis, abdomine sublævigato, nitido.

*Female.* Length 5 lines. Black; the clypeus, a spot above it, the base of the scape in front, a narrow abbreviated line behind the eyes, orange-yellow; the mandibles ferruginous. Thorax: the prothorax anteriorly, a spot beneath the wings, a line on each side of the mesothorax, the tegulæ, a narrow line behind them, the postscutellum and the metathorax, orange-yellow; a black line in the middle of the metathorax; the wings fusco-hyaline and iridescent; the tibiæ, tarsi, and tips of the femora orange-yellow. Abdomen: a spot on each side of the petiole, a subovate spot on each side of the second segment, and its apical margin orange-yellow.

*Hab.* Bachian.

9. *EUMENES POLITUS*. *E. niger*, flavo-variegatus; antennis antice pedibusque ferrugineis; abdomine lævigato, nitido.

*Female.* Length 6 lines. Black; head and thorax closely punctured and subopaque, the abdomen smooth and shining, the petiole with a few delicate punctures. The clypeus, a line above it extending to the anterior ocellus, the emargination of the eyes and a stripe behind them, bright yellow; the scape in front yellow, the flagellum ferru-

ginous beneath. Thorax: the anterior margin of the prothorax, an ovate spot beneath the wings, two narrow abbreviated lines on the mesothorax anteriorly, the tegulæ and a minute spot behind them, two spots on the scutellum, and one arcuate line on each side of the metathorax bright yellow; the legs ferruginous, the anterior tibiæ yellow in front. Abdomen: the apical margin of the petiole and of the two following segments yellow.

*Hab.* Bachian.

Gen. RHYNCHIUM, *Spin.*

1. *Rhynchium hæmorrhoidale*, *Fabr. Syst. Piez.* p. 259.

*Hab.* Bachian; Amboyna; Dory; Cape of Good Hope; Malanca; Singapore; India; Java.

Having had the opportunity of examining numerous specimens of this species from all the above localities, I have found it to be most inconstant in colouring: its varieties include the *R. sanguineum*, and *R. parentissimum*; the females from Bachian are black, with a little red on the head and prothorax.

2. *Rhynchium metallicum*, *Sauss. Mon. Guêpes Sol.* p. 114.

*Hab.* India; Bachian; Sarawak.

3. RHYNCHIUM IRIDIFENNE. *R. nigrum*, capite thoraceque rude punctatis; alis fuscis et violaceo splendide micantibus.

*Female.* Length 7 lines. Black; the head and thorax rugose, the abdomen rather finely punctured; the clypeus much produced and rather widely emarginate at the apex. Thorax elongate; the metathorax truncate with the lateral margins rounded; the wings fuscous, with a splendid violet iridescence. Abdomen with a thin, short cinereous pubescence.

*Hab.* Amboyna.

This insect resembles the *R. metallicum* of Saussure, but is much more elongate and more coarsely sculptured.

4. RHYNCHIUM RUBROPICTUM. *R. nigrum*, capite thoraceque rubro variegatis; alis flavis, basi nigris; abdomine rubro fasciato.

*Female.* Length 8½ lines. Black; the head and thorax closely and rather finely punctured; the head brick-red, black behind, and having a black spot in front of the ocelli, and another in the sinus of the eyes; the antennæ and mandibles red. Thorax: the prothorax, two oblique stripes on the mesothorax, which unite a little before reaching the scutellum, the latter as well as the tegulæ and anterior legs, brick-red; the wings yellow, with their base black. Abdomen: opaque-black, with a red band on the apical margins of all the segments; the apical segment entirely red; beneath black.

*Male.* This sex differs in being smaller, in having the head black with a narrow line on the inner and outer orbits of the eyes, and in the clypeus being yellow; the mesothorax entirely black; otherwise, it is like the female.

I have separated this insect from *R. hæmorrhoidale* with some doubt of its being an extreme variety of that species; if so, it is distinguishable by its much more delicate punctuation and higher colouring.

Gen. ODYNERUS, *Latr.*

1. *Odynerus petiolatus*, *Smith, Proc. Linn. Soc.* iii. 164. 1. ♀.

The *male* received from Dory is very like the female, and has the abdomen similarly petiolated; it differs in having the clypeus, scape and mandibles yellow; the yellow spots on the thorax are much larger and brighter. In other respects the sexes are identical.

*Hab.* Dory; Aru.

Gen. ALASTOR, *St. Farg.*

1. *ALASTOR COGNATUS*. *A. capite thoraceque nigris; abdomine aurantiaco-rubro, primo segmento nigro; alis fuscis.*

*Male.* Length  $5\frac{1}{2}$  lines. Head and thorax black, opaque and rugose; the clypeus covered with silvery-white pubescence, deeply emarginate and bidentate: an elevated carina runs from each tooth halfway up the clypeus; a yellow spot between the antennæ; wings dark fuscous. Abdomen orange red, with the basal segment opaque-black.

*Hab.* Dory.

This insect exactly resembles the *A. fraternus* of Saussure: it may possibly be the male of that species.

Group **Social Wasps.**

Fam. VESPIDÆ, *Leach.*

Gen. POLISTES, *Latr.*

1. *Polistes tepidus*, *Fabr. Syst. Piez.* p. 271.

*Hab.* Bachian; Key Island; Solomon Islands; New Guinea; Australia.

2. *Polistes Pieteti*, *Sauss. Mon. Guêpes Sot.* p. 69, tab. 6. fig. 8.

*Hab.* Amboyna; Australia; Ceram; Celebes.

3. *POLISTES COLONICUS*. *P. rufus, flavoque varius; metathorace abdomineque basi nigris.*

*Male.* Length  $8\frac{1}{2}$  lines. Rufo-ferruginous; the face pale ferruginous, and densely covered with glittering silvery pile. The metathorax, and posterior portion of the mesothorax beneath, black; the wings fulvohyaline with the nervures ferruginous; the posterior coxæ and basal segment of the abdomen black, the posterior portion of the basal segment rufous, with the apical margin bordered with yellow; the apical margins of the following segments narrowly and obscurely yellowish.

*Hab.* Amboyna.

4. *POLISTES SIMULATUS*. *P. rufo-ferrugineus*; capite thoraceque flavo variis; segmentis abdominis flavo marginatis.

*Female*. Length 8 lines. Rufo-ferruginous; the orbits of the eyes pale; the anterior margin of the clypeus angulated. Thorax: the posterior margin of the prothorax, a spot beneath the wings, a line on the sides above each coxa, the anterior pair in front, the tegulæ, postscutellum, and two longitudinal stripes on the metathorax, yellowish-white; the metathorax faintly striated obliquely on each side from the centre; wings hyaline and iridescent, with a fuscous stripe in the marginal cell; the tips of the femora and the claw-joint of the anterior tarsi white. Abdomen: the apical margins of the four basal segments with narrow white marginal fasciæ.

The *male* differs only in having the face covered with silvery pile.

*Hab.* Kaisaa; Bachian.

This species closely resembles *P. elegans* from Key Island, from which it differs in being much less decorated with yellow markings on the head and thorax, but has an additional fascia on the abdomen; it may, however, be an extreme variety.

5. *POLISTES MULTIPICTUS*. *P. niger, flavo-ferrugineo varius*; alis subhyalinis, nervis ferrugineis.

*Female*. Length 6 lines. Head black; the cheeks, the outer orbit of the eyes, two oblique spots on the vertex behind the ocelli, a line on the inner orbit of the eyes, terminating in their emargination; the mandibles, clypeus, antennæ, and a transverse line above their insertion, ferruginous. Thorax: the prothorax, an oblong spot on the mesothorax, the scutellum, femora, tibiæ, and tarsi, ferruginous; the posterior margin of the prothorax narrowly, the postscutellum, and two longitudinal stripes on the metathorax, yellow; the wings hyaline; the nervures ferruginous. Abdomen: the first segment black, with the apical margin yellow; the second ferruginous, the base black, and the apex with a yellow marginal fascia; the third and fourth black, with yellow marginal fasciæ; the fifth and sixth yellow.

*Hab.* Amboyna.

#### Gen. ICARIA, *Sauss.*

1. *ICARIA CONSERVATOR*. *I. capite thoraceque nigris; clypei margine antico mandibulis basi, fronte ante oculos flavo maculatis; abdomine pedibusque fusco-ferrugineis; abdominis annulis flavo marginatis.*

*Female*. Length 5 lines. Head and thorax black; the legs and abdomen fusco-ferruginous; an interrupted line on the anterior margin of the clypeus, a spot at the base of the mandibles, a line on the inner orbit of the eyes, and the scape in front, yellow; the wings hyaline, their nervures ferruginous. Abdomen: the basal segment campanulate; a yellow fascia on the apical margin of all the segments.

*Hab.* Dory.

2. ICARIA IMPETUOSA. *I. ferruginea*; flavo multidecorata; alis hyalinis, margine antico fusco maculato.

*Female.* Length 4 lines. Ferruginous; the mandibles, clypeus, face on each side, the scape of the antennæ in front, and a spot between them, yellow; a black spot at the base of the clypeus. Thorax: the prothorax anteriorly, the tegulæ, scutellum, postscutellum, and the middle of the metathorax, yellow; a black line down the middle of metathorax; the legs variegated with yellow; wings hyaline, their nervures ferruginous, with a fuscous macula in the marginal cell. Abdomen: a narrow yellow band on the apical margin of the petiole, and an oblique spot on each side of the base of the first segment, its apical margin having a broad yellow fascia.

*Hab.* Bachian; Amboyna.

In specimens from Amboyna the yellow is almost obsolete in the metathorax.

#### Gen. PACHYMENES, *Sauss.*

1. PACHYMENES ELEGANS. *P. lute viridis*; clypeo pube argentat-alba; alis subhyalinis, marginibus anticis fuscis.

*Female.* Length 6 lines. Bright metallic-green; the head and thorax with coppery tints, and, as well as the basal segments of the abdomen, closely and strongly punctured; the second and following segments finely punctured. The antennæ and mandibles black; the latter green at their base. The metathorax rounded behind, with deep central depression. Wings subhyaline; the anterior margin of the superior pair fuscous, with a purple tinge. The basal segment of the abdomen campanulate and brassy-green; the following segments blue-green.

*Hab.* Bachian.

This species has a general resemblance to *Pachymenes viridis* from Aru, but in the present species the basal segment is oblong, whilst in the Aru insect it is transverse.

#### Gen. VESPA, *Linn.*

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

*Hab.* Bachian; Celebes; Malacca; Singapore; India; China.

2. *Vespa Philippinensis*, *Sauss. Mon. Guépes, Soc.* p. 148.

*Hab.* Amboyna; Philippines.

#### Fam. ANDRENIDÆ, *Leach.*

##### Gen. PROSOPIS, *Fabr.*

1. PROSOPIS EXIMIUS. *P. capite thoraceque nigris, flavo pulchre pictis; pedibus abdomineque ferrugineis, flavo plagatis.*

*Female.* Length  $4\frac{1}{2}$  lines. Head and thorax black, closely and finely punctured; a yellow stripe at the inner and outer orbits of the eyes, another running from the anterior ocellus to the apex of the clypeus; a yellow spot at the base of the mandibles and another on the labrum; a deeply impressed line between the ocelli and margin of the eyes. Thorax: the collar, four longitudinal stripes on the mesothorax, the sides of the scutellum, the postscutellum, and metathorax, yellow; the latter with an angular black spot on each side; the thorax beneath and at the sides yellow; an ovate black spot on each side of the pectus, and an oblong one on the sides behind the wings; the legs pale ferruginous, spotted with yellow. Abdomen pale ferruginous; the basal segment with a yellow stripe on each side in the middle; the second and third segments have a yellow line on each side at their basal margins; the three apical segments fuscous. The wings subhyaline; their apical margins faintly clouded.

*Hab.* Bachian.

Gen. NOMIA, *Latr.*

1. *Nomia formosa*, *Smith, Proc. Linn. Soc.* iii. 5. ♀.

*Hab.* Bachian; Malacca.

The male of this species is distinguished by having two acute spines on the postscutellum.

2. *Nomia halictoides*, *Smith, Proc. Linn. Soc.* iv. 6.

*Hab.* Bachian; Celebes.

3. *Nomia cineta*, *Smith, Proc. Linn. Soc.* iii. 132.

*Hab.* Bachian; Key Island.

Fam. CUCULINÆ, *Latr.*

Gen. STELIS, *Panz.*

1. *Stelis abdominalis*, *Smith, Proc. Linn. Soc.* iv. 7. ♂.

*Hab.* Celebes; Bachian.

A single example of the female was taken by Mr. Wallace; this sex differs from the male only in being larger. I have not satisfied myself that this really belongs to the genus *Stelis*; it is, however, certainly a parasitic insect, the female not possessing any polleniferous organs, and is either a *Stelis*, or must constitute the type of a new allied genus.

Gen. CÆLIOXYS, *Latr.*

1. CÆLIOXYS INTRUDENS. *C. nigra*; capite thoraceque rude punctatis; facie pube pallida vestita; alis fuscis basi hyalinis.

*Female.* Length  $7\frac{1}{2}$  lines. Black: the head and thorax with deep confluent punctures; the abdomen shining and much more finely and

distinctly punctured. The face with a prominent longitudinal ridge which extends from the anterior ocellus to the apical margin of the clypeus; the sides of the face with a pale golden pubescence; the cheeks have also a dense pale pubescence. The thorax has an obtuse tooth on each side of the clypeus; the sides, beneath, and on the coxæ and femora beneath, a dense short whitish pubescence. Wings fuscous; their base hyaline. Abdomen conical, elongate, tapering gradually from the base to the apex, which is acute; the apical segment has the ventral plate longer than the superior one, it being lanceolate and not notched at the sides near the apex.

*Hab.* Bachian.

Although I have characterized the genus *Caelioxys* as having the eyes pubescent, yet amongst the exotic species, especially those from Africa, there will be found species with the eyes naked: the present species belongs to the former division.

## Fam. DASYGASTRÆ.

### Gen. MEGACHILE, *Latr.*

1. **MEGACHILE PLUTO.** *M. maxima* adhuc cognita, aterrima; genis abdominisque segmento basali pube vestitis; mandibulis elongatis, apice tridentatis; alis fuscis.

*Female.* Length 18 lines. Intense opaque-black; the head rather wider than the thorax; the clypeus slightly produced and subtridentate, and shining black; the cheeks covered with white pubescence; the labrum elongate, thinly sprinkled with erect rigid hairs; the mandibles elongate, tridentate at their apex. Thorax thickly clothed with short erect black pubescence. Wings fuscous and shining; legs stout; the tibiæ rugged exteriorly. Abdomen covered with short black pubescence above, beneath with decumbent rigid pubescence; the basal segment clothed above with white pubescence.

*Hab.* Bachian.

This species is the giant of the genus to which it belongs, and is the grandest addition which Mr. Wallace has made to our knowledge of the family *Apidæ*. We have given a life-size figure of this remarkable bee. Only a single specimen has been captured, and that a female; it is to be hoped that Mr. Wallace will make his discovery complete by the capture of a male. (Plate . fig. 1.)

2. **MEGACHILE LACHESIS.** *M. aterrima*, pube nigra dense vestita; alis nigro-fuscis.

*Female.* Length  $9\frac{1}{2}$  lines. Opaque-black, densely pubescent; mandibles very stout, longitudinally striated, and armed with four blunt teeth. The wings dark fuscous, with a violet iridescence. Abdomen clothed

above with short black pubescence; beneath, the pubescence is long, rigid, decumbent, and shining.

*Hab.* Bachian; Amboyua.

3. MEGACHILE CLOTHO. *M. nigra*; mandibulis fortibus et porrectis; alis fuscis.

*Female.* Length 12 lines. Deep opaque-black; the anterior margin of the clypeus transverse, with an angular tubercle in the middle; mandibles stout and porrect; the labrum oblong, rounded in front, and fringed with a row of rigid hairs. Thorax densely pubescent. The wings dark fuscous with a violet iridescence. Abdomen black; the basal segment above with a dense sooty-black pubescence.

*Hab.* Bachian.

This insect very closely resembles *M. tuberculata*, the dark wings being almost the only difference.

4. MEGACHILE ALECTO. *M. nigra*; clypeo antice pube alba vestito; alis fuscis.

*Male.* Length 6 lines. Black, clothed with black pubescence; the anterior margin of the clypeus with a yellowish-white pubescence, a tuft of the same colour between the antennæ; the pectus has a griseous pubescence. The wings dark brown with a violet iridescence. Abdomen: the apex obliquely truncate; the margin of the terminal segment notched in the middle, from which a central carina runs to the base of the segment.

*Hab.* Dory.

M. Guérin has described a species in the 'Iconographie du Règne Animal,' which is closely allied to the present species; it is from the Isles of Madagascar and Bourbon, and named *M. mystacea*.

5. MEGACHILE FOLIATA. *M. nigra*; capite thoraceque dense punctatis et pube nigra vestitis; segmentis duobus apicalibus pube ferruginea vestitis; alis fuscis.

*Female.* Length 8 lines. Black, clothed with black pubescence, closely punctured; the mandibles very stout and porrect; the legs stout; the tibiæ rugose exteriorly, the posterior pair with pale pubescence; the basal joint of the tarsi within ferruginous; the claw-joint of the tarsi rufo-piceous. Abdomen: the two apical segments clothed with ferruginous pubescence, and the three segments beneath have pubescence of the same colour.

*Hab.* Bachian.

6. MEGACHILE VENTRALIS. *M. nigra*, delicatule punctata; abdomine subtus fulvo dense pubescente; alis subhyalinis.

*Female.* Length  $6\frac{1}{2}$  lines. Black, closely and finely punctured, and shining; mandibles stout, striated, and subdentate; the front of the head and sides of the thorax with black pubescence. Wings fusco-hyaline.



Abdomen nigro-æneous, finely punctured, clothed beneath with bright ferruginous pubescence.

*Male.* The same in size and colour as the female; the face clothed with yellowish-white pubescence; the segments of the abdomen fringed with dense black pubescence; the apex obtuse, with the apical margin deeply notched in the middle. The abdomen is naked beneath and of a pale rufo-testaceous colour.

*Hab.* Amboyna.

### Gen. XYLOCOPA, Latr.

1. XYLOCOPA CORONATA. *X. nigra*; pube nigra vestita; capite postice pube flava decorato; alis nigro-fuscis iridescentibus.

*Female.* Length  $9\frac{1}{2}$  lines. Black; the flagellum rufo-testaceous beneath; the face covered with a mixture of griseous and black pubescence, that on the vertex and behind the eyes bright yellow. Thorax: densely clothed with short black pubescence; the disk of the mesothorax naked, smooth and shining. Wings dark brown with a splendid violet iridescence. Abdomen shining and finely punctured, thinly clothed with short black pubescence in the middle, becoming longer and more dense at the sides and towards the apex; beneath smooth and shining.

*Hab.* Kaisaa.

2. XYLOCOPA UNICOLOR. *X. nitida, nigra*; alis æneo et violaceo splendide micantibus.

*Female.* Length 9 lines. Black; the flagellum, except the two basal joints, testaceous beneath; the clypeus with a transverse shining ridge at its base, its anterior margin and a central longitudinal line smooth and shining; the face clothed with black pubescence. Thorax and legs with black pubescence, the middle of the disk of the latter smooth and shining; a central impressed line runs from the anterior margin of the prothorax to the middle of the mesothorax; wings dark brown with a violet iridescence changing to a green tint at their apex. Abdomen black, shining, and closely punctured; the sides fringed with black pubescence towards the apex.

*Male.* The body clothed with yellowish olive pubescence, darkest on the abdomen, the sides of which towards the apex are fringed with black; the tibiæ and tarsi have fulvous pubescence; the posterior tibiæ are yellow outside; the antennæ in front and the clypeus yellow, the latter with two ovate black spots at its base; the wings fulvo-hyaline and iridescent.

*Hab.* Amboyna.

In both the sexes of this species the second submarginal cell is obsolete; in the male a trace of the first transverse cubital nervure is perceptible; this nervure will frequently be found more or less obliterated in different species of this genus. The male closely resembles that of *X. æstuans*.

Gen. ANTHOPHORA, *Latr.*1. *Anthophora zonata*, *Linn. Syst. Nat.* i. 955.*Hab.* Bachian; Dory; Celebes; Aru; Borneo; Ceylon; India; Java; Hong-Kong; Shanghai; Philippine Islands.2. *Anthophora elegans*, *Smith, Proc. Linn. Soc.* iii. 135.*Hab.* Amboyna; Key Island.Fam. PROCTOTRUPIDÆ, *Steph.*Gen. EPYRIS, *Westw.*1. *EPYRIS ERRATICUS*. *E. niger*; capite thoraceque fortiter punctatis; tibiis tarsisque obscure ferrugineis, alis fuscis.*Female.* Length  $2\frac{3}{4}$  lines. Black; the head oblong, transverse behind, with the lateral angles rounded, with scattered strong punctures; the eyes large, ovate, placed forwards at the sides of the head; the antennæ fulvous beneath, 13-jointed. Thorax oblong, shining, and with strong distant punctures; the metathorax quadrate, truncate, and having three longitudinal carinæ not extending to the verge of the truncation, between the carinæ roughly striated transversely, beyond which the striation is much finer; the wings fuscous; the tibiæ and tarsi obscurely ferruginous. Abdomen very smooth and shining; the apex and also the ovipositor rufo-testaceous.*Hab.* Dory.

This, I believe, is the first species of the genus which has been discovered out of Europe.

Fam. TENTHREDINIDÆ, *Leach.*Gen. CRYPTOCAMPUS, *Hartig.*1. *CRYPTOCAMPUS NIGRIPES*. *C. niger*; pedibus ferrugineis; tibiis apice tarsisque nigris; alis fuscis basi hyalinis.*Female.* Length 3 lines. Black and shining; the anterior femora, tibiæ, and base of the tarsi, and the intermediate femora and base of the tibiæ, ferruginous; the wings hyaline at their base and brown at their apex, with a violet iridescence.*Hab.* Dory.Gen. SELANDRIA, *Leach.*1. *SELANDRIA DORYCA*. *S. cærulea*; antennis pedibusque nigris; alis fuscis iridescentibus.*Female.* Length 4 lines. Head, thorax, and abdomen blue; the antennæ and legs black; the wings dark brown, with purple or violet iridescence; the legs and antennæ very pubescent.*Hab.* Bachian.

Gen. Oryssus, *Fabr.*

1. *Oryssus maculipennis*, *Smith, Proc. Linn. Soc.* iii. 177.

*Hab.* Bachian; Aru.

Gen. XYPHIDRIA, *Latr.*

1. *XYPHIDRIA LÆVICEPS*. *X.* nigra, albo maculata, tibiis tarsisque basi albis; alis hyalinis et iridescentibus.

*Female.* Length 5 lines. Black; the head smooth and shining above, with longitudinal curved striæ in front of the ocelli; the thorax opaque and rugose anteriorly, with a transverse irregular striation; the abdomen slightly shining. The cheeks, and a slightly interrupted narrow line on the hinder margin of the vertex, the mandibles, face anteriorly, inner orbit of the eyes, and ten apical joints of the antennæ, yellowish-white; the pale line on the inner orbit of the eyes passes a little above the ocelli, and then turns inwards to each lateral ocellus. Thorax: a spot on each side anteriorly, the scutellum, the base of the tibiæ, and of the intermediate and posterior tarsi, as well as the coxæ, white; the wings hyaline and iridescent. Abdomen: two oblique lines on the basal segment, an oblong spot at the extreme lateral margin of the second, a small ovate one on the fifth and sixth, an interrupted fascia on the eighth, and the tip of the apical segment, white; beneath rufo-piceous.

*Hab.* Ambyona.

Fam. EVANIDÆ, *Leach.*Gen. EVANIA, *Fabr.*

1. *Evania lævigata* (*Latr.*), *Westw. Mon. Evan. &c., Trans. Ent. Soc.* iii. 241.

*Hab.* Cape of Good Hope; Australia; Dory (New Guinea); Egypt; Greece; Sardinia; Coromandel; Mexico; Brazil; St. Vincent.

Gen. MEGISCHUS, *Brullé.*

1. *Megischus coronator*, *Fabr. Syst. Piez.* p. 118, ♀.

*Hab.* Bachian; Dory; Amboyna.

2. *MEGISCHUS TARSALIS*. *M.* niger, pedibus anticis et intermediis ferrugineis, tarsis posterioribus rubris, alis subhyalinis.

*Female.* Length 9 lines. Black; the head coarsely sculptured, on the face transversely so; the front with a transverse ridge, before which are two acute tubercles touching the eyes, and a central, more elevated one, a little in advance. The thorax coarsely punctured, the prothorax forming an elongated neck; the anterior and intermediate legs ferruginous; the dilated apical portion of the posterior tibiæ and the tarsi bright ferruginous; the posterior coxæ rugose, the femora bidentate;

wings fuscous, the nervures dark brown. Abdomen: the ovipositor the length of the body; the basal segment or petiole finely striated transversely, the following segments smooth and shining; the ovipositor with a wide fascia of white a little before the apex.

*Hab.* Bachian.

This species differs from *M. coronator* in the form and situation of the tubercles on the front of the head; the neck is much longer and more slender; the ovipositor is as long as, but not longer than, the body.

3. *MEGISCHUS VIDUUS*. *M. niger*; capite et antennarum basi rufis; thoracæ rugosæ; alis fuscis.

*Male.* Length 13 lines. Black; the head blood-red; above, with deep curved striæ and three prominent tubercles, the central one the longest, and placed in advance of the lateral ones; before the tubercles with semicircular striæ; the scape of the antennæ and the mandibles ferruginous, the latter black at their tips. Thorax: the prothorax transversely grooved; the meso- and metathorax with large shallow punctures, the scutellum smooth and shining; the wings fuscous, the nervures dark brown; the anterior and intermediate tibiæ, tarsi, and tips of the femora, obscurely ferruginous; the articulations of the posterior legs and the tarsi rufo-piceous; the coxæ transversely rugose; the femora with two large teeth beneath and a number of minute ones between them. Abdomen smooth and shining; the ovipositor finely striated transversely towards the base.

*Hab.* Kaisaa.

This may possibly be the male of *M. coronator*, but, as it comes from a locality where that species has not yet been discovered, and as they differ in several particulars, I have not ventured to unite them.

#### GEN. *CRYPTUS*, *Fabr.*

1. *CRYPTUS SICARIUS*. *C. ferrugineus*; abdomine nitido; antennis apice fasciis; alis hyalinis, fusco fasciatis.

*Female.* Length 7 lines. Ferruginous; the antennæ as long as the body, and, beyond the fourteenth joint, fuscous; the face of a reddish-yellow. The metathorax bituberculate, a slight carina running from each tubercle to the base of the metathorax, and another to the insertion of the abdomen. Wings hyaline with a yellow tinge, and a broad fuscous fascia towards their apex. Abdomen shining and petiolated.

*Var.* The fuscous fascia extending to the apex of the wing.

*Hab.* Dory; Bachian.

The variety is from Bachian.

#### GEN. *MESOSTENUS*, *Grav.*

1. *MESOSTENUS MOLESTUS*. *M. niger*; antennis medio albis; capite thoracæque flavo punctatis; abdominis marginibus flavo fasciatis; alis hyalinis.

*Female.* Length 7 lines. Black; the inner orbit of the eyes, the clypeus, a spot on the mandibles, and a broad stripe behind the eyes, yellowish-white; the 7-14 joints of the antennæ white with a black line beneath. Thorax: an oblique spot before the wings, a spot on the disk of the mesothorax, the scutellum, the postscutellum, and an oblique line on each side before it, a spot in the middle of the mesothorax, and two short spines at its apex, yellowish-white; the sides of the thorax, the coxæ and trochanters, spotted with white; the legs rufo-fuscous, with their articulations paler. Abdomen: the three basal segments with yellowish-white marginal fasciæ; the apical segment with a narrow fascia; the metathorax rugose, and the second segment of the abdomen closely and finely punctured; the wings hyaline; the nervures black.

*Hab.* Bachian.

Gen. PIMPLA, *Fabr.*

1. PIMPLA FORMOSA. *P. rufo-ferruginea, flavo varia*; antennis strigisque tribus mesothoracis nigris; abdominis segmentis flavo marginatis; alis hyalinis, apice fusco maculato.

*Female.* Length 8 lines. Rufo-ferruginous; the scape in front and the head yellow; the region of the ocelli, and a transverse oval spot in front of them, black; the flagellum black, with the extreme apex and two basal joints rufo-piceous. The mesothorax with three broad black longitudinal stripes; the scutellum, postscutellum, a spot beneath the wings, and the anterior and intermediate coxæ in front, yellow; the wings hyaline, with a dark fuscous spot at the apex of the marginal cell, and extending a little beyond it. Abdomen closely punctured, with a yellow fascia on the apical margin of the first five segments; the sixth has an interrupted fascia; the ovipositor short and black.

*Hab.* Bachian.

This insect closely resembles *P. plagiata*, described in the paper on the Hymenoptera of ARU; but I think it differs in too many particulars to be considered a variety of that species.

2. PIMPLA FLAVICEPS. *P. ferruginea*; antennis nigris; capite luteo; alis fuscis, dimidio basali flavo-hyalinis.

*Female.* Length 6½ lines. Ferruginous, with the head yellow; the antennæ blackish, with the scape in front and the apex beneath more or less ferruginous. Thorax very smooth and shining above; the legs rather paler than the body. Wings dark brown; their base flavo-hyaline nearly to the apex of the externo-medial cell. Abdomen punctured; each segment with an deep oblique depression on each side nearly uniting in the middle of the segment; the ovipositor black.

*Hab.* Bachian.

3. *PIMPLA INTEGRATA*. *P. rufo-flava*; thorace punctis 4; abdominis segmentis punctis 12 nigris.

*Female*. Length  $6\frac{1}{2}$  lines. Reddish-yellow; the antennæ and a spot on the vertex, enclosing the ocelli, black; the scape in front ferruginous; the flagellum beneath obscurely fulvous. Thorax: two V-shaped spots on the mesothorax, and a small transverse spot on each side of the metathorax, above, near its base, black. Wings hyaline; the tips of the claws of the tarsi and the pulvillus between them black. Abdomen: the first two segments shining and distantly punctured; the following segments closely punctured; a transverse slightly curved impressed line on each segment near its apical margin; the first and four following segments with a black ovate spot on each side, placed transversely; the seventh with two placed longitudinally.

*Hab.* Bachián.

This species, although distinct from, is closely allied to *P. crassipes* of Brullé.

4. *PIMPLA PLACIDA*. *P. flava*, lævigata, nitida; antennis strigisque tribus mesothoracis nigris; alis hyalinis iridescentibus.

*Female*. Length  $5\frac{1}{4}$  lines. Yellow; the abdomen with a ferruginous tinge; the antennæ, the region of the ocelli, and a spot on the head behind, black; the scape, basal joint of the flagellum in front, and the mandibles, yellow, the latter tip with black; the disk of the mesothorax with three longitudinal black stripes which are united at the base of the scutellum. The wings hyaline and iridescent. The segments of the abdomen with lateral oblique depressions.

*Hab.* Bachián.

Brullé has described two species of *Pimpla* from Australia, and one from the Mauritius, all agreeing with the present species in having three black lines on the mesothorax, as well as in general colouring; but their punctation and other particulars separate them from *P. placida*.

#### Gen. RHYSSA, Grav.

1. *Rhyssa fasciata* (maculipennis), *Smith, Proc. Linn. Soc.* iii. 173.

The name "*maculipennis*," as cited above, must be changed to *fasciata*, the same specific name having been used for a species of *Rhyssa* from Borneo. (See *Linn. Proc. Zool.* vol. ii. p. 120.)

#### Gen. OPHION, Fabr.

1. *OPHION VITTATOR*. *O. rufo-ferrugineum*; capite postice flavo; mesothorace linea media fusca; abdomine nigro-fusco.

*Female*. Length 10 lines. Head and thorax rufo-ferruginous; the face and back of the head yellow; the antennæ ferruginous. The thorax beneath and at the sides black; the mesothorax has a central broad longitudinal stripe which runs to the apex of the scutellum; the sides

of the thorax striated; the wings hyaline; the nervures ferruginous; the first submarginal cell with a semicircular colourless space near its apex marked on one side with a dark line; the legs pale ferruginous, their coxæ black. The abdomen dark rufo-fuscous, with the two basal segments black; the abdomen covered with a dense griseous pile.

*Hab.* Baehian.

This species may possibly be a variety of *O. univittatus* of Brullé.

2. *OPHION UNICOLOR.* *O. rufo-ferrugineum*; metathorace areuate striato; alis hyalinis.

*Female.* Length 10 lines. Rufo-ferruginous; the mesothorax and scutellum very smooth and shining; wings hyaline and iridescent, the nervures rufo-fuscous; the metathorax with a divergent arcuate striation; abdomen smooth and shining.

*Hab.* Baehian.

3. *OPHION INSINUATOR.* *O. rufo-ferrugineum*; abdominis apice fusco; metathorace oblique striato.

*Female.* Length 8 lines. Rufo-ferruginous; the face reddish-yellow; the legs rather paler than the body; the wings hyaline and iridescent; the nervures fuscous; the mesothorax and scutellum smooth and shining; the metathorax with strong even striæ, which diverge obliquely from the centre; the third and following segments of the abdomen rufo-fuscous.

*Hab.* Kaisaa.

#### Fam. BRACONIDÆ, *Westw*

##### Gen. BRACON, *Fabr.*

1. *Bracon tricolor*, *Guér. Voy. Coq. Zool.* ii. 199.

*Hab.* Dory.

2. *BRACON JACULATUS.* *B. niger*; capite, thorace, pedibusque anticis et intermediis ferrugineis; alis nigris.

*Female.* Length 7 lines. The head, the pro- and mesothorax, the scutellum, postscutellum, and the anterior and intermediate legs ferruginous; the flagellum, intermediate coxæ and trochanters, posterior legs, metathorax, and abdomen black; the wings nigro-fuscous. The head and thorax smooth and shining; the metathorax with a central diamond-shaped impression, and an impressed line on each side of it. Abdomen rugose; the basal segment with a central and lateral impressed line; the second segment with two central longitudinal and lateral oblique carinæ; the fifth and following segments smooth and shining; the ovipositor a little longer than the body.

*Hab.* Baehian.

3. *BRACON QUADRICEPS.* *B. rufescenti-flavus*; antennis, tibiis, tarsisque posticis nigris; alis nigro-fuscis, macula hyalina.

*Female.* Length  $7\frac{1}{2}$  lines. Reddish-yellow, smooth and shining; the

head quadrate, with the angles rounded; the antennæ black; the wings very dark brown, shining and iridescent; the posterior tibiæ outside and the tarsi black; the basal segment of the abdomen with an abbreviated impressed line in the middle, and another on each side extending to its apical margin; the ovipositor twice the length of the insect.

*Hab.* Bachian.

Gen. AGATHIS, *Latr.*

1. AGATHIS ATROCEPHALUS. *A. rufescenti-flavus*; capite antennisque nigris; alis nigro-fuscis, basi flavo-hyalinis.

*Male.* Length 6 lines. Reddish-yellow; the head and antennæ black; the head strongly punctured; a deep fossulet on each side of the clypens; the mandibles and palpi pale. Thorax shining above; the metathorax with fine longitudinal carinæ, the central one expanding in the middle, and enclosing a minute diamond-shaped space; between the striæ are a number of transverse carinæ; the legs densely clothed with short pale pubescence, the posterior pair inerassate; the wings dark fuscous, with not quite the basal half flavo-hyaline. Abdomen smooth and shining.

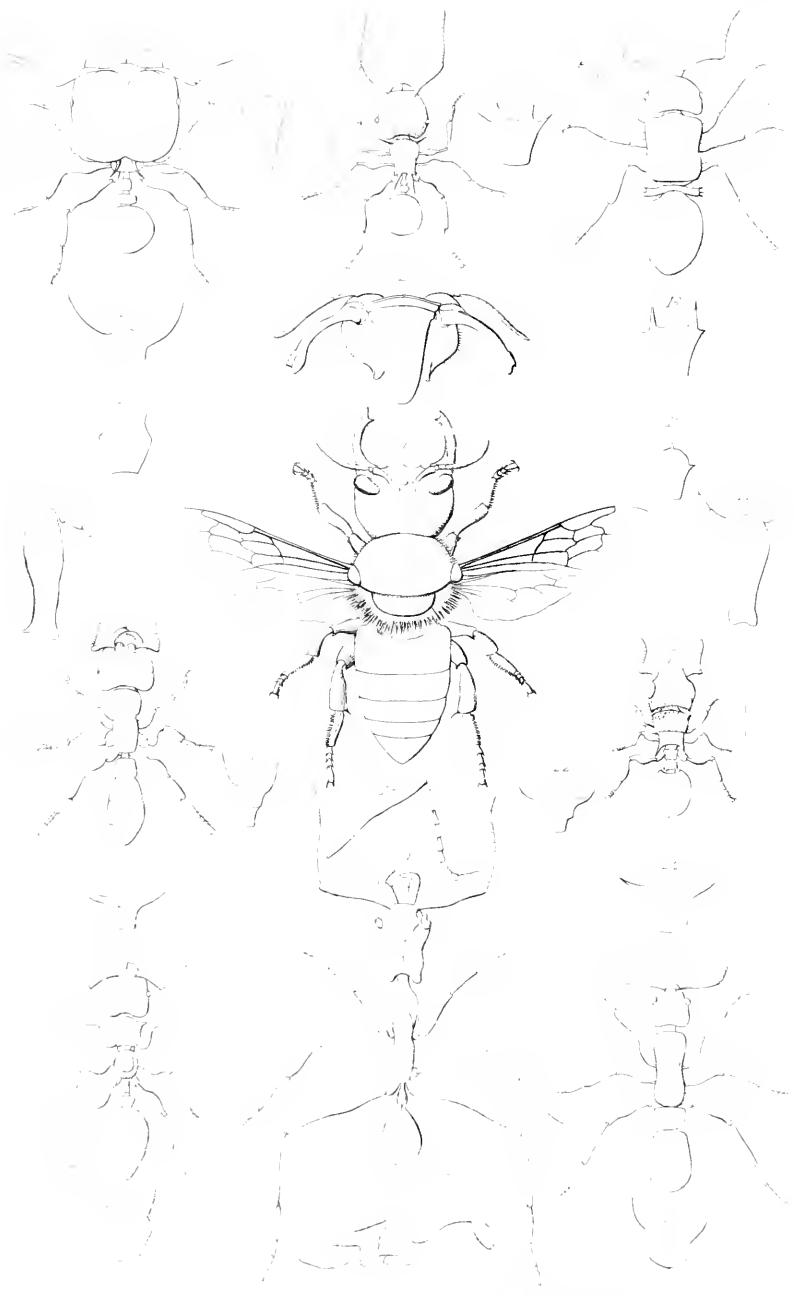
*Hab.* Bachian.

Gen. XYLONOMUS, *Grav.*

1. XYLONOMUS FRACTICORNIS. *X. nigro-chalybeus*; capite albo notato; thorace supra maenlis tribus albidis, metathorace dorso quadricarinato; abdominis segmento basali pallido, secundo apice binotato, sequentibus apice pallido fasciatis; pedibus ochraceis; tarsis postice pallidis.

*Female.* Length  $7\frac{1}{2}$  lines. Steel-blue, inclining to deep purple on the abdomen; the head, below the insertion of the antennæ, a semicircular spot above, on each side of the face, touching the inner orbit of the eyes, and a broad stripe behind them, white; the eleven basal joints of the antennæ black, the third and fourth with a white line at the outside; the four following joints white, the rest of the apical joints black; the apex of the eighteenth joint with two blunt spines at the apex outside; the apex hollowed out obliquely for the reception of the nineteenth joint, which is attenuated at its base and geniculated; this and the following joints forming, as it were, a second antenna. Thorax: the scutellum, postscutellum, tegulæ, and a spot beneath the wings, white; wings hyaline and iridescent; the legs pale ferruginous; the posterior tibiæ dusky, and the tarsi white; the claw-joint of all the tarsi black. Abdomen: the basal segment, or petiole, pale testaceous, with a blunt spine on each side of its insertion; the second segment with two white spots at its apex; the third and penultimate segment with an emarginate apical white marginal







fascia; the other segments with interrupted fasciæ; the ovipositor as long as the body.

*Hab.* Bachian.

This is the most remarkable species of *Ichneumon* with which I am acquainted: the extraordinary geniculation of the antennæ near its apex is the only instance of the kind that I have seen. By some, this might be regarded as being of generic value. The difference of form in antennæ in the same genus has, however, several parallels; I may instance the genus *Prosopis* amongst the *Apidæ*. In the form of the head, the tarsi, wings, and general contour of the body, this is a true *Xylonomus*.

#### EXPLANATION OF PLATE I.

*Fig.* 1. *Megachile Pluto*.

2. Front view of the head of ditto, with mandibles opened to show the labrum.
3. *Pheidole notabilis*, worker major.
4. Ditto, worker minor.
5. *Echinopla pratexta*.
6. *Amblyopone castanea*.
7. *Cataulacus setosus*.
8. *Podomyrma silvicola*.
9. *Odontomachus sævissimus*.
10. *Mesoxena mistura*.
11. Maxilla and maxillary palpi of *Æcophylla smaragdina*.
12. Labium and labial palpi of ditto.
13. Antenna of ditto.
14. Scale of the petiole of *Polyrhachis Charaxis*.
15. Ditto of *P. Busiris*.
16. Ditto of *P. Acantha*.
17. Ditto of *P. Merops*.
18. Ditto of *P. Ithonus*.
19. Ditto of *P. Eudora*.
20. Ditto of *P. Metella*.
21. Side view of *P. Metella*.
22. Scale of the petiole of *P. Atropos*.
23. Ditto of *P. Acasta*.
24. Ditto of *P. Alphenus*.
25. Ditto of *P. Sabella*.
26. Ditto of *P. ferrens*.

All the figures are considerably magnified representations of the insects, except that of *Megachile Pluto*, which is of the natural size.

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

[Read January 19th, 1860.]

Fam. BIBIONIDÆ, *Haliday*.

Gen. PLECIA, *Hoffmansegg*.

1. *Plecia dorsalis*, *Walk.* See vol. i. p. 5.

Fam. CULICIDÆ, *Haliday*.

Gen. CULEX, *Linn.*

2. *CULEX IMPRIMENS*, n. s. *Fam.* Ferruginous, proboscide palpisque nigricantibus, antennis basi ochraceis, abdomine linea testacea, suturis ventreeque testaceis, pedibus testaceis, tarsis fuscis albido fasciatis, alis cinereis.

*Female.* Ferruginous. Palpi and proboscis blackish; the latter straight, a little longer than the thorax. Antennæ ochraceous at the base. Thorax with testaceous tomentum. Abdomen with a testaceous line and testaceous sutures above; under side testaceous. Legs testaceous, long; tarsi brown, the joints whitish at the base. Wings cinereous; veins brown, slightly fringed. Length of the body 3 lines; of the wings 5 lines.

3. *CULEX VENTRALIS*, n. s. *Fam.* Fuscus, capite albo notato, abdomine fasciis latis ventralibus caudidis, pedibus cupreo et purpurascete nitentibus, alis subcinereis.

*Female.* Brown. Head marked with white above. Proboscis straight, very little longer than the thorax. Abdomen with broad pure white ventral bands; legs with cupreous and purplish tomentum. Wings greyish; veins black, fringed. Length of the body 3 lines; of the wings 5 lines.

Fam. TIPULIDÆ, *Haliday*.

Gen. LIMNOBIA, *Meigen*.

DIV. NOV.

No discal areolet; subcostal, radial, cubital, and the three externo-medial veins not forked; subanal and anal veins distinct; the usual veinlet between the 2nd and 3rd externo-medial veins.

4. *LIMNOBIA VITTIFRONS*, n. s. *Fam.* Ochracea, gracilis, capite nigro vittato, antennis nigris albido fasciatis basi testaceis, thorace guttis quatuor nigricantibus, abdomine fasciis septem fuscis, pedibus longissimis gracillimis, tarsis nigricantibus, alis limpidis, halteribus nigris.

*Female.* Ochraceous, slender. Head with a black stripe on the vertex. Antennæ black, nearly as long as the thorax; joints whitish towards the tips; 1st and 2nd joints testaceous. Thorax with two blackish dots on each side; pectus pale testaceous. Abdomen with seven broad brown bands; the 1st and the 7th abbreviated on each side. Legs very long and slender; tarsi blackish. Wings limpid; veins black, testaceous towards the base; halteres black. Length of the body 8 lines; of the wings 14 lines.

Gen. TIPULA, *Linn.*

5. TIPULA FUMIFINIS. *Mas.* Ochracea, capite nigro vittato, antennis nigris basi ochraceis, thorace vittis tribus diffusis fuscis vittaque postica obscuriore magis concisa, abdomine apicem versus fusco maculis lateralibus pallidis, pedibus nigris, femoribus ochraceis apice nigris, alis limpidis, costa venisque apicalibus nigricante marginatis, halteribus testaceis apice nigris.

*Tipula longicornis*, *Dol. Nat. Tijd. Ned. Ind.* 1858.

Ochraceous. Head with a black stripe. Antennæ black, much shorter than the thorax; sutures of the joints whitish; 1st and 2nd joints ochraceous. Thorax with three diffuse brown stripes; hind part with a darker and more concise stripe. Abdomen brown towards the tip; a pale spot on each side of the fore border of the 4th and following segments. Legs black, long, stout; femora ochraceous with black tips. Wings limpid, blackish along the costa and about the terminal veins; discal areolet hexagonal; radial and cubital veins slightly curved, springing from a common petiole which proceeds from the angle of the discal areolet; halteres testaceous, with black knobs. Length of the body 10 lines; of the wings 16 lines.

Fam. STRATIOMIDÆ, *Haliday.*

Gen. PTILOCERA, *Wied.*

6. *Ptilocera quadridentata*, *Wied.* See vol. i. p. 7.

Gen. HERMETIA, *Latr.*

7. HERMETIA RUFIVENTRIS, n. s. *Fem.* Nigra, capite supra lurido, antennis basi fulvis, thorace fasciis tribus tomentosiss subauratis, scutello lurido, abdomine rufo aurco-tomentoso basi nigro, segmento 2<sup>o</sup> albido semihyalino, femoribus apice rufescentibus, tibiis tarsisque testaceis, illis nigricante strigatis, alis nigricantibus basi cinereis, halteribus testaceis apice pomaccis.

*Female.* Black. Head with cinereous pubescence, somewhat lurid above. Antennæ tawny towards the base; flagellum very elongate fusiform. Thorax with three slight gilded tomentose bands, the

middle one more distinct than the others; scutellum lurid. Abdomen red, with gilded tomentum, black at the base; second segment dingy whitish, semihyaline. Femora reddish towards the tips; tibiæ and tarsi testaceous; the former with a blackish streak on each side. Wings blackish, cinereous at the base; veins black; halteres testaceous, with apple-green knobs. Length of the body 6 lines; of the wings 10 lines.

Gen. SARGUS, *Fabr.*

8. SARGUS QUADRIFASCIATUS, n. s. *Mas.* Fulvus, antennis testaceis, articulo 3<sup>o</sup> subrotundo, arista nigra, abdomine subelavato fasciis quatuor nigris, tibiis tarsisque nigricantibus, alis cinereis, stigmatibus halteribusque nigris.

*Male.* Tawny. Head cinereous beneath, mouth and antennæ testaceous; 3rd joint of the latter nearly round; arista black. Abdomen subelavate, about twice the length of the thorax, with four black bands. Tibiæ and tarsi blackish. Wings grey; veins, stigma, and halteres, black. Length of the body 4 lines; of the wings 8 lines.

9. *Sargus mactans.* *Walk.* See vol. iv. p. 97.

Fam. TABANIDÆ, *Leach.*

Gen. CHRYSOPS, *Meigen.*

10. *Chrysops dispar,* *Fabr.* See vol. i. p. 9.

Fam. ASILIDÆ, *Leach.*

Gen. LAPHRIA, *Fabr.*

11. LAPHRIA TRISTIS. *Fam.* Cupreo-nigra, capite nigro, facie argentea, antennarum articulo 3<sup>o</sup> longi-fusiformi, pectore niveo, abdomine cupreo-purpureo, pedibus cyanescente nigris crassis, alis nigricantibus basi cinereis, halteribus piceis.

*Laphria tristis,* *Dol. Nat. Tijds. Ned. Ind.* 1857, p. 398.

*Female.* Cupreous black, with black down and bristles. Head black, with silvery-white pile on each side of the face, and with cinereous hairs beneath; mystax with several long black bristles. Third joint of the antennæ elongate-fusiform. Pectus shining white. Abdomen cupreous purple. Legs bluish-black, thick. Wings blackish, grey at the base, veins black; halteres piceous. Like *L. scapularis* in structure. Length of body 8 lines; of the wings 15 lines.

12. LAPHRIA COMPTA, n. s. *Fam.* Læte cyanea, gracilis, capite aurato, facie ochraceo fasciata. antennarum articulo 3<sup>o</sup> fusiformi, tho-

race antico pectoreque argenteo-albidis, abdomine cylindrico maculis lateralibus trigonis albidis, pedibus robustis viridi aut purpureo variis albo pilosis, tibiis anticis subtus fulvo tomentosus, alis cinereis basi limpidis, halteribus albidis.

*Female.* Structure like that of the preceding species. Bright metallic blue, slender. Head gilded, silvery-cinereous behind and beneath, with a broad ochraceous band on the face; mystax with a few long, slender black bristles. Proboscis and antennæ black; 3rd joint of the latter fusiform. Thorax in front and pectus silvery whitish. Abdomen cylindrical; segments with whitish triangular spots on the sides of the hind borders, which are whitish beneath. Legs stout, partly green or purple, with white hairs and black bristles; fore tibiæ with tawny tomentum beneath. Wings cinereous, limpid towards the base; veins black; halteres whitish. Length of the body  $5\frac{1}{2}$  lines; of the wings 10 lines.

13. *Laphria socia*, *Walk.* See vol. iii. p. 84.

*Laphria Kollari*, *Dol. Nat. Tijd. Ned. Ind.* 1857, p. 396.

14. *Laphria Taphius*, *Walk. Cat. Dipt. Brit. Mus.* 2. 380.

Inhabits also the Philippine Islands.

15. *Laphria comes*, *Walk.* See vol. iii. p. 85.

16. *LAPHRIA AMPLA*, n. s. *Fam.* Nigra, obscura, latiuscula, capite aurato, antennarum articulo 3<sup>o</sup> sublanceolato, maculis duabus humeralibus pectoreque aureo tomentosus, abdomine lineari segmentis 1<sup>o</sup>, 2<sup>o</sup>, 3<sup>o</sup>que ochraceo fasciatis, pedibus rufis crassis aurato pilosis, alis nigricantibus basi cinereis, halteribus albidis.

*Female.* Black, dull, rather broad. Head brightly gilded, with gilded hairs; mystax with a few black bristles. Third joint of the antennæ somewhat lanceolate, nearly twice the length of the 1st and 2nd together. Two humeral spots on the thorax and pectus, with gilded tomentum. Abdomen linear; 1st, 2nd, and 3rd segments with orange bands on the hind borders. Legs red, thick, with gilded hairs and bristles. Wings blackish, cinereous at the base; veins black; halteres whitish. Var.  $\beta$ . Abdomen wholly black. Length of the body 8 lines; of the wings 16 lines.

17. *LAPHRIA PUER.* *Fam.* Testacea, cinereo pilosa, capite aurato, antennarum articulo 3<sup>o</sup> fusiformi apice nigro, pedibus sat robustis non incrassatis, alis subcinereis, venis nigris basi testacis.

*Laphria puer*, *Dol. Nat. Tijd. Ned. Ind.* 1858.

*Female.* Testaceous, with pale cinereous hairs. Head with pale gilded tomentum. Mystax with a few pale bristles; epistoma quite flat.

Proboscis tawny. Third joint of the antennæ fusciform, its apical half black. Legs rather stout, not incrassated. Wings slightly greyish; veins black, of the usual structure, testaceous at the base. Length of body  $3\frac{1}{2}$  lines; of the wings 7 lines.

Gen. OMMATIUS, *Ill.*

18. *Ommatius noctifer*, *Walk.* See vol. ii. p. 88.  
*Ommatius minor*, *Dol. Nat. Tijl. Ned. Ind.* 1857, p. 394.

Fam. LEPTIDÆ, *Westw.*

Gen. LEPTIS, *Fabr.*

19. *Leptis ferruginosa*, *Wied.* See vol. i. p. 118.

Fam. BOMBYLIDÆ, *Walk.*

Gen. ANTHRAX, *Meig.*

20. *Anthrax Pelops*, *Walk.* See vol. ii. p. 90.
21. ANTHRAX DEVECTA, n. s. *Fam.* Cinerea, capite antico lurido. thorace pilis fulvis, scutello rufo, abdomine nigro, fasciis tomentosis interruptis pallide flavescentibus fasciisque duabus subapicalibus interruptis albis, pilis lateralibus nigris basi flavescentibus, disco antico fasciaque postica ventralibus albis, alis cinereis fulvo lineatis disco nigricantibus.
- Group of *A. Tantalus*. *Female.* Cinereous. Head lurid in front and about the mouth. Antennæ black; 3rd joint lanceolate. Thorax with tawny hairs in front and on each side; pectus whitish, with yellowish hairs on each side; scutellum red. Abdomen black, with pale yellowish tomentose interrupted bands; the last two segments with interrupted white bands; sides with black hairs except at the base, where the hairs are pale yellowish; underside with a white disk towards the base, where the hairs are white on each side; a white band hindward. Legs black. Wings grey, blackish in the disk, tawny at the base, along the costa, and along some of the veins; halteres testaceous. Length of the body 7 lines; of the wings 16 lines.
22. ANTHRAX EMITTENS, n. s. *Fam.* Nigra, antennarum articulo 3<sup>o</sup> brevissimo, pectore cinereo pilis albidis, abdomine fasciulis quatuor lateralibus, fasciis ventralibus albido pilosis, alis angustis, costa dimidioque basali nigris, halteribus apice nivis.
- Group of *A. degenera*. *Female.* Black. Head cinereous behind, white about the eyes. Third joint of the antennæ very short. Pectus cinereous, with whitish hairs. Abdomen clothed with black hairs,



with a tuft of white hairs on each side at the base, and with another on each side near the tip; under side with bands of whitish hairs on the hind borders of the segments. Wings narrow, black on nearly half the length from the base and along nearly the whole length of the costa; fore fork of the cubital vein forming an almost right angle, which emits a long stump; halteres with snow-white tips. Length of the body  $3\frac{1}{2}$  lines; of the wings 8 lines.

23. *Anthrax prætendens*, *Walk.* See vol. iv. p. 111.

24. *Anthrax aterrima*, *Dol. Nat. Tijd. Ned. Ind.* 1858.

*A. proferens*, *Walk.* See vol. iv. p. 113.

### Fam. EMPIDÆ, *Leach.*

#### Gen. EPICEIA, n. g.

*Mas*, *Hyboti* affinis. *Caput* thorace non angustius. *Oculi* magni, connexi, supra plani. *Antennæ* brevissimæ; articulus 3<sup>us</sup> brevi-conicus; arista longissima, gracillima. *Abdomen* lineare, thorace multo longius et angustius. *Pedes* postici incrassati, femoribus subtus spinosis.

Allied to *Hybos*. *Male*. Head as broad as the thorax. Eyes large, connected, flat above. *Antennæ* very short; 3rd joint short, conical; arista very long and slender. *Abdomen* linear, much longer and narrower than the thorax. Hind legs incrassated, with the femora spinose beneath. Wings with the veins much like those of *Hybos* in structure, but with the præbrachial vein inclined exteriorly towards the cubital.

25. EPICEIA FERRUGINEA, n. s. *Mas*. Ferruginea, antennis nigris basi testaceis, abdomine nigro basi ferrugineo, pedibus anterioribus testaceis coxis nigris, pedibus posticis nigris, alis cinereis apud costam nigricantibus, halteribus testaceis.

*Male*. Ferruginous. Eyes large, connected, flat above. *Antennæ* black, testaceous at the base. *Abdomen* black, ferruginous at the base. Anterior legs testaceous, with black coxæ; hind legs black. Wings dark grey, blackish along the costa; veins black; halteres testaceous. Length of the body 3 lines; of the wings 6 lines.

### Fam. DOLICHOPIDÆ, *Leach.*

#### Gen. PSILOPUS, *Meig.*

26. PSILOPUS PERSUADENS, n. s. *Mas*. Smaragdinus, capite supra purpurascente-cyaneo antice albo, antennis nigris basi testaceis, arista thoracis longitudine, thorace vittis tribus cupreis, abdomine cyanescente viridi, lateribus albis fasciis cupreo-nigris, pedibus albidis, femoribus posticis apice tibiis posticis basi tarsisque nigris, alis cinereis fascia subapicali nigricante postice abbreviata.

*Male.* Bright emerald green. Head shining white in front; disk of the vertex purplish blue. Proboscis testaceous. Antennæ black, testaceous towards the base; 3rd joint lanceolate; arista about as long as the thorax. Thorax with three cupreous stripes; pectus shining white. Abdomen bluish green, white on each side, with broad black bands, which are partly cupreous on each side. Legs whitish; tarsi, hind femora towards the tips, and hind tibiæ towards the base, black. Wings grey, with an irregular subapical blackish band, which is abbreviated hindward; fore branch of the præbrachial vein curved inwards; discal transverse vein deeply undulating. Length of the body  $5\frac{1}{2}$  lines; of the wings 8 lines.

27. *PSILOPUS PERFICIENS*, n. s. *Fam.* *Cyaneus, latiusculus*, capite purpureo, antennis pedibusque nigris, arista thoracis longitudine, thorace vittis tribus cupreo-viridibus, abdomine viridi, alis cinerascenscentibus.

*Female.* Blue, rather broad. Head purple, silvery in front. Antennæ black, with four setæ; 3rd joint lanceolate; arista as long as the thorax. Thorax with three bright cupreous-green stripes; the middle one with a purple tinge along each side. Pectus silvery. Abdomen green. Legs black. Wings greyish; fore branch of the præbrachial vein scarcely curved; discal transverse vein nearly straight; halteres black. Length of the body 3 lines; of the wings 6 lines.

28. *PSILOPUS SUPERANS*, n. s. *Mas.* *Læte viridis*, capite supra purpureo, antennis nigris brevissimis, arista thoracis fere longitudine, thorace vitta cuprea, abdomine cupreo basi cyaneo-viridi fasciis aurato-*viridibus suturis nigris*, pedibus obscure fulvis, alis cinerascenscentibus.

*Male.* Bright green. Head broader than the thorax, purple above. Antennæ black, very short; arista hardly shorter than the thorax. Thorax with a cupreous stripe; pectus with very slight whitish tomentum. Abdomen cupreous, much narrower than the thorax, bluish green at the base, with golden-green bands; sutures black. Legs dull tawny. Wings greyish; veins black; fore branch of the præbrachial vein forming a rounded but very abrupt angle, straight from thence to its tip; discal transverse vein straight. Length of the body 2 lines; of the wings  $3\frac{3}{4}$  lines.

### Fam. PIPUNCULIDÆ, *Curt.*

#### Gen. PIPUNCULUS, *Latr.*

29. *PIPUNCULUS AMBOINALIS*, n. s. *Mas.* *Testaceus*, antennis piceis, abdomine atro fasciis albido-cinereis, femoribus apices versus nigris, alis longis cinerascenscentibus, vena præbrachiali angulata furcata, halteribus albidis.

*Male.* Testaceous. Head with white tomentum. Antennæ piceous.

Abdomen deep black, with a whitish grey band on the hind border of each segment; tip wholly whitish-grey. Legs pale testaceous; coxæ black; femora black on the apical half; tarsi with black tips. Wings long, greyish; veins black; præbrachial vein forming an angle which emits a fork; halteres whitish. Length of the body 3 lines; of the wings 8 lines.

Fam. SYRPHIDÆ, *Leach.*

Gen. CERATOPHYA, *Wied.*

30. CERATOPHYA INDICA. *Fam.* Testacea, capite maculis tribus nigris, antennis fulvis articulo 3<sup>o</sup> longissimo, thoracis disco nigro, abdomine lituris tribus faseiis duabus latis apiceque nigris, alis subcinereis apice subnigricantibus, areola subapicali ex parte bisecta.

*Ceratophya Indica*, *Dol. Nat. Tijd. Ned. Ind.* 1857, p. 404.

*Female.* Testaceous. Head with a black spot on each side of the vertex, and with a third black spot at the base of the antennæ. Antennæ tawny; 3rd joint linear, very long. Disk of the thorax black. Abdomen fully twice the length of the thorax; 2nd segment with a triangular black dorsal stripe, and with an elongated black spot in front on each side; 2nd and 3rd segments with broad black bands on their fore borders; tip wholly black. Wings slightly greyish, slightly blackish at the tips; veins black; subapical areolet partly bisected. Length of the body 5 lines; of the wings 8 lines.

Gen. ERISTALIS, *Latr.*

31. *Eristalis Agno*, *Walk. Cat. Dipt.* pt. 3. p. 625.

Inhabits also Australia.

32. *Eristalis splendens*, *Leguillon.* See vol. iii. p. 95.

*Eristalis metallica*, *Dol. Nat. Tijd. Ned. Ind.* 1857, p. 406.

33. ERISTALIS INSCRIPTA. *Mas.* Viridis, nitens, capite antico æneo vittis duabus albo tomentosis, antennis rufis, thorace maculis quatuor lateralibus vittisque tribus nigris, abdomine æneo-viridi faseiis duabus connexis maculisque sex posterioribus nigris, alis limpidis vitta subcostali nigricante, halteribus albidis.

*Eristalis inscripta*, *Dol. Nat. Tijd. Ned. Ind.* 1857, p. 40.

*Male.* Green, shining. Head in front æneous, with a broad stripe of white pile on each side. Eyes with the facets in front more minute than those above. Antennæ red; arista simple. Thorax with three slender middle stripes and with two large black spots on each side; forepart with cinereous bloom; scutellum bluish-green. Abdomen æneous-green; 2nd segment with two black bands which are connected by a broad black stripe; 2nd and 4th segments with three black spots on each. Legs black. Wings limpid, with a blackish subcostal stripe

which extends to the brown stigma; veins black; halteres whitish. Length of the body 5 lines; of the wings 12 lines.

34. *ERISTALIS OBLITERANS*, n. s. *Mas.* Viridescente-nigra, nitens, capite guttis duabus albis, antennis piceis, thorace subæneo, scutello nigricante-cyaneo, abdomine cyanescente-viridi, segmentis 1<sup>o</sup> et 2<sup>o</sup> atris viridi marginatis, fascia interrupta maculaque posterioribus nigris, tibiis anterioribus albo fasciatis, alis limpidis basi nigricante-fuscis, halteribus albidis.

*Male.* Greenish-black, shining. Head with a white dot on each side in front. Eyes as in the preceding species. Antennæ piceous; arista simple. Thorax with an æneous tinge; scutellum blackish-blue. Abdomen bluish-green; 1st and 2nd segments deep black, green along their hind borders; 3rd with a black spot in front, and with an interrupted black band hindward. Legs black; anterior tibiæ with a white basal band. Wings limpid, irregularly blackish-brown towards the base; stigma brown; veins black; halteres whitish. Length of the body 4½ lines; of the wings 11 lines.

Fam. CONOPIDÆ, *Leach.*

Gen. CONOPS, *Linn.*

35. *CONOPS RUFIFRONS*. *Mas.* Rufus, subauratus, capite aurato micante, antennis apice pallidioribus articulo 3<sup>o</sup> lanceolato, thorace nigricante, humeris scutelloque rufis, abdomine clavato segmentis 1<sup>o</sup> et 2<sup>o</sup> nigricantibus, tarsis nigricantibus apice pallidis, alis cinereis apud costam luridis, halteribus testaceis.

*Conops ruffrons*, *Dol. Nat. Tijd. Ned. Ind.* 1857, p. 412.

*Male.* Red, with slight gilded tomentum. Head with bright gilded tomentum on each side in front. Antennæ brighter and paler towards the tips; 3rd joint lanceolate, shorter than the 2nd; 4th and 5th very minute, forming an angle with the 3rd; 6th elongate-conical, terminated by an arista. Thorax blackish; humeri and scutellum red. Abdomen clavate; 1st and 2nd segments blackish. Tarsi blackish, with pale tips. Wings grey, lurid along the costa; veins black; halteres testaceous. Length of the body 6 lines; of the wings 9 lines.

Fam. MUSCIDÆ, *Latr.*

Subfam. TACHINIDES, *Walk.*

Gen. TACHINA, *Fabr.*

36. *TACHINA ANALIS*. *Fem.* Pallide aurata, capite niveo, frontibus angustis linearibus ferrugineis, antennis pallide flavis, articulo

3° lineari, arista vix plumosa, thorace vittis quatuor nigris, scutello testaceo, abdomine testaceo longi-ovato apicem versus nigro, pedibus testaceis, tarsis nigricantibus, alis cinereis, costa basi lurida.

*Tachina analis*, *Dol. MSS.*

*Female.* Pale-gilded, with black bristles. Head brilliant white, except on each side of the frontalia, which are narrow, linear, ferruginous, and have a few black bristles along each side; facialia without bristles; epistoma not prominent. Antennæ pale yellow, not near reaching the epistoma; 3rd joint linear, rounded at the tip, more than twice the length of the 2nd; arista moderately long, very minutely plumose. Thorax with four black stripes, the two middle very slender; scutellum testaceous. Abdomen testaceous, elongate-oval, longer than the thorax, black, and with black spines towards the tip. Legs testaceous; tarsi blackish. Wings grey, lurid along the costa towards the base; veins black, tawny towards the base, præbrachial vein forming a very obtuse angle at its flexure, from which it is nearly straight to its tip; discal transverse vein hardly undulating, parted by rather less than its length from the border, and by very little less than its length from the flexure of the præbrachial. Length of the body 4 lines; of the wings 8 lines.

37. *TACHINA?* *DISCIFERA*, n. s. *Fæm.* Fulva, robusta, abdomen ovatum guttis duabus fascia posteriore maculaque apicali nigris, alis cinereis, costa venisque late fusciscentibus, alulis cinereo-fulvis, halteribus pallidis.

*Female.* Tawny, stout, with long black bristles. Head wanting. Abdomen oval, with black spines towards the tip, a little longer than the thorax; 2nd segment with a transverse black dot on its hind border; 3rd with a black band on its hind border; a black apical spot. Wings grey, broadly brownish along the costa and about the veins; the latter black, tawny towards the base; præbrachial vein forming a rounded right angle at its flexure, beyond which it is much curved inward; discal transverse vein undulating, parted by much less than its length from the border, and by much more than its length from the flexure of the præbrachial; alulæ cinereous tawny; halteres paler than the body. Length of the body  $3\frac{1}{2}$  lines; of the wings 7 lines.

#### Gen. *HAMAXIA*, n. g.

38. *HAMAXIA INCONGRUA*, n. s. *Fæm.* Fulva, sat gracilis, capite albedo, frontalibus fulvis linearibus, oculis nudis, palpis clavatis longiusculis, antennarum articulo 3° longo lineari, arista subpubescente, thorace vittis tribus indistinctis subobscurioribus, abdomine elliptico, alis cinereis apud costam fusciscentibus, alulis subtestaceis sat magnis.

*Female.* Tawny, rather slender, with black bristles. Head whitish in front and above, excepting the frontalia, which are tawny and linear; front prominent; facialia with black bristles on each side of the epi-

stoma, which is prominent. Eyes bare. Palpi clavate, rather long. Antennæ almost reaching the epistoma; 3rd joint linear, rounded at the tip, about four times the length of the 2nd; arista very minutely pubescent, tawny and stout at the base. Thorax with three indistinct slightly darker stripes. Abdomen elliptical, not longer than the thorax. Legs stout. Wings grey, brownish along the costa; veins black, tawny at the base; præbrachial vein forming a very obtuse angle, ending with the costal vein at the tip of the wing; discal transverse vein almost straight and upright, parted by much more than its length from the præbrachial transverse vein, and by very much more than its length from the flexure of the præbrachial vein; alulæ with a testaceous tinge, rather small. Length of the body  $3\frac{1}{2}$  lines; of the wings 7 lines.

The characters in the above description of this species will sufficiently distinguish it as forming a new genus of *Tachinides*.

Gen. MASICERA, *Macquart*.

39. MASICERA MORIO. *Mas.* Nigra, elongata, cinerascete-tomentosa, capite albo lateribus auratis, frontalibus atris linearibus, oculis nudis, antennarum articulo 3<sup>o</sup> lineari apice rotundato, thorace vittis quatuor nigris, abdomine longi-conico fasciis tribus albedo-cinereis, pedibus robustis, alis cinereis apud costam nigricantibus postice basi albis, alulis albis.

*Masicera morio*, *Dol. Nat. Tijd. Ned. Ind.* 1858.

*Male.* Black, elongate, with whitish cinereous tomentum and with long bristles and spines. Head with white shining tomentum, pale-gilded on each side above; frontalia deep black, linear, beset with bristles along each side; facialia with bristles along one-third of the length from the epistoma, which is not prominent. Eyes bare. Antennæ reaching the epistoma; 3rd joint linear, rounded at the tip, more than four times the length of the 2nd; arista long, slender, somewhat stouter towards the base. Thorax with four black stripes; the middle pair very slender. Abdomen elongate-conical; 2nd, 3rd, and 4th segments with a whitish cinereous band on the fore borders of the segments. Legs stout. Wings grey, blackish along the costa, white hindward at the base; veins black, pale yellow in the white part; præbrachial vein forming a nearly right angle at its flexure, near which it is curved inward and is thence straight to its tip; discal transverse vein curved inward, parted by less than its length from the border and from the flexure of the præbrachial. Alulæ white. Length of the body 6 lines; of the wings 12 lines.

40. MASICERA MANIFESTA, n. s. *Fam.* Nigra, robusta, capite albo lateribus auratis, frontalibus atris antice per paulo latoribus, oculis pubescentibus, antennarum articulo 3<sup>o</sup> lineari obtuso, thorace cinereo vittis quatuor nigris, scutello testaceo, abdomine longi-ovato fasciis tribus latis cinereis, pedibus robustis, alis cinereis, alulis albis.

*Female.* Black, stout, thickly beset with long black bristles. Head white, shining, gilded on each side of the frontalia, which are deep black and very slightly widening in front; facialia without bristles, except by the epistoma, which is not prominent. Eyes pubescent. Antennæ nearly reaching the epistoma; 3rd joint linear, somewhat obtuse at the tip, four times the length of the 2nd; arista long, stout for nearly half the length from the base. Thorax with cinereous tomentum and with black stripes, the middle pair slender; scutellum testaceous. Abdomen elongate-oval, with black spines which are mostly towards its tips, and with three broad cinereous bands on the foreborders of the segments. Legs stout. Wings grey; præbrachial vein forming a right angle at its flexure, beyond which it is curved inward; discal transverse vein with its hind part much curved inward, parted by much less than its length from the border and by rather less than its length from the flexure of the præbrachial; alulæ white. Length of the body  $5\frac{1}{2}$  lines; of the wings 11 lines.

41. *MASICERA PROMINENS*, n. s. *Fæm.* Nigra, subcylindrica, sat angusta, capite albo, frontalibus nigris antice vix latescentibus, oculis nudis, antennarum articulo 3<sup>o</sup> lineari apice rotundato, thorace albido vittis quatuor angustis nigris, abdomine longi-ovato, pedibus robustis, alis cinereis apud costam fusciscentibus, alulis albis.

*Female.* Black, rather narrow, nearly cylindrical, with numerous long bristles. Head white, shining; frontalia black, hardly widening in front, with a few bristles along each side; facialia with bristles towards the epistoma, which is slightly prominent. Eyes bare. Antennæ nearly reaching the epistoma; 3rd joint linear, rounded at the tip, about four times the length of the 2nd; arista long, stout for one-third of the length. Thorax with whitish bloom, and with four slender black stripes. Abdomen elongate-oval, longer than the thorax, with black spines towards the tip. Legs stout. Wings grey, brownish along the costa; præbrachial vein forming a right angle at its flexure, beyond which it is slightly curved inward; discal transverse vein hardly undulating, parted by very little less than its length from the border, and from the flexure of the præbrachial; alulæ white. Length of the body 4 lines; of the wings  $7\frac{1}{2}$  lines.

#### Gen. PHOROCERA, *Macq.*

42. *PHOROCERA EXPELLENS*, n. s. *Mas.* Nigra, robusta, frontalibus atris linearibus, facie alba, oculis pubescentibus, palpis longis fulvis, antennarum articulo 3<sup>o</sup> lineari longissimo subobtusato, thorace vittis quatuor fasciæque postica nigris, abdomine ovato fasciis tribus albis, alis cinerascentibus breviusculis basi et apud venas nigricantibus, alulis albis, halteribus albidis.

*Male.* Black, stout. Head and thorax with pale gilded tomentum; frontalia deep black, linear, with bristles along each side; face white;

facialia without bristles except by the epistoma, which is prominent. Eyes pubescent. Palpi long, tawny, Antennæ reaching the epistoma; 3rd joint linear, somewhat obtuse at the tip, fully six times the length of the 2nd; arista long, slender, stouter towards the base. Thorax with four black stripes; the middle pair slender; a black band hindward. Abdomen oval, very little longer than the thorax, with black spines towards the tip; 2nd, 3rd, and 4th segments with white bands on their fore borders, that on the 2nd segment very slight. Legs stout. Wings greyish, rather short, blackish at the base and along most of the length of the costa and of the veins; præbrachial vein forming a hardly obtuse and slightly rounded angle at its flexure, from whence it is very slightly curved inward to its tip; discal transverse vein undulating, parted by much less than its length from the border, and from the flexure of the præbrachial. Alulæ white. Halteres whitish. Length of the body  $4\frac{1}{2}$  lines; of the wings 8 lines.

43. PHOROCERA DECEDENS, n. s. *Mas.* Nigra, capite albo supra aurato, frontalibus nigris antice sublatescentibus, oculis pubescentibus, palpis fulvis, antennarum articulo 3<sup>o</sup> lineari longissimo, thorace aurato vittis quatuor nigris, scutelli basi nigro, abdomine ovato fasciis tribus latis interruptis cinereis, pedibus robustis, alis cinereis, alulis albis.

*Male.* Black, with long, black bristles. Head white, gilded above, clothed with white hairs beneath; frontalia black, widening slightly in front, with a few black bristles on each side; facialia with bristles along nearly the whole length from the epistoma, which is not prominent. Eyes pubescent. Palpi tawny. Antennæ almost reaching the epistoma; 3rd joint linear, rounded at the tip, six times the length of the 2nd; arista long, stout for more than one third of its length. Thorax gilded, with four slender black stripes, the lateral pair interrupted; scutellum black at the base; pectus cinereous. Abdomen oval, with black spines towards its tip, hardly longer than the thorax; three broad cinereous interrupted bands on the fore borders of the segments. Legs stout. Wings grey; præbrachial vein forming a right angle at its flexure, beyond which it is curved inward; discal transverse vein slightly undulating, parted by a little less than its length from the border, and by a little more than its length from the flexure of the præbrachial; alulæ white. Length of the body  $4\frac{1}{2}$  lines; of the wings 8 lines.

44. PHOROCERA BASITINCTA. n. s. *Mas.* Nigra, lata, capite albo supra cinereo, frontalibus atris antice latescentibus, oculis pubescentibus, antennarum articulo 3<sup>o</sup> longissimo subobtusato, thorace albido vittis duabus gracillimis nigris, abdomine ovato subtessellato, pedibus robustis, alis cinereis basi et apud costam nigricantibus, alulis albis.

*Female.* Black, broad, thickly beset with long black bristles. Head white, cinereous above: frontalia deep black, widening in front, with black bristles along each side; facialia with bristles along nearly the



whole length from the epistoma, which is slightly prominent. Eyes pubescent. Antennæ reaching the epistoma; 3rd joint linear, somewhat obtuse at the tip, about six times the length of the 2nd; arista long, stout for about one-third of its length. Thorax with whitish bloom, and with two very slender black stripes. Abdomen oval, not longer than the thorax, somewhat tessellated on account of its whitish glancing bands being interrupted on each side. Legs stout. Wings grey, blackish at the base and along part of the costa; præbrachial vein forming a rounded and slightly obtuse angle at its flexure, beyond which it is slightly curved inward; discal transverse vein nearly straight, parted by much less than its length from the border, and by less than its length from the flexure of the præbrachial; alulæ white. Length of the body 4 lines; of the wings 8 lines.

Gen. TRICHOPROSOPA? *Macq.*

45. TRICHOPROSOPA? MARGINALIS, n. s. Nigra, elongata, capite antico albo, antennarum articulo 3<sup>o</sup> fusiformi, thorace cinereo vittis duabus nigris humeris albidis, pedibus robustis, alis nigricantibus elongatis margine postico strigisque cinereis, alulis cinereis nigro marginatis.

Black, elongate, bristly. Head white in front; two long stout bristles on the vertex, and one on each side of the epistoma, which is prominent; frontalia with bristles; facialia without bristles. Antennæ almost reaching the epistoma; 3rd joint fusiform, rather obtuse at the tip, about four times the length of the 2nd; arista long, stout for about one-third of its length. Thorax slightly cinereous; humeri whitish; two dorsal black stripes. Legs stout. Wings blackish, elongate, cinereous along the hind border, and with cinereous streaks in some of the areolets; præbrachial vein emitting a stump and forming an obtuse angle at its flexure, beyond which it is undulating and joins the cubital vein at some distance from its tip; discal transverse vein undulating, parted by about half its length from the border, and from the flexure of the præbrachial; alulæ cinereous, black bordered; halteres black. Length of the body 6½ lines; of the wings 12 lines.

Subfam. DEXIDES, *Walk.*

Gen. DEXIA, *Meigen.*

46. DEXIA? ALULIFERA, n. s. *Mas.* Nigra, angusta, capite albo, frontalibus piccis perangustis, oculis nudis, palpis fulvis, antennis piccis basi fulvis, thorace subcinereo fascia media vittisque tribus anticis albis, abdomine cylindrico fasciis duabus latis apiceque chalybæis, pedibus longis, alis angustis fusciscentibus, alulis pallide flavis, halteribus albis.

*Male.* Black, narrow, with a few slender bristles. Head white, shining; frontalia piecous, very narrow; facialia without bristles, except by the epistoma, which is not prominent, and has a black point on each

side. Eyes bare. Palpi tawny. Antennæ picuous, slender, almost reaching the epistoma; 1st and 2nd joints tawny; 3rd linear, rounded at the tip, about four times the length of the 2nd; arista slender, bare, stout at the base. Thorax slightly cinereous; forepart with three more distinct white stripes, which terminate in a middle white band; pectus white. Abdomen cylindrical, much narrower than the thorax, and about twice its length, chalybeous at the tip, and with two broad chalybeous bands on the fore borders of the segments. Legs long, slender, nearly bare. Wings narrow, brownish; veins tawny at the base; 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 half its length from the border, and by much more than its length from the flexure of the præbrachial; alulae pale yellow, the lower pair extremely large; halteres white. Length of the body  $3\frac{1}{2}$  lines; of the wings 7 lines.

Subfam. SARCOPHAGIDES, *Walk.*

Gen. SARCOPHAGA, *Meigen.*

47. SARCOPHAGA SERICEONITENS. *Fæm.* Cinerea, capite aurato, frontibus nigris antice sublatescentibus, thorace vittis tribus nigris parallelis bene determinatis, abdomine tessellato subtus basi nigro, alis cinereis apud costam subobscurioribus, alulis albis.

*Sarcophaga sericeonitens, Dol. MSS.*

*Female.* Cinereous. Head pale-gilded; frontalia black, slightly widening in front. Palpi black. Thorax with three regular parallel black stripes, the middle one extending over the scutellum. Abdomen distinctly tessellated, black beneath at the tip. Wings grey, a little darker along the costa; præbrachial vein forming a right angle at its flexure, near which it is curved inward, and is thence straight to its tip; discal transverse vein straight, parted by much less than its length from the border, and by little more than half its length from the flexure of the præbrachial; alulae white. Length of the body  $5\frac{1}{2}$  lines; of the wings 8 lines.

48. SARCOPHAGA AURATA, n. s. *Mas et Fæm.* Cinerea, subaurata, capite aurato micante, frontibus atris antice sublatescentibus, thorace vittis tribus nigris parallelis bene determinatis, abdomine apice aurato vittis tribus apiceque nigris, alis cinereis apud costam fusciscentibus, alulis albis.

*Male and Female.* Cinereous, very slightly gilded. Head brightly gilded; frontalia deep black, slightly widening in front. Palpi and antennæ black. Thorax with three regular parallel black stripes, the middle one extending over the scutellum. Abdomen brightly gilded towards the tip, narrower in the male than in the female, with three black stripes, the middle one extending to the tip, which is black, the lateral pair extending to the hind border of the 3rd segment. Wings

grey, brownish along most of the costa; præbrachial vein as in the preceding species; discal transverse vein hardly curved in the male, slightly curved in the female, parted as in the last species, nearer the flexure of the præbrachial in the female than in the male; alulæ white. Length of the body 6-6½ lines; of the wings 10 lines.

Subfam. MUSCIDES, *Walk.*

Gen. MUSCA, *Linn.*

49. MUSCA COSTALIS (genus *Silbomyia*, *Macq.*). *Fæm.* Aureo-viridis, capite aurato micante, frontalibus et faciei lateribus atris, palpis antennæ pedibusque nigris, thorace vittis quatuor auratis, femoribus cyaneseente viridibus, alis cinereis basi et apud costam nigris, venis fusco marginatis, alulis anticis albis, posticis nigricantibus basi albis.

*Cynomyia costalis*, *Dol. MSS.*

Closely allied to *M. opulenta*, *Walk.* vol. ii. p. 104. *Female.* Golden green, beset with long stout black bristles. Head brightly gilded; hind part, frontalia, and face deep black, the latter with a bright gilded middle ridge; epistoma prominent. Palpi and antennæ black, 3rd joint of the latter rather long. Thorax purple in some aspects, with four slight golden stripes. Abdomen with black spines hindward. Legs black, stout; femora bluish green. Wings grey, black at the base and along the costa, brown along most of the length of the veins; præbrachial vein forming a right angle at its flexure, beyond which it is slightly undulating; discal transverse vein undulating, parted by a little less than half its length from the border, and by a little more than half its length from the flexure of the præbrachial; alulæ white, the lower pair blackish, except towards the base. Length of the body 6 lines; of the wings 10 lines.

50. *Musca obtusa*, *Walk.* See vol. iii. p. 105.

51. MUSCA BIVITTATA (genus *Calliphora*, *Desv.*). *Fæm.* Nigra, thorace vittis quatuor albis parallelis, lateralibus postice abbreviatis, abdomine cyaneo-viridi segmentis purpureo marginatis, alis cinereis, costa exteriorè venisque fusco marginatis, alulis albis.

*Lucilia bivittata*, *Dol. Nat. Tijl. Ned. Ind.* 1858.

*Female.* Black. Head wanting. Thorax with four parallel white stripes; the lateral pair abbreviated hindward; pectus white. Abdomen bright bluish green, with a slight white bloom, broader but hardly longer than the thorax; hind borders of the segments purple. Wings grey, brown exteriorly along the costa and along the veins; præbrachial vein forming a right and slightly rounded angle at its flexure, beyond which it is curved inward; discal transverse vein slightly undulating, parted by little more than half its length from the border and from the flexure of the præbrachial; alulæ white. Length of the body 5 lines; of the wings 10 lines.

52. *MUSCA FERRUGINEA* (genus *Ochromyia*, *Desv.*). *Fam.* Fulva, cinereo-subtomentosa, capite albo, palpis pallidis, abdomine apicem versus cyanescente purpureo, tibiis apice tarsisque nigris, alis cinereis, costa exterioro diffuse fusca.

*Ochromyia ferruginea*, *Dol. Nat. Tijd. Ned. Ind.* 1857. 414.

*Female.* Tawny, with slight cinereous bloom, paler beneath. Head white about the eyes and in front, cinereous on the vertex. Palpi pale. Antennæ wanting. Abdomen broader but not longer than the thorax, bluish purple towards the tip. Tibiæ towards the tips and tarsi black. Wings grey, diffusedly brown along the exterior part of the costa; præbrachial vein forming a scarcely obtuse angle at its flexure, beyond which it is slightly curved inward; discal transverse vein curved towards the præbrachial, parted by less than half its length from the border, and by much less than its length from the flexure of the præbrachial. Length of the body 4 lines; of the wings 8 lines.

53. *MUSCA INCONCLUSA*, n. s. *Mas.* Cinerea, capite albido lateribus ferrugineis, palpis antennis pedibusque nigris, thorace lineis tribus indistinctis nigricantibus, abdomine elliptico subtessellato linea dorsali tenui nigra, genubus rufescentibus, alis cinereis, alulis albis, halteribus testaceis.

*Male.* Cinereous. Head whitish in front, somewhat ferruginous on each side of the epistoma, which is prominent. Palpi and antennæ black; the latter not reaching the epistoma; arista plumose. Thorax with three indistinct blackish lines. Abdomen elliptical, not longer than the thorax, slightly tessellated, with a slight black dorsal line. Legs black; knees reddish. Wings grey; veins black, testaceous at the base; præbrachial vein forming a very obtuse angle at its flexure, beyond which it is hardly curved inward; discal transverse vein hardly undulating, parted by half its length from the border, and by less than its length from the flexure of the præbrachial; alulæ white; halteres testaceous. Length of the body 3 lines; of the wings 6 lines.

#### Subfam. ANTHOMYIDES, *Walk.*

##### Gen. *ARICIA*, *Macq.*

54. *Aricia significans*, *Walk.* See vol. iii. p. 107.

##### Gen. *OPHYRA*, *Meig.*

55. *OPHYRA RIPARIA*. *Mas.* Nigra, nitens, capite antico albido guttis duabus argenteis, antennarum articulo 3<sup>o</sup> lineari, abdomine nigricante-æneo, alis subcinereis.

*Ophyra riparia*, *Dol. Nat. Tijd. Ned. Ind.* 1858.

*Male.* Black, shining. Head whitish in front, with a silvery white dot above the antennæ. Third joint of the antennæ linear, more than twice the length of the 2nd. not near reaching the epistoma; arista

bare, stout at the base. Scutellum conical. Abdomen blackish æneous, a little shorter than the thorax. Wings greyish; veins black, cubital and præbrachial veins diverging from the præbrachial transverse to the discal transverse vein, parallel from thence till very near the border, where they very slightly converge; discal transverse vein very slightly curved inward, parted by about half its length from the border, and by very little less than its length from the præbrachial transverse vein. Length of the body 3 lines; of the wings 5 lines.

56. *OPHYRA REDUCTA*, n. s. *Fæm.* Anthracina, puncto capitis albo, palpis antennisque nigris, alis sublimpidis, venis nigris basi testaceis, alulis cinereis testaceo marginatis.

*Female.* Coal-black, shining. Head with a white point above the antennæ. Palpi and antennæ black; the latter nearly reaching the epistoma; arista bare. Wings nearly limpid; veins black, mostly testaceous at the base; cubital and præbrachial veins as in the preceding species; discal transverse vein nearly straight and upright, parted by much less than its length from the border, and by much more than its length from the præbrachial transverse vein; alulæ cinereous, with testaceous borders. Length of the body  $2\frac{1}{2}$  lines; of the wings 5 lines.

Subfam. LAUXANIDES, *Walk.*

Gen. LAUXANIA, *Latr.*

57. *LAUXANIA PERPLEXA*, n. s. *Fæm.* Anthracina, nitens, arista subpubescente, abdomine ovato, alis sublimpidis, venis nigris basi testaceis.

*Female.* Coal-black, shining. Head as broad as the thorax. Antennæ black; 3rd joint linear, rounded at the tip, reaching the epistoma, four times the length of the 2nd; arista very minutely pubescent. Abdomen oval, very little longer than the thorax. Wings nearly limpid; veins black, testaceous towards the base; discal transverse vein straight, upright, parted by nearly its length from the border, and by nearly twice its length from the præbrachial transverse. Length of the body 2 lines; of the wings 4 lines.

Subfam. ORTALIDES, *Holiday.*

Gen. LAMPROGASTER, *Macq.*

58. *Lamprogaster marginifera*, *Walk.* See vol. iii. p. 111.  
*Acinia faciestriata*, *Dol. Nat. Tijds. Ned. Ind.* 1857. 416.

Gen. ZYGENULA, *Dol.*

*Mas.* Corpus latissimum, tumidum. Caput thorace latius, genis valde dilatatis. Antennæ minimæ; articulus 3<sup>us</sup> conicus; arista nuda.

Thorax transversus. Abdomen contractum, declive, thorace brevius.  
Pedes breves, inermes. Alæ mediocres; alulæ maximæ.

*Zygænula*, *Dol. Nat. Tijd. Ned. Ind.* 1858.

*Pterogenia*, *Bigot, MSS.*

*Male.* Body very broad, somewhat tumid. Head extremely broad, broader than the thorax; genæ or sides of the face excessively dilated. Antennæ very small; 3rd joint conical, not extending beyond half the length of the face; arista simple. Thorax a little broader than long. Abdomen contracted, curved downward, shorter than the thorax. Legs short, unarmed. Wings moderately broad; discal transverse vein upright, slightly curved outward, parted by about one-fourth of its length from the border, and by much less than its length from the præbrachial transverse vein; alulæ very large.

59. *ZYGÆNULA PARADOXA*. *Mas.* Cyanescente nigra, capite antennis pedibusque testaceis, abdomine cyaneo, alis sublimpidis basi fusciscentibus, venis flavescente albis basi nigricantibus, halteribus albidis.

*Zygænula paradoxa*, *Dol. Nat. Tijd. Ned. Ind.* 1858.

*Lamprogaster tetyroïdes*, *Walk.* vol. iii. p. 112.

*Male.* Bluish black. Head, antennæ, and legs testaceous. Abdomen blue. Wings nearly limpid, brownish towards the base; veins yellowish white, blackish towards the base. Halteres whitish. Length of the body  $2\frac{1}{2}$  lines; of the wings 6 lines.

#### Gen. DACUS, *Fabr.*

60. *Dacus longivitta*, *Walk.* See vol. iii. p. 115.

61. *DACUS INSCRIPTUS*, n. s. *Fæm.* Niger, capite fulvo macula elongata nigricante, antennis fulvis, articulo 3<sup>o</sup> nigro basi fulvo, arista subpubescente, thorace subcinereo vitta dorsali strigisque duabus obliquis fulvis, abdomine fusiformi basi vittaque dorsali fulvis, pedibus fulvis, tibiis intermediis basi tibiisque posticis nigricantibus, alis cinereis angustis apice fuscis macula discali subapicali cinerea, gutta discali fusca, halteribus testaceis.

*Female.* Allied to *D. bilineatus*. Black. Head tawny, with an elongate blackish spot above. Antennæ tawny, almost reaching the epistoma; 3rd joint black, very elongate conical, tawny at the base; arista very minutely pubescent. Thorax slightly cinereous, with a dorsal tawny stripe, and with two oblique tawny streaks on each side. Abdomen fusiform, as long as the thorax, tawny at the base, and with a dorsal tawny stripe. Legs tawny, slender; middle tibiæ blackish towards the base; hind tibiæ blackish. Wings grey, narrow, lurid along most of the costa, brown towards the tips, near which there is a discal grey spot; a brown dot on the præbrachial transverse vein; discal transverse vein almost straight, upright, parted by one-fourth of its length from the border, and by much more than its length from the præbrachial transverse; halteres testaceous. Length of the body 5 lines; of the wings 9 lines.

62. *DACUS SEPSOIDES*, n. s. *Mas.* *Æneus*, *gracilis*, capite piceo nigro autice ferrugineo vitta albida, oculis albido marginatis, antennis pallide fulvis, arista nuda, thorace vitta cinerea, abdomine cyaneo subcompresso basi viridi segmentis purpureo marginatis, pedibus nigris, robustis, femoribus rufis, alis vix cinerascentibus macula apicali nigricante, halteribus testaceis.

*Male.* *Æneous*, slender. Head piceous black above, ferruginous in front, where there is a whitish stripe; epistoma prominent. Eyes bordered with whitish. Antennæ pale tawny, nearly reaching the epistoma; 3rd joint very elongate-conical; arista bare. Thorax with a cinereous stripe; pectus cinereous. Abdomen blue, somewhat compressed, mostly green towards the base, a little longer and narrower than the thorax; hind borders of the segments purplish. Legs black, stout; femora red; fore coxæ with whitish pile. Wings hardly greyish, with a blackish apical spot; præbrachial vein curved towards the cubital on approaching the tip of the wing; discal transverse vein upright, nearly straight, 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 6 lines.

63. *DACUS SIGNATIPES*, n. s. *Mas.* *Cyanescens-niger*, *gracilis*, *linearis*, capite argenteo, antennis fulvis, arista nuda, abdomine cupreo-nigro fusiformi, pedibus fulvis, tibiis posticis femoribusque apice nigris, tibiis posterioribus basi nigris, alis cinereis fascia lata postice abbreviata maculaque magna apicali fuscis.

*Male.* Bluish black, slender, linear. Head silvery white about the eyes. Antennæ tawny; arista bare. Abdomen cupreous black, fusiform, a little longer than the thorax. Legs tawny, slender; femora black towards the tips; posterior tibiæ black at the base; hind tibiæ with black tips. Wings grey, with a brown band which does not extend to the hind border, and with a large apical brown spot; veins black; discal transverse vein straight, upright, parted by less than its length from the border, and by about four times its length from the præbrachial transverse; postbrachial vein very near the præbrachial. Length of the body 3 lines; of the wings 5 lines.

#### Gen. ENICOPTERA. *Macq.*

64. *ENICOPTERA RUFIVENTRIS*, n. s. *Fam.* *Fulva*, *elongata*, *nitens*, capite punctis tribus nigris, antennarum articulo 3<sup>o</sup> longi-conico, arista subpubescente, thorace nigro-æneo, vitta dorsali humeris scutellique lateribus fulvis, abdomine rufescente fulvo cylindrico, femoribus posterioribus nigro-spinosis, tibiis tarsisque anticis piceis, alis longiusculis subfufescentibus apud discum sublimpidis, fasciis duabus fuscis incompletis diffusis fuscis, halteribus testaceis.

*Female.* Tawny, elongate, shining, almost without hairs and bristles. Head nearly as broad as the thorax, with a black point on the front above the antennæ, and with two black points on the epistoma, which

is prominent. Antennæ not reaching the epistoma; 3rd joint very elongate-conical; arista very minutely pubescent. Thorax æneous black; dorsal stripe, humeri, sides of the prominent scutellum, a band on each side, and disk of the pectus tawny. Abdomen reddish tawny, cylindrical, almost linear, much longer and narrower than the thorax. Posterior femora with minute black spines beneath; fore tibiæ and fore tarsi piceous. Wings rather long, slightly brownish, almost limpid in most of the disk, with two incomplete and diffuse brown bands; veins black, tawny towards the base; discal transverse vein straight, upright, parted by about one-third of its length from the border, and by more than its length from the præbrachial transverse vein; halteres testaceous. Length of the body 6 lines; of the wings 10 lines.

Gen. RIOXA, *Walk.*

65. RIOXA? BIMACULATA, n. s. *Fam.* Fulva, capite supra ochraceo, antennis brevissimis, articulo 3<sup>o</sup> conico, arista plumosa, pectore abdomineque piceis, hoc maculis duabus basalibus fulvis, femoribus posterioribus nigris, femoribus anticis subtus setosis, tibiis posterioribus piceis, alis nigricantibus longiusculis basi vitreis, guttis duabus discalibus, maculis duabus trigonis costalibus maculisque duabus marginalibus albis, halteribus albidis.

*Female.* Tawny, with black bristles. Head ochraceous above, whitish behind. Antennæ very short; 3rd joint conical, a little longer than the 2nd; arista plumose. Thorax with whitish pile on each side; pectus piceous. Abdomen piceous, elliptical, a little shorter than the thorax, with a tawny spot on each side at the base. Posterior femora black; fore femora thickly setose beneath; posterior tibiæ mostly piceous. Wings blackish, rather long, vitreous at the base, with two white dots in the disk, with two triangular white spots on the costa, and with two more on the hind border; discal transverse vein straight, upright, parted by about half its length from the border, and by more than its length from the præbrachial transverse; halteres whitish. Length of the body 4 lines; of the wings 8 lines.

Gen. TRYPETA, *Meig.*

66. TRYPETA TRANSIENS, n. s. Nigra, capite fulvo supra nigro, antennis rufescentibus, articulo 3<sup>o</sup> longi-conico, arista pubescente, thorace vitta lateribusque cinereis, scutello, femoribus posterioribus apice pedibusque anticis fulvis, alis subcinereis fasciis quatuor deviis fulvis nigricante marginatis, 1<sup>a</sup> (abbreviata) et 2<sup>a</sup> apud discum connexis, 2<sup>a</sup>, 3<sup>a</sup>, et 4<sup>a</sup> apud costam connexis, 4<sup>a</sup> obliqua postice furcata, furca exteriori apicali.

*Black.* Head tawny, black above, except in front and behind; face piceous. Palpi and antennæ reddish; 3rd joint of the latter elongate-conical, reaching the epistoma; arista pubescent. Thorax with a cinereous stripe; sides and pectus cinereous; scutellum tawny; fore



legs tawny; posterior femora tawny towards their tips. Wings slightly greyish, with four irregular blackish bordered tawny bands; 1st band abbreviated hindward, joined in the disk to the 2nd; 2nd, 3rd and 4th joined along the costa; 4th oblique, forked hindward, the outer fork occupying the tip of the wing; discal transverse vein straight, upright, parted by less than one-fourth of its length from the border, and by hardly more than its length from the præbrachial transverse. Length of the body 4 lines; of the wings 8 lines.

67. *TRYPETA SIGNIFICIES*, n. s. *Mas.* Viridis, metallica, nitens, latiuscula, capite antico ochraceo-albo facie brevi strigis duabus nigris, antennis pallide testaceis, arista plumosa, abdomine nigro, pedibus testaceis, femoribus nigricantibus, alis limpидis, fasciis quatuor nigricantibus, 1<sup>a</sup> et 2<sup>a</sup> connexis, 3<sup>a</sup> et 4<sup>a</sup> apud costam connexis, 4<sup>a</sup> valde obliqua subapicali; striga nigricante inter 3<sup>am</sup> et 4<sup>am</sup>, halteribus albis.

*Male.* Metallic green, shining, rather broad. Head ochraceous, white in front and about the eyes; face short, with two diverging black streaks; epistoma prominent. Antennæ pale testaceous, not near reaching the epistoma; 3rd joint conical; arista plumose. Abdomen black, not longer than the thorax. Legs testaceous; femora blackish. Wings limpид, with four broad blackish bands; 1st and 2nd bands connected, except near the costa, 3rd and 4th connected on the costa; 4th very oblique, subapical, having a blackish streak between it and the 3rd; discal transverse vein straight, nearly upright, parted by much less than its length from the border, and by very much more than its length from the præbrachial transverse. Halteres white. Length of the body 2½ lines; of the wings 4 lines.

Subfam. SEPSIDES, *Walk.*

Gen. SEPSIS, *Fabr.*

68. *Sepsis basifera*, *Walk.* See vol. iii. p. 124.

Gen. CALOBATA, *Fabr.*

69. *Calobata impingens*, *Walk.* See vol. iv. p. 16.  
*Micropeza albimana*, *Doll. MSS.*

Subfam. PSILIDES, *Walk.*

Gen. MICROPEZA, *Macq.*

70. *Micropeza fragilis*, *Walk.* See vol. i. p. 37.  
*Micropeza tenuis*. *Dol. Nat. Tijd. Ned. Ind.* 1858.

Gen. NERIUS, *Wied.*

71. *Nerius duplicatus*, *Wied.* See vol. iii. p. 125.  
*Nerius striatus*, *Dol. Nat. Tijd. Ned. Ind.* 1856.

72. *NERIUS TIBIALIS*, *Dol. Nat. Tijd. Ned. Ind.* 1857. p. 418. Nigricans, subtus fulvus, palpis testaceis, antennis fulvis basi nigricantibus, arista alba, thorace vitta lata ferruginea, callis humeralibus maculisque duabus posticis fulvis, pedibus anticis fulvis, femoribus tibiisque spinosis, tibiis basi nigris apice dilatatis, tarsis nigris brevissimis, alis nigricantibus.

Blackish, tawny beneath. Palpi testaceous. Antennæ tawny, blackish towards the base; arista white. Thorax with a broad ferruginous middle stripe, with tawny humeral calli, and with a tawny spot on each side hindward. Fore legs tawny, stout; femora and tibiæ spinose beneath; knees black; tibiæ black towards the base, dilated towards their tips, which are black; tarsi black, very short. Wings blackish. Length of the body 6 lines; of the wings 9 lines.

The following list of Amboynese Diptera, characterized, together with many Javanese species, by the late Dr. Doleschall (*Nat. Tijd. Nederlandsch Indië*, 1856-58), will serve as a supplement to my Catalogue. Should it appear that he and I have described the same species as new, his names have the priority, and must be retained.

Fam. MYCETEPHILIDÆ,  
*Hal.*

Gen. *SCIARA*, *Meig.*  
1. femoralis.

Fam. CULICIDÆ, *Hal.*

Gen. *MEGARIINA*, *Desv.*  
2. { amboinensis ♂.  
subulifera ♀.

Gen. *CULEX*, *Linn.*

3. aureostriatus.  
4. variegatus.

Fam. TIPULIDÆ, *Hal.*

Gen. *LIMNOBIA*, *Meig.*  
5. aurantiaca.

Gen. *TIPULA*, *Linn.*  
6. præpotens, *Wied.*

Gen. *MEGISTOCERA*, *Wied.*  
7. atra.

Gen. *CYLINDROTOMA*, *Meig.*  
8. ornatissima.

Fam. STRATIOMIDÆ,  
*Latr.*

Gen. *CLITELLARIA*, *Meig.*  
9. nigerima.

Gen. *EUDMETA*, *Wied.*  
10. marginata, *Wied.*

Gen. *WALLACEA*, *Dol.*  
11. argentea.

Gen. *ODONTOMEJIA*, *Latr.*  
12. cinerea.

Gen. *SARGUS*, *Fabr.*  
13. rufus.  
14. ferrugineus.  
15. formicæformis.

Fam. XYLOPHAGIDÆ,  
*Burm.*

Gen. *SUBULA*, *Meig.*  
16. flavipes.  
17. vittata.

Fam. TABANIDÆ, *Leach.*Gen. TABANUS, *Linn.*

18. furunculigenus.  
19. cinnamomus.  
20. monoculus.

Gen. CHRYSOPS, *Wied.*

21. fasciatus, *Wied.*

Fam. ASILIDÆ, *Leach.*Gen. DASYPOGON, *Meig.*

22. lanatus.

## Gen. XIPHCERA.

23. rufithorax.

Gen. LAPHRIA, *Meig.*

24. cyanea, *Macq.*  
25. pellucida.  
26. Kubingii.  
27. villipes.  
28. dissimilis.  
29. Bleckeri.

Gen. ASILUS, *Linn.*

30. latro.

Gen. OMMATIUS, *Wied.*

31. fulvidus, *Wied.*  
32. spathulatus.  
33. minimus.

Gen. LEPTOGASTER, *Meig.*

34. unicolor.  
35. annulipes.  
36. moluccanus.

Gen. DAMALINA, *Dol.*

37. laticeps.

Gen. DAMALIS, *Fabr.*

38. erythrophthalmus.

Fam. LEPTIDÆ, *Westw.*Gen. ATHERIX, *Meig.*

39. nigritarsis.

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

40. ventrimacula.

41. flaviventris.

42. cæruleopennis.

43. { argyropyga.  
semiscita, *Walk.*

44. { angustata.  
degenera? *Walk.*

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

45. longicornis.  
46. palmatorum.

## Fam. SYRPHIDÆ.

Gen. EUMERUS, *Meig.*

47. argyropus.  
48. bimaculatus.

Gen. GRAPTOMYZA, *Wied.*

49. milleporiformis.

Gen. ERISTALIS, *Latr.*

50. maxima.  
51. refulgens.

Gen. HELOPHILUS, *Meig.*

52. pilipes.

Gen. SYRITTA, *St. Farg.*

53. amboinensis.

Gen. DIDEA, *Macq.*

54. Ellenriederi.  
55. Macquarti.  
56. diaphana.

Gen. PIPIA, *Fall.*

57. mœrens.

Gen. SYRPIUS, *Fabr.*

58. villosulus.

Gen. BACCHA, *Fabr.*

59. vespaformis.  
60. moluccana.  
61. semilimpida.

Fam. CONOPIDÆ, *Leach.*Gen. CONOPS, *Fabr.*

62. bipartita.

- Fam. MUSCIDÆ, *Latr.*
- Gen. ECHINOMYIA, *Dum.*  
63. monticola.
- Gen. EURYGASTER, *Macq.*  
64. setosa.  
65. strigosa.
- Gen. SENOMETOPIA, *Macq.*  
66. sphingum.
- Gen. MASICERA, *Macq.*  
67. aurifrons.
- Gen. ZAMBESA, *Walk.*  
68. Walkeri.
- Gen. CLYTIA, *Desv.*  
69. modesta.  
70. nigroanalis.
- Gen. LYDELLA, *Macq.*  
71. unguiculata.
- Gen. GONIA, *Meig.*  
72. exigua.
- Gen. SPIROGLOSSA, *Dol.*  
73. ipus.
- Gen. PROSENA, *St. Farg.*  
74. moluccana.
- Gen. RUTILIA, *Desv.*  
75. nigrocostalis.
- Gen. OMALOGASTER, *Macq.*  
76. rufescens.
- Gen. SARCOPHAGA, *Meig.*  
77. { aurifrons  
aurata? *Walk.*
78. aliena, *Walk.*  
79. frontalis.
- Gen. LUCILIA, *Desv.*  
80. nosocomiorum.  
81. azurea.
- Gen. POLLENIA, *Desv.*  
82. flavicans.
- Gen. ARICIA, *Macq.*  
83. quadripunctata.  
84. graminicola.
- Gen. SPILOGASTER, *Desv.*  
85. pusilla.
- Gen. HYDROTÆA, *Desv.*  
86. bicolor.
- Gen. PACHYCEPHALA, *Dol.*  
87. Mohnicki.  
88. albifacies.
- Gen. TETANOCERA, *Dum.*  
89. tripunctata.
- Gen. SAPROMYZA, *Fall.*  
90. punctigera.
- Gen. ORTALIS, *Fall.*  
91. regularis.  
92. flaviseutellata.  
93. trifasciata.
- Gen. BACTROCERA, *Guér.*  
STRUMETA, *Walk.*  
94. conformis.  
95. maculigera.  
96. vespoides.
- Gen. THEMARA, *Walk.*  
97. ampla, *Walk.*  
98. alboguttata.  
99. nigropunctulata.
- Gen. HERINA, *Desv.*  
100. chalybea.  
101. limpidipinnis.  
102. grandis.  
103. nigrocostata.
- Gen. DIOPSIS, *Linn.*  
104. graminicola.
- Gen. NERIUS, *Fabr.*  
105. annulipes.
- Gen. DROSOPHILA, *Fall.*  
106. ananassæ.

A List of the Shells observed or collected at Mogador and in its immediate environs during a few days' visit to the place in April 1859; with notes and observations. By the Rev. R. T. LOWE, M.A. Communicated by the SECRETARY.

[Read February 16, 1860.]

[For introductory observations, see the *Botanical* section of the Society's Journal for the present year (p. 26).]

THE shells of Mogador will be more conveniently considered in their two natural divisions of sea- and land-shells, separately.

More than one-half, *i. e.* 53 in 90, or very nearly three-fifths of the whole number of marine Mollusks contained in the following list, are found for the most part commonly in Britain; and in fact nearly all the more common sea-shells, thrown up most abundantly on the extensive sandy beach of Mogador, are those of our own British shores. Such are peculiarly, for example, *Pholas Dactylus*, L., *P. candida*, L., *Saxicava rugosa*, Lam., *Solen Siliqua*, L., *Tellina tenuis*, Da Costa, *T. Fabula*, Gron., *T. solidula*, Pult., *Scrobicularia piperata*, Gm., *Donax anatinus*, Lam., *D. denticulatus*, L., *Lutraria oblonga*, Chemn., *Mactra stultorum* (L.), *M. subtruncata*, Da Costa, *Tapes decussatus* (L.), *T. Pullastra* (Mont.), *Venus striatula*, Don., *Artemis lineta* (Pult.), *Lucinopsis undata* (Penn.), *Cardium aculeatum*, L., *Lucina borealis* (L.), *Mytilus edulis*, L. var., *Nucula Nucleus* (L.)?, *Arca barbata*, L., *Anomia Ehippium*, L., *Patella athletica*, Bean, *P. pellucida*, L., *Fissurella reticulata* (Don.), *Trochus zizyphinus*, L., *T. granulatus*, Born, *T. umbilicatus*, Mont., *T. lineatus* (Da Costa), *Turritella communis*, Risso, *Scalaria clathratula* (Mont.), *Natica nitida* (Don.), *Murex Erinaceus*, L., *Purpura Lapillus* (L.), *Nassa reticulata* (L.), *Cypræa europæa*, Mont., *Tornatella fasciata*, Lam. Of these the greater portion have not been observed at all, and the rest only rarely or accidentally occur in either the Canaries or Madeira; but in both these groups of islands an entirely different set of *common species* takes their place, presenting more affinity with those of the Mediterranean.

This last fact is unfavourable to any hypothesis of a former connexion of these islands with the neighbouring continent. For it cannot be explained by any supposed change or difference in the structural nature of the coasts themselves, produced by, or subsequent to, their separation: the shores both of Porto Santo in the Madeiran, and those of Grand Canary, Lanzarote, and Fuerteventura in the Canarian group, being at this moment precisely

similar in their flat and sandy character to those of the opposite continent at Mogador. In other words, there is no present difference in physical character between the shores of Mogador and those of Porto Santo, Grand Canary, Lanzarote, and Fuerteventura, corresponding with the marked discrepancy existing between their more ordinary Molluscos inhabitants. Had such difference prevailed now, it might have been supposed sufficient to account for the difference in the shells, as the result of former changes, by dislocation or disruption in the coasts themselves, causing the disappearance from those islands of the Mogadorian-British species.

Bearing in mind, therefore, that Mogador is fully  $18\frac{1}{2}$  degrees of latitude south of the nearest southern shores of England, and, on the other hand, only about 400 English miles distant in a nearly easterly direction from Madeira or Porto Santo, and not above 300 English miles in a north-easterly course from the precisely similar, flat, sandy shores of Lanzarote and Fuerteventura, whilst it is removed only one, two, or three degrees of latitude from any one of these\*, it would seem that climatal differences exercise far less influence than others of topographical or geographical configuration on the diffusion of marine Mollusks, if the theory of their progressive propagation be exclusively maintained. For, on that hypothesis, it is evident that these common littoral Mollusks have spread in this instance abundantly and for a vast extent from north to south, in spite of difference of latitude, all down the west coasts of France, Spain, and Portugal to Mogador, along the shores of two continuous, or nearly continuous, continents; whilst they have not found their way westwardly across a comparatively narrow oceanic space or deep-sea channel, from one of these to places situate in very nearly the same parallel of latitude.

This continuation of North European littoral species so far south along the shores of Africa has, however, doubtless been assisted by the prevalent strong northerly winds, sweeping down the coast far below Mogador, and cooling down the surface-temperature of the sea below its average shore-heat in the almost parallel latitudes of the Canary Islands and Madeira. I regret not having leisure

\* Porto Santo, lat.  $33^{\circ} 3' 30''$  N., long.  $16^{\circ} 20' 14''$  W.; Madeira (Funchal), lat.  $32^{\circ} 38' 22''$  N., long.  $16^{\circ} 54' 56''$  W., *Tidal*; Mogador, lat.  $31^{\circ} 30'$  N., long.  $9^{\circ} 46'$  W.; Lanzarote, lat.  $29^{\circ} 0'$  N., long.  $13^{\circ} 54'$  W.; Fuerteventura, lat.  $28^{\circ} 3'$  N., long.  $14^{\circ} 31'$  W., *Johnston*. Lanzarote is from 70 to 75, and Fuerteventura only about 50 English miles distant from the *nearest* opposite part of Africa.

to investigate whether the set of tides or currents may or may not have contributed to this result.

Next to this strong affinity of the Mogadorian Molluscan Fauna with that of the British shores, succeeds its relation (2ndly) to that of the Canarian, (3rdly) to that of the Madeiran, and (4thly) to that of Senegal. Having, for example, according to the following very incomplete list, 26 species in common with Britain alone, Mogador has about as many more in common with Britain and the Canaries, the Madeiras and Senegal, in various combinations. Again, it has 6 or 7 in common with the Canaries alone, and from 33 to 37 more jointly with the same islands, with the Madeiras, Senegal, and Britain, &c. &c. (see for the rest the subjoined Table); offering thus on the whole, in 90 species, 53 in common with the British seas, 39 to 44 with the Canarian, 27 with the Madeiran, and 17 with the coast of Senegal.

This latter number would at once be larger but for the difficulty attending the exact identification of several of Adanson's Senegal species. And doubtless further researches on the spot would add to his list several Mogadorian shells, which, considering the presence of others on the shores of Senegal, have been very probably overlooked or neglected by him. In the meantime it is most interesting to find already, from the materials in hand, two or three common English and Mogadorian shells, *Serobicularia piperata* (Gm.), *Tapes Pullastra* (Mont.), and perhaps also *Maetra stultorum*, L. (of which last, however, a single valve has been also found by Mr. McAndrew in Teneriffe), reaching down even to Senegal, 15° below Mogador, and far within the tropics.

The authorities consulted for habitats in the following list are, 1st, Forbes and Hanley's 'British Mollusca' (referred to as F. H.) for British shells; 2ndly, D'Orbigny's very imperfect article "Mollusques" in Webb and Berthelot's 'Histoire,' &c. vol. ii. part 2 (referred to as W. B.), with Mr. McAndrew's far more exact and copious list of marine Testaceous Mollusca collected during a month passed in the Canary Islands in 1852, in his 'Essay on the Geographical Distribution of the Testaceous Mollusca in the North Atlantic and neighbouring Seas' (Liverpool, 1854, 8vo), reprinted as an appendix to the British Museum's 'List of the Shells of the Canaries,' London, 1854 (quoted as McAndr.); 3rdly, Adanson's 'Histoire' for the shells of Senegal (quoted as Adans.); and 4thly, for Madeira entirely, and for the Canaries partly, my own observations and collections.

*List of Sea and Freshwater Shells observed at Mogador,  
April 21st to April 28th, 1859\*.*

I. ACEPHALA (BIVALVES).

All sea-shells, except *Unionidæ*; the animals breathing water by lamellate gills or branchiæ.

	Hab.
1. Family PHOLADIDÆ.	
Pholas Dactylus, <i>L.</i> .....	b
— candida, <i>L.</i> .....	b
2. GASTROCHÆNIDÆ.	
Saxicava rugosa, <i>Lam.</i> .....	b
Petricola lithophaga ( <i>Retz.</i> ) .....	b
5. Venerirupis Irus ( <i>L.</i> ) .....	b c m
3. PANDORIDÆ.	
Pandora rostrata, <i>Lam.</i> .....	b c?
4. SOLENIDÆ.	
Solen Siliqua, <i>L.</i> .....	b
5. TELLINIDÆ.	
Psammobia vespertina ( <i>Chemn.</i> ) .....	c
Tellina tenuis, <i>Da Costa</i> .....	b
10. — Fabula, <i>Gron.</i> .....	b
— solidula, <i>Pult.</i> .....	b
— carnaria, <i>L.</i> .....	Medit., W. Indies
Scrobicularia piperata, <i>Gm.</i> .....	b s
6. DONACIDÆ.	
Donax anatinus, <i>Lam.</i> .....	b c?
15. — denticulatus, <i>L.</i> .....	s
7. MACTRIDÆ.	
Mactra subtruncata, <i>Da Costa</i> .....	b c?
— stultorum, <i>L.</i> .....	b c
— rugosa, <i>Chemn.</i> .....	c
Lutraria oblonga ( <i>Chemn.</i> ) .....	b
8. VENERIDÆ.	
20. Tapes decussatus ( <i>L.</i> ) .....	b
— Pullastra ( <i>Mont.</i> ) .....	b s
Venus verrucosa, <i>L.</i> .....	b c m
— striatula, <i>Don.</i> .....	b

\* I am indebted to the liberality of Mrs. Elton, Mrs. Grace, and Dr. Carleton, at Mogador, for the gift of most of the following species, and for the opportunity of recording others in their several collections of sea-shells on the spot.



	Hab.
<i>Artemis lineta</i> ( <i>Pult.</i> ) . . . . .	b
25. <i>Lucinopsis undata</i> ( <i>Penn.</i> ) . . . . .	b

## 9. CARDIIDÆ.

<i>Cardium aculeatum</i> , <i>L.</i> . . . . .	b
<i>Cardita antiquata</i> ( <i>L.</i> ) . . . . .	s
— <i>calyculata</i> ( <i>L.</i> ) . . . . .	c m

## 10. LUCINIDÆ.

<i>Lucina borealis</i> ( <i>L.</i> ) . . . . .	b m
30. — <i>leucoma</i> , <i>Turt.</i> . . . . .	b c

## 11. UNIONIDÆ (Freshwater shells).

<i>Unio hispanus</i> , <i>Moq.-Tand.</i> . . . . .	S. Spain
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## 12. MYTILIDÆ.

<i>Mytilus edulis</i> , <i>L.</i> , var. <i>Galloprovincialis</i> . . . . .	b
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## 13. ARCIDÆ.

<i>Nucula Nucleus</i> ( <i>L.</i> ) . . . . .	b
<i>Arca tetragona</i> , <i>Poli</i> . . . . .	b c m
35. — <i>barbata</i> , <i>L.</i> . . . . .	b
— <i>lactea</i> , <i>L.</i> . . . . .	b c
— <i>antiquata</i> , <i>L.</i> . . . . .	c s
<i>Pectunculus Glycimeris</i> ( <i>L.</i> ) . . . . .	b c m

## 14. OSTREIDÆ.

<i>Lima hians</i> ( <i>Gm.</i> ) . . . . .	b c m
40. <i>Pecten varius</i> ( <i>L.</i> ) . . . . .	b m
— <i>Pusio</i> ( <i>L.</i> ) . . . . .	b c m
— <i>Pes felis</i> ( <i>L.</i> ) . . . . .	c m
<i>Anomia Ehippium</i> , <i>L.</i> . . . . .	b m

II. GASTEROPODA (UNIVALVES, except *Chitonidæ*).

A. SEA SHELLS, except *Melaniidæ*; the animals breathing water by means of gills, *i. e.* lamellar, pectinate, or plumose branchiæ (except *Auriculidæ*).

## 15. PATELLIDÆ.

	Hab.
<i>Patella athletica</i> , <i>Bean</i> . . . . .	b
45. — <i>rustica</i> , <i>L.</i> . . . . .	c m
— <i>pellucida</i> , <i>L.</i> , var. <i>α, γ</i> . . . . .	b
<i>Siphonaria pectinata</i> ( <i>L.</i> ) . . . . .	s

## 16. CALYPTRÆIDÆ.

<i>Hipponyx subrufa</i> ( <i>Lam.</i> ) . . . . .	W. Indies
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17. FISSURELLIDÆ.		Hab.
	Fissurella reticulata ( <i>Don.</i> ).....	b c m
50.	— Nubecula ( <i>L.</i> ) .....	Medit.
18. HALIOTIDÆ.		
	Haliotis tuberculata, <i>L.</i> .....	b c m s
19. TROCHIDÆ.		
	Solarium luteum, <i>Lam.?</i> .....	c m
	Trochus zizyphinus, <i>L.</i> .....	b c m
	— granulatus, <i>Born</i> .....	b c m
55.	— Eltoniæ, <i>Lowe</i> .....	Mogador
	— Magus, <i>L.</i> .....	b c s
	— carneus, <i>Gm.</i> .....	Mogador
	— umbilicatus, <i>Mont.</i> , var. lætus .....	b
	— sanguineus, <i>L.</i> .....	Medit.
60.	— lineatus ( <i>Da Costa</i> ) .....	b
	Phasianella Pullus, <i>L.</i> .....	b c
20. TURRITELLIDÆ.		
	Turritella communis, <i>Risso</i> .....	b
21. SCALARIIDÆ.		
	Scalaria pseudoscalaris, <i>Brocchi.</i> .....	c
	— clathratula ( <i>Mont.</i> ).....	b c?
65.	— crenata ( <i>L.</i> ) .....	c
22. MELANIIDÆ (Freshwater shells).		
	Melanopsis cariosa, <i>L.</i> , var. <i>a</i> torulosa .....	S. Spain
	—————, var. <i>β</i> lævigata.....	
23. NATICIDÆ.		
	Natica maroccana ( <i>Chemn.</i> ) .....	b
	Sigaretus haliotoideus ( <i>L.</i> ).....	s
24. MURICIDÆ.		
	Murex Erinaceus, <i>L.</i> , var. torosus.....	b m
70.	Triton cutaceus ( <i>L.</i> ) .....	c
	— nodiferus, <i>Lam.</i> .....	c m
	Purpura Lapillus ( <i>L.</i> ).....	b
	— hæmastoma ( <i>L.</i> ) .....	c m s
	Columbella rustica ( <i>L.</i> ).....	c m s
75.	— conulus ( <i>Oliv.</i> ) .....	c m
	Mitra zebrina, <i>Orb.*</i> .....	c m
	Nassa reticulata ( <i>L.</i> ) .....	b c

\* A name taken by D'Orbigny, without acknowledgment, from a MS. of the present writer, by whom the species had been long previously discovered and distinguished in Madeira.

	Hab.
<i>Nassa incrassata</i> (Müll.).....	b c m
— <i>mutabilis</i> (L.).....	c?
80. <i>Buccinum vittatum</i> (L.).....	s
<i>Cassis Saburon</i> , Lam.....	s
25. CONIDÆ.	
<i>Conus mediterraneus</i> , Brug., $\beta$ <i>franciscanus</i> ...	c
26. VOLUTIDÆ.	
<i>Cymbium rubiginosum</i> (Swains.), $\alpha$ <i>angulatum</i> , $\beta$ <i>incurvum</i> .....	c s
27. CYPREIDÆ.	
<i>Cypræa Pyrum</i> , Gm. ....	c m
85. — <i>spurea</i> , L. ....	c m s
— <i>lurida</i> , L. ....	c s
— <i>europæa</i> , Mont.....	b
<i>Marginella glabella</i> (L.).....	c s
28. TORNATELLIDÆ.	
<i>Tornatella fasciata</i> , Lam. ....	b
29. AURICULIDÆ.	
(Mostly Sea-shore or Salt-marsh Mollusks, but air-breathing and allied to <i>Limnæidæ</i> .)	
90. <i>Melampus æqualis</i> , Lowe, var. $\alpha$ .....	c m

*Tabular View of proportionate Distribution of the preceding Species between Mogador and Britain (b), the Canaries (c), the Madeiras (m), Senegal (s), &c.*

Britain.	The Canaries.	The Madeiras.	Senegal.
b..... 26	c..... 6+1?	m..... 0	s..... 6
b c..... 5+4?	c b..... 5+4?	m b..... 4	s b..... 2
b c m.... 10	c b m.... 10	m b c..... 10	s b c..... 1
b c m s.. 1	c b m s.. 1	m b c s.... 1	s b c m.... 1
b c s.... 1	c b s.... 1	m b s..... 0	s b m..... 0
b m..... 4	c m..... 9	m c..... 9	s m..... 0
b m s.... 0	c m s.... 3	m c s..... 3	s m c..... 3
b s..... 2	c s..... 4	m s..... 0	s c..... 4
49+4?	39+5?	27	17

These, with three Mediterranean species, one West Indian, two

(freshwater) South of Spain, and two (*Trochus Eltoniæ* and *T. carncus*) Mogadorian, make up the whole number, ninety.

*Notes on the preceding List.*

No. 13. *La Calcinelle*, Adans. 232, t. 17. f. 18; *Lutraria piperrata*, Lam.

14. *Donax anatinus*, Lam.—Precisely identical with the common British species, the hinge having one lateral tooth in the left valve, locking between two in the right, close to the end of the nymphæ on the short posterior side, exactly as in English specimens. The true *D. trunculus*, L., is at once distinguished by the absence of these lateral teeth.

21. *Tapes Pullastra* (Mont.), F. H. ii. 382, t. 25. f. 2, 3; *Le Lunot*, Adans. 227, t. 17. f. 11.

22. This *Venus* may just possibly prove to be the true Mediterranean *V. gallina*, L., for I examined it only cursorily, and unfortunately neglected to bring away specimens. It seemed to be abundant.

31. *Unio hispanus*, Moq.-Tand. Rossm. Ic. xii. 26, t. 56. f. 747.—Shell  $1\frac{1}{2}$ –2 inches long, 10–12 lines deep, light and thin, plain yellow-brown, without rays. River at Mogador, and frequently found dead on the beach, having been brought down by floods into the sea. Except in being without coloured rays, it agrees exactly with the Spanish shell above referred to from the Guadalquivir. It approaches *U. batavus*, Nilss.; but besides several other points of difference, less striking though important in their aggregate, it has the anterior end longer or more produced proportionally, and the beaks or umbones consequently less eccentric.

32. This is the var. figured in F. H. t. 48. f. 1; Hanl. Conch. Linn. t. 2. f. 4; Phil. i. t. 5. f. 12, 13.

43. Two varieties, viz., the *Anomia Cepa* and *A. electrica* of Linnæus.

45. *Patella rustica*, L., Dillw. = *P. lusitanica*, Gm., Phil. i. 110. = *P. punctata*, Lam. vi. 1. 333; Payr. Catal. 88, t. 3. f. 6, 7 = *P. guttata*, D'Orb. in W. B. Hist. Can. ii. 2. 98, t. vii. B. f. 13–15. Martini's t. 5. f. 35, 36, well represents old worn shells of this most common and abundant Madeiran and Canarian Limpet.

46. *Patella pellucida*, L. var. *a*.—Shell (being adult) more depressed, with the vertex lower or nearer the margin, and also somewhat stronger and larger, than in most British specimens of

*a* (as figured *e. g.* in Sowerb. Conch. Man. f. 230); the blue rays indistinct. Well represented in F. H. Brit. Moll. t. 61. f. 3. Transitional between *a* and  $\beta$  (*P. lævis*, Penn.). Length  $8\frac{1}{2}$ –9, breadth  $6$ – $6\frac{1}{2}$  lines.

Var.  $\gamma$ , *compressa*, Lowe.—Shape and habit exactly of *P. compressa*, L. Vertex much further from the anterior margin than in *a*. Shell strong, yet subpellucid, oblong, compressed, and deeper at the sides than at each end, so that when placed on a flat surface it rises or gapes considerably at each end, instead of lying flat, or nearly so, as in *a* above described. One specimen, of a darker coffee colour than the others, is distinctly radiated with blue dots from the vertex. Length 10–14, breadth 7–8 lines.

This seems to have much the same sort of relation to the Mogadorian *P. pellucida*, L., *a*, that *P. pellucida*,  $\beta$  (*P. lævis*, Penn. ed. 1. t. 90, lowest fig.), has to the English *P. pellucida*, L. The differences appear in both cases to be due only to age or position. *P. pellucida*,  $\gamma$ , having the sides deeper, from its station probably on some stalk or cylindrical surface.

47. *Siphonaria pectinata* (L.), *Patella pectinata*, Linn., ed. 12, 1259; Hanley, Conch. Linn. 423, t. 4. f. 12 (not Born, Lam., &c.); *Lepas exigua africana*, Mart. i. 111, t. 7. f. 58, 59; *Le Mouret*, Adans. 34, t. 2. f. 5.

My Mogadorian examples agree better with Adanson's than with Hanley's figure. One of the two largest of them is 13 lines long and  $9\frac{1}{2}$  broad; the other 16 lines long and 12 broad. They are all of a regular oval or oblong-oval shape, with the margin very even and entire; differing strikingly in this respect from *S. concinna*, Sowerb. Gen. f. 2, in which the margin is distinctly toothed or crenate.

48. *Hipponyx subrufa*, Sowerb. in Proceed. Zool. Soc. 1835, p. 5; *Pileopsis subrufa*, Lam. ed. 1. vi. 2. p. 18; *Lepas conica rufescens*, Martini, i. 146, t. 12. f. 113.

49. *Fissurella reticulata* (Don.), F. H. ii. 469, t. 63. f. 4, 5 = *F. græca*, Phil. i. 116 (not Linn. or Lam.) = *F. europæa*, Sowerb. Conch. Ill. (*Fissurella*) 5. f. 43.—Shell strong, oblong, with from fifty-five to fifty longitudinal or radiating ribs, alternately large and small, crossed at regular and equal distances by fourteen or fifteen concentric ribs, forming a regular and even network.

50. *Fissurella nubecula* (L.) = *F. rosca*, Lam., Sowerb. = *F. nim-bosa*, Phil. i. 117 (not Linn.).

52. *Solarium luteum*, Lam. ? Phil. i. 174, t. x. f. 27; *Trochus hybridus*, var., Chemn. v. 133, t. 173, f. 1704, 1705 (with reference to Geve, t. 25. f. 24 *a, b*). Except the words "*ad peripheriam bi-*

*sulcata*," instead of *bicingulata*, and the habitat "la Nouvelle-Hollande, M. MacLeay," Lamarck's diagnosis and description (Hist. ed. 2. ix. 100) seem to denote this Mediterranean and Canarian (Lanzarote, *McAndr.*) species; though Philippi's query to this reference must be retained till the above discrepancies can be accounted for. The smaller size and umbilicus distinguish at once the species from *S. hybridum* (L.), Chemn. v. 132, t. 173. f. 1702, 1703; though, from its Mediterranean habitat, as Mr. Hanley suggests, it may very possibly have been the shell primarily intended by Linnæus (Syst. ed. 12. 1228) for his *Trochus hybridus* rather than that of the "Museum Ulricæ."

55. *Trochus Eltoniæ*, Lowe.

*T. testa parvula conica perforata lævi strigis lineolisve purpureo-fuscis rubrisve obliquis eleganter picta, apice livido-cærulescente; anfractibus planatis obsolete spirallyter costulatis v. sulcatis, ultimo ad carinam subcingulato subtus planato; striis earumque interstitiis lævigatis; sutura simplice; perforatione parva aperta distincta cylindrica; apertura depresso-rotundata ad basin columellæ rectæ subangulata.*

Diam. maj. 3-4 lin., min.  $2\frac{3}{4}$ - $3\frac{1}{2}$ ; alt. 3-4. Anfr. 5-6.

An *T. variegatus*, Chemn. v. 104. t. 171. f. 1661, 1662?

Like *T. exiguus*, Pult., or a miniature *T. ziziphinus*, L., but with a distinct though small umbilicus. Shell very strong, simply and exactly conical, as high as broad, very smooth and shining, marbled or mottled with oblique wavy slaty-brown lines, or rose-red streaks, uniting at the sutures into larger distinct equidistant spots or patches on a yellowish-white ground; the apex dusky-livid. Volutions flat, with the suture simple, spirally ribbed or grooved, the ribs and their interstices quite smooth and even, not granulated or striated obliquely as in *T. exiguus*, Pult., or *T. striatus*, L.; the last volution entirely, and the others partially, somewhat indistinctly cingulate, or belted with a slightly raised, smooth, tumid girdle at the lower angle. Base flat, with a small round open perforation like a pin-hole. Aperture round, a little angular only at the base of the straight oblique pillar.

Except the synonym of Chemnitz (which is doubtful, no less from the imperfection of his figures and description than from the habitat, "Cape of Good Hope," attributed to his species), I can find no notice or description at all applicable to this well-marked, pretty little *Trochus*. It is therefore named to record the assiduity and liberality of a very zealous and discriminating shell-collector (Mrs. Elton), the lady of the British Vice-consul at Mogador, to whose kindness I am indebted for the acquisition of

two specimens of the present shell amongst many other interesting species.

57. *Trochus carneus*, Gm., Dillw.; *Globulus indusii*, Chemn. v. 116, t. 171. f. 1682.

*T.* testa granulata solida crassa orbiculato-depressa aperte perspective et profunde umbilicata cinereo-carnea v. rosea, apice valde obtuso; anfractibus planis, ultimo carinato, omnibus arcte et æqualiter granulato-striatis, granularum serie suprema ad suturam paullo majore; umbilico medioeri cylindrico simplice nec granulato nec dentato, iutus canaliculato; apertura depresso-orbiculata edentula simplice.

Diam. maj. 6-8 lin., min. 5-7; alt. 3-6. Anfr. 5-6.

The specimens being dead, and more or less bleached, are of a uniform pale rose-red or pinky flesh-colour, with one exception, which is pale cinereous or greyish-slate tinged with pink or rose.

*Le Vasset*, Adans. t. 12, might be mistaken for a rude figure of this species, but it certainly represents a young shell of *T. Pharaonis*, L.

58. *Trochus umbilicatus*, Mont., var. *lætus*. Smaller, with a much smaller umbilicus and somewhat more elevated spire than is usual in British examples; approaching the Herm Island var. mentioned in F. H. Brit. Moll. ii. 521, but always with a distinct, though often quite minute perforation. The colours are remarkably bright, distinct, and lively.

59. *Trochus sanguineus* (L.), Phil. i. 179; *Turbo sanguineus*, Linn. Syst. ed. 12. 1235, Desh. in Lam. ed. 2. ix. 225; *Turbo purpureus*, Risso, Hist. Nat. iv. 116, f. 48; *Globulus roseus*, Chemn. v. 113, t. 174. f. 1675.—Shell more depressed than in Chemnitz's or Risso's figures, and, except in the fewer stronger grooves and uniformity of colour, strongly resembling small states of *Tr. umbilicatus*, Mont.

60. *Trochus lineatus* (Da Costa), F. H. ii. 525, t. 65. f. 4, 5 (*T. crassus*); *T. crassus*, Pult., Mont., Maton and Rack., Turt., Flem., Dillw., &c.; *Turbo lineatus*, Da Costa, Donov.; *Monodonta lugubris*, Lam. ed. 2. ix. 180.—The Mogadorian shell is neither the Madeiran nor Canarian, but precisely the English form or species.

*Trochus lineatus*, Da Costa=(sec. F. H.) *T. cinerarius*, L.; and *Trochus lineatus*, Lam. ed. 2. ix. 141=again another very different Australian species.

Though ranging all along the west coasts of the Peninsula down to Mogador, this common British form or species does not seem to enter the Mediterranean; and it certainly does not occur in either the Canaries or Madeira. It has apparently a predilec-

tion for a western aspect, being found in Britain chiefly on the west or south-west coasts.

65. *Scalaria crenata*, Desh. in Lam. ed. 2. ix. 76; *Turbo crenatus*, Linn. Syst. ed. 12. 1238; Chemn. xi. 156, t. 195 A. f. 1880, 1881.

66. *Melanopsis cariosa* (L.).

*M. testa ovata* v. *ovato-oblonga subturrita sæpe longitudinaliter costata* et 1-2-seriatim nodulosa, costis nodulisque sæpe obsolete evanidis, olivacea v. castanea nigricans; spira breviuscula apice acuto sæpe eroso-truncato decollata; anfr. planatis subconfluentibus, ultimo supra medium cingulatum constricto-impresso v. subcanaliculato, sutura simplicissima planata exoleta; anfr. ultimo testæ integræ (nec decollatæ) dimidium æquante v. superante; apertura sursum angustissime producta arete contracta acuminata.

*a. torulosa*; plus minus longitudinaliter costata, costis infra suturam obsolete noduliferis, nodulis 1- v. 2-seriatis.

*M. cariosa*, Desh. in Lam. ed. 2. viii. 494; Rossm. Ic. ix. x. 42. "*M. costellata*, Fér." (Desh.).

1. Subvar. *minor*; testa parvula crassiuscula nigricante obsolete 14-16-costulata apice plerumque eroso-decollata.

Long. 4-6 v. 8 lin., apert. 3-4½; lat. 2-3½.

*Murex cariosus*, Linn. ! Syst. ed. 12. 1220; Hanley! Conch. Linn. 298. t. ii. f. 6 (sutura nimis impressa). *Melanopsis cariosa*, Rossm. ix. x. 42. t. 50. f. 680 (spira carioso-decollata) et xiv. 33. t. 68. f. 846 (spira completa) = *M. sevillensis*, Gratel. in Graëlls, Catal. p. 17.

Swarming in the spring at the Emperor's Garden up the river near Mogador, crawling on the sandy mud at the bottom, and clustering on sticks and stones in the water. Animal black. Shell dark olive-brown or black, with chalky-white eroded patches, and the apex almost always much eroded and abruptly truncate, leaving only about three volutions, which are somewhat faintly ribbed longitudinally, the ribs always more or less irregular, and often evanescent on the last volution, the shell blending gradually into  $\beta$  1 in this respect, as with regard to size it passes into  $\beta$  2. Sometimes the ribs form one or two indistinct rows of faint nodules, one above, the other below the single infra-sutural depressed belt. Suture always flattened, plain, and indistinct or simple.

2. Subvar. *major*; testa majore tenuiore pallidiore sæpius turrita, spira productiore acuta distinctius 12-20-costata.

Long. 6-15 lin., apert. v. anfr. 1<sup>mi</sup> 4-7½ v. 8; lat. 3-6.

*Var. major*, Desh. l. c.; Chemn. xi. 285. t. 210. ff. 2082, 2083, huc potius quam ad *M. costatam* (Oliv.) referendæ.

*a.* Short ovate; ribs strong, remote, regular, 12-15.

*b.* Turreted-elongate; ribs more irregular and crowded, 16-20.



Principally in the river itself, but also in the spring at the Emperor's Garden with subvar. 1, abundant. Often carried down by floods, and picked up pale and bleached on the sandy beach between Mogador and the mouth of the river. Shell sometimes short and ovate, but more frequently turreted acuminate, thinner in substance and lighter or paler coloured than subvar. 1, usually pale horn or yellowish, with darker fulvous longitudinal wavy streaks or lines, and more or less pellucid; often bleaching to a pale-straw colour, and acquiring a bright varnish-like polish, but scarcely becoming thickened or opaque. In sculpture it is no less variable than in shape; the ribs and nodules being sometimes strong and regular, sometimes present on a part only of the volutions, and sometimes barely indicated, and so gradually passing into  $\beta$  2, and doubtless constituting, in such extreme state, f. 2078, 2079 of Chemnitz's *Buccina Marocana*, xi. 285, t. 210. ff. 2078-2083; whilst certainly, considering their Moroccan origin, his ff. 2082, 2083 are more safely to be referred to the strongly-ribbed state of this shell than to the oriental *Melanopsis costata* (Oliv.) (Lam. ed. 2. viii. 489; Sowerb. Gen. f. 3, and Conch. Man. f. 315; Rossm. ix. x. 41. t. 50. ff. 678, 679), which may be really distinct, having the suture deeply and strongly marked or impressed, and not as in the present species, in both its varieties and all its Mogadorian forms, flattened and obsolete.

The shorter ovate forms of this subvariety are more strongly, remotely, and regularly ribbed than the more turreted and elongate; the former having only 12-15, the latter about 20 ribs on the last volution.

$\beta$ . *lævigata*; costis nodulisque evanescentibus obsoletis.

1. Subvar. *minor*, testa parvula crassiuscula nigricante, apice plerumque eroso-decollata.

Long. 3-6 v. 8 lin., apert.  $2\frac{1}{2}$ - $4\frac{1}{2}$ ; lat. 2-3 $\frac{1}{2}$ .

Spring in the Emperor's Garden up the river at Mogador, intermixed in about equal abundance with  $\alpha$  1, into which it passes by imperceptible gradations.

2. Subvar. *major*; testa majore pallidior nunc ovata nunc turrita, spira sæpius acuta.

*a. Forma ovata*, testa tenuiore.

Long. 9-10 lin., apert. v. anfr. 1<sup>mi</sup> 6-6 $\frac{1}{4}$ ; lat. 4 $\frac{1}{4}$ -4 $\frac{3}{4}$ .

*Melanopsis lævigata*, Lam. ed. 2. viii. 490; *M. buccinoidea*, Fér. (recent), et *M. fusiformis* (fossil), Sowerb. Gen. ff. 2, 5; *Buccinum prærosum*, Chemn. ix. ii. 40. t. 120. ff. 1035, 1036 (not Linn.), apice eroso-decollato; *Melanopsis prærosa*, Rossm. Ic. ix. x. 41. ff. 676, 677.

Somewhat resembling a *Linnæa palustris* (Müll.), or a *L. peregra*, Drap. Shell thin ovate, with a nearly perfect pointed apex, of a plain olive-brown, pale at the suture, or uniform black. Five examples only. Spring or river at the Emperor's Garden.

*b. Forma turrita*; testa crassiore solidiuscula, anfr. ultimo spiram subæquante.

Long. 7-16 lin., anfr. 1<sup>m</sup> 4-8; lat. 3-7.

*Melanopsis Dufourei*, "Fér.," Lam. ed. 2. viii. 493; Graëlls, Catal. 17. ff. 20-22; Rossm. xiv. 28. t. 68. ff. 836-840\*. *Buccinum Maroccanum*, Chemn. xi. 285. t. 210. ff. 2078, 2079 (testæ majores decorticatæ, ideoque, ut rarius inveniuntur, fasciatæ).

Found with  $\beta$  1 in the spring or river, but comparatively rare.

Nothing can be more variable than the individuals of the present species, as thus constituted, in size, colour, shape, and sculpture; and only the possession of large suites of examples could warrant the fusion into one of forms which, if judged only by detached or isolated instances, might well be considered as so many distinct species. In size it varies from 3 or 4 to 12 or 15 lines long; in colour, from deep uniform brown or black (the prevalent hue in small examples) to pale straw or bluish-white, irregularly streaked longitudinally with brown or fulvous lines; the shape passes by degrees from shortly ovate to turreted-elongate, from broad to narrow-oblong, and from a blunt or decollated to an acuminate finely pointed apex. The ribs vary in number from 12 to 20, sometimes covering the whole shell, sometimes confined to the two or three apical volutions, and passing gradually through every intermediate stage of prevalence or strength into absolute evanescence. And all these characters are so variously blended and combined, that not any one of them can be selected as more regularly typical or predominant, or less liable to change and alteration, than another; *i. e.*, you have ribbed and even both small and large, black and pale, short and elongate, blunt and pointed, strong and thin; or, again, ovate and elongate both small and large, black and pale, ribbed and even, thick and thin, blunt and finely pointed, &c. &c., in every variety of combination. It is merely, therefore, to simplify the synonymy, by an arrangement in accordance with the two pseudo-species of Lamarck and Férussac, that the sculpture is here taken as of primary importance in the grouping of these forms.

\* His f. 835, considered (p. 30) as the typical form of *M. Dufourei*, Fér., belongs rather to the var. *Graëllsii*, p. 31, ff. 841-843 and 844? (*M. Graëllsii*, Villa, Graëlls, Catal. 17. ff. 16-19), characterized by the two depressed belts of the last volution. This form or var. did not occur at Mogador.

An attentive study of all these shells *together with their animals and habits* in their native haunts, may possibly lead to a different conclusion. But my present impression, from a long and careful scrutiny of nearly 200 Mogadorian examples of the shells alone, is, that they are all merely varieties or forms of a single highly polymorphous species.

The streaky longitudinal, instead of spiral, arrangement of the coloured markings, when any are discernible, seems to be characteristic. Only in one example of  $\beta$ , 2 *b*, exhibiting a near approach to Chemnitz's figures 2078, 2079, do the colours assume a fasciated disposition, forming a tolerably distinct bluish band along the infra-sutural depression, with two or three more indistinct subconfluent brown bands below. This singular example bears, indeed, a most marvellous resemblance, both in shape and colour, to *Buccinum vittatum*, L., for which, on a cursory glance, it might easily be mistaken.

All these shells are apt to be coated with a thick greenish incrustation.

*Melanopsis prærosa* (L.) = *Buccinum prærosus*, Linn. Syst. ed. 12. 1203, originally found along with *M. cariosa*,  $\alpha$  1 *suprà*, by Alströmer in the aqueduct at Seville, figured in Hanley, Conch. Linn. t. ii. f. 5, from an authentic specimen, and by Chemn. xi. 285, t. 210. f. 2080, 2081, from examples collected in stagnant pools and streams in Morocco, should be searched for at Mogador. It is distinguished from *M. cariosa*,  $\beta$  2 (*Mel. buccinoidea*, Fér., *laevigata*, Lam.), by the volutions being tabellated or retuse at the top next the suture ("anfractibus supra planis," Chemn. *l. c.*), each thus appearing partly sunk or immersed (*intrusus*) in the lower one preceding.

I forbear recording as a Mogadorian species from a single worn and bleached example from Mrs. Elton's collection a shell which, though in shape and general aspect much resembling some narrow elongated forms of *M. cariosa*,  $\beta$  2 *b*, yet differs specifically in the aperture being simply ovate or acute at top, not acuminate or produced into a sort of constricted narrow channel; and in its coloration, which consists of fine close-set regularly equidistant spiral brown or chestnut lines or striæ, instead of longitudinal irregular streaks, interrupted in the specimen, owing to its worn condition, on a polished ivory-white or yellowish-white ground. It appears to be a dead and thickened worn example of the W. Indian (Jamaican) *Melanopsis lineolata* (Gray); and it may therefore be suspected to have become mixed up accidentally with

Mrs. Elton's Mogadorian shells, amongst which I certainly observed a few undoubtedly W. Indian and other foreign species. Its length is 12, breadth 4, and length of apert.  $5\frac{1}{4}$  lines.

67. *Nerita Maroccana*, Chemn. v. 270, t. 188. ff. 1905-1908; *Natica marochiensis*, Lam. ed. 2. viii. 642; *N. intermedia*, Phil. i. 163; *N. nitida* (Don.), F. H. iii. 330, t. 100. ff. 2-4.

68. *Sigaretus haliotoideus* (L.), Lam. ed. 2. ix. 9; *Helix haliotoidea*, Linn. Syst. ed. 12. 1250; Hanley, Conch. Linn. 390. t. iv. f. 7; *Catinus lactis* (white and flat var.), Mart. i. 196, t. 16. f. 152; *Sigaretus Leachii*, Sowerb. Gen. f. 3 (not *S. haliotoideus*, f. 2, which =, according to Hanley, *Helix neritoidea*, Linn., and also =, according to Deshayes, *S. concavus*, Lam., not Sowerb. l. c. f. 1, which =, according to Deshayes, *S. Grayi*, Desh. in Lam. ed. 2. ix. 12).—*Le Sigaret*, Adans. 24. t. 2. f. 2, appears by the figure to belong rather to *S. neritoideus* (L.) (*S. haliotoideus*, Sowerb.), than to *S. haliotoideus* (L.) (*S. Leachii*, Sowerb.), to which it has been usually referred.

My two Mogadorian examples of this shell, 12 and 15 lines long, agree rather more closely, in the smaller proportionate length (5 and  $6\frac{1}{2}$  lines) of the space occupied by the spire, with Sowerby's fig. 3 of his *S. Leachii* than with Hanley's fig. 7 (from the types) of *S. haliotoideus* (L.), in which the same spaces are respectively  $5\frac{1}{2}$  and  $6\frac{1}{2}$  lines, the whole length being 14 lines in each; though, strictly speaking, they are intermediate in this respect between the two. But such slight discrepancies can scarcely be held to indicate more than local, or possibly mere sexual differences.

In a suite of twelve examples of this species from the coast of South Carolina over against Charleston, the spire occupies a length of 4 to  $5\frac{1}{2}$  lines, the whole length being in the smallest of these examples 10, and in the largest 16 lines. In a thirteenth, from the same locality, 15 lines long, and rather broader and more convex than the rest, the spire is 7 lines long, which is almost exactly the proportion in Hanley's fig. 7. t. 4, with which it also agrees in the greater width of the penultimate volution. I believe this to be the shell of a female individual, and that all the other twelve examples, with the rather smaller spire and more flattened or less concave shell, have probably belonged to males.

69. This is *Murex torosus*, Lam. ed. 1. vii. 174, ed. 2. ix. 598; Sowerb. Conch. Ill. f. 39.

Martini's two upper figures 1026, 1027 of his *Purpura scalata*, iii. 345. t. 110. ff. 1026-1028, referred by Lamarek to his *M. Eri-naceus*, which is the ordinary foliated var. of British authors,

admirably represent the present singular variety of the same species.

72. *Purpura Lapillus* (L.), *Buccinum Lapillus*, Linn.; *Le Sadot*, Adans. 106. t. 7. f. 4.

Although this very common British shell is thus figured and described by Adanson amongst his shells of Senegal, he does not seem to have really found it on that coast, since, contrary to his usual practice, he omits any precise specification of an actual Senegal locality. The habitats he mentions are Port de l'Orient (in France), the island of Teneriffè in the Canaries, and that of Fayal in the Açores; and though the two latter habitats are certainly extremely doubtful (indeed in Teneriffè it may almost safely be affirmed that the shell does not occur), yet his enumeration of them in the absence of his usual precise indication of any Senegal locality is adverse to the notion of its having any better claim than the Teneriffè *Helix*, *Le Pouchet*, to a place amongst his Senegal shells.

The abundant occurrence, however, of a dwarf state or var. of this shell at Mogador renders it not at all improbable that it may be also found still further down the coast, and therefore possibly in Senegal. Fresh observations to decide this point would therefore be extremely interesting.

74. I cannot agree with Mr. Hanley (Coneh. Linn. 221) in dismissing Adanson's *Siger*, 135. t. 9. f. 28, from the synonyms of *C. rustica* (L.). On the contrary, Adanson's expression, "sillons presque imperceptibles," appears to agree no less precisely with the qualified term "læviuscula" of the Linnean diagnosis than with the common Mediterranean, Madeiran, and Canarian shell itself, as contrasted with the strongly-grooved *C. mercatoria* (L.), or *Le Staron*, Adans. 137. t. 9. f. 29, figured immediately above *Le Siger*, on the same plate.

75. *Columbella conulus* (Oliv.). *Buccinum corniculatum*, Lam. ed. 2. ix. 175. *B. Linnæi*, Payr. Catal. 161. t. 8. ff. 10-12; Phil. 1. 225 (var. a). *B. canariense*, D'Orb. in W. B. ii. 2. 90. t. 6. ff. 35-37. Length of specimens not exceeding 5 lines.—Differs from *C. Broderippii*, Sowerb. in Proc. Zool. Soc. (1844) p. 53, in the flat (not "subventricose") volutions, and in the inside of the outer lip being 4-6 or 7, instead of 2-3-toothed.

78. *Nassa incrassata* (Müll.), F. and H. iii. 391. t. 108. f. 3, 4. *Buccinum macula*, Mont., Payr. Catal. 157. t. 7. f. 14. *B. Ascarnias*, Lam. ed. 2. x. 173. *B. asperulum*, Phil. i. 220. *B. Lacepedii*, Payr. Catal. 161. t. 8. f. 13, 14.

80. *Buccinum vittatum*, L.=*Terebra vittata*, Lam.

82. This is *Conus franciscanus*, Brug., which, according to Deshayes (Lam. ed. 2. xi. 81)=a worn *C. mediterraneus*.

83. *Cymbium rubiginosum* (Swains.). Mainly characterized as a species by its strong, solid, substantial thickish shell, oblong shape, narrow sutural channel, rich chestnut or tawny-brown glaze, and distinct well-marked or developed inner lip. There are two tolerably permanent and distinguishable forms or varieties, viz. *a*, *angulata*, with the shoulder angular or slightly pointed, and *β*, *incurva*, with the shoulder rounded and incurved. Of these, *a* includes the shell originally figured by Swainson in his 'Exotic Conchology,' under the name of *Voluta rubiginosa*, and those delineated and described by Sowerby under that of *Cymba rubiginosa*. The only representations I can safely quote of *β* are Buonan. 3. f. 2, and Adanson's *Philin*, t. 3. f. 2.

Mogador has furnished a single small adult example of each of these two forms. That of *a* is, however, so aberrant, that it was pronounced by one of our most experienced practical conchologists to be new and undescribed. It will be advisable, therefore, to enter into some detail with regard to both varieties, first laying down the normal characters and synonyms of each.

*a. angulata*; shoulder or top of outer lip angular or a little pointed, not inflexed; sutural groove sometimes a little broad and open, with the edge erect or subreflexed, and rising mostly above the mammillary cone or spire; shape occasionally slightly ventricose, with the aperture subeffuse and outer lip expanded and sub-arcuated downwards.—*Cymba rubiginosa*, Sowerb. sp. Conch. 6. ff. 7 *a, b, c, d*. *Voluta rubiginosa*, Swains. Exot. Conch.; Martini, t. 70, f. 765.

Of these representations, Sowerby's ff. 7 *c, d*, approach nearest towards a correct delineation of my single Mogadorian example; Swainson's figure, like some of the others, differing in the more produced spire with its apex rising considerably above the edges of the sutural groove; and all being of a more regularly oblong shape, with the outer lip straight, and aperture not at all effuse. The Mogadorian shell is moreover only 4 inches long and 2 inches 3 lines wide, thus being little more than half the size of Sowerby's ff. 7 *c, d*; and though the aperture is even more effuse and the outer lip more expanded than in these figures, and the spire or mammillary cone as much sunk or concealed below the sutural keel, the shoulder is simply angular at the top of the outer lip, without any short erect point. The surface is sprinkled all over, as in *C. pro-*

*boscidale* (Lam.), with little raised points or pustules, apparently caused by the entanglement of grains of sand in the glazed enamelled outer coating of the shell during its deposition. The spire does not rise above the top of the outer lip or aperture; and the very small low mammillary cone is nearly obliterated by the glazed enamel of the rather broad and open concave sutural channel, and completely sunk or hid below the keel or margin of the same, as in Sowerby's ff. 7 *c*, *d*. The sutural channel is deep and concave, but wider in this individual than in the var.  $\beta$  with the retreating, rounded, inflexed shoulder. The outer lip is outwardly prominent, and the aperture effuse downwards, as in Sowerby's ff. 7 *c*, *d*, which also exhibit exactly the general shape and colour (a plain dark fawn, approaching to tawny-chestnut) of this Mogadorian example. The pillar is 3-plaited, and the inner lip strongly defined and thickened, being formed by a distinct, enamelled, smooth raised coat or band, half an inch broad, paler than the rest, along the ventral margin of the aperture.

Of all recorded species this Mogadorian shell certainly comes nearest on the whole to *C. rubiginosum* (Swains.); and then to *C. porcinum* (Lam.), with which it agrees in the sharp angle of the shoulder, but differs in the distinct thickened inner lip, of which there is ordinarily no trace in *C. porcinum* (Lam.), the latter being also a thinner, lighter shell, more closely allied with *C. proboscidale* (Lam.), to which indeed it is united by Dr. Gray.

$\beta$ . *incurva*; shoulder or top of outer lip rounded, incurved and retreating; sutural groove deep and narrow, with the edge inflexed and rising above the obsolete short mammillary cone or spire; shape oblong or cylindric, with the outer lip mostly straight and the aperture rarely effuse.—*Le Philin*, Adans. 48. t. 3. f. 2; Buonan. 3. f. 2.

The only adult Mogadorian example I possess of this variety is  $3\frac{2}{3}$  inches long and  $1\frac{3}{4}$  inch broad, agreeing remarkably well in all respects with Adanson's *Philin* above quoted. In three small immature examples from the same locality, measuring respectively  $1\frac{1}{4}$ ,  $1\frac{5}{8}$ , and  $2\frac{3}{4}$  inches in length, and 8, 12, and 16 lines in width, the broad, blunt, short and rounded apical mammilla is exerted above the shoulder or basal volution, and the shell is outwardly bluish-grey, clouded and mottled with pale spots. The smallest of them has only two plaits on the pillar; but in all of them the inner lip is distinctly developed on the body of the last volution, and the usual rich chestnut or tawny-brown colour per-

vades the inside of the aperture, spreading over the ventral portion of the last volution outside the pale enamelled pillar-lip. In the larger adult shell, the spire is not exerted beyond the basal volution, and the tip of the apical mammilla scarcely protrudes above its rim. In all four, the shape is oblong or cylindric, the outer lip nearly or quite straight, and the aperture not at all effuse.

Adanson's *Philin*, t. 3. f. 2, is a very fair representation of this smaller Mogadorian form of  $\beta$ ; whilst Buonanni's, 3. f. 2, referred by Linnæus to his *Voluta Olla* (*V. Neptuni*, Gm.), and by Hanley (*Conch. Linn.* 237, 238) to *V. proboscidalis*, Lam., belongs rather to the larger Lanzarotan form of this var. Its well-defined deep and narrow sutural channel around the distinct projected mammilla forbids its reference to *V. proboscidalis*, Lam., which is also a vastly larger, lighter, thinner, and altogether differently shaped shell.

An examination, by favour of Dr. Gray and Dr. Baird, of the original types of D'Orbigny's *Voluta Neptuni* and *porcina*, now lodged with the rest of his, or rather Webb and Berthelot's, Canarian Shells in the British Museum, proves them to belong indubitably to *C. rubiginosum* (Sw.), var.  $\beta$ , Lowe,—a shell which indeed is commonly brought to Lanzarote by the Spanish fishermen from the neighbouring coast of Africa, but which is not, at least ordinarily, found on the shores of any of the Canarian islands themselves. In like manner, when M. D'Orbigny states his *V. proboscidalis* (W. B. ii. 2. 86) to have been "*recueillie sur les côtes de l'île de Lancerotte par MM. Webb et Berthelot*," he is at variance with the testimony of one of its alleged collectors (Webb himself), who, in a letter to me dated "Teneriffe, Jan. 30th, 1830," *i. e.* only six months after his and M. Berthelot's joint visit of six weeks to Lanzarote, and two weeks to Fuerteventura, writes: "The reason that many of the shells I sent are in a bad state is, that they are *collected by the fishermen on the opposite continent of Africa*, whereas scarcely anything is thrown up on the rough and precipitous coasts of these islands." The three typical examples, one miscalled by D'Orbigny *V. Neptuni*, and the other two *V. porcina*, in the British Museum, identify themselves amply by their battered, worn, and bleached condition, with those apologized for in the foregoing extract, which has also reference doubtless to a fourth Lanzarotan example of the same form or var.,  $4\frac{1}{2}$  in. long by  $2\frac{1}{4}$  in. broad, sent to me, with various other land and sea mollusks, immediately after his return from Lanzarote to Grand Canary in August 1829, by Webb himself, and which is



in a very similar condition. Instead of being as usual plain-coloured, it is mottled all over, like young *C. Neptuni* (Gm.), with suffused paler spots. This example was erroneously named by me also at the time (as were others subsequently by D'Orbigny) *V. porcina*, Lam.; and it is the very shell referred to by that name in a MS. list of all the shells sent to me by Webb in 1829, with which, at his request, I furnished him, and which he subsequently, it appears, entrusted to M. D'Orbigny.

The only *Cymbium* I could obtain in Lanzarote, during a sojourn there from about the middle of February to that of April 1859, was this *C. rubiginosum* (Swains.), var.  $\beta$ , of which three fine specimens, in fresh, though most unsavoury condition from still containing the remains of their inhabitants, were presented to me by the excellent and active British Vice-Consul at Areife, J. T. Topham, Esq., whose kind and efficient attentions claim the grateful recollection of all visitors to Lanzarote. They had been brought as usual by the fishermen from the opposite coast of Africa; and I could obtain no reliable evidence that the shell was ever really taken living on the shores of either Lanzarote, Fuerteventura, or any other of the Canary Islands.

Of the three existing *Cymbia* in D'Orbigny's collection, the two larger agree precisely with my Lanzarotan examples. The third, marked *Voluta Neptuni*, is merely, in my judgment, a smaller, rather more ventricose, or broader and shorter, form than usual of the same, such as I possess a large example of amongst my Lanzarotan specimens. It is much too solid, thick, and heavy for a *V. Neptuni* or *Navicula* of its size, besides being quite differently shaped, and having a deep narrow sutural channel, with the edge inflexed, round the distinct mammilla, and the shoulder rounded. The pillar is 3-plaited. There can remain, I think, no reasonable doubt of its being anything but a dwarf adult state of *C. rubiginosum*,  $\beta$ . It is a wretched, battered, old example, ground or worn down and bleached perfectly white.

No example marked by D'Orbigny *V. proboscidalis*, or otherwise in any way entitled to that name, exists in his Canarian collection; and I also never received from Webb any shell rightly referable thereto. This throws much doubt on D'Orbigny's enumeration of it as a Lanzarotan species found by Webb, and raises strong suspicion of confusion or mistake, arising possibly from some previous misnomer of one of the three or four examples of *C. rubiginosum* (Swains.), var.  $\beta$ , actually obtained by Webb in Lanzarote.

With a view to confirm the accuracy of the foregoing corrections, and to supply materials to Mogadorian or Canarian observers for further researches, and for the probable discovery on their shores of more than this one *Cymbium*, I subjoin a conspectus of the characters and synonyms of several of the more nearly allied species, as understood by me.

### 1. CYMBIUM OLLA (L.).

*Voluta Olla*, L. = *V. Neptuni*, Gm., Lam.

Plaits of pillar 4; shell proportionately thin and light, globose, ovate, short, inflated, ventricose; spire very short and obtuse, its mammilla indistinct, depressed, and suture obsolete, nearly or quite closed; shoulder (at top of outer lip) angular, erect, slightly prominent, rising above the spire into a short, acute, erect angle or point; inner lip (above the four plaits) distinct and defined; aperture reaching to or beyond the level of the apex, effuse. Colour plain fulvous-fawn or olive-brown; when young, usually mottled with paler or whitish spots.

ADULT: *Voluta Olla*, Linn. Syst. ed. 12. 1196; Hanl. Conch. Linn. 237. *V. Neptuni*, Lam. ed. 2. x. 379. *Cymba Neptuni*, Sowerb. Sp. Conch. p. 5. ff. 2 *c, d*. *Cymbium persicum*, *Patera Neptuni*, Mart. iii. 51. t. 71. f. 767. *L'Yet*, Adans. 44. t. 3. f. 1. *Yetus Neptuni*, Gray in Proc. Zool. Soc. 1855, p. 52.

YOUNG OR PULL.: *Voluta Navicula*, Gmel. *Yetus Navicula*, Gray, l. c. 51. *V. Neptuni pull.*, Sowerb. Gen. f. 1; Sp. Conch. f. 2 *a, b*; D'Orb. in W. B. ii. 2. 85. *Cymbium persicum maculatum*, Martini, iii. 52. t. 71. ff. 768, 769.

*Hab.* "African Ocean and Persian Gulf," Lam.; "African Ocean," Sowerb.; Senegal, Adans.; "Lanzarote" (*i. e.* opposite coast of Africa), Webb; West Coast of Africa, Gambia, Gray.

D'Orbigny's typical Canarian specimen of his *V. Neptuni*, in the British Museum, is certainly nothing (as before affirmed) but a wretched bleached and battered shell of *V. rubiginosa*, Sw. Yet I possess a small mottled young example of the true *V. Neptuni*, Gm. (= *V. Navicula*, Gm.), 2 inches long by 1 inch and 5 lines broad, sent to me by Webb, in 1829, from Lanzarote, which, though doubtless of African origin, suffices to forbid the quotation of *V. Neptuni*, D'Orb., in W. B. ii. 2. 85, together with his *V. porcina*, under *C. rubiginosum* (Sw.), var.  $\beta$ , with which, however, the existing types of both his species in the British Museum are all equally identical. For this, his *record* of the species as a

Canarian (Lanzarotan) shell, though unsupported by the type in his collection, doubtless rests on the authority of a MS. list by myself, with notes or descriptions of all the Canarian shells received by me from Webb, drawn up for, and communicated many years ago (in 1833) to my late friend,—of which D'Orbigny has, without acknowledgment, made unsparing use—borrowing most of the new specific names, and arbitrarily changing others, without reference\* to their real author. In this list, the small mottled Lanzarotan example of *V. Neptuni*, Gm., above mentioned, was included; and it still exists, so marked, in my Canarian (Webbian) collection.

## 2. CYMBIUM PRODUCTUM, *Lowe*.

*Voluta olla*, Lam. (not Linn.).

Plaits 2; shell proportionately thin and light, oval or oblong-oval, mostly subventricose; spire produced, the mammilla glandiform, prominent, exerted; sutural groove very narrow, deep, constricted, nearly closed, its margin strongly incurved and obtuse or rounded; shoulder distinct, rounded, incurved, prominent; aperture ending far below the apex, effuse; inner lip mostly effuse and indistinct, or altogether obsolete. Colour uniform pale buff, with a dark chestnut-blackish epiderm.

*Voluta olla*, Lam. ed. 2. x. 381; Swains. Exot. Conch. *fig. opt.* (not Linn.). *Cymba Olla*, Sowerb. sp. Conch. p. 7. ff. 1a, b, c, d. *Cymbium*, &c. *Philippinum*, Mart. iii. 48. t. 71. f. 766 (pillar 3-plaited); Buonan. 3. f. 6 (pull.). *Yetus Olla*, Gray, in Pr. Z. S. 1855, p. 51.

*Hab.* Indian Ocean, *Lam.*; Asiatic Ocean, and probably Africa, *Swains.*; Mediterranean (Gibraltar), *Sowerb.*; Mediterranean, *Gray*.

Martini's t. 72. ff. 772, 773, carelessly quoted by Swainson, *l. c.*, for this shell, are more correctly referred by the same author, two pages earlier in the same work, to *Voluta melo*, Sol.

## 3. CYMBIUM RUBIGINOSUM (*Swains.*).

*Voluta rubiginosa*, Swains.

Plaits 3; shell strong, thick, heavy, broadly oblong or cylindrical, slightly but equally contracted at each end; spire short, its mammilla distinct, sometimes, but not usually, a little exerted

\* Except in two instances,—*Planaxis lavigata*, p. 79, and *Ranella abbreviata*, p. 94. The "*Planaxis*" is a young example of a *Nassa* very abundant at Arceife in Lanzarote, and closely allied to *N. mutabilis* (L.).

beyond the last volution; sutural groove distinct, deep, concave, narrow, its lip or edge acute, mostly incurved; shoulder either a little prominent, angular, and pointed, or altogether evenly rounded, incurved, and sloping backwards at top; aperture mostly reaching to or beyond the level of the apex, broad, oblong, sometimes a little effuse; outer lip mostly nearly or quite straight, rarely arcuate; inner lip distinct, broad, and defined. Colour plain cinereous-buff, more or less washed with rich coffee-brown or fulvous, rarely mottled. Surface coated more or less with a shining arenulato-granulate or pustulate golden-fulvous glaze. Shell 4–5½ in. long, and 2¼–3 wide.

*a. angulata*; shoulder or top of outer lip angular or slightly pointed; keel or edge of suture erect or subreflexed; sutural groove sometimes a little broad and open; shape oblong or subventricose, with the aperture subeffuse, and outer lip subarcuate or prominent downwards; inner lip slightly thickened and well defined.—*Voluta rubiginosa*, Swains. Exot. Conch. *Cymba rubiginosa*, Sowerb. Sp. Conch. 6. ff. 7 *a, b, c, d*; Mart. t. 70. f. 765.

*Hab.* Mogador, *Lowe*.

Varies with the spire and mammilla longer and distinctly produced beyond (Swains. *l. c.*; Sowerb. f. 7 *b*), and with the spire shorter, and the mammilla shorter or barely longer than the outer lip or aperture (Sowerb. ff. 7 *a, c, d*; Mart. *l. c.*). To this latter form belongs the Mogadorian shell.

*β. incurva*; shoulder rounded and incurved; keel or edge of suture inflexed; sutural groove deep and narrow, contracted by its incurved edge; shape subcylindric, with the lateral outlines straighter and more parallel for the most part than in *a*, the aperture mostly narrower, and less or not at all effuse; the outer lip nearly or quite straight, and the inner lip somewhat more diffuse and broader or less thickened.—*Voluta porcina*, D'Orb.! in W. B. Hist. Can. Moll. p. 85 (not Lam.). *V. proboscidalis*, ejusd. p. 86, probably (not Lam.). *Le Philin*, Adans. 48. t. 3. f. 2; Buonan. 3. f. 2. *V. Neptuni*, D'Orb.! type in collect.

*Hab.* Mogador, and coast of Africa opposite Lanzarote, *Webb, Lowe*.

In all my examples of *β*, as in Adanson's and Buonanni's figures, the tip of the mammillary cone is almost exactly level with, or only very slightly prominent above, the edge of the sutural groove or top of the outer lip.

Lamarek mixes up the synonyms of this species with those of his *Voluta porcina*, from which, as from *V. proboscidalis*, it is certainly very distinct. Dr. Gray has united it with *Voluta Cymbium*,

Lam. (not Linn.). The deep narrow sutural channel and distinct thickened inner lip distinguish both my own and Webb's Canarian specimens from all these shells; as does the greater ponderosity and thickness from at least the two former species. My three Lanzarotan examples of var.  $\beta$  are from  $5\frac{1}{4}$  to  $5\frac{1}{2}$  inches long, and from  $2\frac{1}{4}$  to nearly 3 inches wide. They are plain-coloured, or at most only partially and indistinctly mottled. My fourth Lanzarotan example, from Webb himself, is, however, as before stated, more distinctly mottled all over. D'Orbigny's two in the British Museum, marked *V. porcina*, perfectly resemble these in every respect. His third *Voluta*, marked *V. Neptuni*, is a small, dwarf, shorter and more ventricose form or state of precisely the same shell, with the aperture wider than usual, bleached, and worn down to a dull marble-like whiteness.

#### 4. CYMBIUM PROBOSCIDALE (Lam.).

##### *Voluta proboscidalis*, Lam.

Plaits 4; shell thin, light, subinflated, large, boat-shaped or fusiform-cylindric, contracted at each end; spire very short, its mammilla soon obliterated, small, and sunk below the top of the last volution; sutural groove broad, concave, soon becoming obsolete or confluent over the mammilla, and forming at the top of the shell a cup-shaped hollow, its lip or edge erect, subreflected or curved outwards, acute; shoulder sharply angular, prominent, remote from the spire; aperture reaching beyond or to the level of the apex; outer lip curved convexedly; inner lip none. Colour plain ferruginous-chestnut or tawny-brown. Size 8-10 or 12 in. long, 4-5 or 6 wide.

*V. proboscidalis*, Lam. ed. 2. x. 382; Swains. Exot. Conch. (no fig. in my copy). *Cymba proboscidalis*, Sowerb. Gen.; Sp. Conch. 5. f. 5 *d*, adult; 5 *e*, jun.; 5 *a*, *b*, pull.

*Hab.* "African Ocean," Sowerby.

Dr. Gray, in Proceed. Zool. Soc. 1855, p. 52, unites this species with the following (*Voluta porcina*, Lam.), of which it may possibly prove, indeed, to be only a large mature or full-developed state or form. But further observations of the shells and animals conjointly seem still requisite to justify such combinations.

#### 5. CYMBIUM PORCINUM (Lam.).

##### *Voluta Cymbium*, L.!

Plaits 2, rarely 3; shell thin, light, rather small, narrow-oblong,

subcylindric, a little broader upwards; spire very short, abrupt or truncate, its mammilla distinct, but not exerted; sutural groove very broad and shallow, nearly or quite flat, its lip or edge very acute, erect, and thin, not incurved, sharply raised or carinate; shoulder sharply rectangular, prominent, remote from the spire, the angle sometimes rising into an erect horn-like point; aperture not reaching to the apex; inner lip none. Colour uniform plain nankin-yellow or cinereous bluish-grey. From 4-6 inches long, and 2-2½ broad.

*Voluta porcina*, Lam. ed. 2. x. 383 (excl. syn. Adans. et Mart. f. 765); Swains. Exot. Conch. opt. (excl. syn. Adans. et Mart. f. 765). *Cymba porcina*, Sowerb. Sp. Conch. 6. ff. 6 a-k; Sowerb. Man. f. 434; Mart. t. 70. f. 764. *Voluta Cymbium*, Linn. ! Syst. ed. 12. 1196; Haul. Conch. Linn. ! 237 (not Lam.).

*Hab.* "African Ocean," Lam., Sowerby.

Adanson's *Philin*, t. 3. f. 2, usually referred to the present shell, certainly belongs rather to *C. rubiginosum* (Swains.), by its 3-plaited pillar, its thickened or distinct pillar-lip, its less remote and prominent shoulder, and its deeper, more narrow, concave sutural channel; instead of the mostly 2-plaited pillar, the more prominent remote shoulder, and broad, flat, shallow sutural space around the apical mammillary nucleus or cone of *C. porcinum* (Lam.). In like manner, Buonanni's 3. f. 2, though it omits the thickened inner lip, by the 3-plaited pillar, the distinct, deep, narrow sutural groove with an incurved edge, and the more rounded, retreating, inflexed shoulder, is by no means a bad representation of *C. rubiginosum* (Swains.),  $\beta$ , *suprà*, whilst it exhibits scarcely a single peculiar trait of *C. porcinum* (Lam.).

I feel by no means confident that this supposed species is not a merely immature or half-grown state of *C. probosciale* (Lam.), with which Lamarck himself indicates its close affinity, and Dr. Gray, as before remarked, unites it.

#### 6. CYMBIUM CISIUM, Menke.

*Voluta cymbium*, Lam. (not Linn.).

Plaits 3 v. 4 (4-6, Lam.); shell large, thick and strong, broadly ovate or ovate-oblong; spire short, abrupt or truncate, its mammilla subprominent, distinct; sutural groove deeply and broadly concave, its lip or edge very acute, erect or subreflected, sharply raised or carinate; shoulder winged, with an erect sharp point or angle remote from the spire; aperture scarcely reaching to the apex, subeffuse or broad; outer lip curved; inner lip obsolete or

none (?). Colour pale yellowish or glaucous-grey, mottled or marbled with chestnut. Shell 6 or 7 in. long,  $3\frac{1}{2}$  or 4 in. wide.

*Cymbium excavatum*, Martini, 3. 44. t. 70. ff. 762, 763. *Voluta Cymbium*, Lam. ed. 2. x. 380; Swains. Exot. Conch. (no fig.). *Cymba Cymbium*, Sowerb. Gen. f. 2; Sp. Conch. 7. ff. 9 a-d. *Yetus Cymbium*, Gray in Proceed. Zool. Soc. 1855, p. 52 (in part).

*Hab.* "Atlantic Ocean," Lam.; "African Ocean," Sowerb.; "West Coast of Africa, Gambia," Gray.

90. *Melampus æqualis*, Lowe in Zool. Journ. v. 288. t. 13. ff. 1-5 (var. a).

B. LAND SHELLS, the animals breathing air by a valvular respiratory orifice on the side of the neck.

These belong altogether in their general characters or aspect to the South European type; and only so far as that type exists in the Canaries are they related to the Canarian: having still less affinity to the Madeiran, in consequence of the still less prevalence of the South European character in the Madeiran Helicological Fauna than in that of the Canaries. This observation, founded on the general aspect of the fifteen species collected by me in the immediate vicinity of Mogador, is confirmed by their statistical analysis. Eight are common South European, one only Canarian, and six Moroccan species; the seven latter exhibiting a wholly South European aspect. Of the former eight, three only are found in Britain, five in the Canaries, and four in Madeira: of the seven latter, none of course in either Britain or Madeira, though one of the six peculiar Moroccan species (*H. Pumilio*, Chemn.) is very nearly allied to the exclusively Canarian *H. Despreauxii*, Orb. (a form which has no Madeiran representative), whilst the five others as nearly approach common South European forms.

### 30. HELICIDÆ.

Gen. HELIX, L.

Group 1. *Euparypha*, Hartm.

*Helix pisana*, Müll.; var.  $\gamma$ , Pf.; alboranensis, Webb.  
— *planata*, Chemn.,  $\alpha$  acutangula,  $\beta$  obtusangula.

Group 2. *Xerophila*, Held.

— *caperata*, Mont.,  $\gamma$  mogadorensis.  
— *Eumæus*, Lowe.

5. — *Irus*, Lowe.

— *lancerothensis*, Webb,  $\alpha$  Webbii,  $\beta$  Bertheloti.

Group 3. *Turricula*, Beck (*Crenea*, sp. Alb.).

*Helix Pumilio*, Chemn.

Group 4. *Carocollina*, Beck (*Gonostoma*, pars, Alb.).

— *lenticula*, Fer.

Group 5. *Tachea*, Leach (*Archelix*, Alb.).

— *lactea*, Müll.

Gen. BULIMUS, Scop.

Group 1. *Elisma*, Leach.

10. *Bulimus acutus* (Müll.);  $\beta$  unicolor, Pf.;  $\gamma$ , Pf.; *turricula* (Chemn.).

— *ventrosus* (Fér.).

— *solitarius* (Poir.).

Group 2. *Rumina*, Risso.

— *Paivæ*, Lowe.

Gen. ACHATINA, Lam.

Group *Ferussacia*, Risso.

*Achatina folliculus* (Gron.),  $\alpha$  abbreviata,  $\beta$  producta.

15. — *uricola*, Lowe.

*Notes on the preceding List.*

1. *Helix pisana*, Müll. ;  $\gamma$ , Pf. (ed. 1.) i. 153 ; var. *b. alboranensis*, Webb, Mousson in Hartung's Geolog. Verhältn. Lanzarot. und Fuertav. 132.—The specimens are small, and mostly pale-coloured (*i. e.* narrowly and faintly banded) or white ; but otherwise quite of the usual globose thin-shelled Lisbon, Cadiz, Madeiran, and Canarian form of the species, with the keel present only in quite young examples. The perforation is in smaller shells more open or distinctly marked by the raised and only partially reflected pillar-lip : in larger specimens it is nearly or quite closed. The mouth is usually full rose-coloured. Common in the neighbourhood of Mogador.

2. *Helix planata*, Chemn. xi. 281, t. 209. ff. 2067–2069 ; Pf. (ed. 1.) i. 175 (excl. syn. Webb et habit. Canaria, Lancerotta, et Graciosa). *Carocolla planata*, Lam. (ed. 2.) viii. 148 (excl. syn. Webb et Berth.).

*a. acutangula* ; carina acutissima elevata usque ad labrum producta, apertura ad carinam perinde valde angulata, testa depressa, spira planata, anfr. planis.

Subvar. 1. omnino eretaceo-alba. cc. Chemn. *l. c.* t. 209. ff. 2067, 2068.



Subvar. 2. fusco-fasciata. *rr.* Chemn. *l. c. t.* 209. f. 2069. *H. planata* (*H. arietina* olim), Rossm. xiv. 22. t. 66. ff. 825, *a, b* (excl. f. 826 et habit. "Lanzarote, W. u. B.").

$\beta$ . *obtusangula*; carina aperturam versus subobsoletiore, apertura perinde minus angulata, testa subglobosiore, spira elevatiore, anfr. subconvexiusculis.

Subvar. 1. omnino eretaceo-alba. *ccc.*

Subvar. 2. fusco-fasciata. *rr.*

On shrubs of Broom (*Retama monosperma* (L.)) in the neighbourhood of Mogador.

The Canarian *H. planata*, Webb, Syn. 8. No. 3 (*H. pisana monstrosa*, D'Orb. Hist. Moll. Can. p. 59), is a perfectly distinct species from this Moroccan or Chemnitzian shell. In a MS. catalogue of Canarian shells, sent many years ago to Webb, I had called it (as a new species) *H. festiva*; on which he remarks, in a letter dated "Paris, August 26, 1833," "*H. festiva*, Lowe, *in lit.*, is a variety of *H. planata*, Chemn.," under which name it therefore stands in his 'Synopsis.' It is well distinguished by Mousson in Hartung's Geolog. Verhältn. p. 133, under the odd name of *H. impugnata*, from both *H. planata*, Chemn., and *H. pisana*, Müll., to the former of which Rossmässler refers it (*l. c. f.* 826) along with his *H. arietina*, f. 825.

### 3. *Helix caperata*, Mont.

$\gamma$ . *mogadorensis*; submajor rugosula distinctius et grossiuscule costulato-striata, carina suturaque striis prominulis sæpius suberenulata v. erosulo-rugosiusculis.

Diam. maj.  $4\frac{1}{2}$ -6 lin. (10-13 $\frac{1}{2}$  millim.), min. 4-5 $\frac{1}{2}$  lin. (9-12 mill.); alt. 3-4 $\frac{1}{2}$  lin. (7-10 mill.). Anfr. 5.

Sand-hills; apparently not uncommon.

At first sight this appears, in well-developed living specimens, sufficiently distinct from *H. caperata*, Mont., by its much stronger and more raised or rib-like striae, which, in crossing the generally distinct though not rim-like keel, form in many specimens more or less prominent, though irregular crenulations, like those of *H. rugosa*, Chemn. (*H. Gargotta*, Rossm. f. 357); from which species it is, however, quite distinct in its smaller umbilicus, its simple, not margined (though suberenulate) keel and suture, and in the remote, not approximate, margins of the peristome. In every other point it agrees with large English or Portuguese examples of *H. caperata*, Mont. (*H. striata*, Drap. partim, nec aliorum); differing from *H. lauta*, Lowe, in its rather larger umbilicus, and from both that species and *H. Terveri*, Mich. (Rossm. ff. 354 *d*, 565,

566), in its coarser or stronger ribs, and more distinct and mostly crenulated keel.

Of all Rossmässler's figures, his *H. caperata*, ff. 830, 830 *aa*, and 832, best represent the present form, though not exhibiting the coarser striæ and suberenulated keel.

4. *Helix Eumæus*, Lowe.

T. aperte umbilicata parvula rotundato-depressa, supra convexiuscula subtus planiuscula (nec turgida) arcte et tenuiter striata cinerea, fusco sæpe obscure seriatim lentiginoso-maculata v. interrupte fasciata, vertice fusco-corneo lævi nitido; spira convexiuscula vertice exserto, sutura distincta impressa; anfr.  $4\frac{1}{2}$ –5 convexiusculis, ultimo depresso obtuse carinato antice nec deflexo nec dilatato, apertura oblique lunata; peristomate recto simplici acuto, marginibus remotis.

Diam. maj. 5–6 $\frac{1}{2}$ , min. 4 $\frac{1}{2}$ –6; alt. 3–4 $\frac{1}{2}$  millim.

At the Emperor's Garden up the river. *r.*

From the number of specimens collected, many of which are, however, dead and more or less bleached or discoloured, this is probably a common shell at Mogador, though its insignificant size and unattractive aspect may well have occasioned its being apparently hitherto overlooked. I find, however, two specimens amongst a few other Helices collected at Mogador in 1851 by Mr. T. S. Leacock of Madeira, and sent to me by Mr. Wollaston. Its nearest ally seems to be *H. apicina*, Lam., and it also much resembles *H. armillata*, Lowe; but it is not less distinct from the European than from the Madeiran species, differing from the latter in the less distinct keel and less flattened last volution, which is especially much more convex and rounded beneath; in the much less fine, close, and regular striation, and in the larger umbilicus. In general colouring there is considerable approximation; but the brown spots or interrupted tessellated bands are much more distinct and regular in *H. armillata*.

5. *Helix Irus*, Lowe.

Possessing only two dead specimens of this apparently distinct species, I shall not attempt at present to give its complete diagnosis. In general aspect much resembling *H. squalida*, Lowe, it is still more nearly allied to *H. Eumæus*, differing in having the striæ roughened more or less with fine scobinate asperities or raised linear file-like granulations, after the manner of *H. lentiginosa*, Lowe, and several other Madeiran species. The spire is also discoidally flattened, with the penultimate volution alone abruptly raised above the basal whorl, and the rest of the  $4\frac{1}{2}$  volutions, with the vertex, flat or even a little depressed, much as in *H.*

*squalida* or *obteata*, Lowe, instead of being regularly (with the vertex) prominent or convex. The colour is a pale dull brown, obscurely banded and speckled.

Diam. maj. 6, min.  $5\frac{1}{2}$ , alt.  $3\frac{1}{4}$ – $3\frac{1}{2}$  millim. Anfr. 4– $4\frac{1}{2}$ .

Found with the last species. *rrr*.

6. *H. lancerottensis*, Webb.

*T. parvula globulosa subturbinata pisiformis perforata tenuiuscula rudi-  
uscula striatula calcareo-albida v. pallide fusca sæpe variata s. indi-  
stincte maculata et fasciata; spira convexa elevatiuscula depresso-  
conoidea apice obtuso, sutura distincta impressa; anfr.  $4\frac{1}{2}$ –5 convexis  
tumidiusculis, ultimo subtus rotundato-convexo antice haud vel vix  
deflexo; umbilico cylindrico parvo distincto; apertura rotundato-ovali  
altiore quam lata parum lunata; peristomate interrupto simplici recto  
acuto ad umbilicum reflexo labris remotis.*

*a. Webbii*; pusilla, umbilico subcoarctato angustiore. *H. lancerottensis*,  
Webb! Syn. p. 12, No. 17; Hist. Can. ii. 2, t. 1. ff. 24, 25 (not D'Orb. !  
deser. *l. c.* p. 60).

*Hab.* Mogador, *r*; in Lanzarote and Fuerteventura less common than  
in the rest of the Canary Islands.

This is the only instance at present of the occurrence of a purely  
Canarian *Helix* on the opposite African continent.

D'Orbigny's *description* (*W. B. Hist. Can. l. c.* p. 60) of *H. lance-  
rottensis* proves by his original single type to have been drawn up  
from an old dead bleached example of *H. monilifera*, Webb! The  
figures, however, to which he refers (t. 1. ff. 24, 25) represent the  
true *H. lancerottensis* of Webb, whose first two plates of shells had  
been engraved under his own management by Terver, long pre-  
vious to D'Orbigny's engagement in the work, and correctly  
exhibit the species originally intended, and published by Webb  
in his Synopsis, but of which the present is unfortunately not the  
only one subsequently misunderstood and thrown into confusion  
by D'Orbigny.

*β. Bertheloti*; pusilla, umbilico paullo largiore.

*Hab.* Mogador, *c*.

*H. Orbignyi*, Webb in D'Orb. *l. c.* p. 59, t. 2. ff. 31–33 (not  
of D'Orb.'s types!), a commonly diffused though nowhere locally  
abundant shell in almost all the Canary Islands, and especially in  
Teneriffe, is merely a larger more developed form of *β*, and will  
stand thus:

*H. lancerottensis*, Webb, var. *γ. Orbignii*; major, umbilico paullo  
largiore.

Var. *α* agrees perfectly with six original Lanzarotan specimens

sent to me by Webb in 1829 of his *H. lancerottensis*, and with others found by myself and Mr. Wollaston last year not only in Lanzarote and Fuerteventura, but also together with *H. Orbignyi*, Webb, in all the Canary Islands, and especially in Teneriffe, both at S<sup>a</sup> Cruz and Orotava. Var.  $\beta$  differs from it only in the slightly larger or more open umbilicus, which exposes a portion of the preceding volution. It is more frequent than  $\alpha$  in Mogador, and differs from *H. Orbignyi*, Webb, in size only.

D'Orbigny has wonderfully misunderstood this common species. Not only, as already noted, has he placed in his collection and described in Webb's 'Histoire' for the true *H. lancerottensis*, Webb, an old dead shell of *H. monilifera*, Webb, but five genuine examples of the true *H. lancerottensis* in his collection have been mistaken for, and actually stand as types of, the larger variety, *H. Orbignyi*, Webb.

7. *Helix Pumilio* (Chemn.), Pf. (ed. 1) i. 178. *Trochus Pumilio*, Chemn. xi. 164. t. 196. ff. 1888, 1889.

This most elegant little species is locally abundant in the neighbourhood of Mogador, whence it was received by Chemnitz many years ago. It seems to have escaped entirely the notice of later naturalists. Its only Canarian representative is *H. Despreauxii*, Orb., which abounds on that wonderful half sand, half marshy region of El Charco, near Maspalomas, at the southern extremity of Grand Canary, on dry banks under stones. It is also closely allied to the European *H. elegans*, Gm., *Caroni*, Desh., *elata*, Faure-Big., &c.; but it has no Madeiran analogue.

8. *Helix lenticula*, Fér., Pf. (ed. 1) i. 211; Rossm. vii., viii., 12, f. 452. *H. lenticulata*, D'Orb. Moll. Can. in W. B. ii. 2. 66. t. 2. ff. 10-12. *H. subtilis*, Lowe, Prim. 45. t. 5. f. 13. *Carocolla lenticula*, Phil. i. 136.—A widely diffused South European species, pervading the Madeiran and Canarian groups, and found equally in Spain, Portugal, the South of France, Greece, Sicily, Egypt, and Algeria, as at Mogador. Its range of extension further to the south has yet to be explored.

9. *Helix lactea*, Müll., Pf. (ed. 1) i. 272; Rossm. v. 7. f. 302, and ix. 1. ff. 545-551; Webb, Syn. 9. no. 5; D'Orb. Moll. Can. in W. B. Hist. ii. 2. p. 55. *H. faux nigra*, Chemn. ix. 2. p. 127. t. 130. f. 1161.—The abundant occurrence of this shell living in the wild half-desert region of El Charco at the remote southern extremity of Grand Canary, below Maspalomas, is unfavourable to D'Orbigny's supposition of its having been of Spanish introduction to that island, in which, and in Teneriffe alone of all the Canarian

group, it was found plentifully recent by myself and Mr. Wollaston. In Grand Canary it is so abundant in the neighbourhood of Las Palmas, that it is largely exported alive in casks to the Havana as an article of food. At Mogador I found it also plentifully, up the river, towards the Emperor's Garden. In the Madeiran Islands it does not occur, though a few Canarian individuals from Teneriffe, turned loose by myself at my house on the Levada de S<sup>ta</sup> Luzia in the neighbourhood of Funchal, ten or twelve years ago, may perhaps colonize the place.

10. *Bulimus acutus* (Müll.). *Helix barbara*, Linn. Syst. ed. 12. 1249; Hanl. Conch. Linn. 384.

*β. unicolor*, albidus, Pf. (ed. 1) ii. 215.

*γ. Turricula* (Chemn.); *γ. major*, &c., Pf. l. c.; *Turbo Turricula Marocana*, Chemn. xi. 280, t. 209. ff. 2063, 2064.

Abundant on sand-hills near Mogador.

11. *Bulimus ventrosus* (Fér.), Pf. ii. 215. *B. ventricosus*, Drap. 78, t. 4. f. 31, 32; Rossm. vi. 41, f. 377; D'Orb. Moll. Can. in W. B. Hist. ii. 2. p. 67. *Helix acuta*, Webb, Syn. 13. no. 21 (non Müll.).—Not uncommon at the Emperor's Garden, Mogador.

12. *Bulimus solitarius* (Poir.), Pf. (ed. 1) ii. 216; *B. conoideus*, Rossm. vi. 41, t. 376; *Helix conoidea*, Drap. 78, t. 5. f. 7, 8.—On trunks of trees at the Emperor's Garden, near Mogador: not uncommon.

13. *Bulimus Paivæ*, Lowe.

*T. majusecula rimata adulta decollata subcylindrico-turrita sursum subattenuata apice truncata solidiusecula opaca livido-cervina distincte et æqualiter reticulata, lineis spiralibus impressis subtilibus strias incrementi creberrimas concinne decussantibus; anfr. 5-6 convexiuseculis, sutura impressa constrictiusecula; apert. ovali sursum acuta, perist. acuto deorsum expanso intus in crassato-costato, marginibus callo crassiusculo lato distincto junctis, columellari altero duplo breviori crasso reflexo.* Long. 18-21 lin. (39-44 millim.), dian. 7½ lin. (16 mill.); apert. long. 6½ lin. (13-14 mill.), lat. 4 lin. (8½ mill.). Anfr. 5-6.

*B. decollatus β. major*, Pf. (ed. 1) ii. 153; Küst. t. 12. f. 21, 22.

“*Helix decollata*, var., Fér. t. 140. f. 6” (Pf.).

From two fine examples presented to me at Mogador by Mrs. Elton, who, I think, said she had obtained them at Rabat.

This fine species differs strikingly in several respects from the obsoletely decussated state or variety of *B. decollatus* (L.). With the same number of volutions, it is not only twice, or nearly twice as large, but it is less cylindrical, having the volutions more convex, the suture more deeply contracted or impressed, the last volution

rather broader, and the sides or lateral outlines altogether more convex and less parallel. The whole surface is equably and finely decussated with spiral lines crossing the close, distinct and even striae of growth, which are not conspicuously, as in *B. decollatus* (L.), stronger or coarser at the sutures than elsewhere. The outer lip is slightly expanded downwards, with a distinct, broad, thickened rib or welt inside. The whole interior of the aperture is of the same livid or purplish brown or fawn-colour as the rest of the shell, which is of an altogether thicker, stronger, heavier substance, and more opaque than is usually the case in *H. decollata* (L.).

Named to record the assiduous zeal and energy of the Baron do Castello de Paiva, a distinguished Portuguese naturalist and collector, who, although chiefly devoted to botanical researches, is a no less ardent than generous cultivator and encourager of other branches of natural science.

Pfeiffer's diagnosis of *B. decollatus* (L.), by the words "rugulosostriata, lineis concentricis obsolete decussata," and "anfr. convexiusculis," seems to have been drawn up principally from the obsoletely decussated state or var. of *B. decollatus* (L.) and the present species, which is certainly his African var. *β. major*, 39 millim. long and 14 wide, &c.

I subjoin the diagnosis of *B. decollatus* (L.), not only for the sake of contrast, but because it may help towards the discovery of this shell at Mogador.

*Bulimus decollatus* (L.).

T. rimata adulta decollata angustato-cylindrica apice truncata tenuiuscula subpellucida ochraceo-carnea v. cretaceo-alba lævigata striolis incrementi inæqualibus crebriusculis infra suturam rudiusculis lineave spirali impressa obsolete expressis, striolis spiralibus exilissimis tenuissime vel obsolete sæpe decussata; anfr. 4-6 planatis sutura distincta parum impressa nec constricta; cet. fere ut in *B. Paivæ* sed char. omnibus minus expressis obsoletioribus.

Long. (adult. decoll.) 10-14 vel 15; diam.  $4\frac{1}{2}$ -5; apert. long.  $4\frac{1}{2}$ , lat.  $2\frac{1}{2}$  lin.

*α. lævigata.* Striis incrementi exoletis inæqualibus, spiralibus nullis.

*B. decollatus*, Drap. 76, t. 4. f. 27, 28; Gray, Man. p. 5, t. 6. f. 60; Phil. i. 139; Rossm. v. vi. 45, f. 384; Sowerb. Conch. Man. f. 289; Webb! Syn. 14. no. 1; Orb. Moll. Can. in W. B. Hist. ii. 2. 68; Lowe! Prim. 62. no. 61; Catal. Moll. Mad. in Proceed. Zool. Soc. 1854, 199. no. 101; Küst. M. et C. t. 11. f. 5-8, t. 12. f. 13-20. *Heliæ decollata*, Linn. Syst. (ed. 12) 1247; Müll. Verm. ii. 114; Chemn. ix. 2. 182, t. 136. f. 1254, 1255; Hanl. Conch. Linn. 379.

*Hab.* In Mad., Ins. Can. (Lanzarote, Fuerteventura, Teneriffe, Gomera), Hispania (Malaga), Lusitania (prope Lisboam), Italia (prope Bolsenam), &c.

$\beta$ . *decussata*. Striis incrementi subdistinctioribus lineisque spiralibus subtilissimis paucis obsolete decussata.

Found intermixed with  $\alpha$  in the Canaries, Spain, Italy, &c., but *not in Madeira*.

In size, colour, habit, &c., agreeing perfectly with  $\alpha$ , but approaching *B. Paiva* in the decussated sculpture, which is, however, mostly irregular and much fainter, or sometimes almost evanescent.

14. *Achatina folliculus* (Gron.), Pf. (ed. 1) ii. 283.

$\alpha$ . *abbreviata*; long. 9, diam.  $3\frac{1}{2}$ ; apert. long. 4 millim.

Near Mogador, at the Emperor's Garden up the river. Agrees with Portuguese better than Madeiran specimens, in the more prominent columella. See Catal. Moll. Mad. in Proceed. Zool. Soc. 1854, p. 200.

$\beta$ . *producta*; long. 10, diam.  $3\frac{1}{2}$ ; apert. long. 4 millim.

From Rabat, a single specimen, Mrs. Elton. Differs from  $\alpha$  only in the spire being longer in proportion to the aperture, and in the less prominent or developed columella. In this latter point it agrees with Madeiran better than with Portuguese examples.

15. *Achatina ruricola*, Lowe.

T. majuscula sat firma subpellucida turrata subcylindracea elongata graciliscula, spira producta obtusiuscula; anfr. 6 planis aequalibus sutura subindistincta parum impressa marginata obliqua; apert. ovata sursum acuta nec acuminata  $\frac{1}{3}$  fere (vix ultra) longitudinis aequante; columella arcuata subdilatata basi vix prominula obscureque oblique truncata, peristomate simplici.

Long. 8, diam.  $2\frac{1}{2}$ ; apert. long.  $2\frac{3}{4}$  millim.

*Hab.* Prope Mogador in rure, rrr.

Partaking chiefly of the characters of *A. maderensis* and *A. producta*, Lowe, this elegant little species, of which I found a single example at the picturesque spot already so often mentioned, called the Emperor's Garden, about four miles from Mogador up the river, is perfectly distinct from each; and it will not even enter into either of the groups to which they respectively belong, appertaining properly to that of *A. folliculus* (Gron.). In shape both of the shell and of its aperture it most resembles *A. maderensis*, Lowe; but it wants the peculiar bright polish; it is twice as large; the spire is much less blunt, with flatter volutions and a

shallower, more oblique suture ; the pillar-lip is more dilated and prominent at the base ; and lastly, the peristome is not obtuse or thickened and coloured. From all the other allied Madeiran species it differs in its cylindric shape and short ovate aperture, simply acute, and not narrowed or acuminate at top. It is also a considerably larger shell than *A. gracilis* and *A. Leacociana*, Lowe, to which, amongst these other species, after *A. producta*, Lowe, it most approaches ; and from *A. producta*, Lowe, with which in shape and size it best agrees, it is abundantly distinct by the form and proportionate size of the aperture, besides the much less prominence of the pillar at its base. From *A. folliculus* (Gron.) it differs in the narrow turreted-cylindric shape, the short ovate aperture, and the perfectly even and regular volutions (without any turgidness in the penultimate volution) of the spire.

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On the Homologies of the so-called Univalve Shell and its Operculum. By JOHN DENIS MACDONALD, R.N., F.R.S., F.L.S.  
Communicated by Prof. HUXLEY, F.R.S.

[Read February 16th, 1860.]

ADANSON believed that the univalve spiral shell of the Gasteropod was the homologue of the sinistral valve of the Conchifer, and also that the dextral valve of the latter was represented by the operculum of the former. Dr. Gray appears to support this view ; but as it has met with much opposition from recent writers, who have substituted far more unnatural and fanciful theories, I have been induced to draw up the present paper in support of the doctrine, which I believe to be sound and philosophical, and suggestive of other remarkable homologies which must be ever concealed from our view while this primary barrier is permitted to remain. In dealing with this subject, it will be more convenient to beg the question in the outset, and sustain it as well as all the subsequent reasoning may be capable.

If Adanson's position, as above given, be right, it will be admitted that the left valve, so to speak, of the Gasteropod is more generally that which receives the body of the animal ; but in those examples exhibiting a transposition of the viscera, and therefore a sinistrally spiral shell, the presumption is that the right valve (normally the operculum) envelopes the animal, while the left valve forms the operculum. As far as I have been able to discover, these are the only cases in which a dextrally spiral operculum closes the aperture of a sinistral shell ; for in those instances of



Gasteropoda having a dextral shell commencing with a sinistral nucleus, the spiral nucleus of the operculum is also sinistral, and in the spiral-shelled Pteropoda, the gyri of both shell and operculum are alike sinistral. The legitimate deduction in this latter case is that the body-valve of the Pteropod, though sinistral, is the equivalent of the dextral body-valve of the Gasteropod; and both we assume to be answerable to the left valve of the Conchifer. It is sometimes stated that *Atlanta* affords an exceptional example of a dextral shell with a dextral operculum\*; but this I can confidently affirm is not the case; the operculum of *Atlanta* is sinistral, like all normal opercula.

As relates to the umbones of bivalves and their homologues in the shells of Gasteropoda, the spiral nucleus of both body-valve and operculum is very significant. From the examination of numerous species of the operculated genera of Heteropoda captured from time to time in the Atlantic and the Pacific, I discovered that in all those shells possessing a prominent spiral nucleus, the corresponding little point of the operculum was always beautifully curved and proportionately well expressed; but when the nucleus of the shell was involute, the nucleus of the operculum presented a most indefinite and irregular appearance, though still obviously disposed in a spiral fashion. This latter case is illustrated in the genus *Oxygyrus* (Benson), characterized by having a more or less horny shell with an involute nucleus.

The study of the development of the Conchifera, and the nice examination of the relations and connexions of the mantle, tend to show that that part of the latter which lines the right valve is quite distinct from that which lines the left; and the primitive distinctness of these two portions is permanently exemplified by their homologues in the operculated Gasteropoda.

Any one who will examine the operculigerous lobe in the genus *Turbo*, cannot fail to recognize the idea of an *opercular mantle*, the source of that remarkable deposit of shelly matter which so distinguishes *Turbo*, *Phasianella*, and other genera of the same family. The free margins of this opercular mantle are often ample enough to meet over and conceal the operculum completely, and they may be traced in continuity like those of the *body-valve mantle* round what I have been induced to call the "*pedicle*," which encloses the retractor or adductor muscles, and connects each mantle respectively with the body of the foot and the investment of the visceral mass.

\* Woodward's Manual of Mollusca, p. 201.

There is no example of a Conchifer in which the right-mantle margin does not blend with the left, at least in the region of the hinge; while, on the other hand, there is no instance amongst Gasteropods in which the margin of the right or "*opercular mantle*" coalesces with that of the left or "*shell mantle*" at any point. Here, then, is a simple feature distinguishing two Orders of Mollusca, arising out of the determination of the homology of the univalve and operculum of the Gasteropod with the bivalve of the Conchifer.

Preserving their homology with the two adductors of "*dimyary Conchifera*," and perhaps also combining the representatives of those fibres which serve to withdraw the foot, the great retractor muscles of Gasteropoda generally consist of two principal fasciculi; and even in the shell-protected embryo of those species which are destitute of a shell in the mature state (e. g. *Eolis*) the temporary retractor is composed of two distinct bundles. The double nature of this muscle is usually more apparent at the opercular extremity than at the opposite end, as in the beautiful genus *Atlanta* for example, in which the retractor muscle, arising by a broad oblique attachment extending some little distance upon the right or upper wall of the tube, is inserted into the operculum by two distinct fleshy slips (the great "*pedal sinus*" intervening), while certain portions diverge into the vertical fin and sucker-disc. A still better example occurs in the genus *Neritina*, in which a wide space intervenes between the two retractors. The inner extremity of these muscles scarcely rises above the level of the general surface of the mantle, presenting a broad smooth facet on either side of the body. Indeed the corresponding muscular impressions in the bowl of *Navicella* shadow forth most unequivocally those of the anterior and posterior adductors in Dimyary bivalves. The correctness of this view is supported by the fact that the fibres composing the lateral muscles may be traced through the operculigerous lobe towards the operculum, into which they are separately inserted. The articulation of the operculum of *Neritina* with the columella of the shell is retrospective, as it were, of the state of the typical bivalve, while in other respects the higher type of the Gasteropod is more strikingly developed.

The theoretical conversion of the left valve of a Conchifer into a spiral dextral shell, with a rudimentary and modified right valve forming a suitable operculum, requires no great stretch of the imagination to conceive. The retractor muscles of Gasteropoda passing between the shell and the operculum, take up a longi-

tudinal direction with respect to the animal; while the shells of Conchifera, being applied to the sides of the body, necessitate the transverse direction of the adductors. But we shall have little occasion to disturb the latter from their position while we attempt to follow those transitional steps by which, in theory, we may trace the conversion of the physical condition of the Conchifer (in harmony with the slight metamorphosis of its testaceous covering) into that of the Gasteropod. If, then, while the shell-metamorphosis is going forward we suppose the body of the Conchifer, now occupying its left valve, to revolve, irrespective of the adductors, from left to right on its longitudinal and transverse axes, in both cases moving through a quarter of a circle, the foot and oral extremity at the same time undergoing certain changes (the latter especially, by the acquisition of new parts), the characters of the resulting being will closely resemble those of *Navicella*, to which we have already alluded.

All the external parts of the Gasteropod or the Conchifer appear to be superimposed, as it were, upon each other in a definite order, and so disposed as to effect a more or less perfect bilateral symmetry. Proceeding from above downwards, they admit of arrangement into four distinct systems, as in the following Table. The principal openings are the Oral, Anal, and Generative,—the Oral and Generative between the “*basipodial*” and “*epipodial*” systems, and the Anal between the gills in the Gasteropod, in which therefore all are in advance of the retractors. In the Conchifer, on the other hand, the epipodial system being absent, the oral orifice lies between the gills, or rather their anterior appendices, below the anterior adductor, the anal orifice opens between the two adductors, and the generative openings are below the posterior adductor. The particulars just mentioned constitute the more essential points of difference between the Gasteropod and the Conchifer; but the subject will be better understood by reference to the Table. [See next page.]

Although an abdomen may be said to exist in all cases, it can scarcely be regarded as a distinct part of the animal, being merely the space included by all the external organs and containing the viscera; and the “*soma*” or body is formed by the union of all these organs enclosing the *abdomen*. In the case of the Gasteropod therefore, the viscera are contained in the left-mantle pedicle, protected by the left valve, which becomes concave to receive them. The right-mantle pedicle, bearing the operculum, from its usual position has hitherto been mistaken as a part of the foot, and called

“*metapodium* ;” and as the “*mesopodium*,” so called, derives its name from its intermediate position between the *left-mantle pedicle* and the “*propodium*,” it is so far incorrectly named ; I therefore substitute for it the term “*basipodium*.”

*Common tabular Plan of the Organization of Gasteropoda and Conchifera, showing also their points of difference.*

Systems of external organs, enclosing the abdomen, &c.	Functions.	Relationship of internal systems.
I. PALLIAL.		
1. Shells and ligaments. 2. Pallial lamina and pedicles.	Accessory to respira- tion and defensive.	
Anal aperture in Conchifera between the adductors and generative openings, below the posterior adductor.		
II. BRANCHIAL.		
1. Branchiæ proper. 2. Anterior appendages or Cirri.	Respiration.	Circulatory and depurative.
Oral aperture of Conchifera and anal aperture of Gasteropoda between the gills.		
III. EPIPODIAL.		
1. Epipodia proper. 2. Superior tentacula.	Nataion and sensa- tion.	Nervous system and Organs of sense.
Oral and Generative apertures of Gasteropoda between epi- and basipodial systems.		
IV. BASIPODIAL.		
1. Basipodium. 2. Propodium.	Prehension and loco- motion.	Digestive and Generative.

With the above principles before us, the doctrine that the univalve shell, irrespective of the operculum, is the equivalent of both valves of the Conchifer united together, is quite untenable ; nor does the *prima facie* comparison of *Lepton squamosum* with *Trochus* (such having been chosen by Mr. Woodward in support of this view) establish its truth one whit. It must be remembered also that it devolves upon the upholders of this improbable piece of transcendentalism to dispose of the operculum, which in many cases assumes almost as much importance as the shell itself. Many conchologists regard the operculum merely as a glutinous or horny secretion, sometimes the nidus of calcareous deposit, adapted to the form of the mouth of the shell as a further protection to the retracted animal ; but beyond this, in their estimation, it

deserves little consideration, except from the necessity of noting all the varieties of its form and structure, by which they are enabled to fit the appropriate doors to the many empty dwellings in their cabinets.

The supposition that the particular part of the foot occupied by the byssus in some bivalves corresponds with that which supports the operculum in Gasteropods, is just as unphilosophical as the notion that the vesicular float of *Ianthina* is an extreme modification of the operculum. Nor is the mass of byssus which closes up the interval between the valves of the unattached *Byssos-arca* to be regarded as the homologue of the operculum in Gasteropods, although it may fulfil an analogous function. There are juster grounds for believing that the float of *Ianthina*, *Macgillivrayia*, &c., the suspensory threads of *Litiopa*, *Planaxis*, &c., the temporary byssus of the young *Anodon*, *Naia*, and *Cyclas*, and the permanent byssus of other bivalves, fixed or unattached, are all essentially equivalent structures, having a local origin altogether distinct from the "operculigerous lobe" as it exists in Gasteropods, or from what I am induced to regard as its homologue in Conchifers.

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On the Occurrence of *Gyrodactylus elegans* on Sticklebacks in the Hampstead Ponds, January 1860. By C. L. BRADLEY, Esq., F.L.S.

[Read February 16th, 1860.]

IN examining some of the common Sticklebacks obtained from the Hampstead Ponds during the present month, I found them infested with numerous minute parasitic worms. Although these were more conspicuous upon the fins, they were scattered over the general surface of the skin, and were attached by one end to the fish, while the other floated freely. The parasite has the external characters of a suctorial Annelid. The body is subcylindrical, annulate, without setæ or cilia, and terminated posteriorly by a suctorial base. In its mode of progression, in the expansion and contraction of the body, it closely resembles the Leech. When fully stretched out, it measures about  $\frac{1}{25}$ th of an inch in length, and about  $\frac{1}{250}$ th in breadth, tapering from the middle towards both ends, the cephalic portion being by far the narrower. The latter is bifid, each division furnished with a retractile brush-like extremity, which the animal uses as a tactile organ and also for progression. The posterior base is of a horse-shoe form; the curved margin is divided into sixteen digitations, each having an independent move-

ment. Through the centre of every digitation runs a tendinous cord terminated by a hook. Within the circumference of the disc are found two recurved hooks placed back to back, and connected together by a ring, by which and their bases they are firmly held *in situ*. When the base is cupped, these hooks are erected. A little distance below the bifurcation of the cephalic end, on the ventral surface, may be seen a somewhat spherical cavity, and below this, again, an oval cavity or space, larger and more diaphanous than the former. The one has a radiate arrangement, and appears to be connected with the mouth of the animal; the other is the germ-sac, and contains the next generation. Oftentimes two young ones can be seen within the body of the parent, which they closely resemble in form. While observing these animals with my friend Dr. Bowerbank, we saw the young creature free itself by tearing through the parental envelope, and containing within itself the progeny of a third generation. In some few the oval space simply contained a number of vesicular corpuscles. I was not aware that this parasite had been described until I received a note from my friend Mr. Busk, stating that "it was the *Gyrodactylus elegans* of Nordmann, afterwards more completely described by Siebold, who was the first to notice that it represents a 'nursing form of animal,' and, as suggested by Siebold, is only a transitional, asexual form of a Trematode, such as *Polystomum* or *Octobothrium*; that it was originally found by Nordmann on the gills of the Carp, but that Siebold mentions its occurrence on the fins of two species of Sticklebacks."

Siebold notices two species of *Gyrodactylus*—*G. elegans* and *G. auriculatus*,—to which Dujardin has added a third, *G. anchoratus*. As this parasite has not, so far as I know, been before noticed as occurring in this country, and is in many respects a very interesting object, and as it may be obtained plentifully at the present time, I have ventured to give the above brief description of it\*.

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Discovery of *Alpheus Edwardsii* on the Coast of Cornwall.

By JONATHAN COUCH, F.L.S., &c.

[Read April 5th, 1860.]

THE only species of the Crustacean genus *Alpheus* hitherto known in the waters of the British Islands is the *A. ruber*; and this is

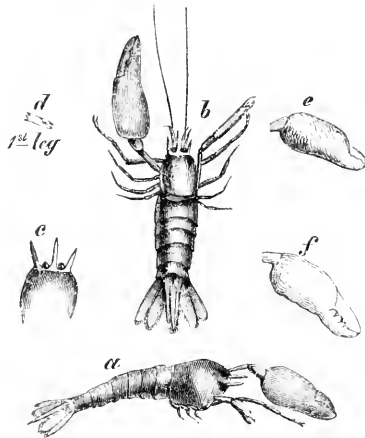
\* [Mr. Bradley has since noticed in the interior of some of the fishes infested with the *Gyrodactylus*, some minute Trematode Worms, which may probably have some genetic connexion with it.—G. B.]

usually represented as of rare occurrence. Such, however, is not the case on the south coast of Cornwall; for I have obtained or inspected numerous examples within the range of our fishermen, taken chiefly from the stomachs of such fishes as feed on the ground at the depth of from 30 to 40 fathoms. But in the month of March in the present year (1860), I had the pleasure of receiving a couple of specimens of a species of this genus which I suppose to have been hitherto unknown in Britain, although it would appear to be not uncommon in the Mediterranean; and as the circumstances under which they were found appear to throw some light on their natural history, I take the liberty of recording them in my notice of their capture.

A fine specimen of Sponge (*Halichondria palmata*) was drawn up with the hook from a depth of 30 fathoms within three or four miles of the harbour of Polperro; and as soon as it was brought on shore it was delivered to Mr. William Laughrin of this place, who is well known for his love of marine natural history, and his skill in setting up and preparing the skins and skeletons of fishes. A search was made in this sponge for whatever of the smaller inhabitants of the ocean it might shelter; and in consequence, a couple of those interesting Crustaceans, Edwards's *Alpheus*, were discovered in the cavities of the Sponge. They were not in one place, and had sought to escape from their pursuer by retiring to a greater depth within the crevices, with their tails bent under them; but on being brought from their concealment and plunged into a vessel of sea-water, they amusingly displayed their natural and, it would appear, fearless character by their actions. The larger of the two was about nine-tenths of an inch in length from the rostrum to the tail; but although of such small size, they traversed the vessel with an apparently threatening aspect, carrying the larger claw aloft, and, especially when irritated, snapping it hard, with such vigour as to be heard over a room of moderate size. The sound resembled, as well in kind as strength, the cracking of a filbert-nut, and was reproduced as often as the little creature was irritated.

As there is no description or figure of this shrimp in any English work with which I am acquainted, I add the notes which I took soon after the little creatures died, together with a figure, which will be found characteristic; and as both the specimens have been added to the national collection in the British Museum, they will be open to the inspection of naturalists at any time.

The body is of a thickened form, much raised and inflated in front or over the stomachic region ; the ringed portion is also stout,



*Alpheus Edwardsii.*

- a.* Side view.      *b.* Dorsal view.      *c.* Frontal spines and eyes.  
*d.* First leg.      *e* and *f.* Second and largest claw, in two aspects.

and not very tapering. Rostrum rather longer than in *Alpheus ruber* in proportion to the size of the creature, pointed ; a lateral spine on each side, almost as long as the rostrum, and very slightly diverging. Eyes small, *in-set*, and between the rostrum and lateral spines. The longer antennæ on a peduncle about the length of the rostrum, the thread very fine. Along the middle plate of the caudal portion a depression, as if it were divided ; very slight hair bordering the side plates. The first or anterior leg very slender, with a very small moveable finger ; the second leg having the inner joint slender, the second compressed, small ; the hand large, wide, stout, but much less massive than in *A. ruber* ; the finger stout, and not long. The hindmost leg long, slight, and feeble. The left hand in both specimens the larger ; the right corresponding hand small. Colour of the larger example a beautiful reddish-orange, dark on the region of the stomach ; of the smaller specimen pale white. It appears to be the habit of this species, as of the *A. ruber*, so to gather up and place its first and slenderer pair of claw-legs as if they were situated behind the second or larger pair,—a circumstance which appears to have misled some naturalists into the opinion that the larger legs were truly the first in order.



On the Poisonous Effect of a small portion of the Liver of a  
*Diodon* inhabiting the Seas of Southern Africa.

[Read June 7th, 1860.]

THE fatal consequences of eating certain Toad-fishes have long been locally known, and are mentioned in general terms in ichthyological works; but well-authenticated and precise statements of the facts are so rare, that I hope the Society will allow the accompanying documents to be entered in their 'Proceedings.'

These cases have been briefly noticed in a treatise on ichthyology published in the last edition of the 'Encyclopædia Britannica;' but it is desirable that the whole evidence should be placed on record.

The Toad-fish of the Cape is a *Diodon*, though Dr. Jameson, not being a practical ichthyologist, has suggested other names.

JOHN RICHARDSON.

London, 11th May, 1860.

*Extract of a Letter from Mr. H. Jameson, Surgeon, R.N., H.M. Ship Winchester, Simon's Bay, Cape of Good Hope, dated 1st Oct., 1845. Addressed to Sir Wm. Burnett, F.R.S., Director-General of the Naval Medical Department.*

"I beg leave to submit an account of the cases, with the *post mortem* examination, and a translation from the German of the symptoms, as furnished me by the surgeon of the brig, observed in two men belonging to the Dutch brig of war 'Postilion,' who were rapidly killed by eating the liver of a poisonous fish, known at the Cape by the name of the Toad- or Bladder-fish. I have preserved specimens of the fish.

"Since this occurrence I have made inquiries among several intelligent people here, from which I find that several fatal accidents have formerly occurred from the same cause, and that animals, more especially pigs, who pick up these fish when cast on shore by the surf, are frequently poisoned by them."

"H.M. Ship 'Winchester,' Simon's Bay,  
10th September, 1845.

"About 12<sup>h</sup> 40<sup>m</sup> P.M. on the 4th of September, my assistance was requested on board the Dutch brig of war 'Postilion,' on account of two men (the boatswain's mate and purser's steward),

who were said to have been poisoned by eating part of a well-known deleterious fish, common in Simon's Bay.

"I immediately repaired on board, taking with me some sulphate of zinc; but on my arrival, about 12<sup>n</sup> 45<sup>m</sup>, found that both men had expired some minutes before. The countenances were collapsed and pallid, covered with cold perspiration; lips livid; pupils moderately dilated; joints still flexible, and limbs relaxed. The symptoms as described to me were, pain and burning sensation at the epigastrium; constriction and spasm of the fauces and muscles of deglutition; rigidity of the tendons, commencing in the fingers and toes; great anguish and distress about the præcordia; rapidly supervening coma, convulsions terminating the scene in one of them. Although vomiting had taken place only in one of the men, there seemed to have been an attempt at it in the other, as ejected matter filled his mouth and flowed from it: this, indeed, was the case with both; but, as will appear from the *post mortem* examination, vomiting in either case must have been very partial, as the stomachs were still distended with food. It is said to have been the liver of a single fish that was eaten: it is known in Simon's Bay by the name of the Toad-fish (*Aplodactylus punctatus*? or *Tetraodon*, Cuvier). It seems they were aware, or had been warned, that the fish was poisonous, but were resolved to try the experiment,—the boatswain asserting that the liver was not so, but rather considered a delicacy. This fish is from 6 to 8 inches long, and the liver may have weighed about 4 drachms. Dinner had been piped to at twelve o'clock, after finishing which the fatal morsel was cooked; this could not have been sooner than twenty minutes after twelve o'clock; at 12<sup>n</sup> 45<sup>m</sup> I got on board, at which time life had been extinct for some minutes; so that the period from the taking of the poison until death could not have exceeded twenty minutes.

"After the fatal issue was generally known among the ship's company, the cook, who had fried the liver for the others, came forward, and said that he had eaten a small portion which had adhered to the bottom of the pan, and complained of dryness of the fauces and unpleasant sensations in the stomach; but his pulse remained firm, and he had no alarming symptoms. He was naturally very much frightened, from which I am inclined to think that his sensations were either occasioned by alarm, or at all events much exaggerated thereby. It was thought prudent to give him an emetic of the zinc. sulph., after the operation of which,

small quantities of brandy and ammonia were exhibited, after which he fell asleep and awoke perfectly well.

“Sept. 5th.—A *post mortem* examination was made to-day. The bodies exhibited no unusual appearance. There was purple lividity in the depending parts, but not to a remarkable degree. Masticated and partly digested food, rejected from the stomach or gullet, flowed from the mouth. The stomach and heart of the purser’s steward were examined more particularly, but only the stomach of the boatswain.

“The surface of the thoracic and abdominal viscera in both appeared perfectly healthy. The stomachs were externally natural, moderately distended with food; they contained a quantity of pultaceous food, nearly wholly reduced to the state of chyme. Some had already passed the pylorus. This matter also pervaded the gullet, as if there had been an attempt at rejection. There was no vestige observed of anything like the poisonous substance which had been swallowed. The mucous membrane surrounding the cardiac orifice was of a deep purple colour—in the first case highly congested, which appearance extended some way along the lesser arch, gradually diminishing as it receded from the cardiac orifice; minute ramifications of vessels were studded over this part of the stomach, and on the ridge at the commencement of the greater arch. Perhaps this state of congestion was not much greater, even in the first case, than it would be in a healthy stomach during the first process of digestion, but it was more remarkable from the dark colour of the blood. In the right ventricle of the heart there was a fibrinous clot, with a small quantity of dark fluid blood; the left ventricle was also moderately distended with dark fluid blood; the muscular substance of the heart was natural, and the muscular tissue throughout seemed firm, florid, and healthy.

(Signed) “HUGH JAMESON, Surgeon.”

“The following is a translation from the German of the symptoms, as furnished to me by the surgeon of the ‘Postilion’ :—

“J. Kleinhaus, boatswain’s mate, thirty-two years of age, and J. Hansen, purser’s steward, forty-three years of age, had partaken at dinner-time, about twelve o’clock (in addition to the usual ship’s fare), of the liver of a fish. Scarcely ten minutes had elapsed when I was called upon to afford medical assistance to both, and observed the following symptoms. J. Kleinhaus lay between decks, and could not raise himself without the greatest

exertion ; his face was somewhat flushed ; his eyes glistening, and pupils rather contracted ; his mouth was open, and, as the muscles of the pharynx were drawn together by cramp, the saliva flowed from it ; the lips were tumid and somewhat blue ; the forehead covered with perspiration ; the pulse quick, small, and intermittent. The patient was extremely uneasy and in great distress, but was still conscious. With great difficulty he related that he had partaken of the liver of the fish ; complained of pain from constriction of the fauces and gullet, together with great uneasiness in the region of the stomach ; and at this time there appeared an inclination to vomit. The patient begged most earnestly for speedy relief. A powder containing one grain of *Tartarus stibiatus* and five grains *pulv. rad. Ipecac.* was immediately administered to him, which, however, was rejected in a few minutes. It was with great difficulty he could swallow the powder and the accompanying warm water. The state of the patient quickly assumed a paralytic form ; his eyes became fixed in one direction ; his breathing became difficult, and was accompanied with dilatation of the nostrils ; his face became pale and covered with cold perspiration ; his lips livid ; his consciousness and pulse failed ; his rattling respiration finally ceased. The patient died scarcely seventeen minutes after partaking of the liver of the fish. During this rapid course there was no full vomiting, the powder given him for that purpose having no effect.

“ ‘ Almost the same symptoms, following each other with equal rapidity, appeared in J. Hansen : vomiting ensued even before an emetic was administered to him. A powder similar to that already mentioned, together with abundance of warm water, was, however, exhibited ; the vomiting was repeated, and the patient after a second powder vomited for the third time. He was still conscious, and said that he felt easier, expressing at the same time some hope ; the pulse became softer ; the vomiting was again repeated ; but in a few moments a single convulsive movement in the arms ensued, whereupon the pulse disappeared, and the livid tongue was protruded from between the lips. His death took place about one minute later than that of his messmate.

(Signed) “ ‘ JULIUS HELLMUTH.’ ”

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The following Account of the Habits of a Species of Australian Ant is extracted from a letter from Sydney, New South Wales, written by Mrs. LEWIS HUTTON, and communicated through ROBERT PATTERSON, Esq., by the SECRETARY.

[Read April 5th, 1860.]

“ONE very hot and cloudless day, when not a breath of air stirred the leaves, my eldest boy (four years old), coming up from the beach fatigued and hot, threw himself on a grassy mound near where I was sitting, and remained quietly enjoying the rest and anticipating the pleasure he would have in showing to his sister the pretty shells and corals he had found. I was startled by a sudden scream, such as one only gives when in terrible pain; a snake was my first thought, and in horror I went to the child, but was at once reassured on seeing him covered by ‘Soldier Ants,’ on whose nest he had unwittingly lain down. Some of the insects still clung on with their forceps and stung my poor boy, who roared with pain at every fresh attack, whilst I killed them as fast as I could, assisted by the nurse. At length all were removed, about twenty being left dead on the ground. Going to see the little fellow bathed with something to ease the pain, I was absent about half an hour, and then returned to the same place, when I saw a large number of the Ants surrounding the dead ones. Being fond of natural history and having read much concerning the instinct of Ants, I determined to watch them closely now. At least four ran off very quickly, and I followed them until I saw them enter a hillock containing an Ants’ nest which we had, in vain, tried to get rid of on account of the annoyance caused by their close vicinity to our sitting tent. They remained here about five minutes, when a number more came out two by two, and proceeded slowly to the place where their dead companions lay. Here they seemed to wait for something; and presently we saw coming from the other side near the creek a number surpassing those I had followed, and halting in the same place. Then two Ants took up one of the dead ones and marched off, followed by two others as mourners, then two others entered the procession with a second dead Ant, succeeded, in the same way, by another pair, and so on until all the dead were taken up, a number of, I should think, 200 bringing up the rear.

“Following the train, I found that the two empty-handed followers relieved their fellows in advance, the latter falling behind in the place of those who relieved them, and thus continuing to

alternate from time to time. They had now gone a considerable distance towards the sea-side when they stopped at a sandy hillock, where those who marched in the rear of the procession commenced operations by making holes, but I soon observed that only about half the number took part in this employment. When a sufficient number of graves had been dug, the dead bodies were laid in them, and I found that those Ants which had hitherto stood idle were deputed to cover them in. About six would not stir from their places, and on these the others fell and killed them, whereupon they made a single large pit at a distance from the other graves, into which all the six were put and duly covered up. The Ants then all paired off and marched back to the scene of slaughter, where they remained together for a few minutes, when each company left for their own habitation.

“The observation of this curious proceeding gave me great pleasure; and I had frequent opportunities afterwards of seeing the insects act much in the same way. If one of the ‘workers,’ however (who are much smaller than the rest), were killed, it was buried where it fell, and no friends attended the funeral.”

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On the Mutual Relations of the Cold-blooded Vertebrata. By  
J. REAY GREENE, B.A., Professor of Natural History in the  
Queen’s College, Cork, &c. Communicated by G. BUSK, Esq.,  
Sec. L.S.

[Read June 21st, 1860.]

PROFESSOR OWEN, in a paper read at the late Meeting of the British Association at Aberdeen, brought forward a new classification of the Reptiles, in which he sought to embody the results of a long-continued series of observations on several extinct forms of the group. To those who are not familiar with the arrangement referred to, the following summary of its leading features, here presented in the somewhat condensed form of an analytical table, may prove, perhaps, not unacceptable.

*Key to Professor Owen’s arrangement of REPTILIA.*

- |   |   |   |    |
|---|---|---|----|
| 1 | { | With post-orbitals and supra-temporals . . . . .  | 2. |
|   | { | No post-orbitals and supra-temporals . . . . .  | 4. |
| 2 | { | Pleurapophyses short and straight. No occipital condyle.<br>Head defended by ganoid plates . . . . . <i>Ord. GANOCEPHALA.</i> |    |
|   | { | Pleurapophyses long and bent . . . . .  | 3. |

- |    |   |  |
|----|---|--|
| 3  | { | Two occipital condyles. Teeth presenting a peculiar complex arrangement of the cement . . . . <i>Ord.</i> LABYRINTHODONTIA.                                    |
|    |   | One occipital condyle. Limbs natatory, with more than five digits. Orbit very large . . . . . <i>Ord.</i> ICHTHYOPTERYGIA.                                     |
| 4  | { | Two occipital condyles. Pleurapophyses short and straight. No scales or scutes. Larvæ with gills . . <i>Ord.</i> BATRACHIA.                                    |
|    |   | One occipital condyle. Larvæ without gills . . . . . 5.  |
| 5  | { | Body covered with a double shield, formed of both the exo-skeleton and endo-skeleton . . . . . <i>Ord.</i> CHELONIA.   |
|    |   | Dermal armour, when present, formed wholly of the exo-skeleton, and never presenting the form of a double shield. . . 6.                                       |
| 6  | { | Limbs not visible. No sacrum. Vertebrae very numerous, with a single transverse process on each side . . <i>Ord.</i> OPHIDIA.                                  |
|    |   | Limbs present, with not more than five digits . . . . . 7.   |
| 7  | { | Anterior limbs formed for flight. Bones light, hollow, with air-cells . . . . . <i>Ord.</i> PTEROSAURIA.   |
|    |   | Limbs ambulatory or natatory . . . . . 8.  |
| 8  | { | Sacral vertebrae never exceeding two. . . . . 9.   |
|    |   | Sacral vertebrae three or more . . . . . 11.   |
| 9  | { | Ribs bifurcate. One external nostril. Anterior trunk-vertebrae with two transverse processes. Skin protected by bony scales . . . . . <i>Ord.</i> CROCODILIA*. |
|    |   | Ribs with simple heads. Two external nostrils . . . . . 10.  |
| 10 | { | Vertebrae flat, or somewhat biconcave. Limbs natatory. <i>Ord.</i> SAUROPTERYGII.  |
|    |   | Vertebrae, in most, procœlian, with a single transverse process on each side. Limbs ambulatory . . . . <i>Ord.</i> LACERTILIA.                                 |
| 11 | { | Sacral vertebrae three. Teeth with compressed crowns; sharp, serrate; in distinct sockets. Vertebrae biconcave. <i>Ord.</i> THECODONTIA.                       |
|    |   | Sacral vertebrae more than three . . . . . 12.   |
| 12 | { | Vertebrae biconcave. Teeth absent or represented by a pair of tusks . . . . . <i>Ord.</i> ANOMODONTIA.   |
|    |   | Vertebrae flat or concavo-convex. Limbs ambulatory, long and strong. Teeth numerous . . . . . <i>Ord.</i> DINOSAURIA.  |

Professor Owen, on the same occasion, gave it as his opinion that the Fishes, Amphibians, and true Reptiles ought properly to be united into one class, for which he proposed the title of *Hæmatocrya*. All the various forms cited in the above Table were regarded, under the general denomination of Reptiles, as a sub-class of this great division.

Here two propositions are enunciated which call for the adop-

\* Of this group there are three sub-orders, *Amphicælia*, *Opisthocælia*, and *Procælia*.

tion of important changes in our present systems:—one, that the Amphibians do not form a natural class, distinct from the Reptiles proper; the other, that between Fishes and Amphibians there exists no definite line of separation. On each of these heads it is proposed to offer a few brief remarks. And first, as to the relationship between Amphibians and Reptiles.

Most zoologists will probably admit that the characters which seem to separate Fishes from Amphibians are of a far less fundamental nature, though apparently more striking, than those which distinguish the latter from Reptiles rightly so-called. Fishes and Amphibians agree in certain well-known features, wherein they differ from all other Vertebrates. Both possess gills, which some Amphibians and all Fishes retain during the entire period of their lives. Both, moreover, are equally destitute of amnion and allantois. Furthermore, as Prof. Huxley has pointed out\*, the hyoidean and mandibular arches are, in these groups, “suspended by a pedicle or *suspensorium*, which is, to a certain extent, common to both;” whereas in Reptiles and all remaining Vertebrates, the proximal ends of the two arches are quite distinct. In short, the true Reptiles possess in common the following series of characters by which they may, without difficulty, be distinguished from Amphibians:—

1. They are without gills.
2. They are provided with an amnion and allantois.
3. They do not exhibit those changes after birth which are so characteristic of most recent Amphibia.
4. Their tegumentary system presents peculiar features.
5. They possess a single occipital condyle.
6. As in other abranchiata Vertebrates, “the proximal end of the hyoidean arch is quite distinct from that of the mandibular arch.”

It seems scarcely necessary to add that the names of Agassiz †, Von Baer ‡, Bell §, Van Beneden ||, De Blainville ¶, Carpenter \*\*,

\* See his Croonian Lecture, “On the Theory of the Vertebrate Skull,” in Proceedings of the Royal Society, November 18, 1858.

† Essay on Classification. London, 1859.

‡ Ueber Entwicklungsgeschichte der Thiere. Königsberg, 1828.

§ History of British Reptiles, second edition. London, 1849.

|| In several of his works. See, however, his ‘Zoologie Médicale,’ published in conjunction with Gervais. Paris, 1859.

¶ De l’organisation des Animaux. Paris, 1822.

\*\* In many of his works, but most recently in his ‘Animal Physiology,’ new edition. London, 1859.



Milne-Edwards\*, Huxley†, M<sup>c</sup>Leay‡, Vogt§, and other naturalists of acknowledged competency, might all be cited in favour of the view here advocated.

It is indeed true that we know not the embryology of the extinct genera *Labyrinthodon* and *Archegosaurus*; but negative evidence of this kind can scarcely be said to have much value. A more valid objection is, that the exo-skeleton of some undoubted Reptiles (for example, *Ichthyosaurus*) exhibits certain characters in common both with Amphibians and true Fishes; yet these characters are overborne by others to which greater weight must still be attached. Persons prone to speculation will doubtless imagine fossil skeletons presenting features intermediate between those of the two groups whose affinities are now under consideration. Such extinct forms may exist, but they have not yet found a place in any osteological museum.

The second of the two preceding propositions, namely, the possibility of distinguishing between Amphibians and true Fishes, now, in its turn, claims our attention.

Before the recognition of such genera as *Lepidosiren* and *Archegosaurus*, this question would not have appeared one of much difficulty; but the cautious zoologist of our own day hesitates before answering it in definite terms.

Admitting, with Professor Owen, that the skeleton of *Archegosaurus* indicates the nearer affinity of its possessor to the Perenni-branchiate Batrachians than to any known Fish, and dismissing, therefore, that singular genus from the category of animals whose class is doubtful, the above question may be re-stated thus:—What conclusion must be drawn from a careful consideration of the totality of organization presented by *Lepidosiren*?

It is unnecessary here to recapitulate at length those great facts in the anatomy of *Lepidosiren* with which zoologists in general are familiar. Let it suffice to notice briefly most of those peculiarities which seem to bear on its disputed affinities.

The scaly covering of *Lepidosiren*, the structure and appearance of the greater part of its skeleton, the relative positions of the anal and uro-genital apertures, the conspicuous lateral line, and the

\* 'Zoologie.' Huitième édition. Paris, 1858.

† See the second of his "Lectures on General Natural History," published in the Medical Times and Gazette, May 17, 1856.

‡ Horæ Entomologicae. London, 1819-21.

§ Zoologische Briefe. Frankfurt am Main, 1851.

mucous ducts on the head are among the most prominent of its piscine tendencies.

Several characters, also, are presented by *Lepidosiren*, which, although more or less ichthyic, are not inconsistent with the notion of its being an Amphibian. These, with scarcely an exception, are as follows :—

1. The presence of an intestinal spiral valve. As Professor Owen\* has remarked, “there is good evidence that the intestine of the *Ichthyosaurus* was provided with a spiral valve, yet it is not on that account regarded as a Fish.”
2. The persistent notochord.
3. The absence of occipital condyles. This and the preceding condition occur also in *Archegosaurus*.
4. The arrangement of the muscular system. On this head Professor Owen justly observes, “that although the muscles of the trunk are quite fish-like in their disposition, yet the lower Perennibranchians and the larvæ of the higher Batrachia offer a similar agreement in this part of their organization to the class of Fishes.” He adds also that the muscles of the mandibular, hyoidean, branchial, and scapular arches “resemble in some points the arrangement of the same muscles in the Perennibranchians, and in other points that in the true Fishes.”
5. The simple structure of the auditory apparatus. A like organization of the same parts may be seen among the Perennibranchians.
6. The conditions of the generative organs. Professor Owen has shown that “the structure of these organs in the *Lepidosiren*, while it shows its near affinity to the Reptiles, by no means proves that it is not a Fish.”
7. The structure of the teeth. These are said to “differ from any known dental apparatus in the class of Fishes in the modifications of the working surface, which at once adapt them for piercing, cutting, and crushing.”
8. The bipartite cellular air-bladder or lung. No comment seems needed on the significance of this apparatus, which, in spite of its highly developed condition, bears so close a resemblance to the air-bladder of the Ganoids; in function, however, the air-bladder of *Lepidosiren* is more truly a lung than that of *Amia* or any other Fish.

\* Description of the *Lepidosiren annectens*, Linnean Transactions, 1841.

9. The enclosure of the gills and branchial arches in a branchial chamber. Professor Owen reminds us that "the larva of the tailless Batrachian presents at one period of its existence a similar structure."
10. The external appearance and habits of the living animal. The mode in which the *Lepidosiren* (several healthy specimens of which have, within the last few years, been received from Africa) comes to the surface of the water to breathe, and the use which the animal makes of its anomalous limbs, are indeed suggestive of its amphibian affinities, though very insufficient to prove them.

On the other hand, the structure of the brain in *Lepidosiren*, its external branchiæ, the presence of a distinct left auricle, and of posterior nares, must be viewed as strongly indicative, to say the least, of its amphibian nature.

Supposing *Lepidosiren* to be an Amphibian, few would hesitate to place it among the Perennibranchians; but there is no single group of the class of Fishes with which it manifests an equal relationship.

It is further to be observed, that when Professor Owen wrote his "Description of the *Lepidosiren annectens*," he was unacquainted with the subsequently constituted genus *Archegosaurus*, in which a persistent notochord and the absence of occipital condyles are associated with unquestionable amphibian characters. Moreover, the heart of *Lepidosiren* has since been proved to possess two auricles, and its nasal sacs have ceased to be accounted blind.

Although it may fairly be inferred that *Lepidosiren* is more like the Perennibranchiate Batrachians than any known group of Fishes, yet its strongly marked ichthyic characters forbid our receiving this conclusion without considerable qualification. Had *Lepidosiren* been only known in a fossil state, what anatomist would have scrupled to place it in the class of Fishes?

If, then, we admit the amphibian affinities of *Lepidosiren*, and acknowledge also its evident ichthyic relations, the conclusion deducible from the foregoing considerations may be stated thus:—

It is possible to define the limits between two great groups or classes of Branchiate Vertebrates. These classes are confessedly artificial. *Lepidosiren* may have its place on the Amphibian side of the boundary.

If *Lepidosiren* be not an Amphibian, the union of *Pisces* and *Amphibia* into one class becomes inevitable. Such a class might receive the name of *Anallantoidea*.

It has been well said that the characters of groups are only a declaration of their prevailing tendencies. "Botanists," writes Mr. Bentham (and his words apply with equal force to the zoologist), "cannot be so mathematically exact as geographers; and where an isthmus is very narrow, we must class the peninsula with the island. How often does it happen that two large orders, say of 500 to 2000 or 3000 species, totally distinct from each other in all those species by a series of constant characters, are yet connected by some small isolated genus of a dozen, half a dozen, nay, a single species, in which these very characters are so inconstant, uncertain, or variously combined as to leave no room for the strait through which we ought to navigate between the two islands!" In like manner, it might be said that *Lepidosiren* and *Archegosaurus* form two very narrow but short bridges, which lead from the low-lying country of Fishes to the higher ground of the Amphibians.

To the preceding remarks it has been thought desirable to append analytical arrangements of the three primary groups of cold-blooded *Vertebrata*, each of these, for convenience of reference, being regarded as a separate class.

Under *Reptilia*\* may be included the four orders usually admitted by zoologists, together with most of the extinct orders defined by Professor Owen. The claim of *Crocodylia* to be viewed as a distinct order, though founded on just grounds, is not universally recognized.

To *Amphibia*† may be referred the extinct orders *Ganocephala* and *Labyrinthodontia*, together with all the recent *Batrachia*‡. These last, however, constitute more than a single order, even in the opinion of those, such as Stannius and Van der Hoeven, who

\* The terms *Pholidota* (Merrem), *Monopnoa* (Fitzinger), and *Haplopnœa* (Van der Hoeven) are synonymous with *Reptilia* in its proper signification.

† Since the time of Linneus, who placed all the cold-blooded Vertebrates, except the osseous Fishes, in his class *Amphibia*, some naturalists have continued to use this term in a very general sense, so as to include both the true Amphibians and the Reptiles. The late Prince Bonaparte (in his "New Systematic Arrangement of Vertebrate Animals," Linn. Trans. 1841) and Stannius (Handbuch der Zootomie der Wirbelthiere, zweiter Theil, zweite Auflage, Berlin, 1856) may be cited, among the moderns, as examples. *Dipnoa* (F. S. Leuckart) and *Diplopnœa* (Van der Hoeven) are synonyms of *Amphibia* proper.

‡ The term *Batrachia* is most frequently employed as synonymous with *Amphibia*; but Stannius, Van Beneden, and Gervais restrict its application to the *Anura*.

do not hesitate to associate them with the true Reptiles. It is still disputed whether the Perennibranchians should be separated from the other tailed forms, to constitute an additional order\*. On the whole it seems best to follow Agassiz, Duméril and Bibron†, Stannius, and Van der Hoeven‡, in regarding *Anura*, *Sozura* or *Sauvobatrachia*§, and *Ophiomorpha* or *Cæciliæ*|| as three well-marked orders of recent *Amphibia*. Lastly, a sixth order may be reserved for *Lepidosiren*.

For Fishes, no doubt can exist as to the propriety of adopting the classification of J. Müller, his subclass *Dipnoi* being of course excluded, if *Lepidosiren* be placed with the *Amphibia*. The recent recommendation of Professor Agassiz, to divide Fishes into four separate classes, advocates changes of too radical a nature to be hastily adopted.

#### CLASS REPTILIA.

*One occipital condyle. No gills. An amnion and allantois. Two auricles. Proximal ends of hyoidean and mandibular arches distinct from one another.*

- |   |   |  |
|---|---|--|
| 1 | { | With post-orbitals and supra-temporals. Limbs natatory, with more than five digits. . . . . Ord. ICHTHYOPTERYGII.  |
|   | { | No post-orbitals, and supra-temporals . . . . . 2.   |
| 2 | { | Limbs absent or very imperfect. Vertebrae very numerous, procælian, with a single transverse process on each side. No sacrum. Eyelid immobile . . . . . Ord. OPILIDIA ¶. |
|   | { | Limbs present . . . . . 3.   |

\* This has been done by Milne-Edwards, Van Beneden and Gervais, and Prince Bonaparte. Milne-Edwards recognizes four orders of *Amphibia*, namely, *Anura*, *Urodela*, *Perennibranchiata*, and *Cæcilia*; with which the *Batrachia*, *Salamandria*, *Pseudo-salamandria*, and *Cæcilia* of Van Beneden and Gervais are, respectively, equivalent. Prince Bonaparte, however, has placed the two first of these divisions in a single ordinal group, *Rana*.

† Erpétologie générale, ou Histoire naturelle complète des Reptiles. Paris, 1834-1855.

‡ See the English translation of his Handbook of Zoology, by the Rev. Prof. Clark. London, 1858.

§ *Caudata* of Vogt; *Urodela* of Duméril and Bibron, also of Stannius, who divides this group into three suborders—*Perennibranchiata*, *Derotremata* (*Amphiuma*, *Menopoma*), and *Myelodera* (*Triton*, *Salamandra*). The *Urodela* of Milne-Edwards include only the second and third of these divisions.

|| *Peromela*, Duméril and Bibron; *Batrachophidiæ*, Bonaparte; *Gymnophiona*, Müller and Stannius; *Apoda*, Vogt.

¶ Serpents which present traces of limbs and sternum may be distinguished from Saurians by their immobile eyelid and want of tympanic cavity. Thus

- 3 { Anterior limbs formed for flight. Bones light, hollow, with  
air-cells ..... *Ord.* PTEROSAURIA.  
Limbs ambulatory or natatory ..... 4.
- 4 { Body covered with a double shield, formed of both the exo-  
skeleton and endo-skeleton ..... *Ord.* CHELONIA.  
Dermal armour, when present, formed wholly of the exo-skele-  
ton and never presenting the form of a double shield. . 5.
- 5 { Sacral vertebræ never exceeding two ..... 6.  
Sacral vertebræ three or more ..... 8.
- 6 { Ribs bifurcate. One external nostril. Anterior trunk-vertebræ  
with two transverse processes. Skin protected by bony  
scutes ..... *Ord.* CROCODYLIA.  
Ribs with simple heads. Two external nostrils .. . . . 7.
- 7 { Vertebræ flat or somewhat biconcave. Limbs natatory.  
*Ord.* SAUROPTERYGII.  
Vertebræ, in most, procœlian, with a single transverse process  
on each side. Limbs ambulatory .... *Ord.* LACERTILIA, s.  
SAURIA.
- 8 { Sacral vertebræ three. Teeth with compressed crowns ; sharp,  
serrate ; in distinct sockets. Vertebræ biconcave.  
*Ord.* THECODONTIA.  
Sacral vertebræ four or more ..... 9.
- 9 { Vertebræ biconcave. Teeth absent or represented by a pair  
of tusks . . . . . *Ord.* ANOMODONTIA.  
Vertebræ flat or concavo-convex. Limbs ambulatory, long and  
strong. Teeth numerous ..... *Ord.* DINOSAURIA.

## CLASS AMPHIBIA.

*Occipital condyles two in number, or absent. No amnion or al-  
lantois. Proximal ends of hyoidean and mandibular arches sus-  
pended by a common pedicle. Gills and lungs. Heart, in most,  
with two auricles.*

- 1 { No occipital condyle. Notochord persistent ..... 2.  
Two occipital condyles ..... 3.
- 2 { Limbs many-jointed, without digits. Opercular bones.  
*Ord.* LEPIDOTA.  
Limbs with four digits. Post-orbitals and supra-temporals.  
Head defended by ganoid plates .... *Ord.* GANOCEPHALA.

also may we distinguish between Serpents and those Saurians in which limbs are absent. See, on these points, the work of Van der Hoeven, already referred to.

- 3 { Post-orbitals and supra-temporals. Pleurapophyses long and bent. Teeth presenting a complex arrangement of the cement ..... *Ord.* LABYRINTHODONTIA.
- 3 { No post-orbitals, and supra-temporals. Pleurapophyses short and straight ..... 4.
- 4 { Feet absent. Body anguiform ..... *Ord.* OPHIOMORPHA.
- 4 { Feet present ..... 5.
- 5 { Tail persistent ..... *Ord.* SOZURA.
- 5 { Tail deciduous ..... *Ord.* ANURA.

CLASS PISCES.

*Breathing by gills only. In some, a swimming-bladder morphologically representing, but not performing the function of a true lung. One auricle. No amnion or allantois. Hyoidean and mandibular arches attached as in Amphibia.*

- 1 { Without jaws ..... 2.
- 1 { With jaws ..... 4.
- 2 { Heart absent. *Subclass 1. Leptocardii, Ord. 1. AMPHIOXINI.*
- 2 { Heart distinct. *Subclass 2. Cyclostomi* ..... 3.
- 3 { Palate perforate ..... *Ord. 1. HYPEROTRETI.*
- 3 { Palate imperforate ..... *Ord. 2. HYPEROARTII.*
- 4 { Arterial trunk with a muscular layer and numerous valves. The optic nerves form a chiasma. Intestine furnished with a spiral valve ..... 5.
- 4 { Arterial trunk without muscular layer and having but two valves. The optic nerves decussate but do not form a chiasma. No intestine spiral valve. Opercula and free gills. Skeleton perfectly osseous. *Subclass 5. Teleostei* ..... 9.
- 5 { Gills adherent. No opercula. *Subclass 3. Elasmobranchii, s. Selachii* ..... 6.
- 5 { Opercula and free gills. *Subclass 4. Ganoidei* ..... 8.
- 6 { Branchiæ not fixed by their outer margin, with a single aperture on each side ..... *Ord. 1. HOLOCEPHALI.*
- 6 { Branchiæ adherent by their outer margin, with several apertures on each side ..... *Ord. 2. PLAGIOSTOMI.* 7.
- 7 { Branchial apertures on the neck below. Eyelids connate with eyes, or absent ..... *Subord. 1. Raiidæ.*
- 7 { Branchial apertures at sides of neck. Eyelids distinct, with free margin ..... *Subord. 2. Squalidæ.*
- 8 { Skeleton cartilaginous ..... *Ord. 1. CHONDROSTEL.*
- 8 { Skeleton osseous ..... *Ord. 2. HOLOSTEL.*

- 9 { Exo-skeleton with bony scutes, or with rough scales or spines . . . . . 10.
- 9 { Exo-skeleton, in most, with ctenoid or cycloid scales. Branchiæ pectinate. . . . . 11.
- 10 { Branchiæ clustered. Body elongate. . *Ord.* 1. LOPHOBRANCHII.
- 10 { Branchiæ pectinate. Body short. Maxillaries connate with pre-maxillaries . . . . . *Ord.* 2. PLECTOGNATHI.
- 11 { Swimming-bladder with air-duct. All the fin-rays, except sometimes the first, soft, jointed . . *Ord.* 3. PHYSOSTOMI. . 12.
- 11 { Swimming-bladder without air-duct . . . . . 13.
- 12 { Ventral fins absent . . . . . *Subord.* 1. P. Apodes.
- 12 { Ventral fins on abdomen . . . . . *Subord.* 2. P. Abdominales.
- 13 { Lower hyoid bones united. . . . . *Ord.* 4. PHARYNGOGNATHI 14.
- 13 { Lower hyoid bones distinct . . . . . 15.
- 14 { All the fin-rays, except sometimes the first, soft, jointed. *Subord.* 1. P. Malacopterygii.
- 14 { Anterior fin-rays hard, unjointed. *Subord.* 2. P. Acanthopterygii.
- 15 { Fin-rays soft, jointed. Ventrals beneath pectorals, or absent. *Ord.* 5. ANACANTHINI.
- 15 { Anterior fin-rays hard, unjointed. Ventrals usually beneath, or before, pectorals . . . . . *Ord.* 6. ACANTHOPTERI.

In the above arrangement, the relative positions of the orders as indicated by Müller have been carefully maintained\*.

\* Müller establishes a sixth subclass (*Dipnoi*) for the *Lepidosiren*. A further contribution to our knowledge of this genus has just been made by Dr. R. M'Donnell (see Natural History Review, April, 1860). The large size of the blood-disks in *Lepidosiren*, the general arrangement of its circulatory apparatus, and its power of emitting vocal sounds are in this memoir referred to among other proofs of its near affinity to the Amphibia. Dr. M'Donnell confirms the biauricular character of the heart and the presence of posterior nares. These observations were based on the examination of eight specimens of *L. annectens*. To this paper a note has been appended by Professor Melville, who strongly contends for the Amphibian nature of the genus, which he proposes to place between the *Perennibranchiata* and *Derotremata* of Stannius.



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

[Read June 21st, 1860.]

Fam. CULICIDÆ, *Haliday*.

Gen. CULEX, *Linn.*

1. *Culex obturbans*, *Walk.* See vol. iv. p. 91.
2. *CULEX ZONATIPES*, n. s. *Mas.* Ferrugineus, pedibus fuscis, femoribus basi pallidis, genibus tarsorumque fasciis quatuor albis, alis cinereis, venis nigris ciliatis.  
Very nearly allied to *C. impatibilis* (vol. iv. p. 91), but distinct.  
*Male.* Ferruginous; proboscis about half the length of the body; legs brown; femora pale at the base; knees white; tarsi with four broad white bands; wings cinereous; veins black, fringed. Length of the body  $2\frac{1}{2}$  lines; of the wings 4 lines.
3. *CULEX FILIPES*, n. s. *Fem.* Ferrugineus, capite abdomineque nigris, pedibus nigricantibus longissimis, femoribus basi pallidioribus, alis cinereis, venis nigris ciliatis.  
*Female.* Ferruginous; head and abdomen black; proboscis less than half the length of the body; legs blackish, very long; femora somewhat paler towards the base; wings cinereous; veins black, fringed. Length of the body  $2\frac{1}{2}$  lines; of the wings 4 lines.

Fam. TIPULIDÆ, *Haliday*.

Gen. LIMNOBIA, *Meigen*.

In the wings of the following species the subcostal is connected with the radial by a transverse veinlet at its tip; the apical veins are curved towards their tips; the 2nd externo-medial springs from the 1st at before one-third of its length, and is connected near its base with the 3rd by a transverse veinlet; the 3rd is connected in like manner with the subanal.

4. *LIMNOBIA STRIGIVENA*, n. s. *Mas.* Cinereo-cervina, thorace anticeo attenuato, pedibus longissimis, femoribus fascia nigra subapicali, tibiis apice nigricantibus, alis albidis longis angustis, venis pallide testaceis nigro conferte fasciatis, halteribus albidis apice nigricantibus.  
*Male.* Cinereous fawn-colour, slender; head oblong; antennæ short; thorax attenuated in front; legs testaceous, slender, very long;

femora with a black subapical band; tibiæ with blackish tips; wings whitish, long, narrow; veins pale testaceous with numerous black bands; halteres whitish with blackish tips. Length of the body 5-7 lines; of the wings 16-20 lines.

The wing-veins of the following species are much like those of *L. strigivena*; but the veinlet between the 2nd and 3rd externo-medial veins is much nearer the base of the former.

5. *LIMNOBIA QUADRIFURCA*, n. s. *Fæm.* Cervina, vix gracilis, antennis nigricantibus pallido cinctis, thorace vittis quatuor piccis antice connexis, abdomine vitta dorsali nigra, pedibus nigricantibus, femoribus pallidis apice nigricantibus fascia subapicali pallida, tibiis basi pallido fasciatis, alis pallide cinereis, costa fulva, venis pallide testaceis nigro conferte cinctis, linea subapicali obliqua nigricante.

*Female.* Fawn-colour, hardly slender; antennæ short, blackish, with pale rings; thorax with four piccous stripes, which are united and form a piccous disk in front; abdomen with a black dorsal stripe; legs blackish; femora pale, blackish towards their tips, near which there is a pale band; tibiæ with a pale band at the base; wings pale cinereous; costa tawny; veins pale testaceous, with very numerous black rings; an oblique blackish line at the base of the apical areolets, Length of the body 7 lines; of the wings 16 lines.

The wing-veins of the next species differ much from those of the two preceding *Limnobiæ* in structure, though the veins are slightly curved near the tip of the wing; the veinlet which connects the cubital vein with the 1st externo-medial vein is nearly opposite the veinlet which connects the 1st and 3rd externo-medial veins and emits the 2nd.

6. *LIMNOBIA PERDECORA*, n. s. *Mas.* Picea, breviscula, sat robusta, thorace antico perangusto, abdomine pallide testaceo apicem versus nigro, pedibus piceis longis, femoribus testaceis apice nigricantibus, alis ferrugineis, costa fasciisque duabus nigricantibus, macula costali subapicali nivea.

*Male.* Piccous, rather short and stout; mouth prominent; antennæ short, with the 1st joint long; thorax very narrow in front; abdomen pale testaceous, black towards the tip; legs piccous, long, slender; femora testaceous, blackish at their tips; wings ferruginous, irregularly blackish along the costa, and with two irregular blackish bands which converge hindward and enclose the transverse veinlets; a snow-white spot near the tip of the costa; halteres pale testaceous. Length of the body 7 lines; of the wings 14 lines.

7. *LIMNOBIA TERMINALIS*, n. s. *Fæm.* Ochracea, capite nigro, antennis setaceis, thorace vitta lanceolata picea postice abbreviata guttisque duabus lateralibus nigris, abdomine fasciis duabus apiceque nigris, pedibus nigris, femoribus basi ochraceis, alis fusciscenti-cinereis, venis halteribusque nigris.

*Female.* Ochraceous; head black; antennæ short, setaceous; thorax

with a lanceolate piceous stripe which is abbreviated hindward, and with a black dot on each side; abdomen black towards the tip, and with two black bands, one near the base, the other before the middle; legs black; femora towards the base, and coxæ, ochraceous; wings brownish cinereous; veins and halteres black. Length of the body  $5\frac{1}{2}$  lines; of the wings 9 lines.

Gen. TIPULA, *Linn.*

8. TIPULA CONGRUENS, n. s. *Fœm.* Cinereo-fusca, oculis lurido cinetis, antennis setaceis setulosis, thoracis lateribus suturisque vittaque fusco marginata ferrugineis, abdominis segmentis cinereo marginatis apice ferrugineo, pedibus ferrugineis longissimis, tibiis tarsisque testaceis, alis cinereis, costa lurida.

*Female.* Cinereous brown, pale cinereous beneath; head lurid about the eyes; antennæ short, setaceous, setulose; thorax ferruginous on each side and along the sutures, and with a ferruginous stripe, which is bordered with brown and is abbreviated hindward; abdomen ferruginous at the tip; hind borders of the segments pale cinereous; legs ferruginous, slender, very long; tibiæ and tarsi testaceous; wings cinereous; costa lurid; veins black; subanal vein towards the tip, and the veinlet which connects it with the discal areolet, tinged with brown. Length of the body 10 lines; of the wings 24 lines.

Gen. PACHYRHINA, *Macq.*

9. PACHYRHINA TRIPARTITA, n. s. *Mas.* Lutea, antennis nigris setaceis setosis basi luteis, thoracis disco, metathoracis fascia abbreviata, abdominis apice pedibusque nigris, femoribus basi luteis, alis cinereis apud costam luridis.

*Male.* Luteous; antennæ black, setaceous, setose, luteous at the base; disk of the thorax black, excepting the sutures; metathorax with an abbreviated black band; abdomen black towards the tip; legs black; femora towards the base, and coxæ, luteous; wings cinereous, lurid along the costa; veins and stigma black; subcostal vein thick. Length of the body 6 lines; of the wings 11 lines.

Gen. GYNOPLISTIA, *Westw.*

10. GYNOPLISTIA FULVICEPS, n. s. *Fœm.* Picea, capite fulvo, antennis nigris pectinatis basi fulvis, abdomine ochraceo basi apiceque nigris, pedibus nigris, femoribus ochraceis, alis cinereis, costa maculis duabus costalibus fasciisque duabus exterioribus nigricantibus, halteribus rufescentibus apice nigris.

*Female.* Piceous; head tawny; antennæ black, moniliform, pectinated, tawny at the base, with 8 branches; metathorax with two reddish spots; pectus with two testaceous streaks on each side; abdomen ochraceous, black at the base and towards the tip, which is reddish; legs black; femora ochraceous, except at the base and towards the

tips; wings cinereous, blackish along the costa, with two blackish costal spots, and with two exterior blackish bands, of which the first is abbreviated hindward, and the second is apical; veins black, yellow at the base; halteres reddish, with black tips. Length of the body 5 lines; of the wings 8 lines.

Fam. STRATIOMIDÆ, *Haliday*.

Gen. PTILOCERA, *Wied.*

11. *Ptilocera quadridentata*, *Wied.* See vol. i. p. 7.

Gen. STRATIOMYS, *Geoffr.*

12. *STRATIOMYS BIFASCIA*, n. s. *Mas.* Nigra, antennis basi flavescens, thoracis tomento aurato, abdominis margine fasciis duabus ventre pedibusque flavescens, alis limpida, halteribus albidis.

*Male.* Black; 1st and 2nd joints of the antennæ yellowish, shorter together than the flagellum, which ends in a short bent style; thorax with gilded tomentum; abdomen shining—border, underside, and two bands yellowish; legs yellowish; wings limpid; veins and halteres whitish. Length of the body 3 lines; of the wings 5 lines.

Gen. CLITELLARIA, *Meigen*.

13. *CLITELLARIA OBESA*, n. s. *Mas.* Cærulescenti-nigra, crassa, antennis rufescentibus lanceolatis, thorace fasciis sex obliquis, abdominis fasciis duabus apiceque argenteo pubescentibus, genibus tarsisque ferrugineis, alis nigricantibus, halteribus albis.

*Male.* Bluish black, very thick; antennæ reddish, lanceolate, ending in a short blackish style, as long together as the breadth of the head; thorax on each side with three oblique silvery pubescent bands; scutellum with silvery pubescence, which also forms two bands on the abdomen, and covers the tip of the same; legs black; knees and tarsi ferruginous; wings blackish, cinereous along the hind border and at the tips; veins black; halteres white. Length of the body 4 lines; of the wings 7 lines.

Gen. SARGUS, *Fabr.*

14. *SARGUS LONGIPES*, n. s. *Mas.* Cupreo-purpureus, capite antice subtusque albido, antennis testaceis, abdomine basi albido, pedibus longis albidis, tibiis posticis nigris, tarsis posticis niveis, alis cinereis, halteribus albis.

*Male.* Cupreous purple; head whitish in front and beneath; antennæ testaceous; thorax with a whitish callus along each side; abdomen whitish at the base; legs long, whitish; tips of the tarsi and hind tibiæ black; hind tarsi pure white, black at the base; wings cinereous; veins black; halteres white. Length of the body  $5\frac{1}{2}$  lines; of the wings 10 lines.

Gen. TINDA, *Walk.*

15. TINDA RECEDENS, n. s. *Mas.* Nigra, nitens, antennis piceis basi rufescentibus, pedibus halteribusque rufescentibus, femoribus posticis extus apices versus nigricantibus, alis obscure cinereis apud costam nigricantibus.

*Male.* Black, shining; epistoma very prominent, furrowed above; antennæ piceous, reddish towards the base; abdomen elongate-elliptical, a little longer and broader than the thorax; legs reddish; hind femora blackish on the outer side towards the tips; wings dark cinereous, blackish along the costa; veins black; halteres reddish. Length of the body 3 lines; of the wings 5 lines.

Gen. SARUGA, *Walk.*

16. Saruga conifera, *Walk.* See vol. iv. p. 102.

Gen. OBRAPA, *Walk.*

17. Obrapa perilampoides, *Walk.* See vol. iii. p. 82.

18. Obrapa celyphoides, *Walk.* See vol. iii. p. 83.

Fam. TABANIDÆ, *Leach.*Gen. TABANUS, *Linn.*

19. TABANUS DOREICUS, n. s. *Mas.* Piceo-niger, fulvo-tomentosus, antennarum articulo 3<sup>o</sup> rufo subcornuto, abdomine basi obscure rufescente, pedibus nigris, alis obscure fuscis, halteribus albidis.

*Male.* Piceous-black; head with tawny tomentum in front and beneath; callus long and slender; eyes somewhat flattened in front, with extremely small facets; 3rd joint of the antennæ red, with a small horn; thorax with tawny tomentum; pectus with cinereous tomentum; abdomen dark reddish towards the base; legs quite black; wings dark brown, dark cinereous along the hind border; veins black, ferruginous towards the base; fore branch of the cubital vein simple, slightly undulating; halteres whitish. Length of the body 8 lines; of the wings 16 lines.

Fam. ASILIDÆ, *Leach.*Subfam. DASYPOGONITES, *Walk.*Gen. DIOCTRIA, *Meig.*

20. DIOCTRIA CLAVIVENTRIS, n. s. *Fam.* Nigra, capite argenteo, mystace albo, antennis basi fulvis, thorace vittis tribus maculisque

humeralibus cinereis, abdomine clavato fasciis fulvis, pedibus fulvis, femoribus posticis nigro variis, alis cinerascensibus, halteribus testaceis.

*Female.* Black; head with silvery-white tomentum; mystax composed of a few white bristles; antennæ linear, 1st and 2nd joints tawny; thorax with three stripes and with humeral spots of cinereous tomentum; metathorax with testaceous tomentum; pectus with whitish tomentum; abdomen clavate; hind borders of the segments and tip pale; 1st and 2nd bands much broader than the others; legs tawny; hind femora mostly black above; wings pale cinereous, darker towards the tips; veins black; halteres pale testaceous. Length of the body 6 lines; of the wings 12 lines.

Subfam. LAPHRITES, *Walk.*

Gen. LAPHRIA, *Fabr.*

21. LAPHRIA REPLENS, n. s. *Mas et fœm.* Cyanca, capite aurato subtus albo, antennis nigris articulo 3<sup>o</sup> fusiformi, pedibus albo setosis, alis nigricantibus basi cinereis. *Mas.* Abdomine nigricante basi viridi. *Fœm.* Abdomine purpureo basi cyanescenti-viridi.

Much resembling *L. complens*, from which it is especially distinct by the curved lower transverse veinlet of the wings; it may be distinguished by the same character from *L. comes*, to which it is very nearly allied, but it differs also from the latter by the longer union of the two subcostal veins. *Male and female.* Blue; head brilliantly gilded, white behind and beneath, where it is clothed with white hairs; mystax with a few black bristles; antennæ black; 3rd joint fusiform; thorax with a tawny mark on each side in front; pectus white; legs with white bristles; wings blackish, cinereous towards the base, the latter hue much more prevalent towards the costa than it is hindward; veins and halteres black. *Male.* Abdomen almost black, green at the base. *Female.* Abdomen purple, bluish-green at the base. Length of the body 5-7 lines; of the wings 10-12 lines.

22. LAPHRIA LITURIFERA, n. s. *Mas et fœm.* Cinereo-nigra, capite aurato subtus albo, mystace pallido setis quatuor nigris, antennarum articulo 3<sup>o</sup> longi-fusiformi, thorace vittis duabus pallide auratis lineisque duabus nigris, abdomine cyaneo guttis lateralibus transversis argenteis, alis obscure cinereis, halteribus pallide flavis.

*Male and Female.* Cinereous-black; head with pale gilded tomentum, white beneath and in front; mystax with a few pale bristles and with four more stout black bristles; 3rd joint of the antennæ elongate-fusiform; thorax with an oblique pale gilded streak on each side in front, with a pale gilded stripe on each side, and with three paler marks on each side of the disk, where there are two black lines; pectus and a band on the metathorax silvery white; abdomen blue, with

transverse silvery-white dots along each side; legs blue, with black bristles and with white hairs; wings dark cinereous, paler along the costa for full half the length; veins black; halteres pale yellow. Length of body 9-10 lines; of the wings 18 lines.

23. *LAPHRIA ARDESCENS*, n. s. *Fæm.* Ochracea, capite aurato, antennarum articulo 3<sup>o</sup> lanceolato, thorace vitta lata nigricante lineas duas nigras includente, abdomine fasciis tribus nigris, alis testaceo-cinereis nigricante bifasciatis.

*Female.* Ochraceous, nearly cylindrical; head with gilded tomentum; antennæ a little longer than half the breadth of the head; 3rd joint lanceolate; thorax with a broad blackish stripe which includes two black lines and is dilated into two lobes on each side hindward; pectus with two black bands; abdomen with three black bands, the first abbreviated; legs very stout; wings testaceous-cinereous, with two very broad blackish bands, of which the 1st is abbreviated towards the costa; veins tawny, partly black. Length of the body 8 lines; of the wings 16 lines.

24. *LAPHRIA DISCIPLINA*, n. s. *Mas.* Ochracea, robusta, capite aurato, antennarum articulo 3<sup>o</sup> nigro lanceolato, thoracis disco nigricante, alis nigricantibus basi limpidis.

*Male.* Ochraceous, stout, with paler hairs and bristles; head with pale gilded tomentum; mystax with many pale gilded bristles; mouth black, except at the base; antennæ a little shorter than half the breadth of the head; 3rd joint black, lanceolate; disk of the thorax blackish; pectus with two blackish bands; claws black; wings blackish and with black veins, limpid and with pale veins at the base and along more than half the length of the costa. Length of the body 7 lines; of the wings 12 lines.

25. *LAPHRIA TRIPARS*, n. s. *Mas.* Ochracea, antennis parvis articulo 3<sup>o</sup> lanceolato, abdominis segmentis 4<sup>o</sup> 5<sup>o</sup>que nigris, alis ochraceo sub-tinctis nigro bifasciatis.

*Male.* Ochraceous; mystax with several bristles; antennæ not longer than half the breadth of the head; 3rd joint lanceolate; abdomen with a broad black band which occupies the 4th and 5th segments; legs robust; wings nearly limpid, with a very slight ochraceous tinge and with two black bands; 1st band broader than the 2nd, which is apical; veins ochraceous, black in the bands. Length of the body 5 lines; of the wings 9 lines.

26. *LAPHRIA BIPARS*, n. s. *Mas.* Ochracea, capite albido, antennis nigris articulo 3<sup>o</sup> sublineari, abdomine apicem versus nigro, alis nigricantibus basi limpidis.

*Male.* Ochraceous; head with whitish tomentum; epistoma quite flat; mystax with very few whitish bristles; mouth and antennæ black; 3rd joint of the latter almost linear, slightly attenuated at each

end; abdomen rather flat; 5th, 6th, and 7th segments black; wings blackish and with black veins, limpid, and with ochraceous veins towards the base. Length of the body  $3\frac{1}{2}$  lines; of the wings 6 lines.

27. *Laphria puer*, *Dol.* See p. 147.

### Subfam. ASILITES, *Walk.*

#### Gen. TRUPANEA, *Macq.*

28. *TRUPANEA COMPLENS*, n. s. *Mas et fœm.* Nigra, capitis pilis albis, antennarum articulo 3<sup>o</sup> fusiformi, thorace vittis tribus cinereis latis indistinctis lineisque duabus testaceis, abdominis segmentis ochraceo marginatis, femoribus subtus tibiisque rufis, alis cinereis, halteribus fulvis. *Fœm.* Abdomine apicem versus styliformi.

*Male and Female.* Black, horny beneath; head thickly clothed beneath with white hairs; epistoma very prominent; mystax with many black bristles; 3rd joint of the antennæ fusiform; arista as long as the three preceding joints; thorax with three broad indistinct cinereous stripes which are divided by two more testaceous lines, the latter hue passing into cinereous towards the pectus; hind borders at the abdominal segments with ochraceous bands, which are most distinct in the male; femora red beneath; tibiæ red, with black tips; wings cinereous; radial arcolet with the usual slate-coloured disk; veins black, of the ordinary structure; halteres tawny. *Male.* Abdominal appendages rather large. *Female.* Four last abdominal segments styliform. Length of the body 10-11 lines; of the wings 18-20 lines.

Allied to *T. strenua*.

#### Gen. ASILUS, *Linn.*

29. *ASILUS LEVIS*, n. s. *Mas.* Pallide testaceo-cinereus, sat gracilis, parce pilosus, capite mystaceque albis, antennarum articulo 3<sup>o</sup> nigro lanceolato, thorace vittis quatuor nigricantibus, abdomine nigro segmentis pallido marginatis, pedibus halteribusque fulvis, alis cinereis apice nigricantibus.

*Male.* Pale testaceous-cinereous, rather slender, with very few hairs and bristles; head with shining white tomentum, which is very slightly gilded in front; epistoma flat; mystax with several white bristles; mouth black, shining; antennæ tawny; 3rd joint black, lanceolate, a little longer than the 2nd joint; arista a little longer than the 3rd joint; thorax with four blackish stripes, the lateral pair obliquely interrupted as usual; hind part with three elongated black spots; abdomen blackish, except the hind borders of the segments; tip black, shining, with very small appendages; legs tawny; tarsi piceous towards the tips; claws black; wings cinereous, tips obliquely blackish;



veins black; forks of the cubital vein undulating; halteres tawny.  
Length of the body 6 lines; of the wings 12 lines.

Allied to *A. tenuicornis*, but very distinct in the structure of the veins.

Gen. OMMATIUS, *Illiger*.

30. *Ommatius noctifer*, *Walker*. See vol. iii. p. 88.

31. OMMATIUS NANUS, n. s. *Mas.* Cinereo-niger, antennis minimis, abdominis segmentis cano marginatis, pedibus flavescens, femoribus tibiisque apice tarsisque nigris, alis cinereis apice nigricantibus, halteribus flavescens.

*Male.* Cinereous black; head and pectus with hoary tomentum; antennæ very small; arista very long and slender; hind borders of the abdominal segments hoary; legs yellowish; femora and tibiæ towards the tips, and tarsi, black; wings cinereous, with blackish tips; veins black; 1st externo-medial vein not straight, as in *O. noctifer*, but undulating; halteres yellowish. Length of the body  $4\frac{1}{2}$  lines; of the wings 8 lines.

Gen. DAMALIS, *Fabr.*

32. DAMALIS LUGENS, n. s. *Mas.* Rufescens-ochracea, antennis thoracis disco abdominisque dorso nigris, pedibus obscure rufis, femoribus tibiisque apice tarsisque nigris, alis nigricanti-fuscis, halteribus apice albis.

*Male.* Dull reddish ochraceous; mouth, antennæ, disk of the thorax, and dorsal abdominal segments, except towards the base, black; legs dark red; femora, except at the base, tibiæ towards the tips, and tarsi black; wings blackish brown, black along the costa towards the base; veins black; halteres with ivory-white knobs. Length of the body  $3\frac{1}{2}$  lines; of the wings 8 lines.

Fam. LEPTIDÆ, *Westw.*

Genus LEPTIS, *Fabr.*

33. *Leptis ferruginosa*, *Wied.* See vol. i. p. 118; vol. iv. p. 110.

Fam. BOMBYLIDÆ, *Leach.*

Genus ANTHRAX, *Fabr.*

34. *Anthrax Pelops*, *Walk.* See vol. iii. p. 90. This seems to be a variety of *A. Dorycus*, *Boisd.* Voy. de l'Astrolabe, pl. 12. f. 12.

Fam. EMPIDÆ, *Leach.*

Genus HYBOS, *Fabr.*

35. *Hybos bicolor*, *Walk.* See vol. iii. p. 91. Var.? *Mas.* Testaceus, thorace vittis duabus indistinctis pallidoribus, abdomine nigro basi testaceo, tibiis posticis nigris, alis nigricantibus.

*Male.* Testaceous; eyes black; antennæ small; arista long and slender; thorax with two indistinct paler stripes; abdomen black, testaceous at the base; hind femora incrassated, serrated beneath; hind tibiæ black, slightly curved; wings blackish; veins black. Length of the body 3 lines; of the wings 7 lines.

Fam. DOLICHOPIDÆ, *Leach.*

Gen. PSILOPUS, *Meigen.*

36. *PSILOPUS VARIIPENNIS*, n. s. *Fam.* Læte viridis, capite pectoreque albis, vertice purpurascenti-cyaneo, antennis nigris basi testaccis, thorace vittis duabus cupreis vittaque dorsali atra, abdomine fasciis quatuor atris apicem versus cupreo micante, pedibus halteribusque flavis, alis albidis fasciis duabus connexis lituraque costali basali nigris.

*Female.* Brilliant green; head shining white in front and behind; vertex brilliant purplish blue; mouth tawny; antennæ black, testaceous towards the base; arista as long as the thorax; thorax with a deep black dorsal stripe and with a cupreous stripe on each side; pectus shining white; abdomen with four deep-black bands, brilliant cupreous towards the tip; legs pale yellow; tarsi and hind tibiæ black; wings whitish limpid, with a blackish costal mark near the base, and with two black bands; 1st band connected with the 2nd by the costa, widely interrupted in the middle; 2nd very broad, subapical, nearly extending to the hind border; veins black; fore branch of the præ-brachial vein slightly curved; discal transverse vein undulating; halteres pale yellow. Length of the body  $4\frac{1}{2}$  lines; of the wings 8 lines.

Fam. SYRPHIDÆ, *Leach.*

Gen. CERIA, *Fabr.*

37. *CERIA ANNULIFERA*, n. s. *Fam.* Nigra, capite flavo vittis tribus nigris, arista albida, thoracis fascia, scutelli margine abdominisque maculis duabus fasciisque tribus flavis, femoribus tibiisque basi flavis, alis cinereis dimidio costali nigris.

Nearly allied to *C. relictura* and to *C. relictæ*. See vol. iii. pp. 93, 94.

*Female.* Black; head pale yellow, with a black vertex and a slender black stripe, and with a broad black stripe on each side of the very prominent peristoma; arista of the antennæ whitish; thorax with a slender yellow band which is dilated on the pectus, and with a yellow humeral callus on each side; hind border of the scutellum yellow; abdomen with a triangular yellow spot on each side of the base, and with slender yellow bands on the hind borders of the 2nd, 3rd, and 4th segments; femora, and tibiæ towards the base, yellow, this hue most prevalent on the hind legs; wings cinereous, black for nearly half the breadth from the costa; interior border lurid; vein black; halteres pale yellow. Length of the body 7 lines; of the wings 12 lines.

Gen. ERISTALIS, *Latr.*

38. *Eristalis splendens*, *Leguill.* See vol. iii. p. 95.
39. ERISTALIS BOMBOIDES, *Walk.* See vol. iv. p. 119. *Fæm?* *Atra*, capite nigro-cyanescente, thorace fascia ænea fasciaque anteriore cinerea, scutelli margine postico æneo, abdomine æneo fasciis duabus connexis atris, tibiis basi pallide flavis, alis cinereis dimidio costali nigricante.
- Female.* Deep black; head bluish black, shining, with white tomentum behind and on each side in front; antennæ black; thorax with a cinereous band in front, and with a middle æneous band; hind border of the scutellum also æneous; abdomen æneous, with two deep-black bands which are connected in the middle; legs shining; tibiæ pale yellow towards the base; wings cinereous, blackish for half the breadth from the costa; veins black; halteres pale yellow. Length of the body 5 lines; of the wings 9 lines.
40. ERISTALIS OBSCURATA, n. s. *Mas et Fæm.* *Atra*, capite albido, thorace fascia media chalybea abbreviata fasciaque anteriore æneo-albida, scutelli margine chalybeo, abdomine maculis tribus transversis apiceque chalybeis, tibiis halteribusque testaceis, alis cinereis costæ dimidio basali lurido.
- Male and Female.* Deep black; head covered with whitish tomentum, excepting the vertex and the callus in front; antennæ black; arista bare; thorax with a coppery whitish band in front, and with a much abbreviated chalybeous band in the middle; hind border of the scutellum chalybeous; abdomen whitish at the base, with three transverse chalybeous spots and a chalybeous tip; tibiæ dingy testaceous, piceous towards the tips; wings cinereous, lurid brown along half the length in front; veins black; halteres testaceous. Length of the body 4 lines; of the wings 8 lines.

Gen. BACCHA, *Fabr.*

41. BACCHA BASALIS, n. s. *Mas.* Chalybeo-nigra, thorace maculis duabus lateralibus flavis, abdomine fulvo contracto fasciis duabus piceis apicem versus nigro fusiformi, pedibus pallide fulvis, tibiis posticis fascia subapicali picea, alis cinereis vitta diffusa nigricante, halteribus pallidis.
- Male.* Chalybeous black; head with whitish tomentum beneath and about the eyes; thorax on each side with a yellow spot, which is prolonged into a band on each side of the pectus; the latter with a livid spot on each side by the alulæ; abdomen tawny and much contracted for nearly two thirds of its length from the base, black and fusiform from thence to the tip, with two piceous bands in the middle; legs pale tawny; hind tibiæ with a piceous subapical band; wings cinereous, with a middle faint diffuse blackish band, which is obsolete hindward; veins black, tawny at the base; halteres pale. Length of the body  $5\frac{1}{2}$  lines; of the wings 9 lines.

Fam. MUSCIDÆ, *Latr.*Subfam. TACHINIDES, *Walk.*Gen. NEMORÆA, *Macq.*

42. NEMORÆA POSTULANS, n. s. *Mas.* Albido-cinerea, vix lata, capite argenteo, frontalibus nigris, thorace lineis quatuor nigris, abdomine longi-ovato tessellato maculis duabus basalibus rufescentibus, alis cinereis.

*Male.* Whitish cinereous, hardly broad, and in that character approaching the genus *Phorocera*, with many black bristles; head silvery white, with white hairs beneath; frontalia black, widening towards the face, with a row of bristles along each side; facialia without bristles; epistoma not prominent; antennæ not reaching the epistoma; 3rd joint linear, about four times the length of the 2nd; arista slender, nearly four times the length of the 3rd joint; thorax with four black lines; abdomen elongate-oval, somewhat tessellated, much longer than the thorax, with a diffuse reddish spot on each side at the base, legs stout; wings cinereous; veins black; præbrachial vein forming a rounded and hardly obtuse angle at its flexure, straight from thence to the tip; discal transverse vein undulating, parted by much less than its length from the border, and from the flexure of the præbrachial; alulæ white. Length of the body 5 lines; of the wings 10 lines.

Gen. EURYGASTER, *Macq.*

43. EURYGASTER MUTANS, n. s. *Fam.* Cinerea, lata, capite cano, thorace lineis quatuor nigris, scutello rufo, abdomine longi-ovato cin- gulis albis lateribus rufis, alis cinereis.

*Female.* Cinereous, broad, with black bristles; head dingy hoary; frontalia black, almost linear, with minute bristles along each side; facialia with bristles towards the epistoma, which is not prominent; antennæ not reaching the epistoma; 3rd joint linear, about 4 times the length of the 2nd; arista slender, very much longer than the 3rd joint; thorax with four slender black lines; scutellum red; abdomen elongate-oval, red along each side, except towards the tip; fore borders of the segments white; legs stout; wings cinereous; veins black; præbrachial vein forming a very obtuse angle at its flexure, hardly curved from thence to its tip; discal transverse vein nearly straight, parted by half its length from the border, and by more than half its length from the flexure of the præbrachial; alulæ white. Length of the body 5 lines; of the wings 10 lines.

Gen. PHOROCERA, *Macq.*

44. PHOROCERA CONVERTENS, n. s. *Mas.* Nigra, capite argenteo, frontalibus atris, thorace lineis quatuor nigris, abdomine longi-conico

lateribus rufescentibus fasciis tribus albis latis interruptis, pedibus longiusculis, alis cinereis, venis fusco nebulosis.

*Male.* Black, bristly; head silvery white; frontalia deep black, slightly widening towards the face, which is oblique, having on each side a row of black bristles, which are continued along part of the facialia; the latter with bristles towards the epistoma, which is not prominent; antennæ almost reaching the epistoma; 3rd joint very slightly widening from the base to the tip, about six times the length of the 2nd; arista slender, nearly twice the length of the 3rd joint; thorax with four black lines; abdomen elongate-conical, reddish along each side, except towards the tip, with three broad widely interrupted shining white bands; legs rather long; wings cinereous, clouded with brown about the veins; præbrachial vein forming a right angle at its flexure, very slightly curved inward from thence to its tip; discal transverse vein undulating, parted by much less than its length from the border, and from the flexure of the præbrachial; alulæ white. Length of the body 5 lines; of the wings 10 lines.

Subfam. DEXIDES, *Walk.*

Gen. RUTILIA, *Desvoidy.*

45. RUTILIA GLORIFICANS, n. s. *Mas.* Latæ cyaneo-viridis, capite strigis duabus anticis cervino-tomentosis, frontalibus atris, antennis picceis; thorace vittis quatuor interruptis nigris, abdomine nigro basi semihyalino fasciis tribus interruptis viridibus micantibus, pedibus picco-nigris, femoribus basi rufescentibus, alis fuscescenti-cinereis basi nigricantibus.

*Male.* Brilliant bluish green; head on each side of the peristoma with a triangular streak of dull fawn-coloured tomentum, which is continued round part of the eye; frontalia deep black, elongate-triangular; antennæ picceous; thorax with four interrupted black stripes, of which the outer pair are abbreviated at each end, and the middle pair are widened and much abbreviated hindward; abdomen black, semihyaline towards the base in some aspects, with three brilliant green interrupted bands, which are very concave on each side of the hind border; legs picceous black; femora reddish towards the base; wings brownish cinereous, blackish towards the base; veins black, picceous at the base; præbrachial vein forming a rounded and slightly obtuse angle at its flexure, near which it is slightly curved inward, and is thence straight to its tip; discal transverse vein 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 brownish cinereous. Length of the body  $7\frac{1}{2}$  lines; of the wings 15 lines.

46. *Rutilia moneta*, *Gerstaecker, Stett. Ent. Zeit.* vol. xxi. (1860) p. 200 (Formosia).

*Note.* *Rutilia callipygos*, *Gerst. Stett. Ent. Zeit.* vol. xxi. (1860) p. 178

(Formosia), seems to be distinct from the following species, though nearly allied to it:—

47. *RUTILIA LUCIGENA*, n. s. *Mas et Fæm.* Læte cyanea, capitis tomento albo, frontalibus atris, antennis pedibusque nigris, thorace vittis quatuor interruptis nigris, abdomine atro fascia interrupta maculisque quatuor posterioribus subquadratis cyaneis micantibus, alis fusciscentibus basi nigricantibus. *Fæm.* Frontalibus purpureo marginatis.

*Male and Female.* Brilliant blue; head with white tomentum on each side in front; frontalia deep black; antennæ and legs black; thorax with four interrupted black stripes, which resemble those of the preceding species, with the exception of the outer pair being longer and narrower; abdomen deep black, its brilliant bluish marks hardly differing from those of *R. moneta* which it also resembles in the colour and structure of the wings. *Male.* Frontalia elongate-triangular. *Female.* Head purple on each side of the linear frontalia. Length of the body 8 lines; of the wings 16 lines.

These three species, and especially the two latter, are very closely allied, and may be termed subspecies.

#### Gen. DOLESCHALLA, n. g.

*Mas et Fæm.* *Corpus* gracile, cylindricum. *Facies* subobliqua. *Palpi* longi, graciles. *Antennæ* epistoma non attingentes; articulus 3<sup>us</sup> 2<sup>o</sup> quadruplo longior; arista plumosa. *Abdomen* longum. *Pedes* longi, graciles. *Alæ* angustæ. *Mas.* Abdomen longissimum. *Fæm.* Abdomen brevius et latius.

*Male and Female.* Body slender, cylindrical, with a few bristles. Head as broad as the thorax; frontalia widening in front; face slightly oblique; facialia without bristles; epistoma prominent. Mouth slender, with long slender palpi. Antennæ not reaching the epistoma; 3rd joint linear, slender, about four times longer than the 2nd; arista plumose, rather longer than the 3rd joint. Abdomen and legs long and slender. Wings narrow; præbrachial vein forming a slightly acute angle at its flexure, near which it is much curved inward, and is thence straight to its tip, the latter being at a short distance from the tip of the cubital vein; discal transverse vein undulating, parted by hardly less than half its length from the border, and by about its length from the flexure of the præbrachial; alulæ large. *Male.* Abdomen very long. *Female.* Abdomen long, a little broader than that of the male.

The name of this genus, which has some affinity to *Scotiptera*, is in remembrance of the late Dr. Doleschall, whose researches and publications have contributed much to the knowledge of the Diptera of the Dutch East Indies.

48. *DOLESCHALLA CYLINDRICA*, n. s. *Mas.* Cincero-nigra, capite

thoracisque vittis tribus auratis, frontalibus atris, abdomine fasciis quatuor latis sordide fulvis, alis fuscis apud costam nigricantibus, halteribus testaceis. *Fem.* Capite albo, frontalibus latis, thoracis vittis albidis, abdomine fasciis duabus apiceque fuscis, segmentorum marginibus anticis albidis.

*Male.* Cinereous black; head with pale gilded tomentum; frontalia deep black, widening in front; a slender middle stripe and two broad lateral stripes on the thorax, and a band on the pectus pale gilded; abdomen with four broad dingy tawny bands; 1st band interrupted; 2nd and 3rd deeply notched; 4th entire; wings brown, blackish along the costa; veins black; halteres testaceous. *Female.* Head white; frontalia broad, linear; stripes and bands of the thorax whitish; abdomen with two bands and the tip shining brown; fore borders of the segments whitish. Length of the body 7-9 lines; of the wings 11-12 lines.

Gen. GYMNSTYLIA, *Macq.*

49. GYMNSTYLIA INVITA, n. s. *Mas.* Nigra, gracilis, capite albo, frontalibus atris, antennarum articulo 3<sup>o</sup> longissimo, thoracis vitta dorsali lateribus pectoreque albo-schistaceis, abdomine compresso fasciis duabus latis glauco-albidis, pedibus longis gracillimis, alis angustis cinereis.

*Male.* Black, slender; head white; frontalia deep black, very narrow; eyes bare; antennæ reaching the epistoma; 3rd joint linear, slender, about six times as long as the 2nd joint; arista rather longer than the 3rd joint; thorax with a dorsal stripe, the sides and the pectus slaty-white; abdomen compressed, with two broad glaucous-whitish bands; legs long, very slender; wings narrow, cinereous; veins black; præbrachial vein forming a rounded and very obtuse angle at its flexure, from whence it is slightly curved inward to its tip; discal transverse vein undulating, parted by much less than half its length from the border, and by a little more than its length from the flexure of the præbrachial; alulae white. Length of the body 4 lines; of the wings 7 lines.

Gen. PROSENA, *St.-Farg.*

50. PROSENA LURIDA, n. s. *Mas.* Testacea, argenteo-tomentosa, capite antico tumido, frontalibus nigris, thorace vittis quatuor indistinctis obscurioribus, abdomine tessellato segmentis nigro marginatis, femoribus nigris, tibiis posticis apice piceis, alis lurido-cinereis.

*Male.* Testaceous, with silvery whitish tomentum; head tumid in front; frontalia black, very narrow, widening towards the face; mouth black, testaceous at the base, as long as the thorax; antennæ testaceous; 3rd joint long, slender, not reaching the epistoma; thorax with four indistinct darker stripes; abdomen tessellated with whitish tomentum; hind borders of the segments black; coxæ and femora black; tips of

hind tibiæ piceous; wings lurid-cinereous; veins black, testaceous at the base: præbrachial vein forming a very obtuse angle at its flexure, slightly curved inward nearer its tip; discal transverse vein deeply undulating, parted by full half its length from the border, and by about its length from the flexure of the præbrachial; alulæ white. Length of the body  $4\frac{1}{2}$  lines; of the wings 9 lines.

Subfam. MUSCIDES, *Walk.*

Gen. MUSCA, *Linn.*

51. MUSCA DITISSIMA, n. s. (Gen. *Lucilia*, *Desv.*) *Mas.* Cuprea, capite fulvo, palpis antennisque rufescenti-fulvis, scutello viridi, abdomine cupreo-rufo fasciis cyanescenti-viridibus, pedibus nigris, alis obscure fuscis.

*Male.* Cupreous; head tawny, with whitish tomentum beneath and about the eyes; proboscis black; palpi and antennæ reddish tawny; scutellum and hind border of the scutum bright green; abdomen cupreous red, with bluish-green bands; legs black; wings dark brown; veins black; præbrachial vein forming a rounded and obtuse angle at its flexure, slightly curved inward from thence to its tip; discal transverse vein deeply undulating, parted by half its length from the border, and by less than its length from the flexure of the præbrachial; alulæ whitish, with testaceous borders. Length of the body 4 lines; of the wings 8 lines.

This species has also been discovered by Mr. Wallace in Celebes; but the specimen from the latter island was too imperfect to be described.

52. MUSCA SARCOPHAGOIDES, n. s. (Gen. *Caliphora*? *Desv.*) *Mas.* Nigra, cinereo-tomentosa, frontalibus atris, antennis rufescentibus, oculis nudis, thoracæ vittis quatuor nigris, abdomine tessellato, alis cinereis basi et apud costam luridis.

*Male.* Black, with cinereous tomentum; frontalia deep black, widening much in front; epistoma rather prominent; antennæ reddish, not reaching the epistoma; eyes bare; thorax with four slender black stripes; abdomen tessellated like that of a *Sarcophaga*; legs stout, black; wings cinereous, lurid at the base and along part of the costa; veins black; præbrachial vein forming an obtuse angle at its flexure, very slightly curved inward from thence to its tip; discal transverse vein 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 lurid cinereous. Length of the body  $3\frac{1}{2}$  lines; of the wings 7 lines.

53. MUSCA MESEMBRINOIDES, n. s. (Gen. *Calliphora*? *Desv.*) *Fæm.* Nigra, tomento cinereo vix aurato, frontalibus atris, oculis nudis, antennis longis, thoracæ lineis quatuor nigris, abdomine tessellato, pedibus robustis, alis fusciscenti-cinereis apud costam diffuse nigricantibus.



*Female.* Black, with very slightly gilded cinereous tomentum; frontalia deep black, linear; eyes bare; antennæ nearly reaching the epistoma; 3rd joint about six times the length of the 2nd; thorax with four slender black lines; abdomen tessellated; legs black, very stout; wings brownish cinereous, diffusedly blackish along the costa; veins black; præbrachial vein forming a rounded hardly obtuse angle at its flexure, slightly curved inward from thence to its tip; discal transverse vein deeply undulating, parted by nearly half its length from the border, and by very much more than half its length from the flexure of the præbrachial; alulæ lurid whitish. Length of the body  $3\frac{1}{2}$  lines; of the wings 7 lines.

54. *MUSCA CALLIPHOROIDES*, n. s. (Gen. *Graptomyza*, *Desc.*) *Mas.* Nigricanti-eyanea, tumida, capite albo, palpis fulvis, antennis piccis longis basi rufescentibus, thorace vittis quatuor auratis, pectore testaceo, abdomine fasciis duabus basique albidis, femoribus fulvis, alis cinereis, costa venisque fusco marginatis.

*Male.* Blackish-blue, tumid; head white with white hairs beneath; a stout bristle on each side of the peristoma; mouth black; palpi tawny; antennæ piccous, reaching the peristoma, reddish towards the base; 3rd joint full six times the length of the 2nd; thorax tawny in some aspects, with four pale gilded stripes; middle stripes much abbreviated hindward, narrower than the lateral stripes, which are connected hindward by a band; pectus testaceous; abdomen with two narrow whitish bands hindward, whitish towards the base, with the exception of a widely interrupted blackish-blue band; legs black; coxæ and femora tawny; wings cinereous, brown along the costa and along the veins; veins black; præbrachial vein forming a rounded right angle at its flexure, much curved inward from thence to its tip; discal transverse vein very 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 cinereous, with testaceous borders. Length of the body  $4\frac{1}{2}$  lines; of the wings 9 lines.

55. *MUSCA TRIFASCIA*, n. s. (Gen. *Ochromyia*, *Macq.*) *Fæm.* Testacea, capite albido, frontibus ferrugineis, antennis longis rufescentibus, thorace aurato, abdomine fasciis tribus nigris, tibiis tarsisque piccis, alis cinereis apud venas subluridis.

*Female.* Testaceous; head whitish; frontalia ferruginous, broad, slightly widening in front; sides of the peristoma prominent, with stout black bristles; mouth black, reddish towards the tip; antennæ reddish, nearly reaching the epistoma; 3rd joint about six times the length of the 2nd; thorax with gilded pubescence; abdomen with three black bands; tibiæ and tarsi piccous; wings cinereous, slightly lurid along the veins; veins black, testaceous towards the base; præbrachial vein forming an extremely obtuse angle at its flexure, very slightly curved inward from thence to its tip; discal transverse vein slightly undula-

ting, parted by hardly half its length from the border, and by much more than half its length from the flexure of the præbrachial. Length of the body 4 lines; of the wings 8 lines.

Subfam. ANTHOMYIDES, *Walk.*

Gen. SPILOGASTER, *Macq.*

56. *Spilogaster xanthoceras*, *Walk.* See vol. iv. p. 141.

Subfam. HELOMYZIDES, *Fallén.*

Gen. HELOMYZA, *Fallén.*

57. *HELOMYZA NIVISTRIGA*, n. s. *Fæm.* Testacea, palpis latiusculis, abdomine apicem versus lanceolato, alis æneo-nigris basi limpidis albo quinquestrigatis.

*Female.* Testaceous, with some stout black bristles; face flat, shining, with a groove on each side; mouth and palpi short, the latter rather broad; arista black; abdomen lanceolate towards the tip; wings æneous-black, limpid at the base, adorned with five white streaks; 1st and 2nd streaks extending from the costa to the middle of the disk, where the 1st is connected with a vitreous streak which extends to the hind border; 3rd streak oblique, discal; 4th and 5th lanceolate; 4th subapical, longer than the 5th, which joins the hind border; veins black, testaceous towards the base, white in the streaks; cubital and præbrachial veins curved; discal transverse vein oblique, slightly angular, parted by full four times its length from the border, and by a little less than its length from the præbrachial transverse, which is rather long. Length of the body 7 lines; of the wings 12 lines.

58. *HELOMYZA QUADRIFERA*, n. s. *Fæm.* Testacea, abdomine apicem versus lanceolato, dimidio postico nigro, alis nigris basi et apud marginem posticum limpidis, macula costali alba subquadrata.

*Female.* Testaceous, like the preceding species in structure; hind half of the abdomen black, lanceolate towards the tip; the black hue extending most on each side; wings black, limpid at the base and along the hind border, with a white subquadrate costal spot, opposite to which the black hue extends nearly to the hind border; veins black, testaceous in the limpid part; cubital and præbrachial veins nearly straight; discal transverse vein straight, parted by less than half its length from the border, and by about its length from the præbrachial transverse. Length of the body 5 lines; of the wings 9 lines.

Subfam. BORBORIDES, *Haliday.*

Gen. COTAMBA, n. g.

*Mas.* Corpus sat latum. Caput supra planum. Oculi nudi. Os parvum. Palpi breves. Antennæ brevissimæ; articulus 3<sup>us</sup> magnus,

rotundus; arista pubescens, apice nuda. *Abdomen* longiconicum. *Pedes* robusti; tibiæ posticæ subarcuatæ; metatarsi postici sat crassi. *Alæ* sat amplæ.

*Male.* Body moderately broad. Head as broad as the thorax, flat above. Eyes bare. Epistoma not prominent. Mouth and palpi small. Antennæ very short; 3rd joint large, round; arista pubescent except near the tip. Abdomen elongate-conical. Legs rather stout; hind tibiæ slightly curved; hind metatarsi rather thick. Wings rather ample; subcostal and mediastinal veins united, ending at rather before half the length of the wing; radial vein ending at about four-fifths of the length; cubital and præbrachial veins parallel to each other; discal transverse vein straight, ending at about twice its length from the præbrachial transverse and from the border.

This genus seems to unite the *Borborides* with the *Oscinides*.

59. COTAMBA FUMIFERA, n. s. *Mas.* Nigra, nitens, pubescens, capite antennis tarsisque rufescentibus, pedibus pubescentibus, alis nigricantibus costa pubescente.

*Male.* Black, shining; body, legs, and costa of the wings pubescent; head, antennæ, and tarsi reddish; wings blackish, rather paler towards the exterior border; veins black. Length of the body  $2\frac{1}{2}$  lines; of the wings 5 lines.

#### Subfam. ORTALIDES, *Haliday*.

#### Gen. LAMPROGASTER, *Macq.*

60. Lamprogaster marginifera, *Walk.* See vol. ii. p. 111.

61. LAMPROGASTER PATULA, n. s. *Fam.* Testacea, latiuscula, capite nigro fasciato, oculis albido cinctis, antennis brevissimis, arista subplumosa, scutello bispinoso, abdomine supra purpureo, alis sublurido-cinereis.

*Female.* Testaceous, rather broad; head rather narrower than the thorax, whitish about the eyes, with a band above the antennæ and facia lia blackish; antennæ hardly more than half the length of the epistoma; arista minutely plumose; scutellum with two short stout spines; abdomen purple; base, oviduct, and underside testaceous; wings cinereous, with a slight lurid tinge; veins testaceous; discal transverse vein hardly curved, not oblique, parted by less than half its length from the border, and by more than its length from the præbrachial transverse, which is black and stout. Length of the body 7 lines; of the wings 12 lines.

62. LAMPROGASTER COSTALIS, n. s. *Mas et Fam.* Piceo-nigra, capite halteribusque testaceis, oculis albido cinctis, arista nuda, thorace vittis duabus cinereis, abdomine obscure rufo, ventre pedibusque testaceis, alis subcinereis fusciscente transverse trilincatis.

*Male and Female.* Piceous black, shining; head testaceous, whitish

about the eyes; arista bare; thorax with a cinereous stripe along each side; abdomen dark red; sutures blackish; underside and legs testaceous; wings slightly cinereous, with three brownish transverse lines; 1st line extending from the base of the cubital vein; 2nd including the præbrachial transverse vein, and extending thence to the costa, where it is dilated; 3rd short, subcostal, opposite the discal transverse vein; veins testaceous; discal transverse vein straight, upright, parted by one-fourth of its length from the border, and by very much more than its length from the discal transverse; halteres testaceous. Length of the body 5-6 lines; of the wings 10-12 lines.

63. *LAMPROGASTER BASALIS*, n. s. *Mas.* *Cyanea*, viridi purpureoque subtineta, capite testaceo supra nigro, pectore ferruginco, abdomine vitta postica diffusa rufescente, pedibus testaceis, alis subcinereis vitta costali nigra vittaque exteriore ochracea.

*Male.* Blue, slightly tinged with green and purple; head testaceous; vertex black; mouth striped with black; arista black, bare; pectus mostly ferruginous; abdomen with a diffuse reddish stripe hindward, piceous beneath; legs testaceous; wings slightly cinereous, with a black stripe along half the length of the costa, and with a narrower ochraceous stripe from thence to the tips; veins testaceous, black towards the base; præbrachial vein slightly angular where it is joined by the discal transverse; the latter slightly curved, parted by less than half its length from the border, and by hardly more than its length from the præbrachial transverse; halteres testaceous. Length of the body 5-6 lines; of the wings 10-12 lines.

64. *LAMPROGASTER VENTRALIS*, n. s. *Mas et Fæm.* Fulva, capite pedibusque testaceis, thorace cyanescente subtineto, abdomine purpureo basi testaceo, alis cinereis apud costam subochraceis. *Mas.* Abdomine subtus hamis duobus conicis testaceis.

*Male and Female.* Tawny; head testaceous; mouth mostly piceous; arista pubescent; thorax with a slight bluish tinge; abdomen purple, testaceous at the base; legs testaceous; wings cinereous, slightly ochraceous along the costa; veins testaceous; discal transverse vein slightly curved, parted by full one-third of its length from the border, and by much more than its length from the præbrachial transverse; præbrachial vein very slightly angular; halteres testaceous. *Male.* Abdomen with a conical testaceous appendage on each side beneath. Length of the body 5 lines; of the wings 10 lines.

#### Gen. POTICARA, n. g.

*Mas et Fæm.* *Corpus* latiusculum. *Caput* brevissimum. *Palpi* parvi. *Antennæ* epistoma non attingentes; articulus 3<sup>us</sup> linearis, 2<sup>o</sup> quadruplo longior; arista plumosa. *Abdomen* angustum, thorace paullo longius. *Alæ* subdilatatæ; costa convexa.

*Mas.* Caput thorace valde latius; facies brevissima, latissima. *Fæm.* Caput thorace paullo latius.

*Male and Female.* Body rather broad. Head very short. Mouth and palpi small. Antennæ not near reaching the epistoma; 3rd joint linear, rounded at the tip, four times the length of the 2nd; arista plumose. Abdomen much narrower, but little longer than the thorax. Legs moderately long and slender. Wings slightly dilated; costa convex; radial vein curved, joining the costa at rather beyond two-thirds of the length of the latter; cubital and præbrachial veins slightly undulating; discal transverse vein slightly undulating, emitting a stump outward in front, parted by one-fourth of its length from the border and from the præbrachial transverse; the latter oblique, almost straight, rather long. *Male.* Head much broader than the thorax; face and epistoma extremely short and broad. *Female.* Head a little broader than the thorax; face extremely short; epistoma large. Wings rather less ample than those of the male.

65. POTICARA TRIARCUATA, n. s. *Mas et Fæm.* Nigro-cyanea, capite fascia rubra, scutello postico rufescente, abdomine fusiformi, pedibus nigris, femoribus flavescenti-albis, alis albidis, linea costali disco radiisque nigris.

*Male and Female.* Dark blue, with tomentum somewhat sericeous; front with a deep-red band; antennæ transverse, suture of the thorax and hind part of the scutellum reddish; pectus shining; abdomen fusiform, shining towards the tip; legs black; femora yellowish white, black towards the tips; wings whitish limpid, with a black line along the exterior part of the costa; disk irregularly black, emitting four black lines to the costa, the fourth joining the costal line; two black curved lines proceeding from the disk to the hind border, parallel to the costal line; veins and halteres black. *Male.* Face and epistoma yellowish white. *Female.* Face and epistoma reddish. Length of the body 4 lines; of the wings 8 lines.

#### Gen. MYSTIA, n. g.

*Mas.* Corpus latiusculum. Caput thorace vix latius; frons depressa; facies latissima; genæ tumidæ. Antennæ epistoma non attingentes; articulus 3<sup>us</sup> lanceolatus, 2<sup>o</sup> quadruplo longior; arista plumosa. Abdomen ovatum, thorace paullo brevius vix latius. *Pedes* robusti.

*Male.* Body rather broad. Head hardly broader than the thorax; front depressed; face very broad; epistoma slightly prominent; genæ tumid. Mouth large. Antennæ not reaching the epistoma; 3rd joint lanceolate, full four times the length of the 2nd; arista plumose. Scutellum prominent. Abdomen oval, a little shorter, but hardly broader than the thorax. Legs stout. Wings moderately broad; præbrachial vein slightly angular at its junction with the præbrachial transverse vein; the latter straight, not oblique, parted by one sixth of its length from the border, and by a little more than its length

from the very oblique and rather long discal transverse vein; subanal vein curved.

66. *MYSTIA ATTRAHENS*, n. s. *Mas*. Picea, capite albido lineis nigris, thoracis disco vittis duabus latis nigris interlineatis, abdomine cyaneseenti-purpureo maculis duabus basalibus rufescentibus, pedibus nigris, femoribus pallidis, alis subcinereis, costa maculaque nigricantibus.

*Male*. Piceous; head whitish, with two black bands between the eyes, and with two black stripes on each side of the face; disk of the thorax whitish cinereous, with two broad black stripes, which are interlined with whitish cinereous; metathorax whitish cinereous; abdomen bluish purple, with a reddish spot on each side at the base; legs black; fore femora ferruginous, with black tips; posterior femora yellow, with black tips; wings slightly cinereous, blackish along the costa and along the præbrachial transverse line, and with a blackish spot at the hind end of the præbrachial transverse vein; veins black. Length of the body 4 lines; of the wings 8 lines.

#### Gen. *DACUS*, *Fabr.*

67. *DACUS DEVIUS*, n. s. *Mas et Fæm*. Picco-niger, capite cyaneo vitta antea testacea, arista albida pubescente, thorace vittis tribus cinereis, tibiis anticis ferrugineis, tibiis posterioribus albidis, tarsis posterioribus testaceis, alis cinereis, costa venisque transversis fusco nebulosis.

*Male and Female*. Piceous black, with slight cinereous tomentum; head blue, whitish about the eyes, ferruginous and with a short broad testaceous stripe in front; antennæ reaching the epistoma; 3rd joint slender, linear, full six times the length of the 2nd; arista whitish, pubescent, much longer than the 3rd joint; thorax with three cinereous stripes; pectus pale cinereous; fore tibiæ ferruginous; posterior tibiæ whitish, with black tips; posterior tarsi testaceous; wings cinereous; exterior part of the costa and transverse veins irregularly clouded with brown; veins black; cubital vein hardly angular; præbrachial transverse vein long, very oblique; halteres whitish. *Male*. Abdomen cylindrical, testaceous towards the tip, longer than that of the female; præbrachial transverse vein curved, parted by one-fourth of its length from the border, and by much less than its length from the discal transverse. *Female*. Abdomen slightly attenuated at each end; præbrachial transverse vein nearly straight, parted by hardly more than half its length from the discal transverse. Length of the body 5-5½ lines; of the wings 9-10 lines.

Distinguishable by the wing-veins from *D. divergens* and from *D. addens*, to which it is much allied.

68. *DACUS INSTABILIS*, n. s. *Fæm*. Fulvus, oculis albido cinctis, epistomate guttis duabus nigris, thoracis disco abdomineque cyaneis,

hujus apice fulvo, ventre nigro, pedibus testaceis, alis cinereis basi costaque luridis.

*Female.* Tawny; head whitish about the eyes and on the disk of the face; epistoma prominent, with a black dot on each side; antennæ not reaching the epistoma; third joint about thrice the length of the 2nd; arista bare, very slender; disk of the thorax, and abdomen except the tip, blue; underside of the abdomen black; legs testaceous; wings cinereous, lurid at the base and along the costa; veins tawny; discal transverse vein curved, parted by less than half its length from the border, and from very much more than its length from the præbrachial transverse. Length of the body 4 lines; of the wings 8 lines.

69. *DACUS SORDIDUS*, n. s. *Fam.* Picco-cyaneus, capite antico ferrugineo, oculis albido cinctis, abdomine apicem versus attenuato, femoribus anticis tarsisque posterioribus fulvis, alis cinereis, striga costali, apicibus spatiorumque apud venam transversam discalem fuscis.

*Female.* Piceous blue; head cinereous beneath, ferruginous in front, whitish about the eyes; pectus cinereous; abdomen pilose, testaceous beneath at the base, attenuated towards the tip; oviduct prominent; legs piceous; fore femora and posterior tarsi tawny; posterior tibiæ tawny towards the tips; wings cinereous; a short costal streak, tips, and space about the discal transverse vein brown; veins black, tawny at the base; discal transverse vein slightly curved, parted by half its length from the border, and by very much more than its length from the præbrachial transverse; halteres testaceous. Length of the body 4 lines; of the wings 7 lines.

70. *DACUS LITURATUS*, n. s. *Fam.* Nigricanti-cyaneus, oculis albido cinctis, antennis piceis, arista plumosa, thorace vittis duabus nigris, abdomine fusiformi apicem versus attenuato, femoribus albis, alis albis basi et apud marginem interiorem pallide cinereis, striga basali fascia obliqua plagaque subapicali nigris.

*Female.* Blackish blue, rather slender, head whitish about the eyes; epistoma tawny; antennæ piceous, very much shorter than the face; 3rd joint about thrice the length of the 2nd; arista plumose; thorax with two black stripes; abdomen fusiform, attenuated towards the tip; legs black, rather slender; coxæ and femora white, the latter with black tips; wings white, pale cinereous at the base and along part of the interior border; basal streak, an oblique band which is abbreviated hindward, and a very large subapical patch black; veins black, hardly undulating; præbrachial vein straight, oblique, parted by about one-fourth of its length from the border, and by half its length from the præbrachial transverse, which is long and oblique; halteres white. Length of the body 4 lines; of the wings 8 lines.

71. *DACUS?* *NIGRILINEA*, n. s. *Fam.* Testaceus, gracilis, thorace lineis tribus nigris, abdomine lauceolato apicem versus cuneiformi apice maculisque duabus nigris, alis subcinereis angustis costa nigra.

*Female.* Testaceous, slender; thorax with three black lines, of which the middle one is much more slender than the others; pectus with a black streak on each side; abdomen lanceolate, cuneiform and shining towards the tip, about twice the length of the thorax; tip and a spot on each side beyond the middle black; wings narrow, slightly cinereous; costa black from one-fourth of its length to the end of the præbrachial vein; veins black; discal transverse vein straight, oblique, parted by less than one-fourth of its length from the border, and by full twice its length from the præbrachial transverse. Length of the body  $4\frac{1}{2}$  lines; of the wings 8 lines.

72. *DACUS CONCISUS*, n. s. *Fam.* Niger, gracilis, capite flavo maculis nigris, arista plumosa, thorace vittis quatuor flavis, abdomine fusiformi petiolato apice attenuato fulvo maculis duabus basalibus flavis, femoribus flavo vittatis, alis limpidis nigricante bivittatis.

*Female.* Black, slender; head yellow, with four black spots on the hind part; front with a black dot on each side, and with a black spot which is furcate hindward; face with an interrupted black band; antennæ tawny, not reaching the epistoma; 3rd joint linear, about one-third of the length of the 2nd; arista plumose; thorax with four yellow stripes, of which the outer pair are curved and extend obliquely along the sides of the pectus; metathorax with a yellow stripe; abdomen fusiform, petiolated at the base, attenuated at the tip, with a yellow spot near the base, and another near the tip which is tawny; femora with a yellow band near the base, tawny towards the tips; tarsi yellowish towards the base; wings limpid, with two blackish stripes which are united towards the base—one costal, the other occupying the middle part of the hind border; veins black; præbrachial vein very slightly angular; discal transverse vein oblique, nearly straight, parted by less than one-fourth of its length from the border, and by a little more than its length from the long oblique præbrachial transverse vein; halteres yellow. Length of the body 4 lines; of the wings 8 lines.

#### Gen. RIOXA, *Walk.*

73. *RIOXA FORMOSIPENNIS*, n. s. *Mas.* Testacea, capite vitta nigra, arista plumosa, thoracis vittis sex metathorace abdominisque fasciis tribus nigris, femoribus posticis piceis, alis nigricantibus basi costaque luridis, punctis septem discalibus strigisque posticis albis.

*Male.* Testaceous, with black bristles; head with a black stripe above; antennæ not more than half the length of the face; 3rd joint conical, less than twice the length of the 2nd; arista long, plumose; thorax with six black stripes, the middle pair dislocated in the middle; pectus with two black stripes hindward; metathorax black, shining; abdomen with three black bands, the 3rd very broad; hind femora piceous; wings blackish, lurid in front and behind at the base, with white



streaks along the hind border, and with seven white points in the disk. Length of the body  $3\frac{1}{2}$  lines; of the wings 7 lines.

Subfam. SEPSIDES, *Walk.*

Gen. CALOBATA, *Fabr.*

74. CALOBATA CONTRARIA, n. s. *Mas et Fæm.* Nigra, capite vitta cinerea antice cyaneo, antennis ferrugineis, abdomine lanceolato subtus lurido, femoribus posterioribus fascia subapicali flavescente, tarsi albis, alis cinereis medio apiceque late fuscescentibus.

*Male and Female.* Black; head blue in front, with a cinereous stripe above; antennæ ferruginous; pectus with slight cinereous tomentum; abdomen lanceolate, lurid beneath; femora yellowish towards the base; posterior femora with a yellowish subapical band; tarsi white, except at the base; wings cinereous; middle part and tips broadly and diffusedly brownish; veins black; cubital and præbrachial veins converging towards each other beyond the discal transverse vein; the latter straight, not oblique, parted by less than its length from the border, and by more than four times its length from the discal transverse vein. Length of the body  $4-4\frac{1}{2}$  lines; of the wings  $7\frac{1}{2}$ -8 lines.

75. CALOBATA PLAGIATA, n. s. *Fæm.* Nigra, gracilis, oculis lurido cinctis, antennis brevissimis, abdomine apicem versus lanceolato, pedibus piceis, femoribus posterioribus vix dilatatis, tarsi basi testaceis, alis subcinereis apice obscurioribus fascia nigricante latissima.

*Female.* Black, slender, with slight cinereous tomentum; head lurid about the eyes; antennæ very short; abdomen lanceolate hindward; legs piceous, long, slender; posterior femora ferruginous, very slightly dilated; tarsi testaceous towards the base; wings slightly cinereous, darker cinereous at the tips, with a very broad middle blackish band; veins black; cubital and præbrachial veins slightly converging towards each other exteriorly; discal transverse vein straight, parted by much less than its length from the border, and by nearly four times its length from the præbrachial transverse. Length of the body  $3\frac{1}{2}$  lines; of the wings 6 lines.

Subfam. PSILIDES, *Walk.*

Gen. MICROPEZA, *Macq.*

76. MICROPEZA FORFICULOIDES, n. s. *Mas.* Nigra, cylindrica, gracillima, subcompressa, thorace antico attenuato, abdomine apice forcipato, pedibus posterioribus longissimis, femoribus posterioribus fulvis, alis nigricantibus postice cinereis.

*Male.* Black, cylindrical, somewhat compressed, very slender; antennæ short; 3rd joint conical, longer than the 2nd; thorax attenuated in front; abdomen less than twice the length of the thorax, furnished at

the tip with two erect forceps-like appendages; legs very slender; posterior legs very long; posterior femora tawny; wings blackish, cinereous along the hind border; veins black; cubital and præbrachial veins very slightly converging towards each other; postbrachial vein very near the præbrachial; discal transverse vein parted by about its length from the border, and by about six times its length from the præbrachial transverse; halteres testaceous. Length of the body 5 lines; of the wings 7 lines.

Gen. NERIUS, *Fabr.*

77. *Nerius duplicatus*, *Wied.* See vol. iii. p. 125.

78. NERIUS MANTOIDES, n. s. *Mas.* Piceus, capite subtus pectoreque ferrugineis, arista albida, pedibus fulvis, femoribus anticis subserratis, tibiis anticis apice dilatatis, alis fascescenti-cinereis. *Fæm.* Obscurior, pedibus piceis simplicibus.

*Male.* Piceous; head beneath and pectus ferruginous; 3rd joint of the antennæ lanceolate; arista whitish, apical; abdomen shorter than the thorax; legs tawny, long, stout; fore femora slightly dilated, minutely serrated beneath; fore tibiæ dilated towards their tips; wings brownish cinereous; veins black; cubital and præbrachial veins converging towards each other exteriorly; discal transverse vein oblique, parted less than its length from the border, and by more than twice its length from the præbrachial transverse; halteres tawny. *Female.* Darker than the male; legs piceous, simple. Length of the body 4-4½ lines; of the wings 7-8 lines.

This species may be distinguished by its wings from *N. tibialis*, which it resembles in structure.

Fam. HIPPOBOSCIDÆ, *Leach.*

Gen. ORNITHOMYIA, *Olfers.*

79. ORNITHOMYIA DOREICA, n. s. *Fæm.* Picea, capite thoracis lateribus anticis pectore pedibusque pallide viridibus, femoribus tibiisque piceo vittatis, tarsis piceis, alis cinereis.

*Female.* Piceous, shining, with black bristles; head, pectus, and legs pale green; sides of the thorax in front pale green, including a piceous spot; femora and tibiæ striped with piceous; tarsi piceous; wings cinereous; veins black, very strongly marked. Length of the body 3½ lines; of the wings 9 lines.

80. ORNITHOMYIA EXILIS, n. s. Picea, capite pedibusque obscure viridibus, alis cinereis.

Piceous, shining; head and legs dull green; wings cinereous; veins black. Length of the body 1¼ line; of the wings 3 lines.

81. ORNITHOMYIA PLANA, n. s. Pallide viridis, alis cinereis.

Pale green; claws black; wings cinereous; veins black. Length of the body 2 lines; of the wings 4½ lines.

Further Observations on *Entozoa*, with Experiments. By T. SPENCER COBBOLD, M.D., F.L.S., Lecturer on Zoology and Comparative Anatomy, Middlesex Hospital College.

[Abstract of Paper read Dec. 20th, 1860.]

THIS communication is designed as a continuation of the author's serial papers on *Entozoa*, two of which have already appeared in the Society's Transactions.

The first species noticed is *Distoma conjunctum* (Cobbold), found infesting the liver of the American Red Fox (*Canis fulvus*). Giving an account of its anatomy, Dr. Cobbold closes his description as follows:—"In connexion with the reproductive system, I may notice the circumstance of a pair of these flukes being found sexually united,—an observation so rare, that it has, I believe, led some to infer that the hermaphroditic flukes were capable of self-impregnation. Even Bilharz's discovery of a Trematode specially furnished with a gynæcophoric canal afforded no direct proof of a true sexual function in the androgynous *Distomata*, because in his aberrant form (as obtains also in a few others) the sexes are separate. Many thousands of flukes must have now passed under my examination, and yet this is the first instance in which I have observed a true sexual union; moreover, I am not acquainted with any similar observation on record, so far as the truly hermaphroditic species are concerned. In the instance now mentioned, the opposed suckers were so firmly adherent, that it was found impossible to detach the animals without breaking them up piecemeal."

The next species referred to is *Pentastoma denticulatum*. A minute account is given of its anatomy, and more particularly of the cephalic hooks and their capsules. A careful experiment of the author's, in relation to the question as to whether this animal is the young of *Pentastoma tænioides*, was attended with a negative result.

The third species commented on, and minutely described, is *Trichocephalus affinis*, obtained in the present instance from the cæcum of a Giraffe. This parasite had been previously noticed by the author in his paper entitled "Contributions to the Anatomy of the Giraffe," published in the 'Proceedings of the Zoological Society of London' for February 1860. Dr. Cobbold had provisionally recognized it under the title of *Trichocephalus*

*gracilis*, but is now satisfied as to its identity with *T. affinis* of Rudolphi. In reference to the reproductive organs of the male *T. affinis*, the following observations were communicated:—"The everted part of the sheath of the penis measures about the  $\frac{1}{9}$ th of an inch in length; it is perfectly transparent, not always uniform in breadth, but covered throughout its entire extent with minute, conical, sharply pointed spines, whose apices are directed backwards towards the body of the animal. The occasional absence of uniformity in the diameter of the sheath seems to be a point of some importance; for, had not my examinations extended over a considerable number of examples, I might have been led to the belief that I had to deal with several distinct forms of *Trichocephalus*. At first, indeed, this conclusion seemed inevitable; but finding intermediate conditions between perfect uniformity and the presence of a large flask-shaped distention near the free extremity, I can only suppose the variations to be due to the degree of protrusion at which the organ has arrived\*."

Respecting the female organs Dr. Cobbold offers the following comment:—"In regard to the organs of generation in the female, Küchenmeister states that there are no external appendages in *Trichocephalus* comparable to those known to exist in the allied Trichosomata. So far, however, from this being the case, there is, in the present species at least, a remarkably prominent and more or less hourglass-shaped sheath,—this projecting vulva, if it may be so termed, being obliquely truncated at the free end, where it is also hollowed out (or, rather, inverted) to give origin to the centrally enclosed vagina, whose orifice is somewhat constricted. The surface of this appendage is supplied with small spines, precisely like those in connexion with the penis-sheath of the male,—the spines being also retroverted. This observation is confirmed by the statement of Mayer, who has described their occurrence at the vaginal orifice of *Trichocephalus dispar*. Dr. Joseph Eberth, of Würzburg, in a recent number of Siebold and Kölliker's Zeitschrift, rather incautiously denies the assertions of Mayer (vol. ix. p. 385). Having discovered long conical processes within the vagina of *T. dispar* totally unlike those described by Mayer and myself, he has inferred that the structures in question are the same as those seen by us. I translate and quote Dr. Eberth's own words:—"According to Mayer, these are similar in form and size to the spines

\* These appearances were illustrated by figures, which will be given, together with the paper itself, in the next Number of the Journal.

on the appendix of the penis. By means of these backwardly directed points, the spicule when introduced into the vagina is said to be retained during the copulatory act. These statements,' adds Dr. Eberth, 'are not correct; the villi of the vagina are larger than the spines of the male, and their points are, on the contrary, directed forwards.' The latter part of this observation is, doubtless, quite true; for it is evident that our little spines are entirely different from the curious villi discovered by Dr. Eberth."

Dr. Cobbold describes two feeding-experiments (one on a rabbit, the other on a chicken) with the eggs of *Trichocephalus affinis*, which were attended with negative results. His communication is closed with an appendix enumerating a variety of entozoa obtained from animals which have died in the Zoological Society's Menagerie, Regent's Park. Some of these will hereafter form the subject of a separate notice.

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Note on the Occurrence of *Gyrodactylus anchoratus*, Nordm. By  
C. L. BRADLEY, Esq., F.L.S.

[Read Dec. 6th, 1860.]

IN the early part of the present year I took the opportunity of calling attention to the occurrence of *Gyrodactylus elegans* upon the fins and skin of the common Sticklebacks obtained from the Hampstead Ponds. Since then I have seen the same parasite upon the fins of other fish kept in the same tank with the infested Sticklebacks—as the Loach, the Gudgeon, and the Roach; and it has attacked and lived for several weeks upon the tadpole or young Frog. Gold Carp under similar circumstances have remained exempt from *G. elegans*, but on examining their gills quite recently, I found what appears to be another species, which corresponds to that described and figured by Dujardin as *G. anchoratus*. It differs from *G. elegans* in being much larger; the cephalic extremity is four-lobed instead of bifid; the hooks in the disk are much more developed, and project considerably beyond its margin. There are four distinct, black, oculiform dots arranged in pairs towards the cephalic end on the dorsal surface. None of them had the appearance of being a "nurse," or of containing ova.

Catalogue of the Dipterous Insects collected at Manado in Celebes, and in Tond, by MR. A. R. WALLACE, with Descriptions of New Species. By FRANCIS WALKER, Esq., F.L.S.

[Read Nov. 15th, 1860.]

(*Manado.*)

Fam. STRATIOMIDÆ, *Haliday.*

Gen. CLITELLARIA, *Meigen.*

1. CLITELLARIA TIBIALIS, n. s. *Mas.* Nigra, nitens, albido pubescens, capite litura alba, antennis luteis, scutello quadrispinoso, pedibus albis, tarsis anticis tibiisque nigris, alis cinereis apud costam nigris apice albis, halteribus luteis.

*Male.* Black, shining, with whitish down. Head a little narrower than the thorax, with a white mark above the base of the antennæ. Eyes nearly approximate in front, diverging hindward. Antennæ luteous; 3rd joint short-elliptical; arista long, slender, bare. Thorax elongate-oval, narrower in front; scutellum with four long spines. Abdomen elongate-elliptical, longer than the thorax. Legs white; tibiæ and fore tarsi and tips of the posterior tarsi black. Wings cinereous, black along the costa, white at the tips, veins black; halteres luteous. Length of the body  $4\frac{1}{2}$  lines; of the wings 8 lines.

Gen. STRATIOMYS, *Geoffr.*

2. Stratiomys finalis, *Walk.* See Vol. IV. p. 94.

Fam. TABANIDÆ, *Leach.*

Gen. TABANUS, *Linn.*

3. TABANUS SPECULUM, n. s. *Mas.* Ater, capite macula antica alba, antennarum articulo 3<sup>o</sup> rufo, thorace fasciulis quatuor lateralibus albis, scutello argenteo, abdomine fasciis interruptis albis, alis nigris cinereo strigatis, apicibus maculaque discali limpidis, macula antica parva lurida, halteribus apice pallide flavescensibus.

*Male.* Deep black. Head with a white transverse spot in front of the antennæ; callus shining, very slender. Eyes uniform; facets extremely minute. Third joint of the antennæ dark red, with an acute distinct horn. Thorax with two tufts of white hairs on each side by the base of the wings; scutellum silvery white, except along the fore border. Abdomen with a white band on the hind border of each segment; these bands are widely interrupted on each side above, but entire beneath. Wings black, with cinereous streaks in the arcolets, with limpid tips, and with a limpid oval discal spot, in front of which

there is a much smaller lurid spot; veins black; fore branch of the cubital vein much curved near the base, slightly curved from thence to the tip; halteres with pale yellow tips. Length of the body 10 lines; of the wings 18 lines.

4. *TABANUS FLEXILIS* (see Vol. IV. p. 104). *Mas.* Piceus, antennis rufis apice nigris, thorace aurato, abdomine fulvo elongato fasciis duabus latis ferrugineis, fasciis duabus posticis apiceque nigris, pedibus nigris, alis cinereis costa fasciisque duabus abbreviatis fuscis, halteribus luteis apice albis.

*Male.* Piceous. Head beneath, thorax, and pectus with gilded tomentum and hairs. Eyes uniform, connected above; facets extremely small. Proboscis black. Antennæ red, black towards the tips; horn of the 3rd joint extremely small. Abdomen tawny, elongate; 2nd and 3rd segments with broad ferruginous bands; 4th and 5th with black bands; 6th also black. Legs black; femora slightly clothed with gilded down. Wings cinereous, brown along the costa, and with two brown bands which are abbreviated hindward; 2nd band very broad; veins black; fore branch of the cubital vein much curved near the base, more slightly curved from thence to the tip; halteres luteous, with white knobs. Length of the body 8 lines; of the wings 14 lines.

Fam. ASILIDÆ, *Leach.*

Subfam. DASYPOGONITES, *Walk.*

Gen. DISCOCEPHALA, *Macq.*

5. *DISCOCEPHALA CONCOLOR*, n. s. *Mas.* Nigra, ferrugineo subtomentosa, pectore cano, pedibus robustis, alis nigris, halteribus apice albis.

*Male.* Black, slightly covered with ferruginous tomentum. Eyes flat and with large facets in front. Pectus hoary. Legs stout, shining. Wings black; halteres with white tips. Length of the body  $2\frac{1}{2}$  lines; of the wings 5 lines.

Subfam. ASILITES, *Walk.*

Gen. TRUPANEA, *Macq.*

6. *TRUPANEA CONCOLOR*, n. s. *Mas.* Cinereo-nigra, capite barba alba mystace nigro, thorace abdomineque vittis duabus lateralibus cinereis, abdomine fasciculo subapicali albo, pedibus crassis, femoribus rufo vittatis, tibiis rufis, alis fuscis.

Allied to *T. calorifica*.

*Male.* Cinereous black, with black bristles. Head with a thick whitish beard; mystax composed of many black bristles. Antennæ black; 3rd joint lanceolate, more than half the length of the arista. Thorax with two lateral cinereous stripes, which are continued along the sides of the abdomen. Abdomen much longer than the thorax, with a

white subapical tuft; appendages large, black, shining. Legs very robust; femora with red stripes; tibiæ red. Wings brown; veins black; halteres tawny. Length of the body 10 lines; of the wings 16 lines.

Gen. ASILUS, *Linn.*

7. ASILUS AREOLATUS. *Fem.* Cinereo-niger, barba parva, mystace nigro, abdomine lanceolato, pedibus robustis, alis nigricantibus postice cinereis.

*Female.* Cinereous black. Head dark gilded in front; epistoma convex; beard small; mystax with numerous black bristles, occupying most of the face. Third joint of the antennæ fusiform; arista about thrice the length of the 3rd joint. Abdomen lanceolate, black and shining towards the tip, more than twice the length of the thorax. Legs robust, with black hairs and bristles. Wings blackish, blackish cinereous hindward, where the disks of the areolets are cinereous; veins black; hind branch of the cubital vein undulating. Length of the body 10 lines; of the wings 18 lines.

8. *Asilus mendax*, *Walk. Trans. Ent. Soc. Lond. New Series*, iv. 130. Allied to *A. areolaris*.

Gen. OMMATIUS, *Illiger.*

9. *Ommatius strictus*, *Walk.* See Vol. IV. p. 109.

Fam. BOMBYLIDÆ, *Leach.*

Subfam. THEREVITES, *Walk.*

Gen. THEREVA, *Latr.*

10. *Thereva congrua*, *Walk.* See Vol. II. p. 90.

Fam. MUSCIDÆ, *Latr.*

Subfam. DEXIDES, *Walk.*

Gen. DEXIA, *Meigen.*

11. DEXIA CYLINDRICA, n. s. *Mus.* Nigra, gracilis, cylindrica, capite argenteo, frontalibus atris, pectore argenteo maculis quatuor atris, abdomine fasciis interruptis albis, pedibus longissimis, alis nigricante cinereis.

*Male.* Black, slender, cylindrical. Head silvery white; frontalia deep black, linear; face vertical. Antennæ reaching the epistoma; 3rd joint linear, full four times the length of the 2nd; arista plumose. Pectus silvery white, with two deep-black spots on each side. Abdomen slightly compressed, full twice the length of the thorax, with an interrupted white band on the fore border of each segment, and with stout black bristles on the hind borders of the segments. Legs very



long. Wings blackish cinereous, black along the costa; præbrachial vein forming a right angle at its flexure, near which it is curved inward, and is thence straight to its tip; discal transverse vein nearly straight, parted by little more than half its length from the border, and by much less than its length from the flexure of the præbrachial; alulae cinereous. Length of the body 6 lines; of the wings 8 lines.

Subfam. MUSCIDES, *Walk.*

Gen. MUSCA, *Linn.*

12. MUSCA (Subgen. *Isomyia*, *Walk.*) CONFLAGRANS, n. s. *Mas.* Rufescenti-cuprea, capite cinereo-piceo, proboscide palpis antennisque nigris, abdominis segmentis nigro marginatis, alis fuscis postice cinereis.

Closely allied to *M. delectans*.

*Male.* Reddish cupreous. Head piceous, with cinereous tomentum. Proboscis, palpi, and legs black. Antennæ piceous. Scutellum golden green hindward. Hind borders of the abdominal segments black. Wings brown, cinereous hindward; veins black; præbrachial vein forming a slightly obtuse angle at its flexure, slightly curved inward from thence to its tip; discal transverse vein undulating, parted by very much less than its length from the border and from the flexure of the præbrachial; alulae brown. Length of the body 5 lines; of the wings 8 lines.

Subfam. ANTHOMYIDES, *Walk.*

Gen. SPILOGASTER, *Macq.*

13. *Spilogaster xanthoceras*, *Walk.* See Vol. IV. p. 141.

Subfam. ORTALIDES, *Haliday.*

Gen. LAMPROGASTER, *Macq.*

14. LAMPROGASTER LUTEIPENNIS, n. s. *Fæm.* Læte viridis aut cyaneo-viridis, capite proboscide antennis pedibus halteribusque luteis, tibiis anticis nigricantibus, alis limpidis, gutta strigaeque costalibus nigricantibus, venis transversis nigro nebulosis.

*Female.* Bright green or bluish green. Head, proboscis, antennæ, legs, and halteres luteous. Antennæ not more than half the length of the face. Tarsi pale, with blackish tips; fore tibiæ blackish. Wings limpid; veins luteous; costa with a blackish dot opposite the discal transverse vein, and a blackish apical streak; transverse veins clouded with black; discal transverse vein straight, parted by about one-sixth of its length from the border, and by about its length from the præbrachial transverse. Length of the body 4-5 lines, of the wings 8-10 lines.

15. LAMPROGASTER SEXVITTATA, n. s. *Fæm.* Nigra, crassa, capite

albido fasciis duabus nigris, antennis fulvis, thorace pectoreque vittis sex albidis, abdomine purpurascenti-cyaneo, tarsis halteribusque albidis, alis cinereis, maculis plurimis transversis fasciisque duabus nigricantibus.

*Female.* Black, broad, thick. Head whitish, with two black bands on the front, and a narrower one on the face. Antennæ tawny, about half the length of the face; arista plumose. Thorax and pectus with three whitish stripes on each side, the first pair connected on the hind border of the scutellum. Abdomen purplish blue. Tarsi whitish, with black tips. Wings cinereous, with many transverse blackish spots, and with two blackish bands; veins black: longitudinal veins slightly undulating or irregular; discal transverse vein straight, parted by more than half its length from the border, and by more than its length from the præbrachial transverse vein; halteres whitish. Length of the body  $4\frac{1}{2}$  lines; of the wings 8 lines.

Gen. DACUS, *Fabr.*

16. *Dacus divergens*, *Walk.* See Vol. IV. p. 149.

*Var. nigricanti-cyaneus*, longus, capite atro antice rufescente, antennis longis basi rufescentibus, arista alba filiformi, thorace vittis tribus cinereis, pedibus piceis, femoribus fulvis, alis cinereis, costa apicali venisque transversis nigricante nebulosis, halteribus albidis.

Blackish-blue, shining, long, slender. Head deep black above, with whitish tomentum behind and about the eyes; face keeled, reddish in the disk. Antennæ black, reddish towards the base, as long as the face; 3rd joint slender, linear, about eight times the length of the 2nd; arista white, filiform. Thorax with three cinereous stripes; pectus cinereous. Abdomen more slender than the thorax. Legs piccous; femora tawny. Wings cinereous, blackish about the transverse veins and along the apical part of the costa to the end of the præbrachial vein; cubital and præbrachial veins very approximate from the base to the præbrachial transverse vein, thence rather remote from each other; discal transverse vein slightly curved, parted by one-eighth of its length from the border, and by very much more than its length from the oblique præbrachial transverse vein; halteres whitish. Length of the body 7 lines; of the wings 12 lines.

Gen. ENICONEURA, *Macq.*

17. *ENICONEURA PICTIPENNIS*, *Walk.* (see Vol. IV. p. 155). *Fam.* Lutea, capite maculis duabus nigris, thorace punctato vittis quatuor indistinctis fuscescentibus, pectore strigis duabus nigris, abdomine longo, alis pallide luteis nigro strigatis postice cinereis.

*Female.* Luteous, shining, paler beneath. Head above with a large elongated black spot, and with a transverse black spot on the face. Thorax punctured, with black hairs and bristles, and with four indi-

stinct brownish stripes. Pectus with a black streak on each side. Abdomen fusiform, with pale hairs, lanceolate and paler towards the tip, full twice the length of the thorax. Wings pale luteous, cinereous along the hind border, with irregular black streaks along the veins; costa also black; veins tawny; discal transverse vein oblique, slightly curved, parted by one-fourth of its length from the border, and by more than its length from the præbrachial transverse vein. Length of the body 8 lines; of the wings 14 lines.

Subfam. DIOPSIDES, *Walk.*

Gen. DIOPSIS, *Linn.*

18. *Diopsis subnotata*, *Westw.* See Vol. IV. p. 161.

Fam. HIPPOBOSCIDÆ, *Leach.*

Gen. ORNITHOMYIA, *Olfers.*

19. *ORNITHOMYIA SIMPLEX*, n. s. Testaceo-viridis, nitens, pedibus pallide viridibus subsetosis, alis cinereis, venis anticis pallide viridibus. Dull testaceous green, shining, paler beneath. Legs pale green, slightly setose. Wings cinereous; costal veins pale green. Length of the body 2 lines; of the wings 5 lines.

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(*Tond.*)

Fam. MYCETOPHILIDÆ, *Haliday.*

Gen. SCIARA, *Meigen.*

1. *SCIARA LONGIPES*, n. s. Cinereo-nigra, robusta, antennis thorace non longioribus, pedibus longis, femoribus sulcatis, alis nigricanti-cinereis.

Cinereous black, stout. Antennæ rather stout, as long as the thorax. Legs long; femora furrowed. Wings blackish cinereous; radial and cubital veins black, stout; the other veins blackish, slender; fork of the subapical vein opposite the end of the radial vein. Length of the body 3 lines; of the wings 6 lines.

Fam. TABANIDÆ, *Leach.*

Gen. CHRYSOPS, *Meigen.*

2. *Chrysops fasciatus*, *Wied.* See Vol. I. p. 112.

Fam. ASILIDÆ, *Leach.*

Subfam. LAPHRITES, *Walk.*

Gen. LAPHRIA, *Fabr.*

3. *LAPHRIA FLAMMIPENNIS*, n. s. *Mus.* Nigra, capite aurato, mys-

tace nigro, antennarum articulo 2<sup>o</sup> rufo, thorace rufescente subtomentoso, abdomine nigricante cupreo glauco-suffuso, pedibus rufis, femoribus nigris, alis luteis apice nigris, halteribus albidis.

*Male.* Black. Head with bright gilded hairs; epistoma prominent; mystax with a few black bristles. Antennæ hardly longer than half the breadth of the head; 2nd joint mostly red; 3rd linear, tapering towards the tip. Thorax slightly covered with reddish tomentum, which is divided by a slender stripe; sides and hind border reddish. Abdomen blackish cupreous, shining, with glaucous reflexions. Legs reddish, robust, bristly; coxæ, trochanters, and femora black. Wings bright luteous, with black tips; hind border blackish; halteres whitish. Length of the body 8-10 lines; of the wings 14-18 lines.

4. *LAPHRIA VULCANUS*, *Wied* (see Vol. I. p. 10), var. *Fæm.* Nigra, capite aurato, mystace nigro, pectoris lateribus aurato notatis, segmentorum abdominalium marginibus posticis glaucescentibus utrinque aurato maculatis, pedibus rufescentibus, alis nigricantibus, halteribus albidis.

*Female.* Black. Head with bright gilded tomentum and hairs; epistoma prominent; mystax with some black bristles. Antennæ hardly longer than half the breadth of the head; 3rd joint linear, tapering towards the tip. Sides of the pectus with patches of pale gilded tomentum. Hind borders of the abdominal segments with a glaucous tinge; their sides with spots of gilded tomentum. Legs reddish; coxæ and trochanters black. Wings blackish; veins black; halteres whitish. Length of the body 9 lines; of the wings 16 lines.

5. *LAPHRIA OBLIQUISTRIGA*, n. s. *Mas.* Nigra, capite argenteo, mystace albo-nigro, thorace strigis duabus obliquis argenteis, abdomine purpurascenti-cyaneo maculis duabus lateralibus argenteis, alis nigris iridescentibus, halteribus albidis.

Closely allied to *L. scapularis*.

*Male.* Black. Head silvery white, with white hairs; epistoma slightly prominent; mystax with white bristles and with a few longer black bristles. Antennæ hardly as long as half the breadth of the head; 3rd joint elongate-fusiform. Thorax with an oblique silvery streak on each side in front. Abdomen purplish blue, with a silvery spot on each side of the hind border of the 4th segment. Legs purplish-blue, robust, bristly; fore tibiæ and hind tarsi beneath with gilded tomentum. Wings black, very iridescent; halteres whitish. Length of the body 8 lines; of the wings 16 lines.

Subfam. ASILITES, *Walk.*

Gen. TRUPANEA, *Macq.*

6. *Trupanea strema*, *Walk.* See Vol. IV. p. 106. *Mas.* Nigra, barba flavescenti-alba, mystace nigro, abdomine fasciulis basalibus albis,

pedibus crassis, alis lurido-fuscis, halteribus flavescensibus fascia subapicali nigra.

*Male.* Black. Head cinereous between the antennæ and the epistoma, thickly bearded with yellowish-white hairs; mystax composed of many black bristles. Third joint of the antennæ subfusiform; arista full twice the length of the 3rd joint. Abdomen nearly twice the length of the thorax, with black hairs and bristles, thickly adorned at the base with tufts of white plumes; appendages shining. Legs very robust, with cinereous hairs and black spines. Wings lurid brown; veins black; halteres yellowish, with a black subapical band. Length of the body 10 lines; of the wings 16 lines.

7. TRUPANEA PLUTONICA, n. s. *Mas et Fam.* Nigra, crassa, barba mystaeaeque auratis, thorace rufescenti-piloso, abdomine lanceolato apicem versus rufescente, femoribus tibiisque rufo vittatis, alis lurido-fuscis, halteribus apice rufescentibus.

The Binder is requested to observe that the extra Number of the *Journal*, published in July last, and which was described by mistake on the cover as "supplemental to Vol. 4," should be bound up with Vol. 5, between the *Zoological* portions of Numbers 17 and 18, with which it will be found to be continuously paged.

9. OMMATIUS DISCALIS, n. s. *Fam.* Cinereo-niger, capite mystaeaeque auratis, antennis basi pedibusque fulvis, thorace vittis tribus subauratis, abdomine fulvo fascia lata subapicali nigra, femoribus nigro strigatis, tarsis nigris, alis luridis apice nigricantibus.

*Female.* Cinereous-black. Head and pectus with pale gilded tomentum; epistoma not prominent; mystax with many gilded bristles. Antennæ tawny at the base. Thorax with three stripes of slightly gilded tomentum. Abdomen tawny, black towards the tip, which is tawny. Legs tawny, robust; hind femora with a short black streak; tarsi black. Wings lurid, blackish towards the tips; veins black, tawny towards the base; halteres tawny. Length of the body 9 lines; of the wings 18 lines.

tace nigro, antennarum articulo 2<sup>o</sup> rufo, thorace rufescente subtomentoso, abdomine nigricante cupreo glauco-suffuso, pedibus rufis, femoribus nigris, alis luteis apice nigris, halteribus albidis.

*Male.* Black. Head with bright gilded hairs; epistoma prominent; mystax with a few black bristles. Antennæ hardly longer than half the breadth of the head; 2nd joint mostly red; 3rd linear, tapering towards the tip. Thorax slightly covered with reddish tomentum, which is divided by a slender stripe; sides and hind border reddish. Abdomen blackish cupreous, shining, with glaucous reflexions. Legs reddish, robust, bristly; coxæ, trochanters, and femora black. Wings bright luteous, with black tips; hind border blackish; halteres whitish. Length of the body 8-10 lines; of the wings 14-18 lines.

4. *LAPHRIA VULCANUS*, *Wied* (see Vol. I. p. 10), var. *Flem.* Nigra, capite aurato, mystace nigro, pectoris lateribus aurato notatis, segmentorum abdominalium marginibus posticis glaucescentibus utrinque aurato maculatis, pedibus rufescentibus, alis nigris.

THORAX with an oblique silvery streak on each side in front. Abdomen purplish blue, with a silvery spot on each side of the hind border of the 4th segment. Legs purplish-blue, robust, bristly; fore tibiæ and hind tarsi beneath with gilded tomentum. Wings black, very iridescent; halteres whitish. Length of the body 8 lines; of the wings 16 lines.

Subfam. ASILITES, *Walk.*

Gen. TRUPANEA, *Macq.*

6. *Trupanea strenua*, *Walk.* See Vol. IV. p. 106. *Mas.* Nigra, barba flavescenti-alba, mystace nigro, abdomine fasciculis basalibus albis,

pedibus crassis, alis lurido-fuscis, halteribus flavescens fasciâ subapicali nigra.

*Male.* Black. Head cinereous between the antennæ and the epistoma, thickly bearded with yellowish-white hairs; mystax composed of many black bristles. Third joint of the antennæ subfusiform; arista full twice the length of the 3rd joint. Abdomen nearly twice the length of the thorax, with black hairs and bristles, thickly adorned at the base with tufts of white plumes; appendages shining. Legs very robust, with cinereous hairs and black spines. Wings lurid brown; veins black; halteres yellowish, with a black subapical band. Length of the body 10 lines; of the wings 16 lines.

7. *TRUPANEA PLUTONICA*, n. s. *Mas et Fœm.* Nigra, crassa, barba mystaceque auratis, thorace rufescenti-piloso, abdomine lanceolato apicem versus rufescente, femoribus tibiisque rufo vittatis, alis lurido-fuscis, halteribus apice rufescentibus.

*Male and Female.* Black, very robust. Head gilded between the antennæ and the epistoma, thickly clothed behind and very thickly bearded with pale gilded hairs; epistoma very prominent, with black bristles along each side; mystax composed of gilded bristles. Third joint of the antennæ lanceolate; arista full twice the length of the 3rd joint. Thorax thinly covered with short reddish hairs; its sides and hind part with black bristles. Abdomen lanceolate, much narrower than the thorax, and nearly twice its length, clothed above towards its tip with long reddish hairs. Legs thick, with black spines and bristles; femora and tibiæ with dark red stripes. Wings lurid brown; radial areolet with a schistaceous streak; veins black; halteres with reddish knobs. Length of the body 10-12 lines; of the wings 18-22 lines.

Gen. *ASILUS*, *Linn.*

8. *Asilus determinatus*, *Walk.* See Vol. IV. p. 107.

Gen. *OMMATIUS*, *Mûlliger.*

9. *OMMATIUS DISCALIS*, n. s. *Fœm.* Cinereo-niger, capite mystaceque auratis, antennis basi pedibusque fulvis, thorace vittis tribus subauratis, abdomine fulvo fasciâ lata subapicali nigra, femoribus nigro strigatis, tarsis nigris, alis luridis apice nigricantibus.

*Female.* Cinereous-black. Head and pectus with pale gilded tomentum; epistoma not prominent; mystax with many gilded bristles. Antennæ tawny at the base. Thorax with three stripes of slightly gilded tomentum. Abdomen tawny, black towards the tip, which is tawny. Legs tawny, robust; hind femora with a short black streak; tarsi black. Wings lurid, blackish towards the tips; veins black, tawny towards the base; halteres tawny. Length of the body 9 lines; of the wings 18 lines.

10. *Ommatius scitulus*, *Walk.* See Vol. IV. p. 109.

Fam. BOMBYLIDÆ, *Leach.*

Gen. ANTHRAX, *Fabr.*

11. *Anthrax Tantalus*, *Fabr.* See Vol. IV. p. 111.

Fam. SYRPHIDÆ, *Leach.*

Gen. CERIA, *Fabr.*

12. *Ceria lateralis*, *Walk.* See Vol. IV. p. 118.

Gen. ERISTALIS, *Latr.*

13. *ERISTALIS TORTUOSA*, n. s. *Mas.* Atræ, capite chalybeo-nigro, arista nuda, thorace fascia interrupta, abdomine fasciis chalybeis, tibiis basi albidis, alis obscure cinereis apud costam nigricantibus, halteribus pallidis.

Allied to *E. bomboides*.

*Male.* Deep black. Head chalybeous black, and very prominent in front. Antennæ black; arista simple. Thorax partly bluish black, with a chalybeous interrupted band on the suture in front. Abdomen with chalybeous bands. Legs black; tibiæ whitish towards the base. Wings dark cinereous, blackish along the costa; veins black; halteres pale. Length of the body 6 lines; of the wings 12 lines.

Gen. PARAGUS, *Latr.*

14. *PARAGUS LATIUSCULUS*, n. s. *Fæm.* Niger, latus, facie testacea, thorace cupreo-nigro, abdomine basi fasciisque duabus fulvescentibus, tarsis halteribusque fulvis, alis cinereis apice nigricantibus.

*Female.* Black, broad. Facies testaceous, produced. Proboscis testaceous towards the tip. Antennæ with the 3rd joint subfusiform. Thorax cupreous black. Abdomen dull tawny at the base, and with two dull tawny bands on the fore borders of the segments. Knees, tarsi, and halteres tawny. Wings cinereous, blackish at the tips; veins black. Length of the body  $2\frac{1}{2}$  lines; of the wings 5 lines.

Fam. MUSCIDÆ, *Latr.*

Subfam. DEXIDES, *Walk.*

Gen. DEXIA, *Meigen.*

15. *DEXIA FUSIFORMIS*, n. s. *Fæm.* Nigra, setosa, fusiformis, capite argenteo, frontalibus atris, antennarum articulo 3<sup>o</sup> longissimo, arista plumosa, thorace vittis tribus cinereis, scutello postico abdominisque



fasciis tribus fulvescentibus, pedibus longis, alis cinereis nigricante strigatis, halteribus pallide flavescentibus.

*Female.* Black, bristly, fusiform. Head silvery white, much narrower than the thorax; frontalia deep black, widening in front; epistoma prominent. Eyes bare. Proboscis slender, jointed. Antennæ not reaching the epistoma; 3rd joint slender, linear, full six times the length of the 2nd; arista plumose. Thorax with three cinereous stripes; scutellum tawny hindward. Abdomen semipellucid, much broader than the thorax, with three dull tawny bands; 1st and 2nd bands broad, interrupted; 3rd narrower, entire. Legs long. Wings cinereous, blackish along the costa and along the black veins; præbrachial vein slightly curved inward towards its tip, forming a well-defined right angle at its flexure; discal transverse vein undulating, parted by a little less than half its length from the border, and by a little less than its length from the flexure of the præbrachial vein; halteres pale yellowish. Length of the body 6 lines; of the wings 14 lines.

Subfam. MUSCIDES, *Walk.*

Gen. IDIA, *Meigen.*

16. IDIA DIVISA, n. s. *Mas et Fæm.* Obscure viridis, subtus testaceo-alba, capite atro, antennis nigris, thorace vittis quatuor cinereis, abdominis disco lurido-fusco, tarsis albidis apice nigris, alis obscure cinereis, costa nigra.

*Male and Female.* Dark green; testaceous white beneath, except towards the tip of the abdomen. Head deep black and shining in front. Antennæ, proboscis, and palpi black. Thorax with four cinereous stripes. Abdomen lurid-brown, except towards the tip. Tarsi whitish, with black tips. Wings dark cinereous; costa and veins black; præbrachial vein much rounded at its flexure; discal transverse vein hardly undulating, parted by much less than its length from the border, and by more than its length from the flexure of the præbrachial vein. Length of the body  $3\frac{1}{2}$ –4 lines; of the wings 6–7 lines.

Gen. MUSCA, *Linn.*

17. Musca (Gen. Silbomyia, *Macq.*) prospera, *Walk.* See Vol. IV. p. 133.

18. MUSCA (Gen. Musca, *Linn.*) UMBRIFERA, n. s. *Fæm.* Nigra, capite pectore abdomineque cinereis, peristomatis lateribus antennisque rufis, thoracis lateribus fulvo pilosis, segmentorum abdominalium marginibus posticis nigris, alis obscure cinereis antice nigricantibus, halteribus fulvis.

*Female.* Black, dull. Head cinereous; frontalia black, widening in front; sides of the peristoma dark red. Antennæ dark red, much shorter than the face. Pectus and sides of the thorax cinereous,

the latter with tawny hairs. Abdomen cinereous, shining, with numerous black bristles; hind borders of the segments black. Wings dark cinereous, blackish in front; veins tawny, black towards the tips; præbrachial vein forming a very obtuse and rounded angle at its flexure, almost straight from thence to its tip; discal transverse vein undulating, parted by hardly half its length from the border, and by much less than its length from the præbrachial transverse vein; alulæ cinereous; halteres tawny. Length of the body 5 lines; of the wings 10 lines.

Subfam. LAUXANIDES, *Walk.*

Gen. CELYPHUS, *Dalman.*

19. *Celyphus scutatus*, *Wied.* See Vol. I. p. 131.

Subfam. ORTALIDES, *Haliday.*

Gen. PLATYSTOMA, *Latr.*

20. *PLATYSTOMA FRONTALIS*, n. s. *Mas.* Cinerca, capite testaceo. fronte nigra, facie plana longissima nigro bimaculata, antennarum articulo 3<sup>o</sup> lineari longissimo arista nuda, thorace nigricante vittis quatuor cinereis, abdomine nigro brevi maculis fasciisque duabus cinereis, pedibus rufis, femoribus apice nigris, tarsis nigris basi rufis, alis subcinereis e maculis nigris subfasciatis.

*Male.* Cinereous. Head testaceous; front black, slightly oblique; face flat, very long, slightly retracted, forming an obtuse angle with the front, with a black spot on each side of the epistoma. Antennæ about half the length of the face; 3rd joint linear, very long; arista bare, hardly longer than the 3rd joint. Disk of the thorax blackish, with four slender cinereous stripes, the inner pair almost contiguous. Abdomen black, elongate-oval, much shorter and rather narrower than the thorax, cinereous towards the base, with two cinereous spots on each side of the middle part, and with a broad subapical cinereous band. Legs dark red; femora black towards the tips; tibiæ streaked with black; tarsi black except towards the base. Wings pale cinereous, with a luteous tinge about the slightly dilated basal part of the costa, with numerous black spots and dots, most of which form four irregular bands; veins black, luteous towards the base; discal transverse vein almost straight, parted by one-fourth of its length from the border, and by nearly twice its length from the præbrachial transverse vein. Length of the body 8 lines; of the wings 16 lines.

21. *PLATYSTOMA PUNCTIPLANA*, n. s. *Fæm.* Cinereo-nigra, capite piceo, arista subpubescente, thorace sublineato, pectore punctato, alis nigris limpido punctatis fascia furcata nigra.

*Female.* Cinereous black. Head piceous, white about the eyes; mouth

very thick. Antennæ much shorter than the face; 3rd joint elongate-conical; arista minutely pubescent. Thorax with several indistinct and very slender cinereous lines; pectus with cinereous punctures. Legs black, shining. Wings black, entirely covered with limpid points, except a black band which is forked in front; border beyond the band with limpid dots; veins black; discal transverse vein nearly straight, parted by one-fourth of its length from the border, and by about its length from the præbrachial transverse vein. Length of the body 3 lines; of the wings 6 lines.

Subfam. SEPSIDES, *Walk*

Gen. PHYTALMIA, *Gerstaecker*.

Div. n.

*Mas.* Corpus longum, gracile, cylindricum. Caput supra depressum. Oculi cornubus duobus longis angustis apice dilatatis oblique porrectis et ascendentibus muniti. Antennæ angulatæ; articulus 3<sup>us</sup> linearis, longiuseculus; arista gracilis, simplex. Thorax antice attenuatus. Abdomen compressum, thorace duplo longius. Pedes longissimi, gracillimi. Alæ angustæ.

Allied to *Calobata*.

*Male.* Body long, slender, cylindrical. Head flat above. Eyes furnished with two long slender folded appendages, which extend forward diverging and obliquely ascending, are dilated at the tips, and are almost half the length of the body. Antennæ angular; 3rd joint linear, rounded at the tip, a little longer than the 1st and 2nd together; arista slender, simple. Thorax attenuated in front. Abdomen compressed, full twice the length of the thorax. Legs very long and slender. Wings much like those of *Calobata* in structure.

22. PHYTALMIA GUTTIPENNIS, n. s. *Mas.* Nigra, capite pedibusque rufescentibus, cornubus antennisque nigris, pectore æneo-viridi, femoribus posterioribus apice pedibusque anticis nigris, tibiis anticis apice tarsisque anticis basi albis, alis nigricantibus albido quadriguttatis.

*Male.* Black. Head reddish; its appendages and the antennæ black, the former reddish towards the base. Pectus æneous-green, varied with cupreous and with purple. Legs reddish; tips of the posterior femora black. Fore legs black; femora towards the base and coxæ reddish; tibiæ at the tips and tarsi at the base white. Wings blackish, with four whitish dots in each; veins black; halteres with testaceous tips. Length of the body 7 lines; of the wings 10 lines.

Subfam. PSILIDES, *Walk*.

Gen. NERIUS, *Wied*.

23. *Nerius fuscipennis*, *Macq.* See Vol. I. p. 38.

Gen. CÆNURGIA, *Walk.*

24. CÆNURGIA REMIPES, *Walk.* (see Vol. IV. p. 164). *Fam.* Lutea, gracilis, nitens, capite guttis tribus nigris, antennarum articulo 3<sup>o</sup> lanceolato arista alba, thorace vittis duabus interruptis nigris, abdomine lanceolato, femoribus compressis latiusculis apice nigris, tibiis tarsisque piceis, alis lurido-cinereis.

*Female.* Luteous, slender, shining. Head a little broader than the thorax, with a black dot on the vertex and another on each side in front. Third joint of the antennæ compressed, lanceolate; arista white, stout, longer than the 3rd joint. Thorax with an interrupted black stripe on each side. Abdomen lanceolate, nearly twice the length of the thorax; oviduct exerted. Legs long; femora compressed, rather broad, with black tips; tibiæ and tarsi piceous. Wings lurid cinereous; veins black; præbrachial vein converging outward towards the cubital vein; discal transverse vein almost straight, parted by nearly its length from the border, and by a little more than twice its length from the præbrachial transverse vein. Length of the body 4 lines; of the wings  $5\frac{1}{2}$  lines.

Fam. HIPPOBOSCIDÆ, *Leach.*Gen. ORNITHOMYIA, *Olfers.*

25. ORNITHOMYIA OBSCURATA, n. s. Nigra, nitens, pedibus obscure viridibus robustis setosis, alis obscure cinereis, venis anticis nigris crassis.

Black, shining. Legs dark green, robust, setose. Wings dark cinereous; costal veins black, thick. Length of the body  $2\frac{1}{2}$  lines; of the wings 6 lines.

Fam. NYCTERIBIDÆ, *Leach.*Gen. NYCTERIBIA, *Latr.*

26. Nycteribia dubia? *Westw. Zool. Soc. Trans.* i. p. 289.

Inhabits also the Philippine Islands.

Catalogue of the Dipterous Insects collected in Batchian, Kaisaa and Makian, and at Tidon in Celebes, by Mr. A. R. WALLACE, with Descriptions of New Species. By FRANCIS WALKER, Esq., F.L.S.

[Read Nov. 15th, 1860.]

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

1. Ptilocera quadridentata, *Fabr.* See Vol. I. p. 7.

Gen. STRATIOMYS, *Geoffroy*.

2. STRATIOMYS ÆQUALIS, n. s. *Fæm.* Cupreo-nigra, capite nigro nitente antice rufescente, antennis rufescentibus, thoracis lateribus auratis, scutelli margine pectoreque flavis, hujus disco nigro, abdominis lateribus ventre pedibusque fulvis, femoribus tibiisque nigro fasciatis, alis cinereis, costa fuscescente, halteribus pomaceis.

*Female.* Cupreous black. Head black, shining, reddish in front, with white tomentum about the eyes. Antennæ reddish, lanccolate towards the tips, shorter than half the breadth of the head. Sides of the thorax gilded; scutellum bordered with yellow, armed with four small spines; pectus yellow, with a black disk. Abdomen black, shining, tawny along each side and beneath. Legs tawny; femora and tibiæ with black bands. Wings cinereous, brownish along the costa; veins black; halteres apple-green. Length of the body 4 lines; of the wings 7 lines.

Gen. CLITELLARIA, *Meigen*.

3. Clitellaria obesa, *Walk.* See p. 232.

Gen. MASSICYTA, *Walk.*

4. Massicyta cerioides, *Walk.* See Vol. III. p. 78.

Gen. SALDUBA, *Walk.*

5. SALDUBA HILARIS, n. s. *Mas et Fæm.* Nigra, gracilis, sublinearis, antennis compressis subarcuatis basi fulvo variis, flagello lineari, thorace vittis quatuor auratis, pedibus luteis, tarsis pallidioribus, tibiis posticis nigris, alis cinereis apice obscurioribus, halteribus pallidis.

Closely allied to *S. diphysoides*, and apparently a local or sub-species.

*Male and Female.* Black, slender, linear. Proboscis yellow, with a black tip. Antennæ compressed, slightly curved, nearly twice the length of the breadth of the head; scape fusiform, partly tawny; flagellum linear, acuminate, very much longer than the scape. Four stripes on the thorax and border of the scutellum of gilded tomentum. Legs luteous; tarsi white or pale yellow, with black tips; coxæ and hind tibiæ black. Wings cinereous, darker towards the tips; veins black; halteres white or pale yellow. *Male.* Smaller than the female; eyes more approximate but not contiguous. Length of the body 3-4½ lines; of the wings 5-8 lines.

6. SALDUBA LUGUBRIS, n. s. *Mas.* Atra, gracilis, linearis, capite nitente, antennis basi fulvis, flagello lineari, thorace vittis duabus cinereis, tarsis albidis, alis nigricantibus.

*Male.* Deep black, slender, linear. Head shining. Eyes approximate

above. Antennæ nearly linear, much longer than the breadth of the head; scape mostly tawny; flagellum longer than the scape. Thorax with a cinereous stripe on each side. Tarsi whitish, with black tips. Wings blackish; veins black. Length of the body  $3\frac{1}{2}$  lines; of the wings 6 lines.

7. *SALDUBA MELANARIA*, n. s. *Mas.* Atra, gracilis, linearis, capite producto, antennis linearibus vix arcuatis basi fulvis, scutelli margine postico sulcato, tarsis posterioribus albidis, alis nigris.

*Male.* Deep black, slender, linear. Head and eyes very flat above; the former produced into a short rostrum, on which the antennæ are seated. Antennæ filiform, hardly curved, a little longer than the breadth of the head; scape tawny on the inner side at the base. Thorax elongate; scutellum with a transverse furrow near the hind border. Abdomen hardly longer than the thorax. Posterior tarsi whitish, with black tips. Wings and veins black. Length of the body 3 lines; of the wings 5 lines.

8. *SALDUBA SCAPULARIS*, n. s. *Mas.* Atra, elongata, capite antico producto, antennis compressis subarcuatis, flagello lanceolato, thorace subpubescente, scutello dentibus quatuor ferrugineis, pedibus piceis, tarsis posterioribus albidis, alis nigricantibus.

*Male.* Deep black, elongate. Eyes flat and connected above. Antennæ compressed, slightly curved upward, seated on a protuberance of the head, and a little shorter than its breadth; flagellum lanceolate, not longer than the scape. Thorax minutely pubescent; humeral angles acute; scutellum armed with four minute ferruginous teeth. Abdomen fusiform, a little longer and broader than the thorax. Legs piceous; posterior tarsi whitish, with piceous tips. Wings blackish; veins black; halteres piceous. Length of the body 3 lines; of the wings 5 lines.

9. *SALDUBA SINGULARIS*, n. s. *Mas.* Nigra, longa, gracilis, antennis linearibus vix arcuatis, flagello basi rufo, thorace cinereo vittis duabus nigris, scutello inermi, femoribus rufis, tarsis albis, femoribus posticis incrassatis spinosis, alis nigricantibus.

*Male.* Black, long, slender. Eyes connected above. Antennæ compressed, linear, hardly curved, much longer than the breadth of the head; flagellum red towards the base, about thrice the length of the scape. Thorax with cinereous tomentum, which is interrupted by a black stripe on each side; scutellum prominent, rounded, unarmed. Abdomen deep black, cylindrical, nearly twice the length of the thorax, shining and tumid at the tip. Femora mostly red; tarsi white, with black tips; hind femora incrassated, with minute spines beneath. Wings blackish; veins black. Length of the body  $3-4\frac{1}{2}$  lines; of the wings 5-8 lines.

Gen. OBRAPA, *Walk.*

10. *Obrapa perilampoides*, *Walk.* See Vol. III. p. 82.
11. *OBRAPA CELYPHOIDES*, *Walk.* See Vol. IV. p. 83. The description referred to here is incomplete; and therefore the following characters are added:—
- Fem.* Atra, obscura, brevis, lata, capite nitente, antennis piceis basi albidis, scutello et postscutello productis, abdomine impresso, tarsis posterioribus luteis, alis limpidis nebula postica nigricante, halteribus albis.

*Female.* Deep black, dull, short, broad, thick. Head shining, with white tomentum in front. Antennæ piceous, whitish at the base. Scutellum conical, very prominent; the postscutellum projecting beyond it, and forming a rim round its border. Abdomen shorter and broader than the thorax, with impressions above, and with two deeper excavations at the tip. Posterior tarsi luteous. Wings limpid; veins yellow, black for half the length from the base, with a blackish cloud hindward. Halteres white. Length of the body  $1\frac{1}{2}$  line; of the wings  $2\frac{3}{4}$  lines.

This species may be distinguished from *O. perilampoides* by its narrower body, by its dull colour, by the very different shape of the scutellum, by the cloud on the wings, and by the greater blackness of the veins.

Gen. CHRYSOMYIA, *Macq.*

12. *CHRYSOMYIA BIPARS*, n. s. *Mas.* Læte cyanea, viridi varia, proboscide pedibus halteribusque pallide flavis, antennis abdomineque pallide luteis, alis limpidis.
- Male.* Bright blue, varied with green. Head a little broader than the thorax. Proboscis and legs pale yellow. Antennæ and abdomen pale luteous, the former very small. Wings limpid; veins and halteres pale yellowish. Length of the body  $1\frac{1}{2}$  line; of the wings 3 lines.

Gen. SARGUS, *Fabr.*

13. *SARGUS CONCISUS*, n. s. *Mas.* Læte cyaneus, ore pedibusque albidis, antennis rufescentibus, thoracis lateribus purpureo variis, abdomine purpureo, femoribus tibiisque piceo variis, alis cinereis, halteribus testaceis.

Allied to *S. redhibens*.

*Male.* Bright blue. Eyes parted above by a very narrow interval. Mouth whitish. Antennæ reddish; 3rd joint round. Thorax varied with purple on each side. Abdomen bright purple. Legs whitish; femora and tibiæ partly piceous. Wings cinereous; veins black; halteres testaceous. Length of the body  $4\frac{1}{2}$  lines; of the wings 8 lines.

14. *SARGUS TIBIALIS*, n. s. *Mas.* Cupreo-purpureus, ore antennis pedi-

bus halteribusque albidis, femoribus anterioribus apice tarsis posticis basi necnon femoribus tibiisque posticis nigris, alis cinereis.

Allied to *S. redhibens*.

*Male*. Cupreous purple. Mouth and antennæ whitish; 3rd joint of the latter round. Thorax with a whitish slender callus along each side. Abdomen elongate subfusiform. Legs whitish; anterior femora towards the tips, hind tarsi towards the base, hind femora and hind tibiæ black. Wings cinereous; veins black; halteres whitish. Length of the body  $3\frac{1}{2}$  lines; of the wings 7 lines.

15. *SARGUS QUADRIFASCIATUS*, *Walk.* See *antè*, p. 146. The description here referred to is incomplete; the following characters are more correct:—

*Mas et Fæm.* Luteo-fulvus, ore antennis pedibusque testaceis, tibiis posticis nigris, tarsis posticis albis basi nigris, alis subcinereis. *Mas.* Abdomine fasciis duabus nigris. *Fæm.* Abdomine fasciis quatuor nigris.

*Male and Female.* Luteous tawny. Head black, shining. Eyes parted by a very narrow interval in the female. Mouth and antennæ testaceous; 3rd joint of the latter round. Legs testaceous; hind tibiæ black; hind tarsi white, black towards the base; anterior tarsi with black tips. Wings slightly cinereous; veins black, testaceous at the base. *Male.* Abdomen with two black bands towards the tip, and with black appendages. *Female.* Abdomen with four black bands. Length of the body  $3\frac{1}{2}$ –4 lines; of the wings 6–7 lines.

16. *SARGUS TARSALIS*, n. s. *Fæm.* Fulvus, capite nigro nitente, thorace subvittato, abdomine fasciis abbreviatis dilatatis nigricantibus, tibiis posticis nigris, tarsis posticis albidis basi nigris, alis nigricantibus, areolarum discis cinereis.

Allied to *S. repensans*.

*Female.* Tawny. Head black and shining above. Third joint of the antennæ round. Thorax indistinctly striped. Abdomen with an abbreviated dilated blackish band on each segment. Hind tibiæ black; hind tarsi whitish, black towards the base. Wings blackish; disks of the areolets cinereous; veins black, tawny at the base. Length of the body 6 lines; of the wings 10 lines.

17. *SARGUS DEBILIS*, n. s. *Mas.* Niger, nitens, antennis scutelli spinis pedibus halteribusque albidis, abdomine sublineari, alis nigricantibus cinereis.

Allied to *S. redhibens*.

*Male.* Black, shining. Antennæ and legs and the four minute spines of the scutellum whitish. Abdomen nearly linear, much longer than the thorax. Legs whitish. Wings blackish cinereous; veins black; halteres whitish. Length of the body  $2\frac{1}{2}$  lines; of the wings 4 lines.

18. *SARGUS INFICITUS*, n. s. *Mas.* Pallide fulvus, nitens, antennis



pedibusque pallide testaceis, thorace abdomineque nigro vittatis, alis subcinereis apice nigricantibus.

*Male.* Pale tawny, shining. Eyes connected above; facets rather large. Antennæ pale testaceous, very short. Thorax with a black stripe. Abdomen with an abbreviated black stripe, a little longer and broader than the thorax. Legs pale testaceous. Wings slightly cinereous, blackish towards the tips; veins black, testaceous at the base. Length of the body  $1\frac{1}{2}$  line; of the wings 3 lines.

Fam. XYLOPHAGIDÆ, *Steph.*

Gen. RHYPHOMORPHA, n. g.

*Fem.* Corpus longifusiforme. Os minimum. Antennæ setacæ, compressæ, dentato-moniliformes, multiarticulatæ, articulis transversis. Abdomen longieonicum. Pedes breves, graciles. Alæ elongatæ.

*Female.* Body elongate fusiform. Front vertical. Eyes prominent, with very minute facets. Mouth very small. Antennæ setaceous, compressed, submoniliform, about as long as the breadth of the head; the teeth successively decreasing in size; scape very short; joints of the flagellum transverse, nearly twenty in number. Thorax much longer than broad, subquadrate in front; scutellum small, unarmed. Abdomen elongate conical, less than twice the length of the thorax. Legs short, slender. Wings elongate; mediastinal, subcostal, and radial veins ending at beyond half the length of the costa; branches of the cubital vein straight; 1st externo-medial slightly curved; 2nd rudimentary; 3rd curved, united to the 4th, close to the border; subanal and anal veins united on the border; discal areolet about four times as long as broad.

This remarkable genus seems to be allied to *Rachicerus*.

19. RHYPHOMORPHA BILINEA, n. s. *Fem.* Testacea, glabra, nitens, capite nigro, antennis dimidio apicali nigris, thorace guttis duabus vittisque duabus piceis, abdomine vitta basali nigra, alis subcinereis.

*Female.* Testaceous, smooth, shining. Head black, shining. Antennæ black for nearly half the length from the tips. Thorax with two slender piceous stripes, and with a piceous dot on each side in front. Abdomen with a slender black band at the base. Wings slightly cinereous; veins black, testaceous at the base. Length of the body 3 lines; of the wings 7 lines.

Fam. TABANIDÆ, *Leach.*

Gen. TABANUS, *Linn.*

20. TABANUS EXTRICANS, n. s. *Mas.* Piceus, antennis nigris basi rufescentibus, pectore cano, abdomine rufescente apicem versus nigri-

cante, pedibus halteribusque rufescentibus, tarsis anticis femoribusque nigris, alis cinereis.

*Male.* Piccous. Head hoary behind and beneath. Eyes divided into two distinct parts; 1st part reddish, composed of large facets which successively decrease in size towards each side; 2nd part æneous, on each side of the face, composed of excessively small facets. Antennæ black, reddish at the base; 3rd joint with an extremely minute horn. Pectus hoary. Abdomen conical, reddish, blackish towards the tip and on the disk beneath. Legs reddish; femora, except the tips and fore tarsi, black. Wings cinereous; veins black, reddish towards the base; fore branch of the cubital vein simple, forming a much-rounded angle near the base; halteres pale reddish. Length of the body 5 lines; of the wings 9 lines.

21. *TABANUS INSURGENS*, n. s. *Mas.* Læte fulvus, antennis parvis, abdomine conico elongato, tarsis anticis nigris, alis obscure cinereis, halteribus pallide fulvis.

*Male.* Bright tawny. Eyes uniform, composed of very minute facets. Proboscis blackish towards the tip. Antennæ short, slender, with hardly any horn. Abdomen conical, very much longer than the thorax. Fore tarsi black. Wings dark cinereous; veins black, tawny towards the base; fore branch of the cubital vein curved and not angular near the base; halteres pale tawny. Length of the body 4 lines; of the wings 9 lines.

#### GEN. CHRYSOPS, *Meigen.*

22. *CHRYSOPS SIGNIFER*, n. s. *Mas.* Niger, capite atro aureo-tomentoso, antennis elongatis basi fulvis, thorace fasciis duabus aureo pilosis, abdomine flavo fasciis tribus apiceque nigris, femoribus obscure rufis, tibiis dilatatis, tarsis posterioribus fulvis, alis cinereis costa fasciisque duabus nigricantibus.

*Male.* Black. Head deep black and shining in front, with a patch of gilded tomentum on each side of the face, and with a smaller one at the base of the antennæ. Antennæ filiform, tawny towards the base, much longer than the breadth of the head. Thorax with two bands of gilded hairs. Abdomen yellow, blackish at the tip, with a black band at the base, and in the middle with two black bands, which are connected on each side and enclose a triangular space between them. Femora mostly dark red; tibiæ dilated; posterior tarsi tawny. Wings cinereous, blackish along the costa, and with two blackish bands; the 2nd very much broader than the first, which is near the base. Length of the body 4 lines; of the wings 7 lines.

23. *CHRYSOPS PARALLELUS*, n. s. *Fem.* Picco-niger, linearis, capite atro nitente, antennis obscure rufis, pedibus piccis, alis nigris postice cinereis macula discali punctoque basali albis.

*Female.* Piceous black, linear. Head deep black, very shining. An-

tennæ dark red, much shorter than the breadth of the head. Abdomen nearly twice the length of the thorax. Legs piceous. Wings black, irregularly cinereous along the hind border, with two cinereous streaks hindward, with a white spot in the disk, and with a white point near the base; veins black; halteres piceous. Length of the body 5 lines; of the wings 9 lines.

Fam. ASILIDÆ, *Leach*.

Subfam. DASYPOGONITES, *Walk*.

Gen. DASYPOGON, *Fabr*.

24. DASYPOGON HONESTUS, *Walk*. (see Vol. III. p. 83). *Mas et Fem*. Rufus, linearis, capite atro, mystace albo, antennis nigris, thorace vitta aurata piceo marginata, abdomine cupreo nigro segmentis rufescente marginatis, femoribus tarsis tibiisque anticis nigris, alis nigricantibus, halteribus testaceis.

*Male and Female*. Body linear. Head deep black, very shining, with a white line along each side of the face; mystax composed of a few white bristles. Antennæ filiform, shorter than the breadth of the head. Thorax red, with a pale gilded piceous-bordered stripe; pectus gilded. Abdomen cupreous black, nearly twice the length of the thorax; hind borders of the segments reddish. Legs black, stout; knees, posterior tibiæ except the tips, coxæ and trochanters red. Wings blackish; veins black, with the usual structure; halteres testaceous. Length of the body 3-4½ lines; of the wings 5-8 lines.

This species is here characterized again on account of the imperfect state of the specimen which was first described.

25. DASYPOGON GLAHRATUS, n. s. *Mas*. Læte ochraceo-rufus, capite atro, mystace albido, antennis nigris, abdomine cupreo-nigro, tarsis nigris, alis nigricantibus.

*Male*. Bright ochraceous red. Head deep black, very shining, with a white line along each side of the face; mystax composed of a few whitish bristles. Proboscis black, lanceolate. Antennæ black, slender, filiform, nearly as long as the breadth of the head. Abdomen cupreous black, linear, narrower than the thorax, and about twice its length. Legs stout, slightly spinose; tarsi black. Wings blackish; veins black, with the usual structure. Length of the body 4 lines; of the wings 8 lines.

Subfam. LAPHRITES, *Walk*.

Gen. LAPHRIA, *Fabr*.

26. LAPHRIA CONGRUA, n. s. *Mas*. Læte cyanea, capite pectoreque maculisque duabus humeralibus argenteis, mystace albo nigro, antennis

nigris, abdomine purpureo basi purpurascenti-cupreo apice cyaneo, alis nigricantibus strigis basique cinereis, halteribus albidis.

*Male.* Bright blue. Head and pectus with silvery white tomentum; mystax with many white bristles and with a few longer black bristles. Antennæ black, about as long as half the breadth of the head; 3rd joint linear, longer than the 1st and 2nd together. Thorax with two silvery-white tomentose humeral spots. Abdomen linear, bright purple, purplish cupreous at the base, mostly bright blue at the tip; hind borders of the ventral segments silvery white. Legs robust, thickly beset with black bristles; anterior femora with numerous white bristles; fore tibiæ with shining white down beneath. Wings blackish, with cinereous streaks towards the base, which is wholly cinereous; veins black; halteres whitish. Length of the body 10 lines; of the wings 16 lines.

27. *LAPHRIA CONSURGENS*, n. s. *Fam.* *Ænea*, capite pectore maculisque duabus humeralibus argenteis, mystace albo nigro, antennis nigris, thoracis lateribus viridi variis, abdomine purpureo-cyaneo, alis nigricanti-fuscis, halteribus albidis.

*Female.* *Æneous*. Head and pectus with silvery-white tomentum; mystax with many short white bristles, and with very few long black bristles. Antennæ black, hardly longer than half the breadth of the head; 3rd joint linear, much longer than the 1st and 2nd together. Thorax tinged with green on each side; two silvery-white tomentose humeral spots. Abdomen bright blue, varied with purple; hind borders of the ventral segments whitish. Legs robust, green, varied with blue and purple, beset with a few black bristles; fore tibiæ with very pale gilded tomentum beneath. Wings blackish brown; veins black; halteres whitish. Length of the body 8 lines; of the wings 14 lines.

28. *Laphria tristis*, *Dol.* See *antè*, p. 146.

29. *LAPHRIA CONVENIENS*, n. s. *Mas.* Nigra, capite postico argenteo, mystace antennis pedibusque nigris, thorace obscuro, pectore ferrugineo-tomentoso, abdomine nigricanti-cupreo, alis cinereis, dimidio apicali nigro, halteribus pallide luteis.

Allied to *L. partita*.

*Male.* Black, robust. Head with silvery cinereous tomentum behind; mystax with several black bristles. Antennæ black, nearly as long as half the breadth of the head; 3rd joint elongate fusiform, a little longer than the 1st and 2nd together. Thorax dull; pectus with ferruginous tomentum. Abdomen blackish cupreous, shining. Legs black, very robust, thickly beset with black bristles. Wings cinereous, black for rather less than half the length from the tips; veins black; halteres pale luteous. Length of the body 6 lines; of the wings 10 lines.

This is most likely the male of *L. consentanea*; but, as the wings are

different in colour, it may be a subspecies, and is therefore here described at length.

30. *Laphria consors*, *Walk.* See Vol. III. p. 85.

31. *Laphria comes*, *Walk.* See Vol. III. p. 85.

32. *LAPHRIA ARGENTIFERA*, n. s. *Fæm.* Atra, capite antico abdominisque segmentis tribus argenteis, mystace albo nigro, thorace maculis quatuor auratis, pedibus rufis, alis purpurascenti-nigris, halteribus albis.

Allied to *L. Vulcanus*, of which species *L. ampla* may be a variety.

*Female.* Deep black, stout. Head white behind, silvery in front; epistoma prominent; mystax composed of short white bristles and of some long black bristles. Antennæ a little longer than half the breadth of the head; 3rd joint linear, nearly twice the length of the 1st and 2nd together. Thorax with two spots of pale gilded tomentum on each side. Abdomen with the three first segments bright silvery. Legs red, stout; coxæ and trochanters black. Wings purplish-black; veins black; halteres white. Length of the body 7 lines; of the wings 14 lines.

33. *Laphria ardescens*, *Walk.* See *antè*, p. 235.

34. *LAPHRIA FLAGRANTISSIMA*, *Walk.* (see Vol. III. p. 86), var. *Fæm.*

Nigra, capite mystaceque auratis, proboscide antennisque rufis, thorace subaurato, maculis humeralibus lateribus scutelloque aurato-fulvis, abdomine basi fasciisque aurato-fulvis, pedibus læte fulvis, alis luteis apice nigricantibus, halteribus flavescensibus.

*Female.* Black, stout. Head brightly gilded; mystax composed of some gilded bristles. Proboscis and antennæ red, the latter not longer than half the breadth of the head; 3rd joint lanceolate, twice the length of the 1st and 2nd together. Thorax slightly covered with gilded tomentum; sides, humeral spots, and scutellum tawny, brightly gilded. Abdomen tawny and gilded at the base and on the hind borders of the following segments, the bands successively decreasing in breadth. Legs robust, bright tawny. Wings luteous, blackish towards the tips and about the exterior part of the subanal vein, cinereous along the hind border; halteres yellowish. Length of the body 8 lines; of the wings 16 lines.

35. *LAPHRIA BASIFERA*, n. s. *Mas.* Nigra, capite antico subaurato, mystace albido, thoracis lateribus subaurato tomentosis, pectore albido, abdomine luteo, basi apiceque nigris, pedibus pallide luteis, alis cinereis, halteribus pallide flavis.

*Male.* Black. Head with cinereous tomentum, slightly gilded in front; mystax composed of several slender whitish bristles. Antennæ full as long as half the breadth of the head; 3rd joint very elongate-fusiform, much longer than the 1st and the 2nd together. Thorax with slightly

gilded tomentum on each side; pectus with whitish tomentum. Abdomen luteous, black at the base and at the tip. Legs robust, pale luteous; coxæ and knees black. Wings cinereous; veins black; halteres pale yellow. Length of the body 5-6 lines; of the wings 10-11 lines.

36. *Laphria manifesta*, *Walk.* See Vol. III. p. 87.

Subfam. ASILITES, *Walk.*

Gen. TRUPANEA, *Macq.*

37. *TRUPANEA INTERPONENS*, n. s. *Fam.* Nigra, robusta, capite pectore thoracisque lateribus albedo-cinereis, epistomate convexo, mystace nigro, barba alba, thorace vittis tribus angustis cinereis, abdomine lanceolato apicem versus attenuato et compresso maculis lateribus trigonis cinereis, pedibus robustis, tibiis anticis subtus rufo tomentosus, tibiis posticis basi rufescentibus, alis luride fuscis, areola radiali schistaceo strigata, halteribus luteis.

*Female.* Black, robust. Head, pectus, and sides of the thorax with whitish cinereous tomentum; epistoma very prominent; mystax composed of many stout black bristles; beard of white hairs. Third joint of the antennæ lanceolate, shorter than the 1st; arista more than twice the length of the 3rd joint. Thorax with three slender cinereous stripes. Abdomen lanceolate, attenuated and compressed towards the tip, with two lateral triangular cinereous spots on each segment except the three last. Legs very robust, with black spines; fore tibiæ with red tomentum beneath; hind tibiæ reddish towards the base. Wings lurid brown, with a slate-coloured streak in the radial areolet, which is very long; veins black; halteres luteous. Length of the body 10 lines; of the wings 18 lines.

38. *TRUPANEA ADDENS*, n. s. *Fam.* Nigra, capite pectore thoracis lateribus ventreque cinereo tomentosus, capite antico subaurato, epistomate convexo, mystace nigro, barba alba, abdominis segmentis cinereo marginatis, dimidio apicali stylato, tibiis rufis apice nigris, alis cinereis, areolis radiali et cubitali schistaceo strigatis, halteribus fulvis.

*Female.* Black. Head, pectus, sides of the thorax and abdomen beneath with cinereous tomentum, which is slightly gilded in front of the head; epistoma prominent; mystax composed of many stout black bristles; beard of white hairs. Third joint of the antennæ shorter than the first; arista about thrice the length of the 3rd joint. Thorax cinereous on each side, and with three cinereous stripes. Abdominal segments cinereous on each side and along the hind borders, with the exception of the four last, which are much compressed and form a style. Legs robust, with black spines; tibiæ red except towards the tips. Wings cinereous; radial and cubital areolets with a slate-coloured streak on each; cubital areolet very long; veins black; halteres tawny. Length of the body 7 lines; of the wings 12 lines.

Gen. ASILUS, *Linn.*

39. *ASILUS INVOLUTUS*, n. s. *Fæm.* Niger, auratus, barba aurata, mystace nigro setis nonnullis anticis albis, thorace vittis quatuor nigris abdomine fasciis nigris latis subtrigonis apicem versus stylato, pedibus rufis, femoribus nigro vittatis, alis cinereis apud costam nigricantibus.

Allied to *A. determinatus* and to *A. introducens*.

*Female.* Black, brightly gilded. Mystax composed of several black bristles and of some lower white bristles; beard with gilded hairs. Palpi beset with black hairs and bristles. Third joint of the antennæ lanceolate, shorter than the 1st and 2nd joints together; arista much longer than the 3rd joint. Thorax with four black stripes; the lateral pair abbreviated and dilated. Abdomen with a broad nearly triangular black band on each segment, excepting the apical part, which is stylate, compressed, and much more than one-third of the whole length. Legs red, very robust; stripes of the femora, knees, and tarsi, except the tips, black. Wings cinereous, blackish along the costa and towards the tips; hind branch of the radial vein undulating; halteres luteous. Length of the body 9 lines; of the wings 14 lines.

40. *ASILUS COMPLENS*, n. s. *Fæm.* Niger, capite antico albedo subaurato, epistomate convexo, mystace setis albis nonnullisque nigris, antennis brevissimis, thoracis lateribus vittisque tribus cinereis, abdomine lanceolato fasciis cinereis, alis cinereis apice nigricantibus, halteribus flavescensibus.

*Female.* Black. Head behind, pectus, and sides of the thorax cinereous; front of the head whitish, slightly gilded; epistoma prominent; mystax composed of white and of fewer black bristles. Antennæ very short; 3rd joint shorter than the first, and about one-third of the length of the arista. Thorax with three cinereous stripes. Abdomen lanceolate, not stylate, with a slender cinereous band on the hind border of each segment. Legs not very robust, with a few black hairs and spines. Wings cinereous, blackish towards the tips; veins black; hind branch of the cubital vein undulating; halteres yellowish. Length of the body 7 lines; of the wings 12 lines.

Gen. OMMATIUS, *Illiger.*

41. *Ommatius noctifer*, *Walk.* See Vol. II. p. 88.

Gen. LEPTOGASTER, *Meigen.*

42. *Leptogaster ferrugineus*, *Walk.* See Vol. III. p. 89.

43. *LEPTOGASTER TARSALIS*, n. s. Niger, capite pectore thoracisque lateribus albo tomentosus, pedibus piccis, trochanteribus posticis albidis longissimis, femoribus subtus flavescensibus, tibiis posticis tarsisque basi albidis, alis subcinereis, halteribus albidis.

Black. Head, pectus, and sides of the thorax with white tomentum. Legs piccons; hind trochanters whitish, very much elongated; femora

yellowish beneath; tarsi and hind tibiæ whitish at the base. Wings slightly cinereous, with a black point at the tip of the mediastinal vein; veins black; halteres whitish. Length of the body 4 lines; of the wings 6 lines.

The description of this species is incomplete, owing to the imperfect state of the specimen.

Fam. LEPTIDÆ, *Westw.*

Gen. LEPTIS, *Fabr.*

44. *Leptis ferruginosa*, *Wied.* See Vol. I. p. 118.

45. *LEPTIS IMPAR*, n. s. *Fam.* Nigra, capite thoraceque albido tomentosus, vertice atro, antennis flavis minimis, abdomine apicem versus fascia vittisque duabus luteis, femoribus posterioribus apice femoribusque anticis flavis, tibiis intermediis fulvis, alis subcinereis dimidio apicali fusciscente, areolis discali et posterioribus cinereo maculatis. halteribus fulvis nigro notatis.

*Female.* Black. Head and thorax with whitish tomentum; vertex of the head deep black. Proboscis mostly yellowish. Antennæ yellow, very small; 3rd joint round. Abdomen towards the tip with a luteous stripe on each side, and a luteous band. Fore femora yellow; middle femora yellow towards the tips; hind femora yellow towards the base and at the tips; middle tibiæ dull tawny. Wings slightly cinereous, brownish for half the length from the tips; discal and hinder externo-medial areolets with a large slightly cinereous spot in each; veins black, tawny at the base; halteres tawny, with a black mark towards the tip. Length of the body  $3\frac{1}{2}$  lines; of the wings 7 lines.

Gen. CHRYSOPILA, *Macq.*

46. *CHRYSOPILA GUTTIPENNIS*, n. s. *Fam.* Picea, antennis flavescens, abdomine nigro apicem versus compresso et attenuato, femoribus flavescens piceo subnotatis, alis amplis nigricanti-fuscis basi maculisque limpidis, halteribus flavescens nigro fasciatis.

*Female.* Piceous. Proboscis and antennæ yellowish, the latter very short, with a long arista. Abdomen black, compressed and attenuated towards the tip. Femora yellowish; posterior femora slightly marked with piceous. Wings ample, blackish brown, limpid towards the base and with several limpid spots, some of which are confluent, and form a band across the middle; veins black, yellowish at the base; halteres yellowish, with a black subapical band. Length of the body 3 lines; of the wings 6 lines.

Fam. BOMBYLIDÆ, *Leach.*

Subfam. BOMBYLITES, *Walk.*

Gen. ANTHRAX, *Fabr.*

47. *Anthrax Pelops*, *Walk.* See Vol. III. p. 90.



48. ANTHRAX CONFIRMATA, n. s. *Mas.* Nigra, capite antico subaurato, thorace pilis ochraceis marginato, scutello apicem versus piceo, abdomine lateribus basi ochraceo pilosis, fascia interrupta media maculisque quatuor lateralibus subapicalibus pallidioribus, alis nigricantibus basi costaque nigris.

*Male.* Black, nearly allied to *A. Tantalus*. Head with a few gilded hairs in front. Thorax and pectus thickly clothed with ochraceous hairs in front and along each side; scutellum piceous along the hind border. Abdomen thickly clothed with ochraceous hairs on each side of the base, with an interrupted middle band, and with two subapical dots on each side of paler hairs; a slender abbreviated ventral stripe of gilded hairs. Wings blackish, very iridescent, black at the base and along the costa. Length of the body 6 lines; of the wings 10 lines.

49. Anthrax prætendens, *Walk.* See Vol. IV. p. 111.

0. Anthrax semiscita, *Walk.* See Vol. I. p. 118.

51. Anthrax aterrima, *Dol.* See Vol. IV. p. 113; et *antè*, p. 149.

#### Fam. EMPIDÆ, *Leach.*

##### Gen. EPICEIA, *Walk.*

52. EPICEIA FERRUGINEA, *Walk.* (see p. 149), var. *Mas.* Nigra, proboscide apicem versus flava, antennis brevissimis, thorace gibboso, abdominis segmentis chalybeo fasciatis, femoribus posticis incrassatis setosis, tarsis fulvis, alis obscure cinereis costa nigricante, halteribus pallide flavis.

*Male.* Black. Proboscis yellow towards the tip. Antennæ very small; arista four times the length of the 3rd joint. Thorax gibbous. Abdomen with a chalybeous band on the hind border of each segment. Hind femora incrassated and setose; tarsi tawny. Wings dark cinereous, blackish along the costa; veins black; halteres pale yellow. Length of the body  $2\frac{1}{2}$  lines; of the wings 5 lines.

#### Fam. DOLICHOPIDÆ, *Leach.*

##### Gen. PSILOPUS, *Meigen.*

53. *Psilopus variipennis*, *Walk.* See *antè*, p. 238.

54. PSILOPUS MARGINALIS, n. s. *Fam.* Cyanescenti-viridis, purpureo varius, antennis halteribusque nigris, abdominis segmentis nigro fasciatis, tibiis anterioribus obscure fulvis, alis nigris margine postico cinereo.

*♂ male.* Bluish-green, varied with purple. Head purplish-blue. Antennæ black; arista as long as the breadth of the head, Abdomen with a black band on the fore border of each segment. Anterior tibiæ

dull tawny. Wings black, cinereous along the hind border; fore branch of the præbrachial vein much bent; discal transverse vein much curved; halteres black. Length of the body  $2\frac{1}{2}$  lines; of the wings 5 lines.

Fam. SYRPHIDÆ, *Leach.*

Gen. ERISTALIS, *Latr.*

55. ERISTALIS HELOPHILOIDES, n. s. *Mus.* Nigra, antennarum arista nuda, thorace luteo nigro-trivittato, vitta media interlineata, abdomine fascia basali albido-flava, maculis utrinque tribus lateralibus magnis connexis flavis, femoribus posticis valde incrassatis, tibiis rufescentibus, alis cinereis basi fasciaque abbreviata nigricantibus, halteribus pallide flavis.

*Male.* Black. Head with cinereous tomentum, except a black shining stripe on the very prominent epistoma. Arista simple. Thorax luteous, with three black stripes, the middle one interlined, the lateral pair obliquely intersected. Pectus cinereous. Abdomen with a whitish-yellow basal band, and on each side with three large connected yellow spots; the 3rd pair connected hindward in the disk. Hind femora much incrassated; tibiæ reddish. Wings cinereous, blackish at the base, and with a blackish middle band which is much abbreviated hindward; veins black; halteres pale yellow. Length of the body 5 lines; of the wings 9 lines.

56. *Eristalis splendens*, *Leg.* See Vol. III. p. 95.

57. ERISTALIS LUCILIOIDES, n. s. *Fem.* Læte purpurea, cyaneo-varia, capite albo, antennis piccis, arista nuda, thorace subcano, abdomine fasciis duabus atris, tibiis tarsisque nigris, alis cinereis, halteribus albis.

*Female.* Bright purple, varied with blue. Head with white tomentum behind and in front, excepting a stripe and the sides of the peristoma, which are black and shining. Antennæ piccous; arista simple. Thorax slightly covered with hoary down; scutellum with black hairs. Abdomen with two deep-black bands. Tibiæ and tarsi black. Wings cinereous, darker towards the tips; veins black; halteres white. Length of the body  $4\frac{1}{2}$  lines; of the wings 9 lines.

Gen. EUMERUS, *Meigen.*

58. EUMERUS ARGENTIPES, n. s. *Fem.* Chalybeo-niger, cinereo pubescens, abdomine fasciis duabus albis arcuatis interruptis, femoribus posticis subincrassatis, tibiis anterioribus fulvis, tarsis argenteis, alis cinereis apice nigris, halteribus albis.

*Female.* Chalybeous black, with cinereous down. Head wanting. Abdomen with two arched interrupted white bands. Legs black; hind femora slightly incrassated; knees and anterior tibiæ tawny; tarsi

silvery white; hind tarsi flat, elongated, dilated. Wings cinereous, black towards the tips; veins black; halteres white. Length of the body 3 lines; of the wings 5 lines.

Gen. PARAGUS, *Meigen*.

59. PARAGUS SUBSTITUTUS, n. s. *Mas.* Chalybeo-niger, facie alba, antennis fulvis linea nigricante, abdomine fasciis quatuor chalybeis, pedibus fulvis, femoribus posterioribus nigris, alis cineris, halteribus albidis.

*Male.* Chalybeous black, shining. Head broader than the thorax; face white. Antennæ tawny, with a blackish line above. Abdomen with four chalybeous bands. Legs tawny; posterior femora black, with tawny tips. Wings cinereous; veins black; halteres whitish. Length of the body 2 lines; of the wings 3 lines.

Gen. BACCHA, *Fabr.*

60. BACCHA INCISA, n. s. *Fem.* Obscure rufa, capite vitta cyaneo-nigra, antennis pedibusque fulvis, thorace vitta nigra, abdomine basi compresso postice dilatato fasciis duabus fulvis, femoribus tibiisque posticis nigricante fasciatis, alis limpidis basi costa fasciaque nigricantibus, halteribus fulvis.

Nearly allied to *B. dispar*.

*Female.* Dull dark red. Head with cinereous tomentum, bluish-black about the base of the antennæ, and with a bluish-black stripe extending from thence to the peristoma. Proboscis, antennæ, and legs tawny. Thorax with a black stripe; metathorax black. Abdomen compressed towards the base, dilated hindward, where there are two curved tawny bands, the hind one abbreviated. Hind femora and hind tibiæ with blackish bands. Wings limpid, blackish at the base and irregularly along the costa, and obliquely at the tips, and with a broad middle blackish band; veins black; halteres tawny. Length of the body 6 lines; of the wings 10 lines.

61. BACCHA TRIPARTITA, n. s. *Mas.* Nigra, capite nigricanti-cyaneo antice fulvo, antennis pedibusque pallide luteis, pectoris lateribus testaceo fasciatis, abdomine compresso fulvo fasciis duabus nigris apicem versus nigricanti-purpureo subdilatato, femoribus posticis nigricante fasciatis, alis subluridis costa exteriori lurida, halteribus fulvis.

*Male.* Head blackish-blue above, tawny in front. Proboscis, antennæ and legs pale luteous. Pectus with two oblique testaceous bands on each side. Abdomen compressed, tawny, with two black bands; hind part blackish purple, slightly dilated. Hind femora with a blackish band. Wings vitreous, with a slight lurid tinge; costa lurid for nearly half the length from the base, blackish from thence to the tips; veins black, tawny at the base; halteres tawny. Length of the body 5 lines; of the wings 9 lines.

Gen. SYRPHUS, *Fabr.*

62. *Syrphus ægrotus*, *Fabr.* See Vol. I. p. 124.  
 63. *Syrphus ericetorum*, *Fabr.* See Vol. III. p. 97.

Fam. MUSCIDÆ, *Latr.*Subfam. TACHINIDES, *Walk.*Gen. EURYGASTER, *Macq.*

64. EURYGASTER LIMITARIS, n. s. *Fem.* Nigra, cinereo tomentosa, capite albo, frontalibus atris, antennarum articulo 3<sup>o</sup> lineari, aristæ dimidio basali robusto, thorace vittis duabus nigris, scutelli margine postico rufescente, abdomine fasciis duabus latis interruptis albis, tibiis posticis fimbriatis, alis cinereis basi nigricantibus, alulis albis, halteribus piceis.

Allied to *E. remittens*.

*Female.* Black, with cinereous tomentum and with black hairs and bristles. Head white; frontalia deep black, slightly widening in front, with bristles along each side; facialia without bristles; epistoma not prominent. Antennæ not reaching the epistoma; 3rd joint linear, rounded at the tip, about four times the length of the 2nd; arista stout for full half its length from the base, rather less than twice the length of the 3rd joint. Thorax with two slender indistinct black stripes; scutellum reddish along the hind border. Abdomen with two broad interrupted white bands on the fore borders of the 2nd and 3rd segments. Legs stout; hind tibiæ thickly fringed with short hairs. Wings cinereous, blackish towards the base; veins black; præbrachial vein forming an obtuse angle at its flexure, very slightly curved inwards from thence to its tip; discal transverse vein hardly undulating, parted by hardly half its length from the border, and by much more than half its length from the flexure of the præbrachial; alulæ white; halteres piceous. Length of the body 6 lines; of the wings 11 lines.

Gen. MASICERA, *Macq.*

65. MASICERA? FICTA, n. s. *Fem.* Atra, capite albido, frontalibus atris, thorace fasciis tribus scutellique margine postico flavescenti-albis, abdomine fasciis tribus flavescenti-albis, 1<sup>a</sup> incisa, 3<sup>a</sup> apicali, alis cinereis, alulis magnis albis.

*Female.* Deep black. Head whitish; frontalia deep black, linear. Antennæ reaching the epistoma; 3rd joint linear, full 4 times the length of the 2nd. Thorax with three yellowish-white bands; the 1st extending obliquely across the pectus; the 2nd curved, connected on each side with the 1st; scutellum yellowish, white along the hind border. Abdomen with three yellowish-white bands; the 1st exca-

vated on each side; the 3rd apical, interrupted hindward. Wings cinereous; veins black; præbrachial vein forming a rounded slightly obtuse angle at its flexure, hardly curved from thence to its tip; discal transverse vein hardly undulating, parted by much less than its length from the border, and by about its length from the flexure of the præbrachial; alulæ large, white. Length of the body 3 lines; of the wings 5 lines.

This species resembles some of the *Muscides* in structure, and hardly belongs to the genus *Masicera*.

Subfam. DEXIDES, *Walk.*

Gen. DEXIA, *Meigen.*

66. DEXIA NIVIFERA, n. s. *Mas.* Lutea, gracilis, capite argenteo, frontalibus atris, antennarum articulo 3<sup>o</sup> longissimo, arista subplumosa, thoracis disco nigricante argenteo-tomentoso, abdomine conico fasciis tribus nigris, pedibus longissimis, tibiis tarsisque nigris, alis cinereis, costa fusciscente, alulis subflavescentibus.

*Male.* Luteous, slender, with black bristles. Head with silvery-white tomentum; frontalia deep black, very narrow on the vertex, widening in front, beset with bristles along each side; facialia without bristles; epistoma hardly prominent. Antennæ almost reaching the epistoma; 3rd joint linear, rounded at the tip, about six times the length of the 2nd; arista black, very much longer than the 3rd joint, slightly plumose. Disk of the thorax blackish, with silvery-cinereous tomentum. Abdomen conical, longer than the thorax, with three black bands; 1st band interrupted on each side; 3rd apical. Legs very long; tibiæ and tarsi black. Wings cinereous, brownish along the costa; veins black, luteous towards the base; præbrachial vein forming an extremely obtuse angle at its flexure, straight from thence till near its tip, where it is slightly curved; discal transverse vein nearly straight, parted by hardly half its length from the border, and by hardly less than its length from the flexure of the præbrachial; alulæ with a slight yellowish tinge. Length of the body 6 lines; of the wings 10 lines.

67. *Dexia alulifera*, *Walk.* See *antè*, p. 157.

Gen. RUTILIA, *Desv.*

68. RUTILIA SATURATISSIMA, n. s. *Mas.* Saturatissime viridis, capite argenteo, frontalibus atris trigonis, palpis antennis pedibusque nigris, thorace vittis quatuor interruptis nigris, abdomine nigro fasciis tribus interruptis aurato-viridibus, alis nigricanti-fuscis basi nigris. *Fæm.* Frontalibus latis, abdominis segmentis 1<sup>o</sup> 2<sup>o</sup>que cupreis.

*Male.* Brilliant green, with black bristles. Head silvery white on each side of the face and of the eyes; frontalia deep black, triangular.

Palpi, antennæ and legs black. Arista minutely pubescent. Thorax with four interrupted black stripes, bright blue on each side; scutellum purple; pectus black, with a broad interrupted bluish-green band on each side. Abdomen black, with three interrupted golden-green bands, which are entire and more slender beneath; 1st band much excavated on each side behind; 2nd slightly excavated; 3rd entire, broader than the others. Wings blackish-brown, black near the base; alule black. *Female*. Frontalia broad, widening slightly in front. First and second bands of the abdomen mostly cupreous. Length of the body 8-9 lines; of the wings 16-18 lines.

69. *RUTILIA FERVENS*, n. s. *Fam.* Aurato-viridis, cyaneo subvaria, frontalibus atris, palpis antennis pedibusque nigris, thorace vittis quatuor angustis interruptis nigris, abdomine nigro fasciis tribus interruptis rufescenti-cupreis, alis luridis basi nigricantibus, alulis obscure cinereis.

*Female*. Golden-green, slightly varied with blue. Head with cinereous tomentum on each side of the face and of the eyes; frontalia deep black, widening in front. Palpi, antennæ, and legs black; arista minutely pubescent. Thorax with four slender interrupted black stripes; pectus black, with a broad interrupted bluish-green band on each side. Abdomen black, with three interrupted reddish-cupreous bands, which are narrower and entire beneath; 1st and 2nd bands much excavated on each side of the hind border. Wings lurid, blackish near the base; veins black, tawny towards the base; alule dark cinereous. Length of the body 8 lines; of the wings 16 lines.

70. *RUTILIA ATRIBASIS*, n. s. *Fam.* Saturate viridis, capite argenteo, frontalibus atris, palpis antennis pedibusque nigris, thoracis lateribus cyaneo purpureoque variis, abdomine nigro fasciis tribus aurato-viridibus, 1<sup>a</sup> incisa, 2<sup>a</sup> 3<sup>a</sup>que interruptis, alis cinereis costa fusca basi nigra, alulis halteribusque nigris.

*Female*. Deep green. Head silvery white, much narrower than the thorax; frontalia deep black, broad, linear; face, palpi, antennæ, pectus, and legs black. Thorax tinged with blue and purple on each side; pectus with a bluish-green band on each side. Abdomen black, with three golden-green bands; 1st band much broader than the others, deeply notched on its hind border; 2nd and 3rd interrupted. Wings cinereous, more or less tinged with brown along the costa, black towards the base; veins, alule and halteres black. Length of the body 8½ lines; of the wings 17 lines.

71. *RUTILIA COMPLICITA*, n. s. *Fam.* Saturate cyanea, capite argenteo, frontalibus atris, palpis nigris apice fulvis, antennis pedibusque nigris, thorace vittis quatuor nigris, scutello obscure purpureo, abdomine nigro fasciis tribus aurato-viridibus, 1<sup>a</sup> 2<sup>a</sup>que interruptis, 3<sup>a</sup> incisa, alis cinereis costa fusca basi nigra, alulis halteribusque nigris.

*Female.* Deep blue, Head silvery-white; frontalia deep black, widening in front. Palpi black, tawny towards the tips. Antennæ, pectus, legs, and abdomen black. Thorax with four black stripes, tinged with purple on each side; scutellum dark purple; pectus with a blue band on each side. Abdomen with three golden-green bands; 1st band slightly interrupted, notched on the hind border, much broader than the 2nd; 2nd interrupted, excavated on each side behind; 3rd much abbreviated on each side, deeply indented in front; ventral bands more regular. Wings as in the preceding species. Length of the body 8 lines; of the wings 16 lines.

72. *RUTILIA VOLUCELLOIDES*, n. s. *Mas et Fœm.* Nigra, capite albidocinereo, frontalibus atris, antennis piceis arista nuda, thoracis lateribus pectoreque cinereis, scutello ferrugineo, abdomine fasciis tribus latis interruptis chalybeo-ferrugineis, alis cinereis basi costæque dimidio basali nigricantibus, alulis albidis.

*Male.* Black, rather dull, hardly tomentose. Head whitish cinereous; frontalia deep black, widening much in front; epistoma prominent. Eyes almost connected. Antennæ piceous, about half the length of the face; 3rd joint about twice the length of the 2nd; arista simple, stout at the base, about twice the length of the 3rd joint. Sides of the thorax in front and pectus cinereous. Scutellum ferruginous. Abdomen with three broad interrupted ferruginous chalybeous-tinged bands. Wings cinereous, blackish at the base and along more than half the length of the costa; præbrachial vein forming a rounded hardly obtuse angle at its flexure, beyond which it is slightly curved inward; discal transverse vein hardly undulating, parted by hardly one-third of its length from the border, and by much more than half its length from the flexure of the præbrachial; alulæ whitish. Length of the body 5 lines; of the wings 10 lines.

*Female.* Larger. Eyes slightly parted above. Wings with the discal transverse vein parted by one-fourth of its length from the border, and by rather more than half its length from the flexure of the præbrachial. Length of the body 7 lines; of the wings 14 lines.

73. *RUTILIA TRIXOIDES*, n. s. *Fœm.* Nigra, capite parvo subaurato, frontalibus atris, antennarum arista nuda, thorace vittis tribus cinereis, scutello ferrugineo, alis cinereis basi nigricantibus costa fusca, alulis obscure cinereis.

*Female.* Black, with black hairs and bristles. Head narrower than the thorax, with cinereous slightly gilded tomentum; frontalia deep black, hardly widening in front. Eyes bare. Antennæ not near reaching the epistoma; arista simple, stout at the base, more than twice the length of the 3rd joint. Thorax with three cinereous stripes; sides and pectus mostly cinereous; scutellum ferruginous. Abdomen broader, but not longer than the thorax. Wings cinereous, blackish near the base, brown along the costa; veins black; præbrachial vein

forming a rounded right angle at its flexure, slightly curved inward from thence to its tip; discal transverse vein undulating, parted by one-fourth of its length from the border, and by more than half its length from the flexure of the præbrachial; alulæ dark cinereous. Length of the body 7 lines; of the wings 14 lines.

Subfam. MUSCIDES, *Walk.*

Gen. MUSCA, *Linn.*

74. MUSCA (Gen. *Silbomyia*?) *DIFFUSA*, n. s. *Mas*. Viridis, cyaneo purpureoque varia, capite aurato, frontalibus atris, palpis antennis tibiis tarsisque nigris, pectoris lateribus argenteo quadrimaculatis, alis obscure cinereis basi costaque basali nigris, alulis albis, halteribus nigris.

*Male*. Green, varied with blue and purple. Head with gilded tomentum; frontalia deep black, very narrow; epistoma piceous, prominent. Palpi, antennæ, tibiæ, and tarsi black. Antennæ not reaching the epistoma. Pectus with two silvery-white spots on each side. Wings dark cinereous, black about the base and along the adjoining part of the costa; veins black; præbrachial vein forming a rounded very obtuse angle at its flexure, nearly straight from thence to its tip; discal transverse vein deeply curved in front, parted by hardly one-third of its length from the border, and by about half its length from the flexure of the præbrachial; alulæ white; halteres black. Length of the body 6 lines; of the wings 14 lines.

75. *Musca* (Gen. *Silbomyia*, *Macq.*) *costalis*, *Walk.* See *antè*, p. 159.

Subfam. HELOMYZIDES, *Fallén.*

Gen. DRYOMYZA, *Fallén.*

76. *Dryomyza semicyanea*, *Walk.* See Vol. III. p. 109.

Gen. HELOMYZA, *Fallén.*

77. HELOMYZA SCUTELLARIS, n. s. *Mas et Fæm.* Testacea, crassa, facie albida, antennis fulvis arista plumosa, scutello postice atro, abdomine maculis quatuor posticis nigris, alis cinereis apud costam subluteis, venis apud marginem nigro subnebulosis.

*Male and Female*. Testaceous, stout. Head black, whitish behind and on the face, with several stout black bristles on the vertex and front. Antennæ tawny, less than half the length of the face; 3rd joint elongate-conical; arista plumose, full thrice the length of the 3rd joint. Scutellum deep black hindward. Abdomen oval, hardly narrower or shorter than the thorax, with a black spot on each side of the 4th and



5th segments. Legs rather short and slender. Wings cinereous, with a luteous tinge along the costa; veins black; tips of the radial, cubital, and præbrachial veins slightly clouded with black; discal transverse vein straight, upright, slightly clouded with brown, parted by more than half its length from the border. *Male*. Discal transverse vein parted from the præbrachial transverse by thrice its length. *Female*. Discal transverse vein parted from the præbrachial transverse by more than twice its length. Length of the body  $2\frac{1}{2}$  lines; of the wings 4 lines.

Gen. XARNUTA, *Walk.*

78. *Xarnuta leucotelus*, *Walk.* See Vol. I. p. 28.  
Eyes in the living insect "silky green, with opal-blue reflexions."

Gen. SEPEDON, *Latr.*

79. *SEPEDON COSTALIS*, n. s. *Mas.* Ferruginea, capite pallide luteo guttis duabus nigris, antennis piceis, articulo 1<sup>o</sup> pallide luteo, 2<sup>o</sup> longissimo, 3<sup>o</sup> conico basi luteo, arista alba pubescente, thorace cinerascente vittis duabus obscurioribus, pectore argenteo, pedibus pallide luteis, tarsis piceis, femoribus posticis nigro spinosis, alis obscure fuscis costa pallide cinerea.

Allied to *S. duplicans*.

*Male*. Ferruginous. Head pale luteous, shining white about the eyes; front depressed, with a black dot on each side; peristoma with a piceous dot on each side. Antennæ piceous, longer than the breadth of the head; 1st joint short, pale luteous; 2nd very long, slender, linear; 3rd conical, pale luteous towards the base, about one-fourth of the length of the 2nd; arista white, minutely pubescent. Thorax slightly cinereous, with two slender parallel approximate darker stripes; sides and pectus darker, the latter with silvery-white tomentum. Abdomen linear, longer and a little narrower than the thorax. Legs pale luteous; hind femora long, robust, armed beneath with minute black spines; fore tibiæ partly piceous; tarsi piceous. Wings dark brown, pale cinereous along the costa for two-thirds of the length from the base; veins black, tawny at the base; discal transverse vein straight, upright, parted by hardly half its length from the border, and by much more than twice its length from the præbrachial transverse vein. Length of the body 5 lines; of the wings 8 lines.

Subfam. BORBORIDES, *Walk.*

Genus COTAMBA, *Walk.*

80. *Cotamba fumifera*, *Walk.* See *antè*, p. 247.

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

- 81.
- Lamprogaster marginifera*
- ,
- Walk.*
- See Vol. II. p. 111.

Gen. PTEROGENIA, *Bigot*.

82. PTEROGENIA VITTIFINIS, n. s.
- Mas et Fam.*
- Nigra, lata, crassa, capite albido, facie maxima, arista subplumosa, scutelli lateribus luteis, femoribus crassis, tarsis flavescenti-albis, alis albis costa basali lutea fasciis duabus guttisque nigricantibus.
- Mas.*
- Abdomine ovato.
- Fam.*
- Abdomine lanceolato vittis tribus luteis.

*Male and Female.* Black, broad, thick. Head whitish, black beneath and with a black band on the front; face very large. Antennæ black, not more than half the length of the face; arista minutely plumose, more than twice the length of the 3rd joint. Scutellum rather small, not ascending, luteous along each side. Femora rather thick; tarsi yellowish white. Wings white, luteous along the costa towards the base, with many blackish dots, some of which are confluent along the hind border, and with two blackish bands, which are connected on the hind border; veins black; discal transverse vein straight, parted by one-fourth of its length from the border, and by much more than its length from the præbrachial transverse vein; halteres whitish. *Male.* Abdomen oval, not longer than the thorax. *Female.* Abdomen lanceolate, shining, much longer than the thorax, with three luteous stripes. Length of the body 3 lines; of the wings 6 lines.

83. PTEROGENIA VARIIPENNIS, n. s.
- Mas.*
- Nigra, nitens, lata, crassa, capite albido fascia nigra, facie maxima, thorace vittis quatuor albidis, abdomine brevi-conico, pedibus fulvis, femoribus nigris, tarsis albis, alis limpidis guttis plurimis transversis fuscis fascia obliqua abbreviata e guttis nigris, halteribus luteis.

*Male.* Black, shining, broad, thick. Head whitish, black beneath and with a black band on the front; face very large. Antennæ black, much less than half the length of the face; arista simple, much more than twice the length of the 3rd joint. Thorax with two whitish stripes on each side; scutellum whitish along each side. Abdomen short-conical, shorter than the thorax. Legs tawny; femora mostly black; tarsi white, with black tips. Wings limpid, with a luteous tinge along the costa, with numerous transverse brown dots, and with an oblique middle band which is abbreviated hindward, and is formed of two separate lines of black dots; veins black, luteous towards the base; discal transverse vein straight, upright, parted by hardly one-fourth of its length from the border, and by very much more than its length from the præbrachial transverse vein; halteres luteous. Length of the body 3 lines; of the wings 6 lines.

## Gen. PLATYSTOMA, Latr.

84. *PLATYSTOMA ATOMARIA*, n. s. *Mas et Fæm.* Nigra, lata, robusta, subaurato pubescens, capite rufescenti-fulvo punctis nigris, facie maxima, antennis fulvis, thorace vittato, scutello maximo, abdomine subcompresso segmentis cinereo marginatis, tibiis tarsisque fulvis, alis cinereis, guttis plurimis transversis nigricantibus, halteribus sordide albidis.

*Male and Female.* Black, broad, stout, dull, thinly clothed with slightly gilded pubescence. Head reddish tawny, whitish behind and about the eyes, with three black points on the vertex; front with four black points in a line at the base of the antennæ; face very large, with a black dot on each side at the end of the groove in which the antenna rests; epistoma not prominent. Antennæ tawny, little more than half the length of the face; 3rd joint slender, linear; arista bare, slender, very much longer than the 3rd joint. Thorax with a not pubescent stripe; scutellum very large, elongate-conical, slightly ascending, extending far over the abdomen. Abdomen slightly compressed, a little shorter and much narrower than the thorax; hind borders of the segments cinereous; oviduct long, stylate, tawny towards the tip. Femora stout; tibiæ and tarsi tawny. Wings cinereous, with very numerous transverse blackish dots, some of which are confluent; alulæ dark cinereous, very large; halteres dingy whitish. Length of the body 4 lines; of the wings 7 lines.

85. *PLATYSTOMA PRODUCTA*, n. s. *Fæm.* Cinereo-nigra, robusta, elongata, capite luteo, facie nigro vittata, antennis fulvis articulo 3 longissimo, thorace vittis quatuor cinereis, abdomine basi subtusque rufescente, tibiis posterioribus rufis apice nigris, femoribus tibiisque anticis rufo strigatis, alis cinereis punctis guttis fasciisque tribus exterioribus nigricantibus, halteribus piccis.

*Female.* Cinereous black, stout, elongate. Head luteous, brighter above than in front, white behind and about the eyes; a ferruginous point on each side of the vertex; face with a black stripe between the white grooves for the antennæ. Antennæ tawny, a little more than half the length of the face; 3rd joint linear, slender, full six times the length of the 2nd; arista simple, full twice the length of the 3rd joint. Thorax with four slender cinereous stripes; sides and pectus also cinereous; humeral calli tawny. Abdomen a little shorter and narrower than the thorax, reddish on each side and beneath; oviduct black, short. Posterior femora red towards the tips; posterior tibiæ red, with black tips; fore femora and fore tibiæ slightly streaked with red. Wings cinereous, with numerous blackish points and transverse dots; apical part with three blackish bands, the 1st interrupted; veins black; discal transverse vein straight, upright, parted by full one-third of its length from the border, and by more than its length

from the præbrachial transverse vein; halteres piceous. Length of the body 4 lines; of the wings 8 lines.

Gen. DACUS, *Fabr.*

86. DACUS PUBISETA, n. s. *Mas.* Cyaneus, elongatus, capite argenteo, facie fulva palpis nigris apice fulvis, antennis fulvis articulo 3<sup>o</sup> longissimo arista alba pubescente, thorace vittis tribus cinereis, abdomine compresso cupreo-purpureo, femoribus halteribusque albis, alis subcinereis nigro bifasciatis, fascia 1<sup>a</sup> incompleta, 2<sup>a</sup> lata vittam costalem emittente.

Allied to *D. divergens* and to *D. addens*,

*Male.* Blue, elongate. Head with silvery-white tomentum behind, in front, and about the eyes; disk of the face tawny, its grooves for the antennæ alongside of the eyes. Palpi black, with tawny tips. Antennæ tawny, as long as the face; 3rd joint slender, six times the length of the 2nd, slightly broader towards the tip which is rounded; arista white, much longer than the 3rd joint, densely pubescent except towards the tip. Thorax with three cinereous stripes; pectus silvery whitish; scutellum with two long apical bristles. Abdomen compressed, cupreous-purple, varied with blue, much longer and narrower than the thorax. Legs purplish-black, with silvery-whitish tomentum; femora white, except towards the tips. Wings slightly cinereous, with two black bands; 1st band incomplete; 2nd broad, emitting a costal stripe to the tip of the wing; veins black; discal transverse vein upright, slightly curved outward, parted by about one-fourth of its length from the border, and by rather less than its length from the præbrachial transverse vein, which is long and very oblique; halteres white. Length of the body 6 lines; of the wings 10 lines.

87. DACUS DISCIPENNIS, n. s. *Fæm.* Fulvus, capite lutescente, facie nigro biguttata, antennis facie longioribus, arista nuda, thoracis disco piceo-nigro strigis maculisque duabus lateralibus flavis, abdomine fusiformi ferrugineo segmento 2<sup>o</sup> fulvo, pedibus fulvis, tarsis halteribusque pallide flavis, alis subcinereis, dimidio antico vittaque postica fuscis.

Allied to *D. emittens*.

*Female.* Tawny. Head more luteous; face with a black dot in the groove for the antenna on each side. Antennæ longer than the face; 1st and 2nd joints rather long; 3rd linear, slender, oblique at the tip, about thrice the length of the 2nd; arista bare, much longer than the 3rd joint. Metathorax and disk of the thorax and of the pectus piceous black; an oblique yellow streak on each side of the pectus, and a large spot of the same colour on each side of the metathorax. Abdomen fusiform, ferruginous, longer and a little narrower than the thorax; 2nd segment tawny. Legs tawny; tarsi pale yellow. Wings slightly cinereous, dark brown on half the breadth from the costa,

and with a diffuse brown stripe hindward ; the dark costal part diffuse towards the tip of the wing ; veins black ; discal transverse vein undulating, parted by one-fourth of its length from the border, and by a little more than its length from the præbrachial transverse vein, which is oblique ; halteres pale yellow. Length of the body 4 lines ; of the wings 8 lines.

88. *Dacus pectoralis*, *Walk.* See Vol. III. p. 114.

89. *DACUS AREOLATUS*, n. s. *Fam.* Fulvus, capite pallide flavo, facie guttis quatuor nigris, antennarum articulo 3<sup>o</sup> longissimo, thorace vittis duabus nigris lituris nonnullis scutelloque flavis, abdomine brev elliptico, oviductu gracili cylindrico longissimo, pedibus flavescensibus, alis limpidis vittis duabus connexis fuscis 2<sup>a</sup> furcata, halteribus pallide flavis.

*Female.* Tawny. Head pale yellow, except the disk of the front, which is pale tawny ; face with two black dots in the groove for the antenna on each side. Antennæ a little longer than the face ; 3rd joint linear, slender, rounded at the tip, six times the length of the 2nd ; arista simple, a little longer than the 3rd joint. Thorax with two black stripes ; two calli and a short hinder stripe on each side, scutellum, a spot on each side of the metathorax, and an oblique streak on each side of the pectus yellow. Abdomen short-elliptical, not longer than the thorax, terminated by a slender cylindrical oviduct, which is as long as the preceding part. Legs yellowish. Wings limpid, with a brown costal stripe which is dilated towards the tips, and with a brown irregular forked hindward stripe which is twice connected with the costal stripe ; two elongated limpid spots included in the brown part ; veins black, tawny towards the base ; discal transverse vein almost straight, parted by one-fourth of its length from the border, and by a little more than its length from the oblique præbrachial transverse vein ; halteres pale yellow. Length of the body 3 lines ; of the wings 5 lines.

90. *DACUS STRIGIFINIS*, n. s. *Fam.* Testaceus, elongatus, capite maculis duabus nigris, antennarum articulo 3<sup>o</sup> epistoma attingente, thorace vittis tribus piceis, abdomine fusiformi, alis limpidis costa fusciscente, vena transversa discali fusco nebulosa.

*Female.* Testaceous, elongate. Head with a piceous point on the vertex, and with a black spot on each of the grooves for the antennæ. Antennæ reaching the epistoma ; 3rd joint linear, slender, rounded at the tip, about four times the length of the 2nd ; arista bare, much longer than the 3rd joint. Thorax with three indistinct piceous stripes. Abdomen fusiform, narrower and a little longer than the thorax. Wings limpid ; costa brownish ; veins testaceous ; discal transverse vein straight, clouded with brown, parted by one-sixth of its length from the border, and by about its length from the præbrachial transverse vein. Length of the body 3 lines ; of the wings 6 lines.

91. *Dacus sepsoides*, *Walk.* See *antè*, p. 163.

Gen. *ADRAMA*, *Walk.*

92. *Adrama selecta*, *Walk.* See Vol. III. p. 118.

93. *ADRAMA CONSORS*, n. s. *Fæm.* Fulva, longa, gracilis, capite macula nigra, antennarum articulo 3<sup>o</sup> lineari latiusculo, arista subpubescente, thorace maculis duabus anticis nigris, abdomine longi-fusiformi pubescente, pedibus longiusculis, femoribus muticis, alis limpidis costa nigra.

*Female.* Tawny, long, slender. Head with a black spot on the front. Antennæ nearly reaching the epistoma; 3rd joint linear, rather broad, rounded at the tip; arista minutely pubescent, very much longer than the 3rd joint. Thorax with a black spot on each side in front. Abdomen elongate-fusiform, pubescent, a little narrower than the thorax, and nearly twice its length. Legs rather long; femora unarmed. Wings limpid; costa black to the tips; veins black, tawny at the base; discal transverse vein straight, upright, parted by one-sixth of its length from the border, and by very much more than its length from the præbrachial transverse vein. Length of the body 4½ lines; of the wings 7 lines.

Gen. *STRUMETA*, *Walk.*

94. *STRUMETA REPLETA*, n. s. *Fæm.* Pallide lutea, capite parvo, antennis fulvis basi nigris arista plumosa, thorace vittis sex nigris, abdomine longi-ovato fasciis quatuor nigris, 2<sup>a</sup> 3<sup>a</sup>que subinterruptis, 4<sup>a</sup> apicali, femoribus nigris, alis nigricanti-fuscis latiusculis vittis duabus guttisque luteis et albis.

*Female.* Pale luteous. Head much narrower than the thorax. Antennæ tawny, black at the base, not more than half the length of the face; 3rd joint about twice the length of the 2nd; arista thinly plumose, full twice the length of the 3rd joint. Thorax with six black stripes; the two lateral pair abbreviated; pectus with a black disk and a black stripe on each side; metathorax and base of the scutellum black. Abdomen elongate-oval, a little longer than the thorax, with four black bands, the 4th apical, the 2nd and 3rd slightly interrupted. Femora black. Wings blackish-brown, rather broad, with luteous costal dots, and with white marginal dots, with a luteous subcostal stripe, and with a white posterior stripe; veins black; discal transverse vein almost straight, slightly oblique, parted by one-fourth of its length from the border, and by about its length from the præbrachial transverse vein. Length of the body 3 lines; of the wings 7 lines.

Gen. *ORTALIS*, *Fallén.*

95. *ORTALIS TARSALIS*, n. s. *Fæm.* Cyanea, nitens, capite supra atro antice picco, palpis pedibusque nigris, antennis fulvis arista plumosa,

abdomine longi-conico, tarsi albis apice nigris, alis albis nigro trifasciatis, fascia 2<sup>a</sup> punctum album includente, 3<sup>a</sup> apud costam excurrente, halteribus piceis.

*Female.* Blue, shining. Head deep black above, piceous in front, silvery white about the eyes. Proboscis and palpi black. Antennæ tawny, very short; 3rd joint conical, a little longer than the 2nd; arista plumose. Abdomen elongate-conical, longer than the thorax; oviduct black, long, lanceolate. Legs black; tarsi white, with black tips. Wings white, with three black bands; 1st band very near the base; 2nd broad, including a white costal point; 3rd traversing the discal transverse vein, continued along the costa to the tip of the wing; veins black; discal transverse vein straight, upright, parted by less than half its length from the border, and by more than its length from the præbrachial transverse vein; halteres piceous. Length of the body 2½ lines; of the wings 4 lines.

95\*. *ORTALIS OBLIQUA*, N.S. *Fæm.* Cyanea, nitens, capite piceo antice fulvo, palpis pedibusque nigris, antennis fulvis, arista nuda, thorace vitta cinerea, abdomine subfusiformi subcompresso basi testaceo, femoribus anticis fulvis, alis albidis nigro trifasciatis, fascia 1<sup>a</sup> obliqua, 2<sup>a</sup> 3<sup>a</sup>que connexis, 3<sup>a</sup> apicali, halteribus albidis.

*Female.* Blue, shining. Head piceous above, tawny in front, shining white about the eyes; peristoma large, produced. Proboscis and palpi black. Antennæ tawny, nearly reaching the epistoma; 3rd joint linear, rounded at the tip; arista simple, slender. Thorax with a cinereous stripe; pectus with cinereous tomentum. Abdomen subfusiform, keeled above, slightly compressed, testaceous at the base, longer than the thorax; oviduct black, long, lanceolate. Legs black, pubescent; fore coxæ and fore femora tawny. Wings whitish, with three black bands which are abbreviated hindward; 1st band oblique, proceeding from the base of the costa to the disk; 2nd attenuated hindward, connected on the costa with the 3rd, which is apical; veins black; discal transverse vein straight, upright, parted by one-fourth of its length from the border, and by more than its length from the præbrachial transverse vein; halteres whitish. Length of the body 2½ lines; of the wings 4 lines.

#### Subfam. SEPSIDES, *Walk.*

#### Gen. ANGITULA, *Walk.*

96. *ANGITULA LONGICOLLIS*, *Walk.* (see Vol. III. p. 123), var. *Fæm.* Cyanea, nitens, viridi purpureoque varia, capite antennisque pallide luteis, articulo 3<sup>o</sup> apice nigro, abdomine fusiformi subtus luteo, pedibus nigris, femoribus basi coxisque anticis albis, alis fusciscenti-cinereis apice nigricantibus, costa basali halteribusque nigris.

*Female.* Blue, shining, varied with green and with purple. Head pale

luteous, narrower than the thorax; vertex and front reddish. Antennæ pale luteous, shorter than the face; 3rd joint linear, black towards the tip, which is rounded; arista pubescent. Thorax much produced and attenuated in front; scutellum truncated on the hind border. Abdomen fusiform, narrower and a little longer than the thorax, luteous beneath. Legs long, black, rather stout; femora towards the base, and fore coxæ, white. Wings brownish cinereous, black along the basal part of the costa, blackish at the tips; veins black; discal transverse vein hardly curved, parted by less than half its length from the border, and by very much more than its length from the præbrachial transverse vein; halteres black. Length of the body 6 lines; of the wings 10 lines.

Gen. CALOBATA, *Fabr.*

97. CALOBATA STABILIS, n. s. *Fem.* Cyanea, fronte atra, facie picea, proboscide palpisque pallide flavis, antennis luteis, pedibus pallide flavis, femoribus anticis apices versus tibiis anticis tibiis tarsisque posterioribus piceis, femoribus posterioribus piceo trifasciatis, tarsis anticis albis, alis subcinereis fascia apicibusque pallide fuscis.

*Female.* Blue. Head silvery white about the eyes; front deep black; face piceous. Proboscis and palpi pale yellow, darker at the tips. Antennæ luteous; 3rd joint conical. Thorax with slight cinereous tomentum; pectus more silvery. Abdomen slender, compressed, a little longer than the thorax, and less than half its breadth. Legs pale yellow; fore femora piceous for half the length from the tips; posterior femora with three piceous bands; posterior tibiæ and tarsi and fore tibiæ piceous; fore tarsi white, piceous towards the base. Wings slightly cinereous, pale brown towards the tips, and with a pale brown band beyond the middle; veins black; cubital and præbrachial veins converging towards each other, nearly contiguous at the tips of the wings; discal transverse vein straight, parted by half its length from the border, and by full four times its length from the præbrachial transverse vein; halteres black. Length of the body 5 lines; of the wings 8 lines.

98. CALOBATA COARCTATA, n. s. *Fem.* Cinereo-nigra, gracilis, capite nigricanti-cyaneo, palpis antennisque nigris, arista nuda, pedibus piceis, femoribus posterioribus fascia subapicali pallide flava, tarsis albidis apice nigris, alis subcinereis nigricante trifasciatis, halteribus albis apice nigris.

*Female.* Cinereous black, slender. Head blackish-blue, whitish about the eyes. Proboscis, palpi, and antennæ black; 3rd joint of the latter conical; arista simple, slender. Abdomen compressed, narrower and very much longer than the thorax. Legs piceous, long, slender; posterior femora with a pale-yellow subapical band; tarsi whitish, with black tips. Wings narrow, slightly cinereous, blackish at their



tips, and with two blackish bands; 2nd band very broad; veins black; cubital and præbrachial veins slightly converging towards their tips; discal transverse vein parted by one-fourth of its length from the border, and by about four times its length from the præbrachial transverse vein; halteres white, with black knobs. Length of the body 4 lines; of the wings 6 lines.

Subfam. PSILIDES, *Walk.*

Gen. MICROPEZA, *Meig.*

99. *Micropeza fragilis*, *Walk.* See Vol. I. p. 37.

100. *MICROPEZA PROLIXA*, n. s. *Mas?* Piceo-nigra, gracillima, capite antico palpisque fulvis, fronte atro guttata, antennis pedibusque pallide luteis, his longissimis gracillimis, femoribus anticis, tarsis posterioribus tibiisque piccis, tarsis anticis albis, alis nigricantibus, halteribus piceis.

*Male?* Piceous black, very slender. Head in front, proboscis, and palpi tawny; a deep black dot on the front. Antennæ pale luteous; 3rd joint conical. Thorax fusiform. Abdomen linear, longer and narrower than the thorax. Legs pale luteous, very long and slender; fore femora, tibiæ, and posterior tarsi piceous; fore tarsi white. Wings blackish, very narrow, darkest along the costa; veins black; cubital and præbrachial veins slightly converging towards the tips; discal transverse vein straight, parted by less than its length from the border, and by more than six times its length from the præbrachial transverse vein; halteres piceous. Length of the body 4 lines; of the wings 6 lines.

Gen. NERIUS, *Wied.*

101. *Nerius duplicatus*, *Wied.* See Vol. III. p. 125.

Subfam. OSCINIDES, *Haliday.*

Genus CEPHALOCONUS, n. g.

*Fæm.* Corpus brevisculum, subconvexum. Caput thorace vix brevius; facies elongata, porrecta, conica; peristoma minimum. Proboscis et palpi brevissima. Antennæ brevissimæ, articulo 3<sup>o</sup> conico, arista nuda. Scutellum productum. Abdomen longiconicum, thorace paulo brevius. Pedes brevisculi, tibiis tarsisque gracilibus. Alæ mediocres.

*Female.* Body rather short, slightly convex. Head nearly as long as the thorax; the face elongated, porrect, and conical; peristoma very small. Proboscis and palpi very short. Antennæ very short; 3rd joint conical; arista simple, slender, about four times the length of the 3rd joint. Scutellum prominent. Abdomen elongate-conical,

shorter and a little narrower than the thorax. Legs rather short; tibiæ and tarsi slender. Wings of moderate size; veins straight; præbrachial vein beyond the discal transverse vein slightly converging towards the cubital vein.

102. CEPHALOCONUS TENEBROSUS, n. s. *Fæm.* Cinereo-niger, obscurus, capite nitente lineis quinque flavis, antennis luteis, metathorace testaceo, tibiis, tarsis halteribusque pallide flavis, alis nigris postice cinereis.

*Female.* Cinereous black, dull. Head shining black, with five yellow lines—two above, one on each side, and one beneath; front piceous, slightly interlined with yellow. Antennæ luteous. Metathorax testaceous. Tibiæ and tarsi pale yellow. Wings black, cinereous along the hind border; veins black; discal transverse vein straight, nearly upright, parted by half its length from the border, and by a little more than twice its length from the præbrachial transverse vein; halteres pale yellow. Length of the body 2 lines; of the wings  $3\frac{1}{2}$  lines.

Fam. HIPPOBOSCIDÆ, *Leach.*

Gen. ORNITHOMYIA, *Olfers.*

103. ORNITHOMYIA BATCHIANICA, n. s. Viridis, nigro-setosa, thorace abdomineque fuscis, guttis duabus humeralibus nigris, pedibus robustis, tibiis nigro vittatis, tarsis nigris, alis subcinereis.

Green, thickly beset with black bristles. Thorax brown; humeral calli large, green, each with a black dot. Abdomen brown. Legs robust; tibiæ striped with black; tarsi black. Wings slightly cinereous; veins black. Length of the body 4 lines; of the wings 8 lines.

Fam. NYCTERIBIDÆ, *Leach.*

Gen. NYCTERIBIA, *Latr.*

104. Nycteribia parilis, n. s. Pallide lutea.

Pale luteous. Length of the body  $\frac{1}{2}$  line.

(*Kaisaa.*)

Fam. STRATIOMIDÆ, *Haliday.*

Gen. OBRAPA, *Walk.*

1. Obrapa perilampoides, *Walk.* See Vol. III. p. 82.

Fam. LEPTIDÆ, *Westw.*

Gen. LEPTIS, *Fabr.*

2. Leptis ferruginosa, *Wied.* See Vol. I. p. 118.

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

3. *Anthrax semiscita*, *Walk.* See Vol. I. p. 118.

Fam. MUSCIDÆ, *Latr.*Subfam. DEXIDES, *Walk.*Gen. RUTILIA, *Desv.*

4. *Rutilia complicita*, *Walk.* See *antè*, p. 238.

Subfam. ORTALIDES, *Haliday.*Gen. STRUMETA, *Walk.*

5. *Strumeta repleta*, *Walk.* See p. 296.

Subfam. PSILIDES, *Walk.*Gen. MICROPEZA, *Meig.*

6. *Micropeza prolixa*, *Walk.* See p. 299.

(*Makian.*)

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

1. ANTHRAX PELOPS, *Walk.* (see Vol. III. p. 90), var. *Fem.* Nigra, capite antico fulvescente, thorace pilis ochraceis marginato, scutello apicem versus obscure rufo, abdomine fasciis duabus pallidis, maculis quatuor lateralibus subapicalibus niveis, lateribus basi ochraceo pilosis, alis nigricantibus apice et apud marginem posticum cinereis.

*Female.* Black, nearly allied to *A. Tantalus*. Head with some tawny down in front. Third joint of the antennæ lanceolate, much longer than the arista. Thorax and pectus thickly clothed with ochraceous hairs in front and along each side; scutellum dark red towards the tip. Abdomen thickly clothed with ochraceous hairs on each side of the base, with a slender basal band of paler hairs, with a middle yellowish-white band, and with two subapical snow-white dots on each side; disk beneath with short yellowish-white bands. Wings blackish, cinereous at the tips and along the hind border. Length of the body 6 lines; of the wings 12 lines.

Fam. MUSCIDÆ, *Latr.*Subfam. MUSCIDES, *Walk.*Gen. MUSCA, *Linn.*

2. MUSCA (Gen. *Chrysomyia*, *Desc.*) NITESCENS, n. s. *Fam.* Cyanescenti-viridis, capite argenteo, frontalibus atris, palpis antennis pedibusque nigris, abdominis segmentis nigro fasciatis, alis cinereis, basi costa alulisque nigricantibus.

*Female.* Bluish-green, with black bristles. Head silvery white; frontalia deep black, linear. Palpi, antennæ, and legs black. Antennæ nearly reaching the epistoma. Abdomen with a black band on the hind border of each segment. Wings cinereous, blackish about the base and along most of the costa; veins black; præbrachial vein forming a rounded right angle at its flexure, beyond which it is slightly curved inward; discal transverse vein straight, parted by half its length from the border, and by much less than its length from the flexure of the præbrachial; alulæ blackish. Length of the body 5 lines; of the wings 8 lines.

(*Tidon.*)

Fam. ASILIDÆ, *Leach.*Subfam. DASYPOGONITES, *Walk.*Gen. DASYPOGON, *Fabr.*

1. DASYPOGON CONGRESSUS, n. s. *Mas.* Niger, capite antico argenteo, mystace albo, antennis lanceolatis, abdomine lineari segmentis albido marginatis, alis cinereis, halteribus albis.

*Male.* Black, with whitish tomentum. Head silvery white in front; mystax composed of several white bristles. Antennæ lanceolate, not longer than half the breadth of the head. Abdomen linear, narrower and very much longer than the thorax; hind borders of the segments whitish. Legs stout, bristly. Wings cinereous; veins black; subanal and anal veins united on the hind border; halteres white. Length of the body  $3\frac{1}{2}$  lines; of the wings 7 lines.

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

2. Anthrax Pelops, *Walk.* See Vol. III. p. 90.

Fam. SYRPHIDÆ, *Leach.*Gen. ERISTALIS, *Latr.*

3. ERISTALIS INFICITUS, n. s. *Mus.* Luteus, capitis vitta chalybeo-fulva, antennarum arista nuda, thorace maculis duabus lateralibus trigonis nigris, fasciis duabus albidis, abdomine basi albido-tomentoso apicem versus subæneo fasciis duabus nigris interruptis, alis limpidis, halteribus flavescentibus.

*Male.* Luteous. Head with yellowish-white tomentum, excepting the shining tawny stripe, which has a chalybeous tinge hindward. Eyes red. Antennæ luteous; arista simple. Thorax with a large triangular black spot on each side of the disk, with a whitish band, and with another hindward adjoining the scutellum; metathorax black; pectus with a whitish oblique streak on each side; its disk black. Abdomen with whitish tomentum at the base, and with an æneous tinge towards the tip; hind borders of the 1st and 2nd segments black on each side. Wings limpid; veins black, tawny towards the base; halteres yellowish. Length of the body 4 lines; of the wings 8 lines.

Fam. MUSCIDÆ, *Latr.*Subfam. TACHINIDES, *Walk.*Gen. ECHINOMYIA, *Duméril.*

4. ECHINOMYIA SARCOPHAGOIDES, n. s. *Fam.* Nigra, cinereo tomentosa, capite albo, frontalibus rufis antice dilatatis, antennis rufis articulo 3 supra nigricante, thorace quadrivittato, scutelli margine postico rufescente, abdomine tessellato, alis cinereis, venis transversis fusco nebulosis, alulis albis, halteribus fulvis.

*Female.* Black with cinereous tomentum and with black bristles and spines. Head white; frontalia red, widening much in front, with bristles along each side; facialia without bristles; epistoma prominent. Antennæ red; 3rd joint blackish and gibbous above, shorter than the 2nd, which has some black bristles above; arista stout, longer than the 3rd joint. Thorax with four slight stripes; scutellum reddish about the hind border. Abdomen tessellated, a little broader and longer than the thorax. Legs very robust. Wings cinereous; veins black, tawny along the costa and towards the base; transverse veins clouded with brown; præbrachial vein forming a right angle at its flexure, near which it is curved inward, and is thence straight to its tip; discal transverse vein hardly undulating, parted by its length from the border, and by much less than its length from the flexure of the præbrachial; alulæ white; halteres tawny. Length of the body 6 lines; of the wings 10 lines.

On *Sclerostoma Syngamus*, and the Disease which it occasions in Birds. By T. SPENCER COBBOLD, M.D., F.L.S., Lecturer on Zoology and Comparative Anatomy, Middlesex Hospital College.

[Read Dec. 20th, 1860.]

IN the year 1799, a letter from Dr. Andrew Wiesenthal, Professor of Anatomy at Baltimore, U.S., was published in the second volume of the 'Medical and Physical Journal,' containing an account of a parasite infesting the trachea of fowls and turkeys in America. As this brief communication bears the early date of May 21st, 1797, and constitutes the first public record that we have respecting the above-named entozoon, I will introduce the subject by a short extract from Dr. Wiesenthal's letter. "There is," he says, "a disease prevalent among the gallinaceous poultry in this country, called the *gapes*, which destroys eight-tenths of our fowls in many parts, and takes place in the greatest degree among the young turkeys and chickens bred upon old-established farms. Chicks and poults, in a few days after they are hatched, are found frequently to open their mouths wide, and gasp for breath, at the same time frequently sneezing and attempting to swallow. At first the affection is slight, but gradually becomes more and more oppressive, and it ultimately destroys. Very few recover; they languish, grow dispirited, droop and die. It is generally known that these symptoms are occasioned by worms in the trachea. I have seen the whole [wind-pipe] completely filled with these worms, and have been astonished at the animals being capable of respiration under such circumstances."

Any one who has witnessed birds suffering from the above-named malady, known in this country also by the name of *gapes*, will at once have recognized the close accuracy of Dr. Wiesenthal's description; and so far as the phenomenology of the disease itself is concerned, very little more has been added in the accounts which have from time to time appeared. The publication of the letter above referred to is accompanied by a simple woodcut representing one of the worms of its natural size, and another view of the same example three or four times magnified. The figures evidently depict a female; but the position of the reproductive orifice is not indicated, neither is the question of sexuality discussed.

On the 1st of August 1808, the English naturalist, George Montagu, F.L.S., made a communication to the Wernerian So-

ciety, his paper being entitled "Account of a species of *Fasciola* which infests the trachea of Poultry, with a Mode of Cure." Montagu does not appear to have been aware of the existence of any previous record on this subject, as we gather from an editorial note appended to his memoir in the first volume of the Wernerian Society's Transactions. Fortunately our author gave a scientific description of the parasite, which consequently led to its being specifically noticed, under various titles, in the systematic works of Rudolphi, Dujardin, and Diesing; but by far the most elaborate accounts of this animal are due to the writings of Von Siebold, whose name legitimately stands at the head of helminthology.

To avoid further prelude, I subjoin a complete synonymy, with references:—

*Sclerostomum Syngamus.* Diesing.

*Sclerostomum Syngamus*, Diesing, Syst. Helminth. vol. ii. p. 302.

*S. tracheale*, Diesing, loc. cit. p. 303.

*Syngamus trachealis*, Siebold, Wiegmann's Archiv, 1836. Div. 1. p. 106, pl. 3. figs. 1, 2; *ibid.* 1837, Div. 1. p. 53 et 67; *ibid.* 1838, Div. 2. p. 293; *ibid.* 1842, Div. 2. p. 348; Dujardin, Hist. Nat. des Helminth. p. 261; Youatt, 'Veterinarian,' 1840; also in Gurlt and Hartwig's Mag. f. d. gesamt. Thierheilk. für 1841, p. 50.

*Strongylus trachealis*, Nathusius, Wiegmann's Archiv, 1837. Div. 1. p. 60; Creplin, *ibid.* 1846, Div. 1. p. 131; Bellingham, Annals of Nat. Hist. vol. xiii. p. 104; also in Froriep's Neu. Notiz. vol. xi. p. 160.

*S. Meleagris Gallopavonis*, Bellingham; (*loc. cit.*).

*Distoma lineare*, Rudolphi, Entoz. Synops. pp. 114 & 414.

*Fasciola trachea* [*sic*], Montagu, Mem. Wern. Nat. Hist. Soc. vol. i. p. 194, pl. 7. fig. 4.

*Worm of poultry*, Wiesenthal, Med. and Phys. Journ. 1799, vol. ii. p. 204 (with woodcut).

If, as I surmise, the above synonyms all refer to the same species of worm, this parasite has been found and recorded as occurring in the trachea of the following birds, namely: the Turkey, Domestic Cock, Pheasant, Partridge, Common Duck, Lapping, Black Stork, Magpie, Hooded Crow, Green Woodpecker, Starling and Swift. I do not doubt that this list might be very much extended if our British ornithologists would favour us with their experience in the matter. Hitherto I have been surprised to find how few of those to whom I have mentioned the subject appear to be acquainted either with the nature of the parasite or with the various methods to be adopted in curing the disease to which its presence in the windpipe gives rise. In view, therefore, of adding something to our knowledge of its structure, and, more

particularly, in the hope of directing general attention to the mode of checking its ravages, I have ventured to make it the subject of a special communication, which will not, I trust, be the less opportune, following, as it does, Mr. Lubbock's interesting account of *Sphærulearia*\*.

The specimens forming the subject of my recent examinations came into my possession last July, whilst on a visit to my friend, Mr. William J. Fraser, at the Rookery, near Dartford, in Kent. Here my attention was directed to a small, diseased, almost featherless chicken, which I at once recognized as suffering from the *gapes*. The bird belonged to a brood consisting of eleven individuals, all of which were between six and seven weeks old. The ten healthy birds had individually attained a considerable size, an average example weighing  $9\frac{1}{2}$  ounces; but the infested chicken had only acquired a weight of 4 ounces, in consequence of the deteriorating influences of an impeded respiration. Several other equally striking evidences of an imperfect nutrition were observable: among these were the extremely rudimental condition of the wattles, the small body as contrasted with the relatively much more highly developed extremities, and the very scanty growth of the feathers, which on several parts of the body were entirely wanting; the healthy birds being well fledged throughout. The strange habits of the chicken were also in keeping with its physical peculiarities. It held itself entirely aloof from the other members of the brood, and, as if to make up for its defective assimilating powers, tried to add to its substance by greedily devouring every thing which came in its way, thus consuming fully two or three times as much as any other member of the brood. The only interruption to its constant eating during the day arose from the act of gaping, which took place at irregular intervals, sometimes as often as once every minute. The extension of the neck, and consequent elongation of the trachea, seems to have the effect of separating or unfolding the knot of enclosed parasites—sufficiently, at least, to allow of a certain degree of expiration and inspiration.

Having, on scientific grounds, stated my desire to experiment upon and cure this bird of its disease, Mr. Fraser persuaded me to take it away, which I did a few days afterwards, and operated upon it in the following manner:—A very small portion of carded wool having been dipped in chloroform and placed in front of the bird's nostrils, it was soon rendered perfectly insensible. The skin of the neck was then divided and the trachea slit up to the ex-

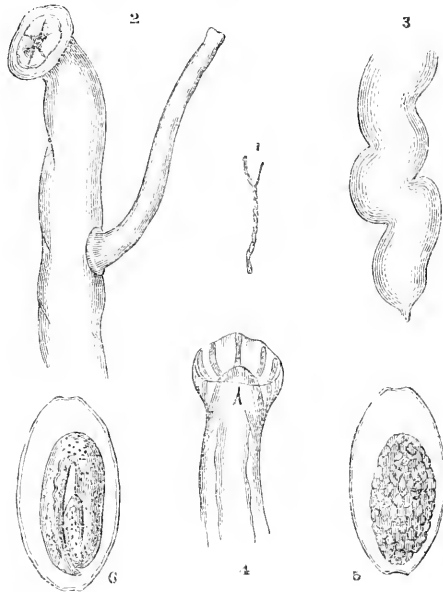
\* See 'Nat. Hist. Review,' new series, vol. i. p. 44, *et seq.*



tent of about a quarter of an inch ; and introducing one prong of a pair of common dissecting forceps, I removed seven Sclerostomata. Six of these parasites were united in pairs, the odd worm being a female from which the mate had in all likelihood been rudely torn during the withdrawal of the forceps ; and if so, it escaped my observation. After I had closed the external wound with a single thread, the bird was permitted to wake out of its artificial sleep ; and, notwithstanding that it had parted with a drop or two of blood, it soon recovered its legs, and ran about the table as vigorously as ever. Moreover, as if this were not enough to satisfy me as to its almost instantaneous cure, in a very few minutes afterwards it demolished the contents of a saucer partly filled with bread previously steeped in milk. An occasional gape was caused by an accumulation of frothy mucus within the injured trachea ; but this obstruction the bird soon got rid of, by a few shakes of the head attended with sneezing. The only subsequent inconvenience to the bird arose from emphysematous distention of the cellular tissue of the head and neck. This was on two or three occasions relieved by a slight puncture of the extremely thin integument, the emphysema ceasing to form after the external wound had healed. Unwilling to lose sight of this chicken, I took it with me into Norfolk, where it was well fed and rapidly attained the size of an ordinary full-grown pullet. A few days ago it was returned to me alive, having attained the weight of 2 lbs. 8½ ozs. I have since caused it to be killed ; and on dissecting the neck, although there was no scar externally, a distinct cicatrix indicates the site of the operation on the trachea,—the divided cartilaginous rings, six in number, being united only by a thin layer of connective tissue.

Reverting now to the Entozoa extracted from the trachea, I observe, in the first place, that the females have an average length of  $\frac{5}{8}$ ths of an inch, the males scarcely exceeding  $\frac{1}{3}$ th of an inch. In both sexes the bodies are tolerably uniform in breadth throughout ; and that of the female measures  $\frac{1}{3}$ th, whilst the transverse diameter of the male is only from  $\frac{1}{60}$ th to  $\frac{1}{50}$ th of an inch. The heads are relatively even more disproportionate. In the fresh state the mouth of the female was seen to be furnished with six prominent chitinous lips ; but the conspicuousness of the latter became much lessened after the specimens had been placed in spirit (fig. 2). In both sexes the surface of the body is quite smooth ; but the female displays a series of spirally arranged lines, which at first sight convey the idea of a natural twisting of the body ; this

torsion, however, is more apparent than real, being likewise more marked in some individuals than in others. The body of the female, towards the tail, exhibits a decided tendency to fold upon itself; and in one example this feature was very significant (fig. 3). The lower part of the body preserves a tolerably uniform thickness almost to the extremity, where it is suddenly constricted to



#### EXPLANATION OF WOODCUT.

Fig. 1. *Sclerostoma Syngamus*, male and female. Natural size.

Fig. 2. Upper part of the same, showing more especially the six-lobed circular lip of the female, and the mode of sexual union. Enlarged.

Fig. 3. Lower end of the body of the female, with its mucronate caudal appendage. Enlarged.

Fig. 4. Lower end of the body of the male, showing the cup-shaped bursa, hard rays, lateral muscles, bifurcate penis, digestive tube, and rounded tail. Magnified 30 diameters.

Fig. 5. Mature egg.  $\times 220$  diam.

Fig. 6. Egg, with contained embryo.  $\times 220$  diam.

form a short, narrow, mucronate, pointed tail scarcely visible to the naked eye. Employing a pocket-lens, it is easy to observe through the transparent integument the spacious digestive canal, surrounded on all sides by sinuous foldings of the ovarium, tuba, and uterus,—the vagina terminating laterally at a point correspond-

ing with the line of the upper fourth of the body. Here the male is usually found rigidly affixed by means of a strong, membranous, sucker-like bursa, which proceeds from the lower end of its body. This cup-shaped appendage is formed out of a folded extension of the dermal covering, which thus envelopes the centrally enclosed and rounded tail (fig. 4). The membrane of the bursa is simple, transparent, undivided, smooth at its free border, and strengthened internally by a series of projecting rays, the precise number of which I could not ascertain with certainty. Probably there are twelve; but I only recognized nine. These rays appear to me to be simple, firm, chitinous bands, whose purpose is to fix and support the bursa, in the same manner as we find the whalebone rods employed to distend the hood of an umbrella. Acting antagonistically to these rays we also find a pair of strong retractor muscles, which, taking their origin a little higher up on either side, converge below to be inserted into the base of the cup-shaped bursa (fig. 4). In addition to these structures, a very distinct view of the penis can be gained by transmitted light. This organ, in the retracted condition, is entirely concealed within the caudal prominence. It is very small, only about the  $\frac{1}{25}$ th of an inch in length, and consists of two narrow cylindrical spicules, which, though distinct, are firmly united at their lower third (fig. 4).

In regard to the peculiar mode of union of the sexes, it becomes an interesting point to ascertain whether there be an actual incorporation of the substance of the copulatory organs during or after the act of impregnation. In my specimens none of the three pairs were organically united, and I succeeded in separating one pair very readily. Dujardin speaks of them as being soldered together, whilst the statements of Von Siebold are still more explicit. In connexion with this subject, the latter observer makes the following comment\* :—"The two sexes of almost all round worms are united only at the time of copulation. The male of *Heteroura androphora* has also the habit of remaining connected with its mate beyond the period of copulation; here, thus, there is a continuous union of the two sexes without a growing together; and in *Syngamus trachealis* there is ultimately a lasting continuity of the sexes by means of an actual growing together."

Having entire confidence in Von Siebold's statement, I am bound to conclude that the sexual union in my specimens had only recently been effected; but, admitting this to have been the case, one naturally asks in what manner can the mature eggs make their

\* Wiegmann's Archiv, 1836, p. 106.

escape, seeing that the vagina is blocked up by the intromittent organ and bursa of the male? Clearly the eggs can only escape by an eventual breaking up of the body of the parent; this result, however, is quite admissible, as it constantly happens in the cestode proglottides, where the vaginal orifice is too small to allow of the escape of the eggs with their contained six-hooked embryos. The eggs of *Sclerostoma Syngamus* are comparatively large, measuring longitudinally as much as the  $\frac{1}{250}$ th of an inch, their transverse diameter being just half the above measurement; the length of the yelk is  $\frac{1}{350}$ th from pole to pole. The process of segmentation of the yelk accords with that observable in nematodes generally, the spherical cellules represented in the accompanying drawing (fig. 5) averaging a breadth of only  $\frac{1}{2500}$ th of an inch. The egg itself is oval, and bordered by two extremely delicate and transparent envelopes, whose curvatures at either pole are slightly interrupted, and the eggs consequently present truncated ends when viewed in profile. Many of the ova contain fully formed embryos; and in the centre of the lower third of the body of one of them I distinctly perceived an undulating canal, probably constituting the as yet imperfectly formed intestinal tube. By whatever mode the young make their *exit* from the shell, it is manifest that prior to their expulsion, they are sufficiently developed to undertake an active migration. Their next habitation may occur within the body of certain insect larvæ or even small land mollusks; but I think it more likely that they either enter the substance of vegetable matters or bury themselves in the soil at a short distance from the surface.

Finally, I propose very briefly to notice the various methods which may be adopted with the view, on the one hand, of checking the destructive influences of this parasite, and, on the other, of limiting its abundance.

*First.* When the worm has taken up its abode in the trachea of fowls and other domesticated birds, the simplest plan consists, as Dr. Wiesenthal long ago pointed out, in stripping a feather from the tube to near the narrow end of the shaft, leaving only a few uninjured webs at the tip. The bird being secured, the webbed extremity of the feather is introduced into the windpipe. It is then twisted round a few times and withdrawn, when it will usually happen that several of the worms are found attached. In some instances this plan entirely succeeds; but it is not altogether satisfactory, as it occasionally fails to dislodge all the occupants.

*Secondly.* The above method is rendered more effectual when

the feather is previously steeped in some medicated solution which will destroy the worms. Mr. Bartlett, Superintendent of the Zoological Society's Gardens, employs for this purpose salt, or a weak infusion of tobacco; and he informs me that the simple application of turpentine to the throat externally is sufficient to kill the worms. To this plan, however, there is the objection, that, unless much care be taken, the bird itself may be injuriously affected by the drugs employed.

*Thirdly.* The mode of treatment recommended by Mr. Montagu appears worthy of mention, as it proved successful in his hands, although the infested birds were old partridges. One of his birds had died from suffocation; but he tells us that "change of food and change of place, together with the infusion of rue and garlic instead of plain water to drink, and chiefly hempseed, independent of the green vegetables which the grass plot of the menagerie afforded, recovered the others in a very short time."

*Fourthly.* The plan I have here adopted by way of experiment. This method is evidently only necessary when the disease has so far advanced that immediate suffocation becomes inevitable; or it may be resorted to when other methods have failed. In the most far-gone cases instant relief will follow this operation, since the trachea may with certainty be cleared of all obstructions.

*Lastly.* Perhaps the most essential thing to be observed, in view of putting a check upon the future prevalence of the disease, is the total destruction of the parasites after their removal—a precaution, however, which cannot be adopted if Mr. Montagu's mode of treatment is followed. If the worms be merely killed and thrown away (say, upon the ground), it is scarcely likely that the mature eggs will have sustained any injury. Decomposition having set in, the young embryos will sooner or later escape from their shells, migrate in the soil or elsewhere, and ultimately find their way into the air-passages of certain birds in the same manner as their parents did before them.



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OF THE

## LINNEAN SOCIETY.

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